DOI: 10.55643/fcaptp.3.62.2025.4793

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Received: 07/04/2025
Accepted: 09/06/2025
Published: 30/06/2025

SECURITY-ORIENTED BUSINESS MODEL OF FINANCIAL MANAGEMENT OF COMPETITIVE STRATEGY OF INNOVATIVE DEVELOPMENT OF BANKING SYSTEM ENTITIES

ABSTRACT

The article provides an in-depth analysis of the security aspects of financial management in Ukrainian banks, in particular with an emphasis on the competitive strategy and innovative development of banking system entities. By calculating key financial stability ratios, in particular, reliability ratios, financial leverage, capital security and capital multiplier for three leading banks – Joint Stock Company Commercial Bank "Privatbank", Joint Stock Company "Oschadbank" and Joint Stock Company "Raiffeisen Bank", it is investigated how financial stability and the ability to innovate can be integrated into the security and development strategies of these institutions. In particular, based on the calculation of the dynamics of financial indicators for the period 2021-2025, the impact of internal and external factors on the financial stability of banks that demonstrate different levels of adaptation to economic changes and the ability to innovate transformations is revealed. Calculations show how the efficiency of equity capital use and leverage management can serve as indicators for improving banking safety and increasing competitiveness at the national and international levels. It is determined that the use of a safety-oriented business model allows banks not only to maintain their stability in a competitive environment but also to effectively integrate innovative development strategies.

Keywords: financial management, banking system, security aspects, financial stability, innovative strategies, financial risks, competitiveness, bank capital, strategic management

JEL Classification: G21, G32, D63

INTRODUCTION

The modern banking system of Ukraine is going through a period of deep transformations, caused by both internal economic challenges and global trends in financial development. In such conditions, domestic banking institutions face a strategically important task – ensuring the effective functioning of financial management, taking into account security aspects, which are becoming increasingly relevant against the background of growing economic instability and risks. That is why the analysis of the financial stability of the country's leading banks through the prism of key ratios is an extremely important tool for assessing the reliability, flexibility and adaptability of the financial management system.

Financial management in banks today is not limited to optimizing costs or increasing profitability. Instead, it is viewed as a systemic activity that integrates risk management, innovation processes, capital and assets in order to achieve long-term stability. In the conditions of fierce competition and rapid development of digital technologies, banks must respond promptly to external challenges, implement innovative solutions and, at the same time, ensure the security of the financial system. It is these conditions that form the demand for building a security-oriented business model that is not only able to support innovative development but also to guarantee sustainability and stability in any conditions.

At the same time, the calculation of key financial stability ratios, such as the reliability ratio, financial leverage, equity participation in asset formation, capital security and capital multiplier, allows us to obtain a holistic picture of the current state of the banking system. The results of such calculations become the basis for predicting the effectiveness of future management decisions and adjusting the strategic course of banks. Analyzing examples of such institutions as Joint-Stock Company Commercial Bank "Privatbank", Joint-Stock Company "Oschadbank" and Joint-Stock Company "Raiffeisen Bank", we have the opportunity to study not only financial stability in dynamics but also how changes in key indicators affect the ability of banks to ensure innovation and respond to competitive challenges.

In this context, an integrated assessment of financial management appears as an effective method for a comprehensive analysis of the financial condition of a bank. Thanks to the combination of quantitative and qualitative indicators, it allows not only to record the current level of financial stability but also to predict the development of the bank in the long term. An important aspect is also the assessment of weighting factors, which reflect the priority of individual parameters in the overall management system. This, in turn, ensures the adaptability of financial strategies to rapid changes in the external environment and allows for an effective balance between profitability and security.

Thus, the study of security aspects of the formation of the financial management system in banks is of great importance in modern conditions. It not only contributes to the improvement of the general financial culture but also creates the prerequisites for building a new paradigm of financial management, focused on strategic sustainability, innovation and competitiveness. In such a paradigm, transparency, flexibility and the ability for long-term development become priorities, which is the key to the stable functioning of the banking system in the face of global economic changes.

LITERATURE REVIEW

The topic of our scientific research is relevant, but at the same time not yet fully disclosed in scientific sources, especially in the domestic and Eastern European context. The global scientific community has been observing a growing interest in its individual components: financial security, cyber risks, innovation management in banks, and digital transformation, however, these topics are most often studied in isolation.

The scientific article by Gataullina and Klymenko (2022) examines the structure of the banking system of Ukraine, which is the foundation for the formation of a business model of financial management in banks. Dobryk and Zaporozhets (2014) focus on approaches to ensuring stability, which is the basis for financial management in competitive conditions. Furman et al. (2023) complement the topic we are studying through the prism of human capital management in an innovative environment. Gryshchenko et al. (2021) analyze in detail the issues of competitive advantages and innovations, which are conceptually important for the development strategies of banking institutions in market conditions.

An interesting and unconventional approach is the approach of Kopishynska et al. (2021), which considers the case method and IT project management, which are important for the implementation of digital innovations in the banking sector. Balanovska et al. (2022) highlight the issues of entrepreneurship, which is relevant when forming strategies for banks serving agribusiness. The scientific teachings of Khodakivska et al. (2022) are directly related to the topic of economic security and innovative entrepreneurship, which is important for building security-oriented models in the banking sector.

Relevant to long-term innovation strategy and risk management are the findings of Peter and Jarratt, D. G. (2015), which also contribute to the formation of a strategic vision and scenario approach to planning in banks. Poberezhny et al. (2010) identify the basic theoretical resource on banking security, which can be used to form the conceptual basis of a security-oriented business model. The scientific article by Kubitskyi et al. (2023) focuses on institutional management in higher education but contains valuable ideas on innovation management, management strategy and digital transformation. These approaches are relevant for the banking sector in terms of creating competitive advantages and modernizing financial management, in particular, by implementing educational technologies in the corporate training of bank personnel.

Although the study by Balanovska et al. (2020) is dedicated to the agricultural sector, it provides an analytical basis for the economic efficiency of digital technologies. This directly concerns the innovative component of banking strategy: assessing the profitability of digitalization can be adapted for banking services (e.g., process automation, fintech solutions). In a competitive market, the ability to effectively implement IT innovations directly affects the financial security and managerial efficiency of banks. The scientific work by Zoria et al. (2022) is useful as an example of a structured approach to investment support for innovations, which can be used to build financial models in the banking sector. The emphasis on the methodological principles of financial support for innovations is especially valuable - these approaches can be adapted in the context of banking strategies focused on financing innovative businesses or internal transformation. Although the

study by Kyryliuk et al. (2021) is in the agricultural sector, it contains an in-depth analysis of the economic and organizational drivers of security, a conceptually important aspect of the topic of the article. The principles of quality and stability assurance presented in the article can be applied in the context of the financial security of banks: through improving the quality of services, risk control and implementing security standards in the business model. The scientific work by Palaščáková et al. (2024) reveals a managerial approach to the development of social intelligence, which can be integrated into the bank's financial management strategy through the formation of a culture of innovation, increasing the communicative competence of employees and supporting their self-development. In the topic of the competitive strategy of banks, human capital plays a key role, and its management through social intelligence is a promising tool.

The scientific work of Casino et al. (2019) is extremely valuable, especially in terms of technological security. Blockchain is one of the most promising tools in ensuring transparency, reliability of operations, and reducing fraud in the banking sector. The scientific work of Kubitskyi et al. (2024) directly responds to the need to study the impact of innovations on competitiveness. Through the use of modelling, it is possible not only to assess the effectiveness of innovations in banks but also to optimize their implementation strategies, taking into account risks and financial indicators. This directly corresponds to the tasks of forming an effective and safe business model in banking financial management.

The scientific textbook Gerasymovych et al. (2004) is a fundamental source for the analysis of banking activities, covering the structure, financial indicators, and risks, which directly relates to the formation of a security-oriented model. The inclusion of classical approaches to analysis allows us to build a modern system of financial monitoring and assessment of the bank's competitiveness. The study by Mazur et al. (2021) is focused on improving the efficiency of financial controlling; this study provides important management tools that can be adapted in banks to monitor financial stability, manage costs, and analyze profitability and risks - key components of financial security and strategic management. The scientific work by Xu et al. (2024) examines models for regulating cross-border data flows, in particular between the USA and China, which is critically important in the context of the digital transformation of the banking system, where the issue of protecting financial and personal data of customers is of paramount importance. Experience in the field of distance learning and quality monitoring Oseredchuk et al. (2022) can be used to form training and development systems for bank personnel through corporate educational platforms, which contributes to the development of an innovative culture and flexible financial management, increasing resilience to challenges.

The scientific article by Zafar (2013) explores cybersecurity issues in HR systems, which is especially relevant for banking institutions that handle sensitive information. Rousalinov (2021) is a valuable theoretical source, especially for deepening the concept of financial security, its structural components, threats and countermeasures. It provides an analytical basis for forming a financial management strategy for a banking institution, taking into account potential risks of the internal and external environment. Although the scientific article by Ovcharenko et al. (2022) is devoted to ecoclusters, it contains valuable approaches to modelling organizational strategy and interaction between participants in the economic ecosystem. Despite the transport focus, the study by Trushkina et al. (2022) has a general economic focus and demonstrates an example of integrating sustainable development into a state strategy. Banking institutions, as part of the economic system, must take into account sustainability trends when developing their own innovation strategies. Zervaki (2018) raises the important concept of human security as the basis of modern strategic thinking, which is closely intertwined with financial security. Zolkover and Ovcharenko (2024) propose a model for assessing innovative security that is ideally integrated into a security-oriented business model of financial management. Ensuring innovative security is the basis for the stable development of banks in a competitive environment.

The textbook on econometrics by Nakonechny et al. (2006) provides a methodological basis for building models for forecasting and assessing financial risks, which are key to banking safety. The scientific material by Ivashchuk (2008) is the basis for building formalized business models, in particular in the field of financial management. Modelling scenarios of the development and behaviour of the banking system increases the effectiveness of strategic planning. The scientific findings of Stolyarov et al. (2022) cover methods for optimizing resource management that can be applied in banking management for the effective allocation of capital, resources and technologies. Optimization approaches contribute to ensuring stability and financial sustainability. The analysis of industries with network interaction and product individualization by Hoberg and Phillips (2016) is important for digital banking services.

The scientific source Zhuravlyova (2018) is extremely important, as it offers an integrated model for assessing the financial stability of a bank based on the quality of asset and liability management. This is the core of any security-oriented financial management model. The scientist Shpylyovy (2016) highlights key financial security tools that directly correspond to the research. Vasylchak et al. (2022) contain important aspects of human capital management in the context of innovation, which is important for banks as employers focused on digital transformation and personnel security. The scientific article

DOI: 10.55643/fcaptp.3.62.2025.4793

by Cervino et al. (2003) examines international legal aspects of security that can be conceptually transferred to transnational banking operations, especially in the context of new global challenges and conflicts. The scientific work of Voznyuk et al. (2021) considers innovative approaches to training that can be applied in the banking sector through corporate education and staff training as an important factor in long-term security.

The role of the human factor in cybersecurity is considered by Ani et al. (2019), which is critical for banking institutions. Pennock and Rouse (2016) propose a systems vision of enterprises as adaptive knowledge systems. This approach is ideally suited to form an integrated business model of the bank that responds to risks, innovations and market needs.

Another extremely valuable scientific source is Lytvynuk (2014), which is devoted to the methodology for assessing the financial stability of the banking system of Ukraine. The scientific concept of Zhyvko et al. (2022) ideally corresponds to the concept of a security-oriented approach, as it reveals security issues in the context of the digitalization of financial management. Covers both technical and organizational aspects of information protection in the economic system. Maksymova (2014) considers methodological approaches to assessing the financial stability of a bank. It is important to build a sound control system within the framework of financial management and risk minimization strategy. Bezverkhyi et al. (2019) developed an econometric model for assessing the quality of reporting. It can be useful for building financial control and transparency within a security-oriented business model. Gažarová et al. (2025) from the standpoint of interdisciplinarity present a new methodological approach to risk assessment. Methodologically, it can be used as an example of the implementation of innovative risk assessment indicators, which is relevant for creating financial risk monitoring tools in the banking system. The principle of weight-adjusted indices can be adapted to financial indicators that take into account the specifics of risks in the banking sector. Information sources were Internet resources of official publications [43-52].

At the same time, the vast majority of works focus on describing general aspects of digitalization, financial stability or bank ratings, but do not sufficiently reveal the systemic interaction between financial security and innovative mechanisms of strategic management in the banking sector. For example, works based on the financial statements of specific banks often focus on static indicators, without due attention to proactive risk management tools or models capable of adapting to the challenges of digital transformation and global financial risks.

There is also a certain fragmentation of approaches: some sources deal well with the regulatory or statistical framework, others with individual aspects of financial management, but there is no holistic approach to building a security-oriented business model. Most works lack a clear toolkit for integrating information security, financial stability, and innovation dynamics in the management practices of banking institutions.

At the same time, in the context of our scientific article, there is a need to deepen research in such areas as the formalization of innovation security criteria, the construction of an adaptive model of financial management based on digital risks, as well as the study of mechanisms of stability of the banking system in conditions of crisis market fluctuations. The development of the concept of synergistic management, which combines economic efficiency, information security and strategic flexibility of banks as subjects of the competitive space, is especially relevant.

Thus, despite a significant amount of research, there is still no comprehensive solution to the problem of a safety-oriented innovation strategy in the banking sector, which emphasizes the relevance and scientific novelty of our work.

AIMS AND OBJECTIVES

The purpose of the article: is to analyze the security aspects of the formation of the financial management system of leading banks in Ukraine and to assess the effectiveness of financial management using an integral indicator, as well as to identify key factors that affect the financial stability of banking institutions in modern conditions of economic instability and competitive strategy of innovative development.

In accordance with the stated goal, the following research objectives have been defined:

- to investigate the main indicators of the financial stability of banks to assess the level of their financial management;
- to determine the impact of financial ratios on the effectiveness of implementing innovative strategies in the banking sector;
- to analyze the dynamics of key ratios and their compliance with optimal values from the point of view of the safety of banking activities;
- to construct an integral indicator of financial management based on qualitative and weighted coefficients characterizing the financial stability of banks;

- to formulate conclusions regarding the adaptive capabilities of banks to modern challenges in the financial and economic environment.

METHODS

The article applies a comprehensive approach to assessing the financial stability of entities in the banking system of Ukraine, in particular through a methodology that integrates financial management and security aspects of bank asset management. The basis of the analysis is the methodology for calculating and interpreting the main financial stability coefficients, which allows for a detailed assessment of the ability of banks to adapt in a changing economic environment.

The methodology includes several key stages. The first is the collection and processing of data for the past five years on the financial performance of banks, in particular Joint-Stock Company Commercial Bank "Privatbank", Joint-Stock Company "Oschadbank" and Joint-Stock Company "Raiffeisen Bank". Based on this data, specific financial stability ratios are calculated, including the reliability ratio, financial leverage, equity participation in asset formation, capital security and capital multiplier. This allows for a deep understanding of the financial stability of each bank in the context of not only the current financial condition but also its ability to innovate and adapt to risks, in particular by assessing the level of protection from external and internal economic shocks.

Next, the dynamic analysis technique is used, which allows us to assess changes in financial indicators over several years and determine the development trends of each bank within the framework of financial management. With the help of this technique, it is possible not only to measure the level of financial stability but also to predict possible scenarios of its changes in the future, taking into account internal and external factors.

A feature of the methodology is also the use of a model that integrates the concept of security-oriented financial management, which involves not only maintaining stability but also taking into account aspects of innovative development of banking activities, such as technological innovations, expanding services, adapting to changes in client requirements and financial regulation. This approach allows for a comprehensive assessment that covers both aspects of financial stability and the bank's potential for further development in the conditions of the modern economy.

The methodology also provides for a comparative analysis between different banks, which allows for assessing the level of competitiveness of the banking system of Ukraine based on financial and security criteria. An important stage is also taking into account the optimal values of each of the coefficients to determine how effectively banks use their resources in the context of a financial security strategy.

In general, the proposed methodology is multidisciplinary and flexible, focused on the integration of financial, economic and security aspects into the development strategy of banks. This allows not only to formulate a holistic view of the state of financial stability of banks but also to determine their ability to further innovative transformations, which is extremely important for the competitive strategy of innovative development of entities of the banking system of Ukraine.

RESULTS

Let us begin the analysis of the study of the security aspects of the formation of the financial management system in banks. The calculation of the main financial stability ratios for the leading banks of Ukraine, such as Joint-Stock Company Commercial Bank "Privatbank" (hereinafter – "Privatbank"), Joint-Stock Company "Oschadbank" (hereinafter – "Oschadbank") and Joint-Stock Company "Raiffeisen Bank" (hereinafter – "Raiffeisen Bank"), provides important information for assessing the effectiveness of their financial management in the context of developing a competitive strategy and implementing innovations. These indicators reflect the financial stability of banks, which is an important aspect in the formation of a security-oriented business model focused on minimizing risks and ensuring stable development in a changing economic environment. Such calculations also make it possible to understand how changes in the main ratios affect financial stability and the ability of banks to support innovative development in the context of growing competitive challenges. In particular, the capital security and income asset security ratios demonstrate different financial risk management strategies. Changes in these ratios indicate the need for banks to adapt to new market conditions and ensure stable financial growth.

Therefore, these calculations and analysis of financial ratios are an integral part of developing a security-oriented business model, which should take into account not only the financial stability of the bank but also the effectiveness of implementing innovative strategies in conditions of high competition (Table 1).

DOI: 10.55643/fcaptp.3.62.2025.4793

Table 1. Research on security aspects of the formation of the financial management system in banks, 2021-2025, as of 01.01. *(Source: calculated by the authors taking into account official financial reporting data of banking institutions)*

Joint-Stock Company Commercial Bank "Privatbank"							
№	Indicator name	As of 01.01.					Pace of change, %
		2021	2022	2023	2024	2025	
Coefficient							Optimal value
1	Reliability ratio	0.20	0.12	0.14	0.15	0.16	No less than 5%
2	Ratio of "financial leverage"	5.00	8.33	7.00	6.83	6.40	Within 1: 20
3	Ratio of equity participation in asset formation	0.17	0.11	0.13	0.13	0.17	No less than 10%
4	Ratio of equity protection	0.90	1.40	1.20	1.17	0.88	*
5	Ratio of income assets protection by equity	-0.17	-0.26	-0.23	-0.23	-0.17	*
6	Ratio of capital multiplier	1.95	2.62	3.30	3.35	2.78	12.0-15.0
Joint-Stock Company "Oschadbank"							
1	Reliability ratio	0.10	0.09	0.09	0.11	0.11	No less than 5%
2	Ratio of "financial leverage"	9.74	11.15	11.07	9.32	9.05	Within 1: 20
3	Ratio of equity participation in asset formation	0.09	0.08	0.08	0.10	0.15	No less than 10%
4	Ratio of equity protection	1.61	1.82	1.81	1.55	1.00	*
5	Ratio of income assets protection by equity	-0.28	-0.29	-0.29	-0.27	-0.20	*
6	Ratio of capital multiplier	4.72	5.41	6.97	8.08	5.47	12.0-15.0
Joint-Stock Company "Raiffeisen Bank"							
1	Reliability ratio	0.15	0.12	0.13	0.14	0.15	No less than 5%
2	Ratio of "financial leverage"	6.68	8.62	7.62	7.03	6.52	Within 1: 20
3	Ratio of equity participation in asset formation	0.13	0.10	0.12	0.12	0.25	No less than 10%
4	Ratio of equity protection	1.15	1.45	1.29	1.20	0.61	*
5	Ratio of income assets protection by equity	-0.22	-0.26	-0.24	-0.23	-0.06	*
6	Ratio of capital multiplier	20.65	27.08	30.71	31.77	17.63	12.0-15.0

The results of the calculations demonstrate that against the background of different values of the coefficients, banks need to maintain a balance between financial stability and innovative strategies. The determined optimal values for each coefficient help banks not only to increase their stability but also to effectively adapt their development strategies in the face of technological changes and global challenges. For example, the high coefficient of "financial leverage" for "Oschadbank" and "Raiffeisen Bank" indicates the effective use of resources to increase competitiveness, but these banks need additional attention to increasing the share of equity in asset formation.

As a result of this block of research on the security aspects of the formation of the financial management system in banks, we can draw conclusions.

Let us consider the study of the security aspects of the formation of the financial management system in banks in Ukraine using the example of three leading banks: "Privatbank", "Oschadbank" and "Raiffeisen Bank", in particular the analysis of financial stability coefficients. The calculation of these ratios is important in the context of a security-oriented business model of financial management, which is an important part of the competitive strategy and innovative development of banking system entities.

For "PrivatBank", certain fluctuations in financial stability ratios are observed during 2021-2025, which indicates a change in the quality of its financial management. In particular, the reliability ratio for this period changes from 0.20 in 2021 to 0.16 in 2025, which indicates a decrease in the level of financial reliability. At the same time, the financial leverage ratio is steadily decreasing from 5.00 in 2021 to 6.40 in 2025, which is an important indicator of the efficiency of asset use.

Therefore, a decrease in reliability and financial leverage ratios may indicate strategic changes in capital management and a growing emphasis on innovative financial instruments, which may also indicate the need to revise the development strategy, given the decrease in the equity ratio in asset formation in 2025, which is only 0.17.

Oschadbank's analysis shows similar trends, albeit with slightly different changes. From 2021 to 2025, the bank's reliability ratio decreased from 0.10 to 0.11, which indicates a stable level of reliability, although lower than the optimal value. The decrease in the equity protection ratio from 1.61 in 2021 to 1.00 in 2025 indicates a decrease in the bank's ability to protect its capital from possible financial risks, which is a significant problem for the bank. In addition, there is a trend towards an increase in the capital multiplier ratio, which from 4.72 in 2021 to 5.47 in 2025 confirms the growth of the bank's capitalization, although this indicator has not yet reached the optimal level within 12-15.

For "Raiffeisen Bank", the largest changes are observed in the capital multiplier ratio, which decreases from 20.65 in 2021 to 17.63 in 2025. This indicates a decrease in the efficiency of capital use, which may be a consequence of a change in the strategy for managing financial resources in conditions of high competition and changes in the economic environment. It is also worth noting the decrease in the equity protection ratio from 1.45 in 2021 to 0.61 in 2025, which indicates serious problems in protecting the capital of this bank. Thus, the analysis of the financial stability of banks using these ratios is an important tool for assessing the state of their financial management and making strategic decisions. A security-oriented business model of financial management, which is based on these indicators, allows banks to reduce potential risks and adapt their activities to changing market conditions. In turn, these changes may affect the competitiveness of banks, especially in the context of innovative development and rapid changes in the financial sector.

The next stage of research into the security aspects of the formation of the financial management system in banks is the construction of a model of integrated assessment of financial management. For which we will use the formula:

$$\text{Iifm} = \sum_{i=1}^{6} \frac{\boldsymbol{Q_i}}{\boldsymbol{P_i}}, \textit{at the same time } \boldsymbol{W} = \{0.05,\ 0.1,\ 0.1,\ 0.15,\ 0.15,\ 0.65\},$$

where – Iifm an integral indicator of a bank's financial management, which determines the overall level of a bank's financial management based on six separate indicators (X1, X2, X3, X4, X5, X6); Qi – qualitative indicators of the bank's financial results, namely the value of each of the six ratios that assess various aspects of the bank's financial performance; Pi – weighting factors that determine the significance of each indicator in the overall assessment of financial management.

The methodology for constructing an integral assessment of financial management in banks using the specified formula and weighting factors allows for a comprehensive assessment of the effectiveness of the bank's financial management, taking into account various aspects of its financial activities. In our study of the security aspects of the formation of the financial management system in banks, the main coefficients of the financial results of the studied banks were determined, we will mathematically define and outline their weighting factors for calculating the integral indicator of financial management (Table 2).

Table 2. Bank financial management ratios, their mathematical formulation and weighting factors. *(Source: improved by the authors taking into account the scientific source Zhuravlyova, 2018)*

Coefficient	Mathematical formulation	Weighting factors
Reliability ratio	X1	0.05
Ratio of "financial leverage"	X2	0.10
Ratio of equity participation in asset formation	X3	0.10
Ratio of equity protection	X4	0.15
Ratio of income assets protection by equity	X5	0.15
Ratio of capital multiplier	X6	0.65

A high integral indicator indicates that the bank has a well-developed financial strategy and is able to effectively manage its finances, with a low level of risk and high stability. A low integral indicator indicates potential problems in the management of the bank's finances, which may indicate a high level of risks or a poor financial strategy. This method allows banks and regulators to assess the financial condition of banks and make informed decisions on managing their activities. In general, the methodology for constructing an integral assessment of financial management in banks is aimed at a comprehensive assessment of the effectiveness of the bank's financial activities, taking into account various aspects of its

DOI: 10.55643/fcaptp.3.62.2025.4793

financial condition. For this purpose, a special formula is used that combines six coefficients that reflect various financial indicators. Each of these coefficients is evaluated on the basis of specific numerical values that determine various aspects of the bank's management activities, for example, the level of reliability, financial stability, the degree of participation of equity in the formation of assets, etc. The formula for calculating the integral indicator of financial management combines these coefficients through weighting coefficients that determine the significance of each indicator in the overall assessment, which allows calculating a generalized integral indicator that allows you to assess how effectively the bank manages its finances and how financially stable and reliable it is.

The explanation of the weighting coefficients is also important because each coefficient has a different weight in the overall assessment. For example, the capital multiplier coefficient has a large weight because it reflects the bank's ability to effectively use its capital to generate income, while other coefficients assess more specific aspects, such as reliability or capital security.

In general, the integral indicator obtained using this methodology allows us to understand the general level of the bank's financial management and its readiness to function effectively in the face of various economic challenges and risks. Based on the above methodology, the integral indicator of the bank's financial management for the last five years was determined (Table 3).

Table 3. Dynamics of the integral indicator of financial management of leading banks of Ukraine, 2021-2025, as of 01.01.

Joint-Stock Company Commercial Bank "Privatbank"					
Name of coefficients	**As of 01.01.**				
	2021	**2022**	**2023**	**2024**	**2025**
Reliability ratio	0.20	0.12	0.14	0.15	0.16
Financial leverage ratio	5.00	8.33	7.00	6.83	6.40
Equity participation ratio in asset formation	0.17	0.11	0.13	0.13	0.17
Equity protection ratio	0.90	1.40	1.20	1.17	0.88
Equity protection ratio of income assets by equity	-0.17	-0.26	-0.23	-0.23	-0.17
Capital multiplier ratio	1.95	2.62	3.30	3.35	2.78
Integral indicator	63.49	98.44	85.61	83.93	77.86
Joint-Stock Company "Oschadbank"					
Reliability ratio	0.10	0.09	0.09	0.11	0.11
Financial leverage ratio	9.74	11.15	11.07	9.32	9.05
Equity participation ratio in asset formation	0.09	0.08	0.08	0.10	0.15
Equity protection ratio	1.61	1.82	1.81	1.55	1.00
Equity protection ratio of income assets by equity	-0.28	-0.29	-0.29	-0.27	-0.20
Capital multiplier ratio	4.72	5.41	6.97	8.08	5.47
Integral indicator	116.56	132.59	134.16	117.23	107.98
Joint-Stock Company "Raiffeisen Bank"					
Reliability ratio	0.15	0.12	0.13	0.14	0.15
Financial leverage ratio	6.68	8.62	7.62	7.03	6.52
Equity participation ratio in asset formation	0.13	0.10	0.12	0.12	0.25
Equity protection ratio	1.15	1.45	1.29	1.20	0.61
Equity protection ratio of income assets by equity	-0.22	-0.26	-0.24	-0.23	-0.06
Capital multiplier ratio	20.65	27.08	30.71	31.77	17.63
Integral indicator	109.00	139.13	134.23	129.73	101.49

Analysis of the dynamics of the integral indicator of financial management of the leading banks of Ukraine based on the table allows us to draw conclusions about the effectiveness of financial management in the three main financial institutions of the country: "Privatbank", "Oschadbank" and "Raiffeisen Bank". An important element of this table is the use of coefficients that reflect various aspects of financial management: from the level of reliability to the efficiency of capital use.

The dynamics of the integral indicator of financial management of "Privatbank" indicate certain difficulties that the bank faces in the period from 2021 to 2025. At the beginning of 2021, the integral indicator was relatively low - 63.49, which indicates weak financial stability and the need to improve management processes. However, already in 2022, the bank demonstrated improved results, when the integral indicator reached 98.44, which reflects positive dynamics in its financial management.

In the following years, starting from 2023, the bank will experience a gradual decrease in the indicator to 85.61, and by 2024 this indicator will further decrease to 83.93, which may indicate an increase in financial risks and a decrease in management efficiency. In 2025, the integral indicator will decrease again to 77.86, which may be due to negative macroeconomic conditions, an increase in debt obligations and a decrease in the level of capital, which does not allow ensuring the stability of the bank's financial management. "Oschadbank" continues to demonstrate more stable financial management dynamics compared to "Privatbank". Although its integral indicator also varies, it remains at a high level throughout the period. At the beginning of 2021, "Oschadbank's" integral financial management indicator is 116.56, which indicates a fairly stable financial management. In 2022, this indicator increases to 132.59, and in 2023 it reaches its maximum value of 134.16. This indicates the effectiveness of the financial strategy and the growth of trust in the management processes in the bank.

However, after 2023, there is a certain decrease in the integral indicator. In 2024, it decreases to 117.23, and in 2025 - to 107.98. This decrease may be the result of worsening conditions in financial markets, changes in the macroeconomic environment, or insufficient adaptation to new conditions. Such a decrease may indicate that "Oschadbank", although continuing to demonstrate stability, faces certain challenges in managing its finances, which are reflected in the overall result.

The dynamics of the integral indicator of financial management of Raiffeisen Bank is interesting since the bank demonstrates a fairly significant change in indicators during the period from 2021 to 2025. At the beginning of 2021, the integral indicator of this bank was 109.00, which already indicates stable financial activity. However, in 2022, the bank demonstrates a noticeable improvement in performance, when the integral indicator increases to 139.13, which indicates effective financial management and a positive impact on the overall financial condition. The highest indicator is achieved in 2022, which indicates a high level of financial stability of the bank during this period.

After 2022, the integral indicator begins to decline, which reflects the possible difficulties faced by the bank. In 2025, this indicator decreases to 101.49, which is the lowest value for the entire study period, which may be a sign that the bank has faced new challenges, such as economic changes, reduced confidence or changing financial conditions.

Let us conduct a comparative characteristic of the integral indicator of financial management of leading banks in Ukraine over the last five-year period (Table 4).

Table 4. Comparative characteristics of the integral indicator of financial management of leading banks in Ukraine, 2021-2025. *(Source: calculated by the authors)*

Bank	Integral indicator
Joint-Stock Company Commercial Bank "Privatbank"	81.87
Joint-Stock Company "Oschadbank"	121.71
Joint-Stock Company "Raiffeisen Bank"	122.72

A comparative analysis of the integral indicator of financial management of the leading banks of Ukraine for the period 2021-2025 shows the following results." Privatbank" has the lowest integral indicator among the three banks (81.87), which indicates weaker financial management efficiency compared to other banks, which may indicate the presence of financial risks and the need to improve resource management. "Oschadbank" has an integral indicator of 121.71, which indicates stability and sufficient efficiency of financial management, which indicates good financial stability and proper management of assets and liabilities. "Raiffeisen Bank" demonstrates a very similar result to "Oschadbank (122.72), which also indicates a high level of financial management. The bank has a high level of financial management efficiency, which

DOI: 10.55643/fcaptp.3.62.2025.4793

allows it to maintain a stable financial position. Thus, "Oschadbank" and "Raiffeisen Bank" have higher results compared to "Privatbank", which indicates better financial stability and managerial efficiency of these institutions.

A graphical comparative characteristic of the integral indicator of financial management of the leading banks of Ukraine over the last five-year period is presented in Figure 1.

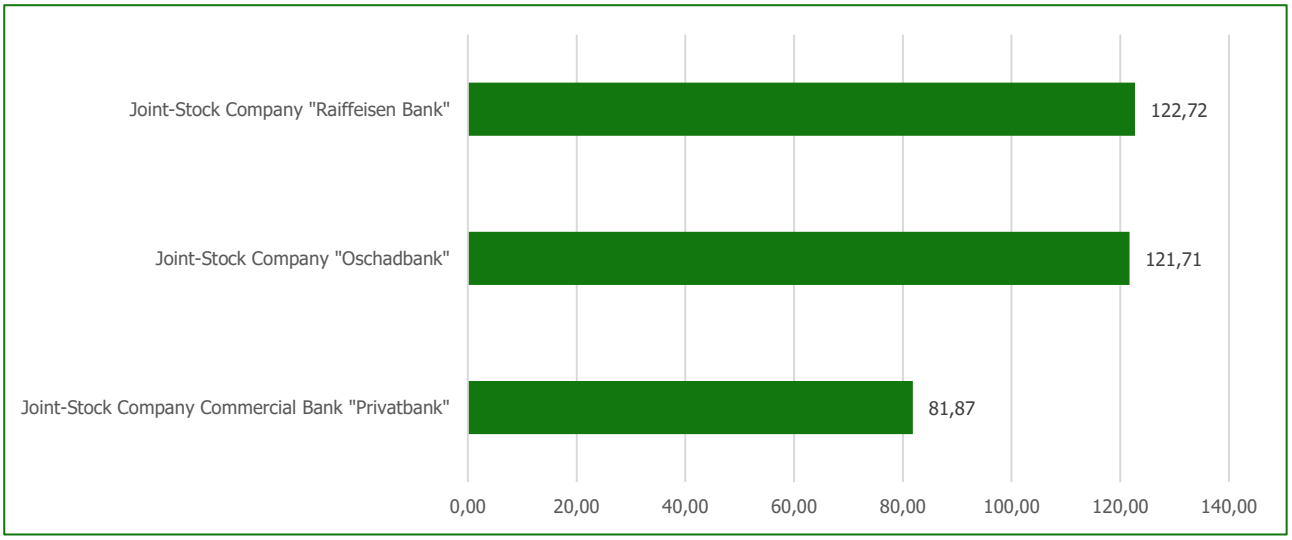

Figure 1. Comparative characteristics of the integral indicator of financial management of leading banks in Ukraine, 2021-2025. *(Source: calculated by the authors)*

Assessment of financial management within the framework of a competitive strategy of innovative development of banking system entities should go beyond the use of traditional numerical indicators. The financial stability of a bank is an important, but not the only aspect, since it also reflects general management processes and adaptability to a changing competitive environment. Therefore, the formalization of such an indicator cannot be complete without taking into account the innovative potential and the bank's ability to implement new strategies.

For a comprehensive assessment of financial management within the framework of a competitive strategy of innovative development, it is proposed to use a combined assessment through the geometric mean and variable average values. This allows a more accurate assessment of the effectiveness of innovative approaches in financial management, given that the maximum value of the indicator is considered to be 1.5. Thus, to determine the financial stability and competitive position of the banking system, an appropriate calculation method can be used that includes innovative aspects of development.

$$\text{Ifs} = \sum_{i=1}^{n} (\text{Zi} \cdot \text{Qi})$$

where I_{fs} – is the integral indicator of the bank's financial management; Zi – is the i-th indicator characterizing financial management; Qi – is the average value over time, which takes into account changes in the indicator over a certain period; n – is the evaluation modulators.

As a result of using the proposed method of calculating the financial management indicator of the assessment through the geometric mean and variable average values, we have the result of this calculation (Table 5).

Table 5. Integral indicator of financial management of leading banks in Ukraine using the geometric mean and variable mean method, 2021-2025.

Name of coefficients	As of 01.01.					Moving average	Bank financial management indicator, 2021-2025
	2021	2022	2023	2024	2025		
Joint-Stock Company Commercial Bank "Privatbank"							
Reliability ratio	0.20	0.12	0.14	0.15	0.16	0.15	
Financial leverage ratio	5.00	8.33	7.00	6.83	6.40	6.55	
Equity participation ratio in asset formation	0.17	0.11	0.13	0.13	0.17	0.14	
Equity protection ratio	0.90	1.40	1.20	1.17	0.88	1.13	
Equity protection ratio of income assets by equity	-0.17	-0.26	-0.23	-0.23	-0.17	-0.22	
Capital multiplier ratio	1.95	2.62	3.30	3.35	2.78	2.82	
Integral indicator of financial management	1.33	1.47	1.45	1.44	1.40		1.418
Joint-Stock Company "Oschadbank"							
Reliability Ratio	0.10	0.09	0.09	0.11	0.11	0.10	
Financial leverage ratio	9.74	11.15	11.07	9.32	9.05	10.06	
Equity participation ratio in asset formation	0.09	0.08	0.08	0.10	0.15	0.10	
Equity protection ratio	1.61	1.82	1.81	1.55	1.00	1.63	
Equity protection ratio of income assets by equity	-0.28	-0.29	-0.29	-0.27	-0.20	-0.27	
Capital multiplier ratio	4.72	5.41	6.97	8.08	5.47	6.30	
Integral indicator of financial management	1.37	1.42	1.45	1.43	1.37		1.407
Joint-Stock Company "Raiffeisen Bank"							
Reliability ratio	0.15	0.12	0.13	0.14	0.15	0.14	
Ratio of "financial leverage"	6.68	8.62	7.62	7.03	6.52	7.22	
Ratio of equity participation in asset formation	0.13	0.10	0.12	0.12	0.25	0.14	
Ratio of equity protection	1.15	1.45	1.29	1.20	0.61	1.20	
Ratio of income assets protection by equity	-0.22	-0.26	-0.24	-0.23	-0.06	-0.22	
Ratio of capital multiplier	20.65	27.08	30.71	31.77	17.63	26.37	
Integral indicator of financial management	1.35	1.44	1.46	1.47	1.31		1.405

Also, a comparative characteristic of the integral indicator of the financial management of banks was carried out using the method of estimation through the geometric mean and variable average values of the leading banks of Ukraine for the recent period (Table 6).

Table 6. Comparative characteristics of the integral indicator of financial management of banks using the geometric mean and variable mean values of the leading banks of Ukraine, 2021-2025.

Bank	Integral indicator of bank financial management
Joint-Stock Company Commercial Bank "Privatbank"	1.418
Joint-Stock Company "Oschadbank"	1.407
Joint-Stock Company "Raiffeisen Bank"	1.405

DOI: 10.55643/fcaptp.3.62.2025.4793

A comparative illustration of the integral indicator of financial management of banks using the geometric mean and variable mean values of the leading banks of Ukraine for the recent period is presented in Figure 2.

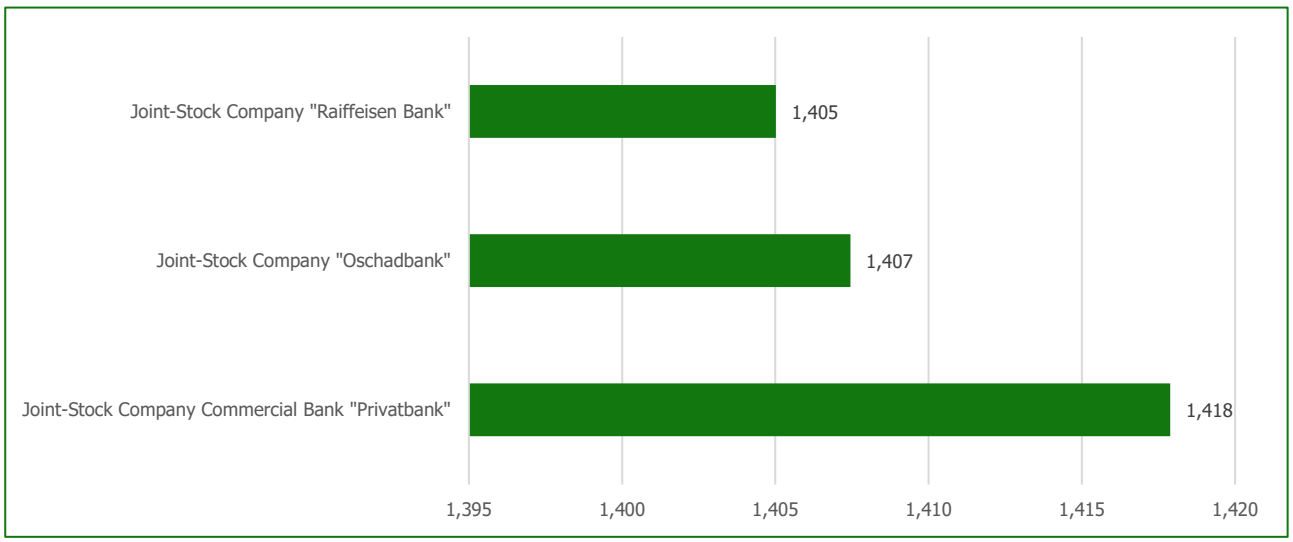

Figure 2. Comparative characteristics of the integral indicator of financial management of banks using the geometric mean and variable mean estimation methods, 2021-2025.

At the final stage of studying the security aspects of the formation of the financial management system in leading banks of Ukraine, we use economic and mathematical methods and models, namely the production linear production function, denoting the main coefficients of financial management of leading banks of Ukraine, which were previously calculated, as factors, and the number of clients of these banks as the quality of the performance indicator. Calculations, the degree of influence of factors on the performance indicator, analysis, and modelling are carried out for the last five years, forecasting for 2026.

The number of clients of the leading banks of Ukraine over the past year as of 01.01. is graphically presented in Figure 3.

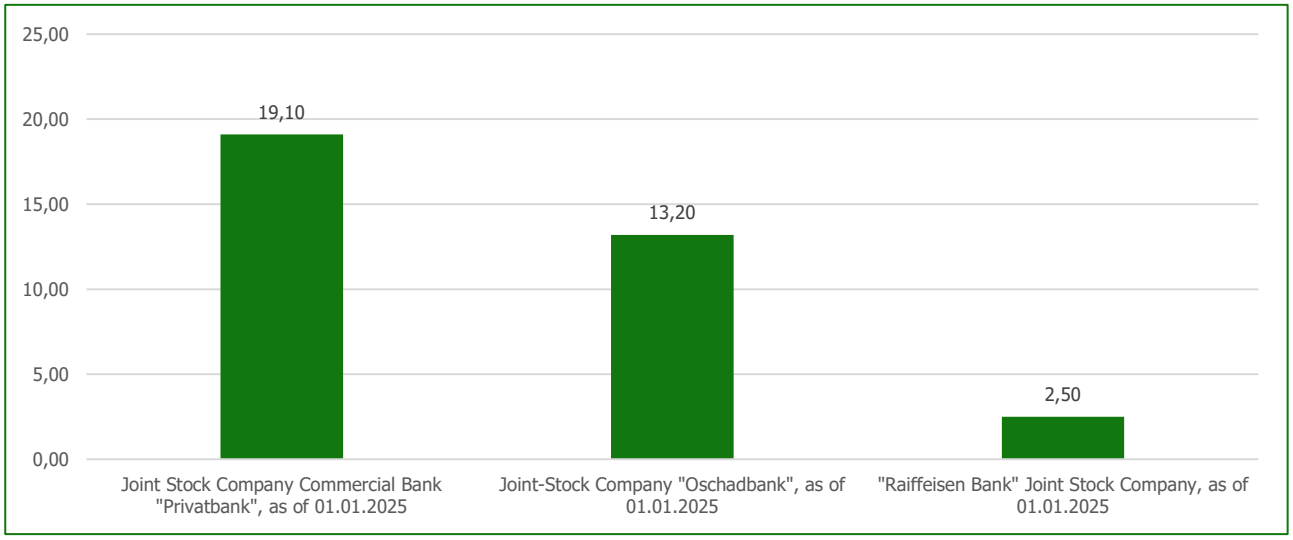

Figure 3. Number of clients of leading banks in Ukraine, 2025 as of 01.01. million people. *(Source: summarized by the authors taking into account statistical data of the analyzed banks)*

We conduct an economic, statistical and econometric analysis of the main coefficients of the linear production function of the number of clients of the leading banks of Ukraine using the least squares method. If we analyze the coefficients of the equations, then any change in the factor characteristics of the main coefficients of financial management of the leading banks of Ukraine causes a change in the effective indicator of the number of clients of these banks.

The production linear regressions of the number of bank customers have the form:

Joint-Stock Company Commercial Bank "Privatbank"	$Yr=34.15+13.84X_1+1537.46X_2+297.74X_3+0.10X_4-8.60X_5+0.10X_6$
Joint-Stock Company "Oschadbank"	$Yr=556.74+0.41X_1+3695.86X_2+515.85X_3+0.12X_4-36.64X_5+0.12X_6$
Joint-Stock Company "Raiffeisen Bank"	$Yr=7.14+0.16X_1+96.30X_2+28.26X_3+0.11X_4-2.44X_5+0.11X_6$

The analysis of the coefficients of linear production functions of the number of bank customers shows that the main factors of financial management, such as reliability, financial leverage, equity participation in asset formation and capital security, have a significant impact on the number of customers of the leading banks of Ukraine. Changes in these factors cause corresponding changes in the performance indicator - the number of customers.

For each bank, the linear model demonstrates a different degree of influence of factors on the total number of customers. For example, for "Privatbank", the coefficients related to financial leverage and capital have the greatest impact, while for "Oschadbank", the indicators related to the stability and reliability of the bank are more significant. "Raiffeisen Bank" demonstrates a less pronounced influence of financial management factors on the number of customers, which may indicate it's stable but more loyal to changes in customer base.

Therefore, these results indicate the importance of monitoring and adjusting financial factors for optimizing the client base and developing banking activities.

We forecast factor characteristics: financial management ratios of leading banks of Ukraine and the effective indicator of the number of bank clients as of 01.01.2026.

If we analyze the obtained results of the forecast values of financial management ratios of leading banks of Ukraine, they are increasing, which may be a qualitative result of financial management and the safety of the banking entity's activities.

As for the forecast value of the number of clients of leading banks of Ukraine, they may also increase as a result of the effectiveness of financial management.

A comparative analysis of the actual and forecast value of the number of clients of leading banks of Ukraine for the past and future years is presented in Table 7.

Table 7. Comparative characteristics of the actual and forecast value of the number of clients of the leading banks of Ukraine, 2025, 2026.

Bank	As of 01.01. Number of clients, million people	
	2025	2026
Joint-Stock Company Commercial Bank "Privatbank"	19.10	19.60
Joint-Stock Company "Oschadbank"	13.20	13.34
Joint-Stock Company "Raiffeisen Bank"	2.50	2.58

A graphical comparison of the actual and forecasted number of clients of leading Ukrainian banks for the past and future years is presented in Figure 4.

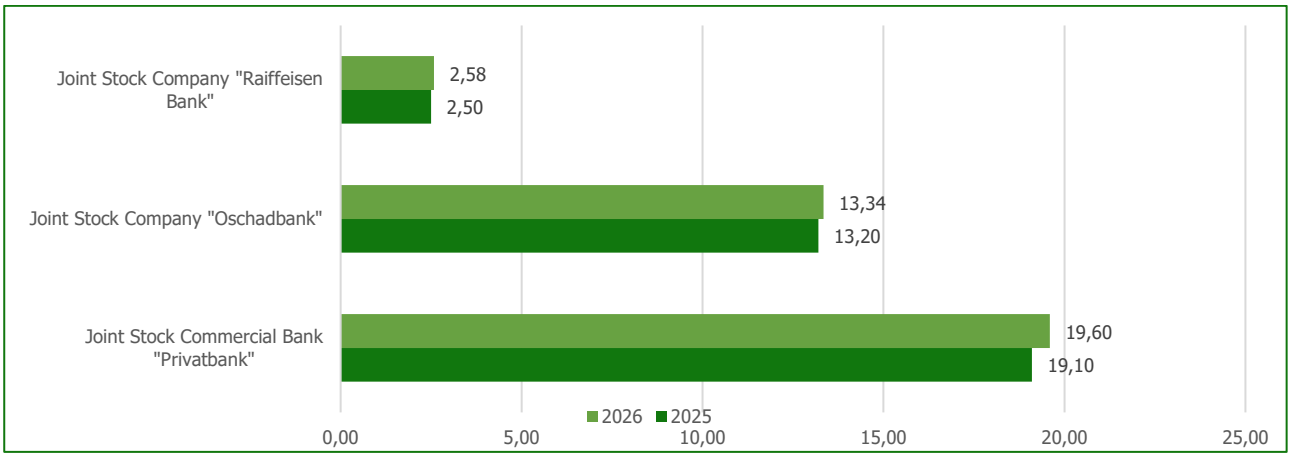

Figure 4. Comparative characteristics of the actual and forecast value of the number of clients of leading banks in Ukraine, 2025, 2026.
(Source: summarized by the authors taking into account statistical data of the analyzed banks)

DOI: 10.55643/fcaptp.3.62.2025.4793

The results of the economic, statistical and econometric analysis of the main coefficients of the linear production function of the number of bank customers allow us to draw several important conclusions regarding the relationship between financial indicators and the number of customers, as well as analyze the impact of these changes on the efficiency of bank operations.

First of all, it is worth noting that linear regression applied to data on the number of bank customers allows us to identify key factors that influence this value. All three banks that were studied have similar structural models taking into account financial coefficients, but their effect on the number of customers differs significantly, which is important for further assessment of competitive strategies and innovative development.

For "PrivatBank", the coefficients related to financial leverage and capital efficiency have the greatest impact on the number of customers, which means that changes in these indicators can significantly adjust the bank's customer base. "Privatbank", as one of the largest banks in the country, requires constant monitoring of the level of capital and its use to maintain financial stability, which in turn helps to attract new customers, as well as maintain the loyalty of existing ones.

"Oschadbank", on the other hand, demonstrates a much greater impact of reliability and stability coefficients on the number of customers, which indicates the importance of ensuring trust in the bank as a reliable financial partner for a wide range of consumers. Indicators related to the stability of financial indicators largely determine the long-term attractiveness of the bank to customers. "Oschadbank", with a large network and a stable position in the market, in particular among government institutions and pensioners, actively uses these factors to retain customers and attract new ones.

For "Raiffeisen Bank", the results of the analysis show that here the impact of the ratios is more smoothed, and although the values of the ratios are positively correlated with the number of customers, their intensity is much lower compared to other banks, which may indicate other factors that were not taken into account in the model, or a certain stability of the bank, which allows it to retain customers without significant changes in financial indicators. "Raiffeisen Bank" often focuses on high-quality service and innovations in customer service, which also plays an important role in maintaining the customer base, although this role is not so clearly expressed in numerical indicators. The analysis shows that changes in the main ratios of banks have a significant impact on the number of customers, and this relationship is key to understanding how financial management factors directly affect the performance of banks. Taking into account the results obtained, we can conclude that effective management of financial indicators, such as capital, reliability, asset security and stability, is an important factor in shaping the development strategy of a banking institution.

These results also highlight the importance of continuous monitoring and analysis of a bank's financial ratios for developing competitive strategies. Banks that change or improve their financial indicators in the direction of increasing reliability and stability are able to attract more customers and improve their market position.

For innovative development of the banking system, it is important not only to maintain the stability of financial indicators but also to actively work on the implementation of innovations that can affect the improvement of the customer experience, which may include the use of the latest technologies to ensure better access to financial services, the development of new products and services, as well as the creation of more flexible and adaptive business models that allow banks to respond more quickly to changes in the competitive environment.

Taking into account the results of the analysis, we can conclude that successful financial management in banks should ensure a balance between the stability of financial ratios and flexibility in adapting to changing market conditions, which will allow not only to retain existing customers but also to attract new ones, which is the basis for the long-term development of a banking institution in a competitive environment.

Thus, the results of the economic and econometric analysis demonstrate the importance of each financial ratio for banking activities and also provide useful insights for further improvement of financial management in the banking system. These conclusions are not only the basis for developing strategies to improve the client base but also part of the overall strategy of innovative development of banks.

DISCUSSION

The analysis of scientific sources has shown the fragmentation of approaches to the study of the issues of our article. In particular, the work of Gerasymovych et al. (2004) presents a classical approach to the analysis of banking activities, but there is no emphasis on the risks associated with cybersecurity, innovations and digital platforms, which are critically important in the new conditions. Xu et al. (2024) focus on the issue of global data flow management between the US and China, which is relevant in the context of transnational digital policy. However, the study does not take into account the

specifics of financial institutions, in particular banks, and their role in the circulation of large volumes of personalized information, which is one of the main vectors of financial security.

Oseredchuk et al. (2022) investigate the quality of monitoring in higher education under distance learning conditions, which is relevant to digital security. At the same time, the authors lack specificity regarding digital risks in the financial sector, as well as the adaptation of digital technologies in banks to support financial stability. Oseredchuk et al. (2022) investigate the quality of monitoring in higher education under distance learning conditions, which is relevant to digital security. At the same time, the authors lack specificity regarding digital risks in the financial sector, as well as the adaptation of digital technologies in banks to support financial stability.

Ani et al. (2019) focus on assessing human capital in cybersecurity. Despite its importance, the work does not address how the level of training of staff in banks affects the overall financial security of the institution, particularly in combination with organizational and technological factors. Zolkover and Ovcharenko (2024) investigate the level of innovation security, however, the model proposed by the authors is general economic, without taking into account the specifics of banking institutions, their financial indicators, risk profiles and the impact of regulatory policy on innovation dynamics.

Finally, Stolyarov et al. (2022) examine the optimization of the material and technical support of enterprises, which indirectly relates to the efficiency of resource management. However, the authors do not address the issues of strategic risk management in the context of the digital transformation of financial institutions, nor do they consider the relationship between material resources and financial security. Thus, we can conclude that most studies lack a holistic approach to the analysis of the financial security of banks, which would include digital risks, innovation processes, human capital, information and analytical support, and strategic management. It is these components that are the subject of in-depth consideration in our work, which gives it scientific novelty and practical significance.

CONCLUSIONS

Taking into account the obtained results, several important conclusions can be drawn regarding the security-oriented business model of financial management and the competitive strategy of innovative development of the banking system of Ukraine. Using the example of leading banks such as "Privatbank", "Oschadbank" and "Raiffeisen Bank", it is clear that changes in the main financial ratios have a direct impact on their financial indicators, in particular on the number of clients.

In particular, the integral financial management indicator of "PrivatBank" for 2021 was 63.49, while in 2025 it reached 77.86, which indicates an improvement in the overall efficiency and sustainability of the bank, which is likely a result of optimizing financial strategies and implementing innovative solutions. However, this also shows that in order to achieve a stable and high level of financial sustainability, the bank must not only implement innovations but also take into account security factors in order to avoid negative financial consequences.

"Oschadbank", with an integral indicator that increased from 116.56 in 2021 to 107.98 in 2025, demonstrated less resilience compared to other banks, which may be a result of insufficient flexibility in adapting to new economic realities or ineffective financial risk management. However, thanks to stable ratios, such as the "financial leverage" ratio, which fluctuated from 9.74 in 2021 to 9.05 in 2025, "Oschadbank" remained competitive in the market.

As for "Raiffeisen Bank", its integral indicator changed from 109.00 in 2021 to 101.49 in 2025. This bank demonstrated stability in achieving results, despite fluctuations in key ratios, such as the reliability ratio, which varied from 0.15 to 0.13 during this period. At the same time, the capital multiplier ratio increased from 20.65 to 17.63, which indicates a significant dependence of the bank's financial stability on effective capital management and innovative approaches to its use.

Therefore, the performance and financial stability of banks depend on strategies that include both the optimization of financial ratios and the integration of innovative technologies in risk management. Innovations and technological developments help banks improve their competitiveness, but it is important to take into account the risks associated with their implementation, in particular from the point of view of the security of financial transactions. Thus, to ensure sustainable development and an effective competitive strategy, it is necessary to combine innovative solutions with a reliable financial management system based on clear financial indicators and security mechanisms.

In further scientific research, it is advisable to focus on the development of adaptive models of financial management, taking into account the dynamics of changes in the macroeconomic and regulatory environment. The study of mechanisms for integrating risk management tools within the framework of security-oriented strategies of banks is of particular relevance. In addition, a promising direction is the development of methodological approaches to assessing the effectiveness of the implementation of innovative financial technologies in the context of ensuring the financial stability of banking

DOI: 10.55643/fcaptp.3.62.2025.4793

institutions. It is also advisable to conduct an in-depth study of the impact of digital transformation on the competitiveness and security of the banking sector in the context of hybrid threats.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All Authors have contributed equally.

FUNDING

The Authors received no funding for this research.

CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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БЕЗПЕКООРІЄНТОВАНА БІЗНЕС-МОДЕЛЬ ФІНАНСОВОГО МЕНЕДЖМЕНТУ КОНКУРЕНТНОЇ СТРАТЕГІЇ ІННОВАЦІЙНОГО РОЗВИТКУ СУБ'ЄКТІВ БАНКІВСЬКОЇ СИСТЕМИ

У статті здійснено поглиблений аналіз безпекових аспектів фінансового менеджменту в банках України, зокрема з акцентом на конкурентну стратегію та інноваційний розвиток суб'єктів банківської системи. За допомогою розрахунку ключових коефіцієнтів фінансової стійкості, зокрема коефіцієнтів надійності, фінансового важеля, захищеності капіталу та мультиплікатора капіталу для трьох провідних банків – Акціонерне товариство комерційний банк «Приватбанк», Акціонерне товариство «Ощадбанк» та Акціонерне товариство «Райффайзен Банк», досліджено, як фінансова стійкість і здатність до інновацій можуть бути інтегровані в стратегії безпеки та розвитку цих установ. Зокрема на основі розрахунку динаміки фінансових показників за період 2021-2025 років виявлено вплив внутрішніх і зовнішніх чинників на фінансову стійкість банків, що демонструють різні рівні адаптації до економічних змін і здатність до інноваційних трансформацій. Розрахунки показують, як ефективність використання власного капіталу та управління фінансовим важелем можуть служити індикаторами для покращення безпеки банківської діяльності та підвищення конкурентоспроможності на національному й міжнародному рівнях. Визначено, що застосування безпекоорієнтованої бізнес-моделі дозволяє банкам не лише зберігати свою стійкість у конкурентному середовищі, а й ефективно інтегрувати інноваційні стратегії розвитку.

Ключові слова: фінансовий менеджмент, банківська система, безпекові аспекти, фінансова стійкість, інноваційні стратегії, фінансові ризики, конкурентоспроможність, капітал банку, стратегічне управління

JEL Класифікація: G21, G32, D63