Uncertainty as a Determinant of Risk in Security-Oriented Management of Ukrainian Commercial Banks

Anastasiia Poltorak[1], Andrii Ahafonov[2]

Abstract. *Today, commercial banks in Ukraine operate in an unstable financial environment and geopolitical challenges, which necessitate adapting traditional risk management models and integrating new methods for assessing uncertainty that consider the stochastic nature of economic processes and the psychological and behavioral characteristics of market participants. This research aims to identify and substantiate the features of the impact of uncertainty on risk management processes in the system of security-oriented functioning of commercial banks and to develop methodical approaches to increasing their stability and efficiency in the modern financial environment. The research methodology is represented by decision-making theory methods, including expert and analytical assessments, fuzzy logic methods, multi-criteria analysis, and construction of decision matrices considering various event scenarios. The article develops an Integrated Bank Security Decision Index (IBSDI), which allows quantitatively assessing the effectiveness of management decisions in banks, taking into account ten main types of uncertainty: geopolitical, regulatory, cybersecurity, stochastic, information, uncertainty of operating conditions, antagonistic, strategic goals, reputational, and other types of uncertainty. The index considers the weight of each type of uncertainty for corporate security, threats' intensity, and banking decisions' stability. The study results show that integrating economic, regulatory, information, and security components into a single assessment system increases the adaptability of banks, minimizes risks, and strengthens stability in crisis and uncertain conditions. The proposed method provides the basis for expert assessment, scenario analysis, and strategic planning, consistent with the international standards Basel III/IV and the practices of leading world banks. To ensure the reliability and practical effectiveness of the model, it is necessary to regularly update its parameters and check the consistency of expert assessments.*

Keywords: *security-oriented management, security-oriented governance, commercial bank management, commercial banks, financial management, risk management, risk governance.*

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Невизначеність як детермінанта ризику в системі безпекоорієнтованого управління комерційними банками України

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Анотація. Сьогодні комерційні банки України функціонують в умовах нестабільного фінансового середовища та геополітичних викликів, що обумовлює потребу адаптації традиційних моделей ризик-менеджменту та інтеграції нових методів оцінки невизначеності, що враховують стохастичну природу економічних процесів, психологічні та поведінкові особливості учасників ринку. Метою цього дослідження є виявлення та обґрунтування особливостей впливу невизначеності на процеси управління ризиками в системі безпекоорієнтованого функціонування комерційних банків та розробка методичних підходів щодо підвищення їхньої стабільності та ефективності в сучасному фінансовому середовищі. Методологія дослідження представлена комплексом методів теорії прийняття рішень, серед яких експертно-аналітичні оцінки, методи нечіткої логіки, багатокритеріальний аналіз та побудова матриць рішень із врахуванням різних сценаріїв розвитку подій. У статті розроблено інтегральний індекс IBSDI (Integrated Bank Security Decision Index), що дозволяє кількісно оцінювати ефективність управлінських рішень у банках з урахуванням десяти основних типів невизначеності: геополітичної, регуляторної, кібербезпекової, стохастичної, інформаційної, невизначеності умов ведення діяльності, антагоністичної, стратегічних цілей, репутаційної та інших типів невизначеності. Індекс враховує вагу кожного виду невизначеності для корпоративної безпеки, інтенсивність загроз та стійкість банківських рішень. Результати дослідження свідчать, що інтеграція економічних, регуляторних, інформаційних та безпекових компонентів у єдину систему оцінювання дозволяє підвищити адаптивність банків, мінімізувати ризики та підсилити стабільність у кризових та невизначених умовах. Використання запропонованої методики забезпечує основу для експертного оцінювання, сценарного аналізу та стратегічного планування, узгоджених із міжнародними стандартами Basel III/IV та практиками провідних світових банків. Для забезпечення достовірності та практичної ефективності моделі необхідно регулярно оновлювати її параметри і здійснювати перевірку узгодженості експертних оцінок.

Ключові слова: безпекоорієнтоване управління, безпекоорієнтований менеджмент, управління комерційними банками, комерційні банки, фінансовий менеджмент, управління ризиками, ризик-менеджмент.

INTRODUCTION

Today, Ukraine's financial environment is characterized by heightened uncertainty and significant volatility, creating critical challenges for risk management within the banking system. Commercial banks are compelled to operate under conditions where traditional approaches to risk assessment have become insufficiently valid, and the effectiveness of managerial decisions is largely determined by their ability to adapt to emerging internal and external threats.

Contemporary bank risk management must account for the stochastic nature of economic processes and the psychological and cognitive characteristics of market participants, which influence their financial decision-making, which at times exhibits irrational behavior.

The core scientific problem lies in identifying how the genesis of uncertainty in the banking sector and its extrapolation to prospective scenarios impacts risk and the possibilities for its elimination or mitigation. Accordingly, the scientific significance of this study is grounded in the systematization of the interrelationships between uncertainty, risk, and mechanisms for ensuring financial security, taking into consideration modern technologies, behavioral aspects, and the principles of integrative financial system management.

LITERATURE REVIEW

The Regulation on the Organization of the Risk Management System in Banks of Ukraine and Banking Groups defines the objectives and principles of risk management across different areas of banking operations and at all organizational levels, as well as establishes the requirements for implementing a comprehensive, effective, and adequate risk management system within banks [1].

In addition to the NBU Regulation on the Organization of the Risk Management System [1], several other regulatory frameworks play a pivotal role in shaping risk management and guiding banking operations under conditions of uncertainty. These include: the Law of Ukraine On Banks and Banking Activities [2] (Article 44, which sets requirements for risk management and internal control systems); the Law of Ukraine On the National Bank of Ukraine [3] (Articles 6 and 7, which outline the NBU's responsibilities for maintaining financial system stability and banking supervision); NBU Resolution No. 88 of July 2, 2019 On Approval of the Regulation on the Organization of the Internal Control System in Banks of Ukraine and Banking Groups [4]; NBU Resolution No. 351 of June 30, 2016 On Approval of the Regulation on the Determination by Banks of Ukraine of Credit Risk for Active Banking Operations [5];

NBU Methodological Recommendations on Stress Testing Procedures in Ukrainian Banks [6]; and the recommendations of the Basel Committee on Banking Supervision (Basel III) [7], which have been incorporated into the NBU's regulatory framework.

International standards and guidelines also inform approaches to understanding and managing uncertainty in the banking sector's globalization. In global practice, uncertainty management largely relies on the Basel III / Basel Framework standards, which govern capital, liquidity, and risk management requirements for banks worldwide [7]. Supervisory authorities, such as the European Central Bank, increasingly emphasize resilience to geopolitical shocks and macro-financial risks, identifying these factors as key supervisory priorities for 2025–2027 [8; 9].

From the management theory perspective [10; 11], risk is conceptualized as the measurable probability of a particular event. In contrast, uncertainty is characterized by the inability to assess the likelihood of various scenarios quantitatively. This distinction is critical for developing security-oriented approaches to bank management in Ukraine. In both scholarly literature and banking practice, the terms "risk" and "uncertainty" are frequently used interchangeably; however, they have fundamental differences. Following the classical framework proposed by F. Knight, risk refers to situations in which the probabilities of outcomes are known or can be estimated. At the same time, uncertainty pertains to conditions where probabilities are either absent or ambiguous [11]. In banking practice, risk is typically quantified (e.g., through VaR, Expected Loss, PD, LGD), whereas uncertainty is more often assessed qualitatively, using expert judgment, scenario analysis, or fuzzy logic methodologies.

The relationship between the concepts of "uncertainty" and "risk" has been explored in the research of V. Reshetylo and Yu. Fedotova [12, pp. 149–154]. D. Kabachenko analyzed the specific characteristics of managerial decision-making under conditions of uncertainty and risk [13, pp. 107–115]. O. Kryklii and A. Moskalenko concluded that uncertainty can lead to reduced investments and capital outflows, foster insecurity and fear, and trigger declines in both investment and lending activities, thereby serving as a source of liquidity crises [14].

While acknowledging significant scholarly contributions to the study of uncertainty and risk in security-oriented banking management, it is important to note that the unique characteristics of the current financial environment in Ukraine necessitate the adaptation of traditional risk management models and the integration of innovative methods for assessing uncertainty to enhance the efficiency and security of banking operations.

RESEARCH OBJECTIVE

This research aims to identify and substantiate the specific features of uncertainty's impact on risk management processes within the security-oriented operations of commercial banks and develop methodical approaches aimed at enhancing their stability and efficiency in the contemporary financial environment.

RESEARCH METHODOLOGY

In this study, the authors employed a comprehensive set of decision-making theory methods, including expert-analytical evaluations, fuzzy logic techniques, multi-criteria analysis, and the construction of decision matrices under various scenario-based developments. An integrated index – IBSDI (Integrated Bank Security Decision Index) – was developed to quantitatively assess the effectiveness of managerial decisions in banks, taking into account ten key types of uncertainty: geopolitical, regulatory, cybersecurity-related, stochastic, informational, operational, antagonistic, strategic, reputational, and other forms. The index incorporates the relative weight of each type of uncertainty for corporate security, the intensity of emerging threats, and the resilience of banking decisions.

RESULTS

In banking institutions' practical operations, risk and uncertainty rarely exist in their pure forms. More often, hybrid situations occur. For example, foreign exchange risk can be statistically modeled (a situation of risk), but its amplification due to geopolitical events constitutes a factor of uncertainty. Therefore, the classification of types of uncertainty (Table 1) is based on factors that cannot be reliably assessed in probabilistic terms but have a critical impact on the security of the banking sector.

The types of uncertainty outlined in Table 1 are directly or indirectly incorporated into the regulatory framework of the National Bank of Ukraine (NBU), particularly within its requirements for risk management, stress testing, credit risk assessment, and business continuity planning. The classification of uncertainties presented in Table 1 aligns with approaches applied by leading international financial institutions, including the Bank for International Settlements, the Basel Committee on Banking Supervision, and the European Banking Authority. For example, the European Central Bank (ECB), as reported by Reuters, emphasized the requirement for banks to develop stress scenarios linked to geopolitical risks to assess capital resilience [8]. This approach enables the alignment of Ukrainian security-oriented management practices with international methodologies, ensuring compatibility with the standards set by global regulators.

During 2022–2023, geopolitical uncertainty significantly affected foreign investment outflows and compelled banks to increase their liquidity buffers.

Table 1. Types of uncertainty, their characteristics, and their impact on security-oriented management of commercial banks

Type of Uncertainty	Characteristics	Impact on Security-Oriented Management of Commercial Banks
Geopolitical	Associated with instability in international politics, military conflicts, sanctions, and restricted access to capital markets	Increases systemic risks, complicates planning, triggers capital outflows, and undermines international trust in banks
Regulatory	Linked to potential future changes in legislation, regulatory frameworks, or requirements from the NBU, FATF, and international standards (Basel III, etc.)	Complicates compliance procedures, necessitates continuous adaptation of business models, and increases costs for legal expertise and risk management
Cybersecurity	Associated with potential cyber threats, disruptions to digital systems, and attacks on platforms, online banking, or databases	Directly threatens the informational and financial components of corporate security [17], undermines client trust, and may lead to asset losses
Stochastic	Related to the probabilistic nature of events (e.g., fluctuations in exchange rates, interest rates, inflation, etc.)	Complicates asset-liability management, requiring the use of VaR models, scenario analysis, and stress testing
Informational	Associated with a lack of or distortion in internal or external information (financial, client, or market data)	Increases the likelihood of poor managerial decisions, fraud, and non-compliance with regulations
Operational Environment Uncertainty	Stemming from the absence of stable economic, social, or infrastructural conditions	Necessitates adaptive, flexible security strategies and increases the importance of operational risk management
Antagonistic	Associated with potential conflicts with counterparties, competitors, government agencies, or corporate raiding attempts	Requires the development of fraud-prevention systems, protection of corporate rights, and collaboration with law enforcement agencies
Strategic Goal Uncertainty	Related to the lack of clear development priorities within banking institutions due to environmental changes	Complicates the design of security management strategies, requiring scenario-based approaches and flexible planning
Reputational	Connected with negative informational influence, disinformation, or social media campaigns	Necessitates robust PR security systems, crisis management strategies, and continuous monitoring of media and social networks

Source: compiled and extended by the author based on [13; 15; 18; 19].

Modern decision-making theory, relevant to security-oriented management in commercial banks, rests on the following key principles:

1. Clearly defined decision objects and risk-forming factors. The object of the decision is explicitly defined, and the risk-forming factors influencing it are identified [13; 15]. In banking, such objects may include an individual credit agreement, a financing instrument, a securities transaction, an investment program, or the placement of funds in the interbank market. Managing these objects requires assessing not only their financial feasibility but also their potential impact on the various components of the bank's corporate security [17].

2. Definition of performance indicators. For each decision object, a performance indicator is determined that adequately reflects the outcome of the managerial action. In the short term, this may include net profit, return on assets, or net interest margin; in the long term, indicators such as net present value (NPV), internal rate of return (IRR), or an integrated measure of the bank's corporate security level are applied.

3. Quantification of risk indicators. A risk indicator is established to enable quantitative evaluation of potential threats or losses. In the banking sector, such indicators include variations in expected profits, Value at Risk (VaR) metrics, interest rate volatility, client credit scoring, solvency ratios, and risk concentration levels.

4. Definition of decision alternatives. A set of decision-making alternatives is established (Table 2), from which the bank selects the optimal option based on the trade-off between expected outcomes and acceptable risk levels. Alternatives may involve client selection, loan types, collateral structures, hedging mechanisms, refinancing strategies, or liquidity management approaches.

5. Formulation of development scenarios. Development scenarios (Table 2) are constructed based on internal and external risk factors. For banks, these scenarios may cover shifts in the macro-financial environment, exchange and interest rate fluctuations, client solvency changes, tightening sanctions, or modifications to NBU regulatory requirements.

6. Evaluation of outcomes for each alternative-scenario combination. The projected result is determined for every combination of a decision alternative and a development scenario, such as expected profitability, costs, or risk levels. For example, this could include projected credit portfolio returns in the context of macroeconomic deterioration or default risks in specific sectors.

7. Assessment of scenario probabilities. If probabilities are known or can be reasonably estimated (e.g., using statistical data, expert judgment, or machine learning models), the situation reflects risk. The situation represents uncertainty if probabilities are unknown or cannot be quantified. In security-oriented banking management, each condition requires different analytical tools, ranging from traditional risk metrics to fuzzy sets and expert-based modeling techniques.

8. Decision-making and selection of the optimal alternative. The final decision is made by selecting the alternative that maximizes management effectiveness while maintaining an acceptable level of risk and preserving the bank's financial stability. The objective is not only to maximize profitability but also to minimize potential threats to the bank's operations as a complex socio-economic institution operating under conditions of uncertainty.

Foreign banks are increasingly integrating machine learning models, fuzzy logic methods, and advanced stress-testing tools recommended by the Basel Committee. For example, banks in the EU and the United States actively apply scenario modeling (stress testing), sensitivity analysis, and Monte Carlo simulations to evaluate the potential impact of geopolitical and market shocks.

Table 2. Structure of the "Decision Matrix" in Security-Oriented Management of a Commercial Bank

Decision Alternatives	Development Scenarios			
	C_1	C_2	$C_{...}$	C_n
A_1	A_1C_1	A_1C_2	$A_1C_{...}$	A_1C_n
A_2	A_2C_1	A_2C_2	$A_2C_{...}$	A_2C_n
$A_{...}$	$A_{...}C_1$	$A_{...}C_2$	$A_{...}C_{...}$	$A_{...}C_n$
A_n	A_nC_1	A_nC_2	$A_nC_{...}$	A_nC_n

Source: compiled and adapted by the authors based on [13; 15].

Table 3. Mathematical Criteria in Decision-Making Theory within the System of Security-Oriented Management of a Commercial Bank

Indicator	Formula	Core Principle	Conditions for Application in the Security-Oriented Management of a Commercial Bank
Wald Criterion (maximin)	$J = max_j min_k f_{kj}$, where f_{kj} – is the evaluation of the j decision alternative under the k economic scenario	"Guaranteed security" – selecting the alternative with the least possible loss	Relevant during periods of crisis, when choosing the least risky strategy, or in liquidity management under capital outflows.
Savage Criterion (minimax regret)	$J = min_j max_k R_{kj}$, where $R_{kj} = f_k^* - f_{kj}$	"Minimization of regret" – reducing potential losses caused by an incorrect choice	Useful when selecting among risky investment instruments or during changes in reserve policy.
Laplace Criterion (equiprobable events)	$J = max_j \frac{1}{n} \sum_{k=1}^{n} f_{kj}$	"Focus on the average" – assuming all scenarios are equally probable	Applied in the absence of complete information on the probabilities of all scenarios.
Hurwicz Criterion (cautious–optimistic compromise)	$J = max_j[\alpha min_k f_{kj} + (1-\alpha)max_k f_{kj}], \alpha \in [0,1]$	"Flexible approach" – balancing between the worst and best outcomes	Effective in strategic planning and product development processes.
Bayes Criterion (mathematical expectation)	$J = max_j \sum_{k=1}^{n} P_k f_{kj}$, where P_k is the probability of the k	"Expected benefit" – decisions based on the probability-weighted outcomes	Applied when statistical data are available, particularly in currency risk management using forecasting models.
Extreme Optimism Criterion (maximax)	$J = max_j max_k f_{kj}$	"Believe in the best" – orientation toward the maximum possible gain	Rarely applied in banking management; may be used for high-risk decision-making.

Source: generalized and adapted by the authors to the research context using [13; 15].

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e-ISSN 2518-1181, www.afj.org.ua
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In the process of developing security-oriented management tools, it is essential to account for the variability in the application of mathematical criteria (Table 3), depending on the characteristics of the environment in which the decision is made. Classical decision-making theory criteria (the Wald criterion, the Laplace criterion, the Savage criterion, and the criterion of extreme optimism) are typically applied under conditions of complete uncertainty, when the probabilities of alternative scenarios (Table 2) are either unknown or cannot be reliably estimated. In such circumstances, the primary focus is on minimizing potential losses or unrealized gains – an aspect that is critically important for banking institutions facing geopolitical, regulatory, or cyber-related uncertainty.

Building on the analysis of contemporary research, we propose the IBSDI criterion (Integrated Banking Security Decision Index) (1) – a quantitative metric designed to assess the effectiveness of managerial decisions under multidimensional uncertainty. This criterion integrates the following dimensions: the influence of external risks and uncertainties (e.g., geopolitical, regulatory, informational, or stochastic factors, as outlined in Table 1); the degree of institutional security across eight core components of corporate security (financial, informational, economic, etc.); the adaptability of decisions to crisis or uncertain scenarios; and the weighted significance of each component within the bank's overall security framework.

$$IBSDI_j = \sum_{i=1}^{n} \left(w_i \cdot S_{ij} \cdot (1 - U_i) \right), \qquad (1)$$

Where:

j – the variant of the managerial decision;

i – the category of risk/uncertainty (ranging from 1 to n);

w_i – the weight coefficient representing the importance of the i-th type of uncertainty for the bank's corporate security;

$S_{ij} \in [0; 1]$ – the resilience level of the j-th managerial decision to the i-th threat (assessed either through expert evaluation or based on simulations and historical data);

$U_i \in [0; 1]$ – the level of uncertainty or the intensity of the i-th type of threat at the current stage (evaluated based on environmental analysis, e.g., geopolitical tension = 0.9; regulatory turbulence = 0.6, etc.).

The higher the IBSDI value, the more effective and secure the managerial decision under conditions of multifactor uncertainty. The index value can be normalized to a [0–1] or [0–100] scale. If IBSDI falls below a threshold level (e.g., 0.5), the decision is considered unsafe or unstable from the perspective of the bank's corporate security.

In security-oriented management, it is critical to account for the dynamic nature of risks and their time lags. Geopolitical and regulatory risks, in particular, may exert delayed effects, whereas cyber threats manifest instantaneously and frequently.

To accurately model the temporal dynamics within the IBSDI framework, it is advisable to apply:

– time-series analysis methods recommended by the Bank for International Settlements (BIS) for systemic risk forecasting [15];

– rolling-window analysis, which enables the evaluation of risk event impacts within a moving time frame;

– a scenario-based approach to incorporating time lags into credit risk management, in line with Basel III requirements [7].

This approach is particularly relevant for the Ukrainian market due to the high frequency of changes in both the macroeconomic environment and the regulatory framework. The National Bank of Ukraine's (NBU) regular practice of bank stress testing highlights the necessity of integrating dynamic scenarios into risk management models.

Table 4. Core Types of Uncertainty to Be Considered in Determining the Integrated Banking Security Decision Index (IBSDI)

Notation	Type of Uncertainty	U_i – Intensity	w_i – Weight Coefficient	Interpretation
U_1	Geopolitical	0.9	0.2200	Critical risk, determinant at the macro level
U_2	Regulatory	0.7	0.1668	High turbulence of the legislative environment
U_3	Cybersecurity	0.6	0.1348	Persistent threats to the digital infrastructure
U_4	Stochastic	0.5	0.1159	High volatility of market parameters
U_5	Informational	0.6	0.0893	Risk of data shortage or distortion
U_6	Operational Conditions	0.8	0.0816	Unstable infrastructure, energy-related risks
U_7	Antagonistic	0.4	0.0505	Conflicts, counterparty-related risks
U_8	Strategic Goals	0.5	0.0526	Complexity of strategic planning
U_9	Reputational	0.6	0.0556	Reputation as the foundation of trust in the financial sector
U_{10}	Other (environmental, social, etc.)	0.3	0.0328	Currently less significant, but potentially critical

Source: author's development.

The model incorporates assessing at least ten core types of uncertainty (Table 4).

Table 4 has been constructed based on the results of an expert analysis that applied fuzzy logic methods, a point-based scoring scale, and the principles of multi-criteria analysis within the framework of decision-making theory under uncertainty.

First, an expert panel was formed comprising 12 professionals specializing in banking risk management, IT security, economic security, and banking regulation (including representatives of commercial banks and the National Bank of Ukraine).

Second, an intensity scale for Ui was developed. Specifically, each type of uncertainty was evaluated using a fuzzy point-based scoring method on a scale from 1 to 10, applying a modified expert assessment procedure based on fuzzy evaluation principles, where:

1–2 – very low relevance;
3–4 – low relevance;
5–6 – moderate relevance;
7–8 – high relevance;
9–10 – critically high relevance.

The average score for each type of uncertainty was normalized to the range [0;1] using the formula:

$$U_i = \frac{\bar{b_i}}{10}, \qquad (2)$$

where $\bar{b_i}$ represents the mean expert score for uncertainty type i. For example, geopolitical uncertainty with an average score of 9 results in an intensity value $U_1=0.9$, while regulatory uncertainty with an average score of 7 corresponds to $U_2=0.7$.

The determination of the weight coefficients (w_i) was carried out using the Analytic Hierarchy Process (AHP) and weight normalization methods. At the first stage, a pairwise comparison of factors was conducted according to the criterion "impact on the bank's corporate security." Experts compared each type of uncertainty with the others based on its influence on: the stability of the bank's operations; management complexity; threat to strategic objectives; and potential destructive impact upon realization.

At the second stage, a pairwise comparison matrix was constructed (for 10 types of uncertainty, a 10×10 matrix) following the algorithm of T. Saaty [16] (Table 5).

Table 5. T. Saaty Pairwise Comparison Matrix of Uncertainty Types

	Geopolitical	Regulatory	Cybersecurity	Stochastic	Informational	Operational Conditions	Antagonistic	Strategic Goals	Reputational	Other (Environmental, Social)
Geopolitical	1.00	2.00	2.00	3.00	4.00	2.00	5.00	4.00	3.00	5.00
Regulatory	0.50	1.00	2.00	2.00	3.00	2.00	4.00	3.00	2.00	4.00
Cybersecurity	0.50	0.50	1.00	2.00	2.00	2.00	3.00	3.00	2.00	3.00
Stochastic	0.33	0.50	0.50	1.00	2.00	2.00	3.00	2.00	2.00	3.00
Informational	0.25	0.33	0.50	0.50	1.00	2.00	2.00	2.00	2.00	2.00
Operational Conditions	0.50	0.50	0.50	0.50	0.50	1.00	2.00	2.00	2.00	2.00
Antagonistic	0.20	0.25	0.33	0.33	0.50	0.50	1.00	1.00	1.00	2.00
Strategic Goals	0.25	0.33	0.33	0.50	0.50	0.50	1.00	1.00	1.00	2.00
Reputational	0.33	0.50	0.50	0.50	0.50	0.50	1.00	1.00	1.00	2.00
Other	0.20	0.25	0.33	0.33	0.50	0.50	0.50	0.50	0.50	1.00

Source: generalized by the authors based on expert pairwise comparisons of each type of uncertainty.

The weight coefficients (w_i) – the components of the priority eigenvector – were calculated using the geometric mean method:

$$w_i = \frac{(\prod_{j=1}^n a_{ij})^{\frac{1}{n}}}{\sum_{i=1}^n (\prod_{j=1}^n a_{ij})^{\frac{1}{n}}} \qquad (3)$$

An assessment of expert consistency was also conducted. To verify the logical coherence of the pairwise judgments, the following metrics were calculated:

– λ_{max} – maximum eigenvalue of the matrix (4);

$$\lambda_{max} = \frac{1}{n}\sum_{i=1}^n \left(\frac{(Aw)_i}{w_i}\right) \qquad (4)$$

– CI – Consistency Index (5);

$$CI = \frac{\lambda_{max}-n}{n-1} \qquad (5)$$

– CR – Consistency Ratio (6);

$$CR = \frac{CI}{RI} \qquad (6)$$

where: CI is the random index, dependent on matrix size. For n = 10, according to tabulated values, CI = 1.49 [16].

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e-ISSN 2518-1181, www.afj.org.ua
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The calculations yielded: $\lambda_{max} = \mathbf{10.34}, CI = \mathbf{0.0381}, CR = \mathbf{0.0256}$. Since CR < 0.1, the matrix is consistent, and the resulting weights are statistically justified.

At the third stage, the local priorities (weights, w_i) were computed and normalized so that the sum of all weights equals 1:

$$\sum_{i=1}^{10} w_i = \mathbf{1} \qquad (7)$$

Thus, the weight coefficients w_i represent the outcome of a formal mathematical procedure, including the construction of the pairwise comparison matrix using the Saaty AHP method, calculation of the priority eigenvector, and normalization to ensure the sum of weights equals 1. These coefficients are based on a systematic approach, allow for verification of expert consistency, and are scientifically substantiated.

The resilience of a managerial decision to each type of uncertainty reflects the degree of actual protection of the bank, which relies on the components of corporate security [17]. These components are not treated as separate variables in the formula (1) but indirectly influence the assessment of S_{ij} (based on a correspondence matrix between types of threats and security components).

Thus, risk and uncertainty differ in their nature: risk can be quantitatively measured, insured, or hedged, whereas uncertainty requires adaptive and flexible decisions integrating economic, organizational, and behavioral factors. It is precisely uncertainty, rather than risk in the narrow sense, that constitutes the key challenge for security-oriented management in Ukrainian commercial banks. Uncertainty, as a critical factor of risk in banking operations, has not only a theoretical but also a clearly regulated normative dimension. As reflected in Ukrainian legislation and regulatory acts, the National Bank of Ukraine consistently implements international risk management standards (Basel III, FATF recommendations). This demonstrates the state's recognition of the systemic impact of uncertainties on the financial system's stability.

CONCLUSIONS

The study identified and substantiated the characteristics of uncertainty's impact on risk management processes within the security-oriented functioning of commercial banks.

The proposed IBSDI index is based on expert-intuitive and mathematical foundations, ensuring sufficient objectivity, flexibility, and adaptability for real-time updating of indicators. It enables a comprehensive assessment of the safety of managerial decisions in conditions of complex uncertainty; engages the corporate security system as a basis for adaptive management; formalizes the process of selecting a managerial strategy from the perspective of risk minimization and resilience maximization; and serves as a foundation for expert assessment models, scenario analysis, strategic planning, etc. Most existing risk management models do not account for multi-vector uncertainty, a defining characteristic of Ukrainian banks. The IBSDI approach allows integration of economic, regulatory, informational, and security components into a unified evaluation system.

At the same time, the proposed IBSDI model has several limitations that should be considered during practical implementation:

– subjectivity of expert assessments. Even using the Saaty AHP method, the quality of the results depends on the experts' qualifications and experience. International standards, including ISO 31000:2018 "Risk management – Guidelines," emphasize the need for periodic validation of models against actual data;

– necessity for regular updating of parameters. The values of weight coefficients and threat intensities must be adjusted at least quarterly, per practices described in the Basel Principles for effective risk management.

Incorporating international experience is critically important for building an effective security-oriented management system for Ukrainian banks. Harmonization of domestic approaches to risk and uncertainty management with the requirements of Basel III/IV, FATF recommendations, and the practices of leading global banks enhances the competitiveness of the national banking sector and strengthens its resilience under global crises.

4 Список використаних джерел
1. Про затвердження Положення про організацію системи управління ризиками в банках України та банківських групах: Постанова Правління Національного банку України від 11.06.2018 р. № 64. URL: https://zakon.rada.gov.ua/laws/show/v0064500-18#n16 (дата звернення: 28.07.2025).
2. Про банки і банківську діяльність: Закон України від 07.12.2000 р. № 2121-III (зі змінами та доповненнями). URL: https://zakon.rada.gov.ua/laws/card/2121-14 (дата звернення: 28.07.2025).
3. Про Національний банк України: Закон України від 20.05.1999 р. № 679-XIV (зі змінами та доповненнями). URL: https://zakon.rada.gov.ua/laws/card/679-14 (дата звернення: 28.07.2025).
4. Про затвердження Положення про організацію системи внутрішнього контролю в банках України та банківських групах: Постанова Правління Національного банку України від 02.07.2019 р. № 88. URL: https://zakon.rada.gov.ua/laws/show/v0088500-19#n6 (дата звернення: 28.07.2025).
5. Про затвердження Положення про визначення банками України розміру кредитного ризику за активними банківськими операціями: Постанова Правління Національного банку України від 30.06.2016 р. № 351. URL: https://zakon.rada.gov.ua/laws/show/v0351500-16#Text (дата звернення: 28.07.2025).
6. Про схвалення Методичних рекомендацій щодо порядку проведення стрес-тестування в банках України: постанова Правління Національного банку України від 06.08.2009 р. № 460. URL: https://zakon.rada.gov.ua/laws/show/v0460500-09#Text (дата звернення: 28.07.2025).

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Облік і фінанси, № 3(109), 2025
e-ISSN 2518-1181, www.afj.org.ua

7. Core principles for effective banking supervision / Basel Committee on Banking Supervision. Issued for comment by 6 October 2023. URL: https://www.bis.org/bcbs/publ/d551.pdf (дата звернення: 28.07.2025).

8. Canepa F., Aguado J. ECB supervisors focus on risks from tariffs to cyber attacks, central bank sources say. *Reuters*. July 15, 2025. URL: https://www.clipr.cc/fzqL9 (дата звернення: 28.07.2025).

9. Supervisory priorities 2025-27. Banking Supervision. Supervisory Board of the European Central Bank. URL: https://www.clipr.cc/sCJ5h (дата звернення: 28.07.2025).

10. ISO 31000:2018 – Risk management – Guidelines. URL: https://www.iso.org/standard/65694.html#lifecycle (дата звернення: 28.07.2025).

11. Knight Frank H. Risk, Uncertainty and Profit. Mineola, New York: Dover publications, Ins., 2012.

12. Решетило В. П., Федотова Ю. В. Невизначеність та ризик: співвідношення понять та специфіка прийняття рішень. *Проблеми системного підходу в економіці*. 2020. Вип. 3(2). С. 149–154. https://doi.org/10.32782/2520-2200/2020-3-41

13. Кабаченко Д. В. Прийняття управлінських рішень в умовах невизначеності та ризику. *Економічний вісник*. 2017. № 2. С. 107–115. URL: https://ev.nmu.org.ua/docs/2017/2/EV20172_107-115.pdf (дата звернення: 28.07.2025).

14. Криклій О. А., Москаленко А. О. Вплив невизначеності на ліквідність банківської системи України. *Ефективна економіка*. 2020. № 11. https://doi.org/10.32702/2307-2105-2020.11.57

15. Dautović E., Gambacorta L., Reghezza A. Supervisory policy stimulus: evidence from the euro area dividend recommendation. *BIS Working Papers*. No. 1085. 29 March 2023. URL: https://www.bis.org/publ/work1085.htm (дата звернення: 28.07.2025).

16. Saaty T. L., Vargas L. Models, Methods, Concepts & Applications of the Analytic Hierarchy Process. Second edition. 2022. Publisher: Springer. https://doi.org/10.1016/0270-0255(87)90473-8

17. Poltorak A., Ahafonov A. Conceptual Foundations for Evaluating the Effectiveness of Security-Oriented Management in Commercial Banks. *Інвестиції: практика та досвід*. 2025. № 4. С. 32–41. https://doi.org/10.32702/2306-6814.2025.4.32

18. Полторак А. С., Каземирчик М. С., Поліщук А. І. Пріоритетні загрози фінансовій безпеці в умовах трансформаційних процесів у сучасній економіці. *Modern Economics*. 2020. № 24(2020). С. 157–163. https://doi.org/10.31521/modecon.V24(2020)-25

19. Полторак А. С. Теоретична концептуалізація фінансової безпеки держави. *Фінансовий простір*. 2020. № 4. С. 27–37. https://doi.org/10.18371/fp.4(40).2020.221669

4 References

1. Board of the National Bank of Ukraine. (2018). On the approval of the Regulation on the organization of the risk management system in banks of Ukraine and banking groups (Resolution dated June 11, 2018, No. 64). Retrieved from: https://zakon.rada.gov.ua/laws/show/v0064500-18#n16 [in Ukrainian]

2. Verkhovna Rada of Ukraine. (2000). On banks and banking activity: Law of Ukraine No. 2121-III. Retrieved from: https://zakon.rada.gov.ua/laws/card/2121-14 [in Ukrainian]

3. Verkhovna Rada of Ukraine. (1999). On the National Bank of Ukraine: Law of Ukraine No. 679-XIV. Retrieved from: https://zakon.rada.gov.ua/laws/card/679-14 [in Ukrainian]

4. Board of the National Bank of Ukraine. (2019). On the approval of the Regulation on the organization of the internal control system in banks of Ukraine and banking groups. Retrieved from: https://zakon.rada.gov.ua/laws/show/v0088500-19#n6 [in Ukrainian]

5. Board of the National Bank of Ukraine. (2016). On the approval of the Regulation on the determination by banks of Ukraine of the amount of credit risk for active banking operations. Retrieved from: https://zakon.rada.gov.ua/laws/show/v0351500-16#Text [in Ukrainian]

6. Board of the National Bank of Ukraine. (2009). On the approval of the Methodological Recommendations regarding the procedure for stress testing in banks of Ukraine. Retrieved from: https://zakon.rada.gov.ua/laws/show/v0460500-09#Text [in Ukrainian]

7. Basel Committee on Banking Supervision. (2023). Core principles for effective banking supervision. Retrieved from: https://www.bis.org/bcbs/publ/d551.pdf

8. Canepa, F., & Aguado, J. (2025). ECB supervisors focus on risks from tariffs to cyber attacks, central bank sources say. *Reuters*. Retrieved from: https://www.clipr.cc/fzqL9

9. Supervisory Board of the European Central Bank. (n.d.). Supervisory priorities 2025-27. Retrieved from: https://www.clipr.cc/sCJ5h

10. International Organization for Standardization. (2018). ISO 31000:2018 – Risk management – Guidelines. Retrieved from: https://www.iso.org/standard/65694.html#lifecycle

11. Knight, F. H. (2012). Risk, uncertainty and profit. Mineola, NY: Dover Publications.

12. Reshetylo, V. P., & Fedotova, Y. V. (2020). Uncertainty and risk: Relationship of concepts and specifics of decision-making. *Problems of System Approach in Economics*, 3(2), 149–154. https://doi.org/10.32782/2520-2200/2020-3-41 [in Ukrainian]

13. Kabachenko, D. V. (2017). Managerial decision-making under uncertainty and risk. *Economic Bulletin,* (2), 107–115. Retrieved from: https://ev.nmu.org.ua/docs/2017/2/EV20172_107-115.pdf [in Ukrainian]

14. Krykliy, O. A., & Moskalenko, A. O. (2020). The impact of uncertainty on the liquidity of the banking system of Ukraine. *Effective Economics,* (11). https://doi.org/10.32702/2307-2105-2020.11.57 [in Ukrainian]

15. Dautović, E., Gambacorta, L., & Reghezza, A. (2023). Supervisory policy stimulus: Evidence from the euro area dividend recommendation. *BIS Working Papers,* No. 108. Retrieved from: https://www.bis.org/publ/work1085.htm

16. Saaty, T. L., & Vargas, L. (2022). Models, methods, concepts & applications of the Analytic Hierarchy Process (2nd ed.). Springer. https://doi.org/10.1016/0270-0255(87)90473-8

17. Poltorak, A., & Ahafonov, A. (2025). Conceptual foundations for evaluating the effectiveness of security-oriented management in commercial banks. *Investments: Practice and Experience*, 4, 32–41. https://doi.org/10.32702/2306-6814.2025.4.32

18. Poltorak, A. S., Kazemirchik, M. S., & Polishchuk, A. I. (2020). Priority threats to financial security under transformational processes in the modern economy. *Modern Economics,* 24, 157–163. https://doi.org/10.31521/modecon.V24(2020)-25 [in Ukrainian]

19. Poltorak, A. S. (2020). Theoretical conceptualization of the state's financial security. *Financial Space,* 4, 27–37. https://doi.org/10.18371/fp.4(40).2020.221669 [in Ukrainian]