AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Business Management, Economics and Banking
ISSN (E): 2832-8078 Volume 48, May- 2026

CONTEMPORARY APPROACHES TO ENHANCING CREDIT RISK MANAGEMENT MECHANISMS IN THE BANKING SYSTEM OF UZBEKISTAN

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ABSTRACT

The increasing complexity of banking operations, rapid digital transformation, and growing economic uncertainty have significantly increased the importance of effective credit risk management in modern banking systems. This study examines contemporary approaches to enhancing credit risk management mechanisms in the banking system of Uzbekistan. The research analyzes existing credit risk management practices, identifies key challenges affecting the quality of risk assessment, and evaluates international experiences related to Basel III standards, IFRS 9 requirements, artificial intelligence, machine learning, and early warning systems. The study employs comparative, analytical, and statistical methods to assess current trends in credit risk management and banking sector stability. Based on the findings, practical recommendations are proposed to improve credit risk assessment procedures, strengthen risk monitoring systems, and increase the resilience of commercial banks. The results indicate that the integration of advanced digital technologies and international risk management standards can significantly enhance the effectiveness of credit risk management and contribute to the sustainable development of Uzbekistan's banking sector.

KEYWORDS

Credit risk management, banking system, commercial banks, credit risk assessment, Basel III, IFRS 9, artificial intelligence, machine learning, non-performing loans, financial stability, Uzbekistan.

Introduction

In today's rapidly evolving financial environment, effective credit risk management has become a key factor in ensuring the stability and sustainable development of banking systems. Credit risk, arising from a borrower's inability to fulfill financial obligations, remains one of the most significant risks faced by commercial banks. The increasing complexity of financial markets, digital transformation, and growing economic uncertainties have encouraged banks worldwide to adopt advanced risk assessment and monitoring techniques. International regulatory frameworks, including Basel III and IFRS 9, emphasize the importance of modern credit risk management mechanisms to strengthen financial resilience and reduce potential losses [1].

In Uzbekistan, ongoing banking sector reforms and the expansion of lending activities have increased the importance of improving credit risk management practices. Although commercial banks have introduced various risk control measures, challenges related to non-performing loans, risk

concentration, and the application of advanced analytical tools remain. Therefore, studying contemporary approaches such as artificial intelligence, big data analytics, predictive modeling, and early warning systems is essential for enhancing the effectiveness of credit risk management mechanisms [2]. This study aims to examine the current state of credit risk management in Uzbekistan's banking system and propose practical recommendations based on international best practices.

Literature review on topic

Research on contemporary approaches to credit risk management in banking systems has been widely conducted by foreign and domestic economists, banking specialists, and financial researchers.

Italian scholars Porretta, Letizia, and Santoboni examined the relationship between credit risk management, IFRS 9, and Basel III requirements in commercial banks [3]. The authors concluded that the Expected Credit Loss (ECL) approach enhances the early identification of credit risk and strengthens the resilience of banking institutions against potential loan losses. In our view, this approach provides an important methodological basis for improving credit risk management mechanisms in Uzbekistan's banking sector.

German researchers Markus Behn and Cyril Couaillier investigated the effectiveness of IFRS 9-based credit risk provisioning practices in European banks [4]. Their findings indicate that forward-looking credit risk assessment models contribute to more timely recognition of deteriorating loan quality and improve the stability of banking systems during periods of economic uncertainty.

British financial scholars associated with the Basel Committee on Banking Supervision emphasized that risk-sensitive capital requirements and advanced credit risk assessment frameworks play a critical role in maintaining banking sector stability [5]. According to their research, the integration of Basel III standards into banking operations significantly improves risk monitoring and supervisory effectiveness.

Serbian researcher Nenad Milojević analyzed the prospects of artificial intelligence and machine learning in banking risk management [6]. The scholar highlighted that AI-based credit scoring systems enhance the accuracy of borrower evaluation, reduce information asymmetry, and improve the prediction of potential defaults. These findings demonstrate the growing importance of digital technologies in modern credit risk management.

Researchers Branka Hadji Misheva, Joerg Osterrieder, Ali Hirsa, Onkar Kulkarni, and Stephen Fung Lin examined the application of Explainable Artificial Intelligence (XAI) in credit risk assessment [7]. Their study revealed that transparent and interpretable machine-learning models increase the reliability of credit decisions while ensuring regulatory compliance and stakeholder confidence.

Uzbek economist Shodmonqul Elmirzayev studied modern approaches to banking risk management and corporate finance under market economy conditions [8]. The scholar emphasized that effective credit risk management contributes to improving financial sustainability and increasing the competitiveness of commercial banks.

Uzbek economist Bahodir Khodiyev researched financial sector reforms and banking development in Uzbekistan [9]. According to the scholar, the introduction of international banking standards and advanced risk management practices is essential for enhancing the efficiency and stability of the national banking system.

Despite the significant contributions of these scholars, the rapid digitalization of financial services, the emergence of artificial intelligence technologies, and the growing complexity of credit markets indicate that further research on contemporary approaches to enhancing credit risk management mechanisms in the banking system of Uzbekistan remains highly relevant.

Research methodology

This study employs a comprehensive research methodology based on qualitative and quantitative approaches to examine contemporary mechanisms of credit risk management in the banking system of Uzbekistan. The research utilizes methods such as scientific abstraction, comparative analysis, systematic approach, and logical reasoning to evaluate theoretical and practical aspects of credit risk management. Statistical and analytical methods are applied to assess the dynamics of credit portfolios, non-performing loans, and banking sector stability indicators. Furthermore, international best practices related to Basel III standards, IFRS 9 requirements, artificial intelligence, machine learning, and early warning systems are analyzed and compared with existing practices in Uzbekistan. Based on the findings, practical recommendations are developed to improve the efficiency of credit risk management mechanisms and strengthen the sustainability of the national banking system.

Analysis and discussion of results

In recent years, Uzbekistan's banking sector has experienced significant growth in lending activities as a result of economic reforms, increasing investment demand, and the expansion of financial services. The rapid growth of credit portfolios has enhanced the role of commercial banks in financing economic development while simultaneously increasing exposure to credit risk. Therefore, monitoring the quality of loan portfolios and the level of non-performing loans (NPLs) has become one of the key indicators of banking sector stability.

According to the Central Bank of the Republic of Uzbekistan, the total loan portfolio of commercial banks reached UZS 533.1 trillion as of January 1, 2025, while the volume of non-performing loans amounted to UZS 21.2 trillion. As a result, the average NPL ratio in the banking sector stood at 4.0 percent, indicating a relatively moderate level of credit risk by international standards [10]. At the same time, state-owned banks accounted for a significant share of total lending activities, suggesting that the concentration of credit risk remains relatively high within several large financial institutions.

Table 1. Key Credit Risk Indicators of Uzbekistan's Banking Sector (2020–2024)

Indicators	2020	2021	2022	2023	2024
Total loan portfolio (trln UZS)	276.9	326.4	392.1	462.8	533.1
Growth rate of loan portfolio (%)	31.2	17.9	20.1	18	15.2
Non-performing loans (trln UZS)	13.8	14.2	16.9	19.4	21.2
NPL ratio (%)	5	4.4	4.3	4.2	4
Loan loss reserves (trln UZS)	17.4	19.6	23.8	27.5	31.7
Capital adequacy ratio (%)	18.4	17.5	17.8	17.9	17.3
Return on Assets (ROA, %)	1.5	2.1	2.3	2.4	2.2
Return on Equity (ROE, %)	10.2	14.8	16.1	16.9	15.8

**Compiled by the author based on data from the Central Bank of the Republic of Uzbekistan.*

Table 1 demonstrates that the loan portfolio of Uzbekistan's banking sector increased from UZS 276.9 trillion in 2020 to UZS 533.1 trillion in 2024, reflecting substantial growth in lending activities. Despite this expansion, the NPL ratio declined from 5.0 percent to 4.0 percent, indicating improvements in credit portfolio quality and risk management practices. Furthermore, the capital adequacy ratio remained above regulatory requirements throughout the analyzed period, confirming the resilience of the banking sector against potential credit losses. At the same time, the continuous increase in loan loss reserves suggests that commercial banks are strengthening their risk mitigation mechanisms in accordance with international standards.

The effectiveness of credit risk management largely depends on the quality of borrower assessment procedures, monitoring systems, collateral management, and compliance with international regulatory standards. In recent years, commercial banks in Uzbekistan have implemented significant reforms aimed at improving risk management practices. The introduction of centralized credit history databases, digital lending platforms, and IFRS 9 requirements has strengthened the overall risk assessment framework. However, differences remain among banks regarding the sophistication of credit scoring models, risk monitoring tools, and data analytics capabilities.

Table 2. Assessment of Existing Credit Risk Management Mechanisms in Uzbekistan's Banking Sector

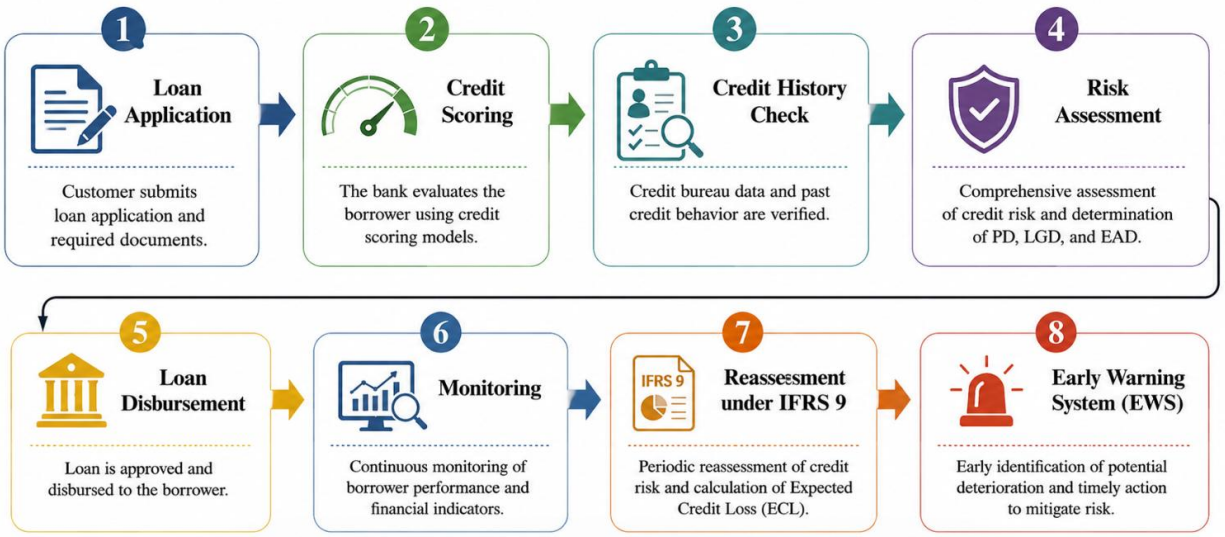
Risk Management Component	Current Status	Strengths	Existing Challenges
Credit Scoring System	Widely implemented in retail lending	Faster credit decisions, reduced operational costs	Limited use of AI and alternative data
Credit History Assessment	Based on Credit Bureau databases	Improved borrower transparency	Incomplete information on some borrowers
Collateral Management	Traditional collateral-based approach	Reduces potential loan losses	Overreliance on collateral valuation
Loan Monitoring System	Periodic monitoring procedures	Early identification of repayment issues	Limited real-time monitoring capabilities
IFRS 9 Implementation	Gradually introduced across banks	Better provisioning and risk recognition	Complexity of ECL model calculations
Stress Testing Practices	Conducted by major banks	Assessment of adverse scenarios	Lack of advanced scenario modeling
Digital Risk Management Tools	Expanding across the sector	Improved efficiency and data processing	Uneven adoption among banks

**Compiled by the author based on data from the Central Bank of Uzbekistan and commercial banks' annual reports.*

The analysis indicates that Uzbekistan's banking sector has established a relatively comprehensive credit risk management framework. Credit scoring systems and credit history databases have improved the quality of lending decisions, while IFRS 9 implementation has enhanced the recognition of potential credit losses. Nevertheless, many banks continue to rely heavily on traditional risk assessment methods, particularly collateral-based lending approaches. Furthermore, the limited application of

artificial intelligence, machine learning algorithms, and real-time monitoring systems constrains the ability of banks to identify emerging risks at an early stage.

The findings suggest that the modernization of credit risk management mechanisms should focus on the integration of advanced analytical technologies, enhancement of predictive risk models, and expansion of digital monitoring systems. Such measures would contribute to more accurate borrower assessment, improved portfolio quality, and greater resilience of the banking sector against future financial shocks [11].



** Developed by the author based on Basel Committee on Banking Supervision (2000), IFRS Foundation (2014), and the practices of commercial banks in Uzbekistan*

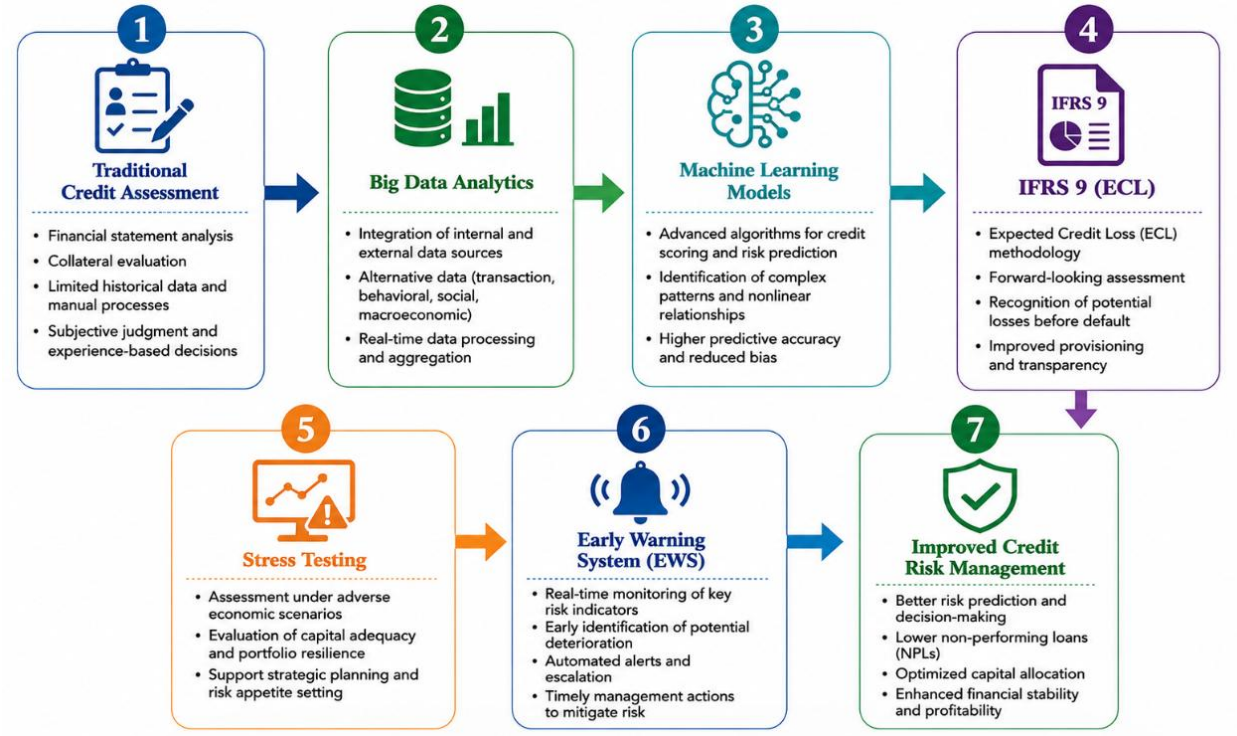
Figure 1. Credit risk management process in the banking system

Figure 1 illustrates the sequential process of credit risk management in the banking system, beginning with loan application and borrower assessment and ending with the Early Warning System (EWS). The framework demonstrates that effective credit risk management is based not only on initial credit scoring and credit history verification but also on continuous monitoring and periodic reassessment in accordance with IFRS 9 requirements. The integration of monitoring, Expected Credit Loss (ECL) assessment, and early warning mechanisms enables banks to identify potential repayment problems at an early stage, reduce the likelihood of non-performing loans, and improve the overall quality of credit portfolios. Consequently, the implementation of this integrated risk management process contributes to enhancing the financial stability and sustainability of the banking sector.

International experience demonstrates that effective credit risk management increasingly relies on advanced digital technologies and risk-sensitive regulatory frameworks. Leading banking systems in the United States, the European Union, and Asian countries have adopted Basel III standards and IFRS 9 requirements to improve credit risk assessment and strengthen financial stability. In particular, the Expected Credit Loss (ECL) model enables banks to recognize potential losses before actual default occurs, thereby enhancing the quality of risk provisioning and portfolio management. Furthermore, the implementation of stress testing and risk-based supervision has improved the ability of financial institutions to withstand adverse economic conditions.

In recent years, artificial intelligence (AI), machine learning (ML), big data analytics, and Early Warning Systems (EWS) have emerged as key components of modern credit risk management. These

technologies allow banks to process large volumes of customer data, predict default probabilities more accurately, and identify signs of financial distress at an early stage. Compared with traditional credit assessment methods, AI-driven models provide faster decision-making, improved prediction accuracy, and more effective risk monitoring. Therefore, the integration of innovative digital solutions into Uzbekistan's banking sector could significantly enhance the efficiency of credit risk management mechanisms and reduce the level of non-performing loans.



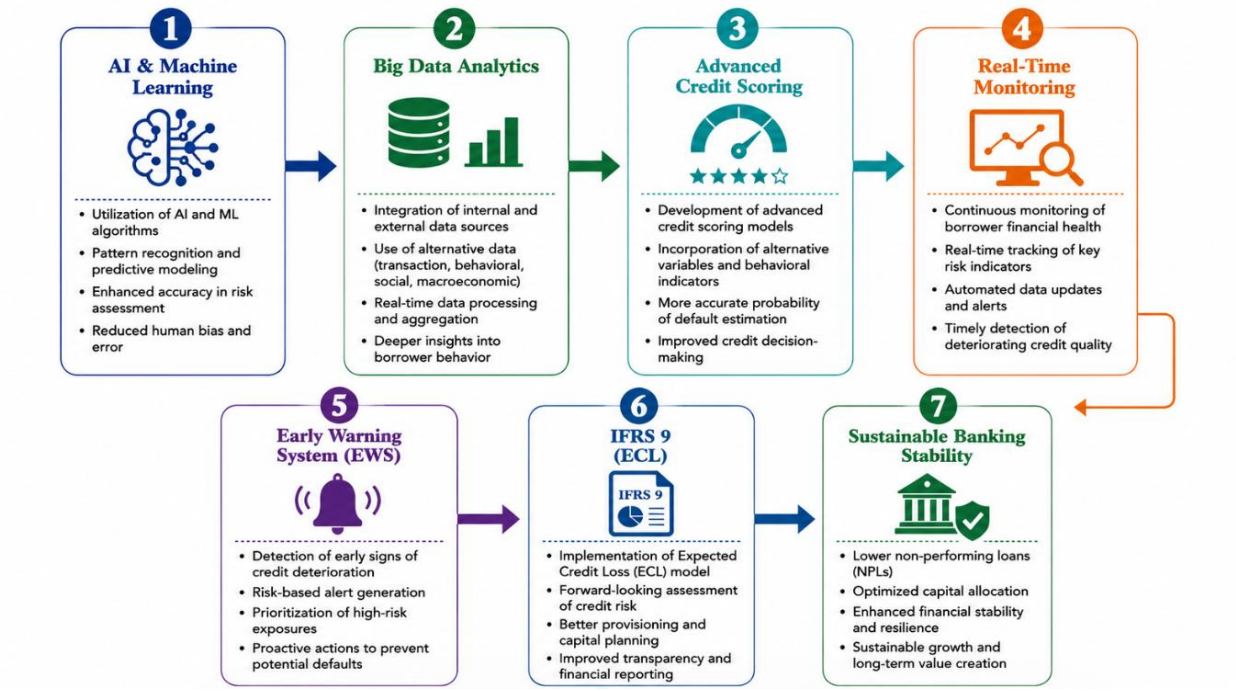
**Developed by the author based on Basel Committee on Banking Supervision (2011), IFRS Foundation (2014), Milojević (2021), and Hadji Misheva et al. (2021)*

Figure 2. Contemporary approaches to credit risk management

Figure 2 illustrates the evolution of credit risk management from traditional assessment techniques toward data-driven and technology-based approaches. The integration of big data, machine learning, IFRS 9-based provisioning, and early warning systems enables banks to improve risk prediction accuracy, strengthen monitoring processes, and enhance overall portfolio quality. As a result, these contemporary approaches contribute to reducing credit losses and increasing the resilience of banking institutions in a rapidly changing financial environment.

Based on the analysis, several measures can be proposed to improve credit risk management mechanisms in Uzbekistan's banking sector. First, commercial banks should expand the use of artificial intelligence and machine learning technologies in credit scoring and risk assessment processes to increase the accuracy of default predictions and reduce information asymmetry. Second, the integration of Big Data analytics and alternative data sources, including transaction histories, digital payments, and customer behavioral information, would enhance the quality of borrower evaluation. Third, banks should strengthen Early Warning Systems (EWS) by implementing real-time monitoring tools capable of identifying potential credit deterioration at an early stage. Furthermore, the full implementation of IFRS 9 requirements and advanced Expected Credit Loss (ECL) models would improve credit loss provisioning and portfolio quality. Finally, continuous staff training, development of risk management

culture, and further alignment with Basel III standards are essential for strengthening financial stability and ensuring the sustainable development of Uzbekistan's banking system.



**Developed by the author based on the research findings*

Figure 3. Proposed Model for Enhancing Credit Risk Management in Uzbekistan

The analysis demonstrates that Uzbekistan's banking sector has made notable progress in strengthening credit risk management mechanisms through the adoption of international standards and modern risk assessment practices. Nevertheless, challenges related to credit portfolio concentration, information quality, and the limited application of advanced digital technologies continue to affect the effectiveness of risk management processes. The findings indicate that the integration of artificial intelligence, big data analytics, advanced credit scoring models, real-time monitoring systems, and IFRS 9-based risk assessment approaches can significantly improve the accuracy of credit risk prediction and early detection of potential loan deterioration. Therefore, the modernization of credit risk management mechanisms should be considered a strategic priority for enhancing banking sector stability, reducing non-performing loans, and ensuring sustainable financial development in Uzbekistan.

Conclusion and suggestions

This study analyzed contemporary approaches to enhancing credit risk management mechanisms in the banking system of Uzbekistan. The findings revealed that despite the positive development of the banking sector and the gradual implementation of international regulatory standards, several challenges continue to affect the efficiency of credit risk management. These challenges include credit portfolio concentration, limitations in risk assessment methodologies, and the insufficient application of advanced digital technologies. The study also demonstrated that modern approaches such as artificial intelligence, machine learning, big data analytics, IFRS 9-based Expected Credit Loss models, and Early Warning Systems can significantly improve the quality of credit risk assessment and monitoring. Therefore, the modernization of credit risk management mechanisms is essential for strengthening financial stability and ensuring the sustainable development of Uzbekistan's banking sector.

Based on the research findings, the following recommendations are proposed:

1. Commercial banks should introduce AI- and machine learning-based credit scoring models to improve the accuracy of borrower assessment and reduce default risk.
2. The use of big data analytics and alternative data sources should be expanded to enhance the effectiveness of creditworthiness evaluation and risk forecasting.
3. Banks should strengthen real-time monitoring systems and integrate advanced Early Warning Systems (EWS) to identify potential credit deterioration at an early stage.
4. The implementation of IFRS 9 requirements should be improved through the wider application of forward-looking Expected Credit Loss (ECL) models.
5. Credit portfolios should be further diversified to reduce concentration risk and improve resilience to sector-specific economic shocks.
6. Regular stress testing procedures should be enhanced to assess the banking sector's ability to withstand adverse macroeconomic scenarios.
7. Continuous professional training programs should be organized for risk management specialists to improve their competencies in digital technologies and modern risk assessment techniques.
8. Greater alignment with Basel III standards and international best practices should be ensured to strengthen the overall stability and competitiveness of Uzbekistan's banking system.

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