



MECHANISMS FOR MANAGING RISKS AND IMPROVING LENDING EFFICIENCY THROUGH ARTIFICIAL INTELLIGENCE

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ABSTRACT	KEY WORDS
. This article examines mechanisms for using artificial intelligence to manage risks and improve lending efficiency in commercial banks, drawing on the banking system of Uzbekistan and the case of Aloqabank. Comparative and ratio analyses are applied to the bank's 2024 annual report and financial statements prepared under International Financial Reporting Standards, together with Central Bank statistics as of 1 March 2026. The analysis identifies the links between a unified data repository, intelligent credit scoring, expected credit loss estimation, early warning, risk-based pricing, collateral monitoring and transaction monitoring. It emphasises that loan loss allowances should reflect underlying risk, rather than be reduced as an end in themselves. Practical recommendations for Aloqabank cover the integration of artificial intelligence throughout the credit life cycle, model risk controls and the financial evaluation of pilot projects. The effectiveness of the proposed mechanisms requires separate testing and subsequent monitoring.	Artificial intelligence, commercial bank, credit risk, financial performance, credit scoring, ECL, IFRS 9, early warning system, RAROC, collateral monitoring, fraud prevention, model risk, Aloqabank.

Introduction

The expansion of commercial banks' loan portfolios increases the need to assess borrowers' creditworthiness, identify repayment difficulties at an early stage and use capital efficiently. Accelerating lending while maintaining risk controls requires reliable data, consistent assessment methods and timely management decisions. Artificial intelligence (AI) can bring these functions together, but its benefits depend on data quality and the way it is integrated into banking processes. The strategy approved by Presidential Resolution No. PQ-358 of the Republic of Uzbekistan, dated 14 October 2024, established an institutional basis for developing AI technologies across the economy [1]. In banking, these tools must be used within the legal framework governing banking activities, credit information exchange, personal data and banking secrecy [2–5].¹

¹ President of the Republic of Uzbekistan. Resolution No. PQ-358 of 14 October 2024, On Approval of the Strategy for the Development of Artificial Intelligence Technologies until 2030. Available at: <https://lex.uz/docs/-7158604>.

This article aims to develop mechanisms through which AI can support credit risk assessment and improve the financial outcomes of lending. To this end, it examines developments in the banking system, analyses Aloqabank's loan portfolio and operating indicators, and sets out stages for implementation. The study focuses on commercial banks' lending and risk management activities, particularly the relationship between AI, decision quality, costs and risk-adjusted returns.

The study uses comparative analysis, ratio analysis, a systems approach and a case study. Its evidence base comprises Central Bank indicators for March 2025 and March 2026, together with Aloqabank's 2024 annual report and consolidated financial statements [6–9]. Aggregate reports do not allow the causal effect of AI to be isolated. The analysis therefore assesses the rationale for implementation and develops the proposed mechanisms.

MAIN ANALYSIS

Theoretical and institutional foundations of bank risk management

AI can support bank risk management by consolidating customer and transaction data, estimating potential losses and providing evidence for staff decisions. A credit scoring model classifies borrowers by risk; a monitoring model tracks changes in their financial position; and transaction analysis prioritises operations requiring investigation. These functions become more useful when they operate within a common data and control framework.

For customers with limited credit histories, lawfully obtained information on cash flows and repayment behaviour may provide additional signals. However, more data do not automatically improve model accuracy. Duplicate records, incorrectly labelled defaults or the underrepresentation of particular groups in the sample can distort decisions. Model outputs therefore need to be explainable, and material exceptions should be reviewed by authorised specialists.

The Central Bank's roadmap for 2025–2028 provides for improvements in banks' corporate governance and risk management systems, fuller implementation of Basel III requirements and the development of risk-based supervision [10]. These priorities reinforce the need to improve banks' internal analytical capabilities. The roadmap should not, however, be interpreted as imposing a direct obligation on every bank to use AI.

Developments in Uzbekistan's banking system

As of 1 March 2026, banking system assets had reached UZS 932,347 billion, loans UZS 613,701 billion and deposits UZS 421,877 billion. Table 1 compares these amounts with the corresponding date one year earlier [6]. Faster growth in deposits than in loans indicates a change in the funding base. Credit quality nevertheless requires a separate assessment of arrears, borrowers' cash flows and credit losses.

Table 1 Key indicators of Uzbekistan's banking system

Indicator	1 March 2025	1 March 2026	Change
Assets, UZS billion	780,232	932,347	19.5%
Loans, UZS billion	540,022	613,701	13.6%
Deposits, UZS billion	319,375	421,877	32.1%
Loan-to-deposit ratio, %	169.1	145.5	–23.6 pp

Source: Author's calculations based on Central Bank data [6]. Growth rates and ratios are rounded to one decimal place; pp denotes percentage points. UZS denotes the Uzbek soum.²

Aloqabank's indicators as of 1 March 2026 also establish the scale of the analysis: assets amounted to UZS 32,693 billion, loans to UZS 20,265 billion, capital to UZS 3,890 billion and deposits to UZS 15,609 billion [7]. These figures illustrate the practical importance of monitoring risks by segment and regularly reviewing decision quality.

Lending and risk management at Aloqabank

Aloqabank's 2024 annual report records assets of UZS 23,251.3 billion, equity of UZS 3,082.2 billion, return on assets (ROA) of 1.0% and return on equity (ROE) of 6.6% [8]. Potential improvements in profitability should be assessed alongside funding costs, operating expenses, credit losses and the composition of capital. These indicators do not, by themselves, establish that their levels result from the absence of AI implementation.

The consolidated financial statements prepared under International Financial Reporting Standards (IFRS) report gross loans of UZS 13,465,306 million, a loan loss allowance of UZS 423,388 million and net loans of UZS 13,041,918 million at the end of 2024 [9]. The author calculates the allowance-to-gross-loans ratio at 3.14%. This represents the allowance recognised relative to the loan portfolio and should not be equated with the non-performing loan ratio.³

Table 2 Aloqabank's lending and risk indicators for 2024

Indicator	Value	Period and source
Assets, UZS billion	23,251.3	31 December 2024, annual report [8]
ROA / ROE, %	1.0 / 6.6	2024, annual report [8]
Gross loans, UZS million	13,465,306	31 December 2024, IFRS [9]
Loan loss allowance, UZS million	423,388	31 December 2024, IFRS [9]
Net loans, UZS million	13,041,918	31 December 2024, IFRS [9]
Allowance / gross loans, %	3.14	Author's calculation based on [9]
Active customers, thousands	More than 593.3	End of 2024 [8]
Suspicious transactions reported, number	25,340	Fourth quarter of 2024 [8]

Source: Aloqabank's annual report [8] and consolidated financial statements prepared under IFRS [9]. IFRS denotes International Financial Reporting Standards.

² Calculation methods: growth = $(2026 \text{ value} / 2025 \text{ value} - 1) \times 100$; loan-to-deposit ratio = $\text{loans} / \text{deposits} \times 100$. The official table presents these ratios rounded to whole percentages as 169% and 145%.

³ Joint-Stock Commercial Aloqabank. Consolidated Financial Statements, 31 December 2024. Note 9: Loans and Advances to Customers. Allowance ratio: $423,388 / 13,465,306 \times 100 = 3.14\%$. Amounts in the statements are expressed in UZS million.

The loan portfolio of UZS 12,944.3 billion reported in the annual report and the gross and net loan balances in the IFRS financial statements are based on different accounting bases [8; 9]. They should therefore not be treated as interchangeable values of the same indicator. Before comparing portfolio figures, the scope of consolidation, the definition of loans and the treatment of loss allowances must be reconciled.

The bank had more than 593.3 thousand active customers. The annual report defines an active customer as one whose account recorded turnover during the preceding six months [8]. This customer base offers opportunities for transaction analysis, but the availability of data suitable for model training requires separate assessment. Matching customer identifiers, checking data completeness and distinguishing information available at the time of the decision are essential steps.

The annual report states that 25,340 suspicious transactions were reported to the designated state authority in the fourth quarter of 2024 [8]. This figure reflects the volume of transaction review and reporting, rather than the number of confirmed fraud cases. AI performance in this process should be assessed through the proportion of valid alerts, review time and missed high-risk cases, as well as the number of alerts generated.⁴

Mechanisms for managing risks through artificial intelligence

The first mechanism is the development of a unified data repository. Data from the core banking system, card transactions, credit bureau, collateral register, recovery outcomes and transaction monitoring are linked through customer identifiers. Each data item is assigned a source, update frequency, permitted purpose and access level. The use of credit information, personal data and information protected by banking secrecy must have an appropriate legal basis [3–5].

The second mechanism links credit scoring to lending terms. The model estimates a borrower's probability of default and recommends credit limits, interest rates, collateral requirements and monitoring intensity within the bank's credit policy. Implementation requires clear authority for lending decisions and approval of exceptions, together with a documented rationale for decisions.

The third mechanism improves the estimation of expected credit losses. A simplified expression for expected credit loss (ECL) is:

$$ECL = PD \times LGD \times EAD \times DF$$

Here, PD is the probability of default; LGD is loss given default; EAD is exposure at default; and DF is the discount factor. This expression is an illustrative model for a single period and scenario. In practice, IFRS 9 requires consideration of the relevant measurement horizon, forward-looking information, probability-weighted scenarios and discounting [9]. More accurate estimation may increase allowances in some segments; the objective is to align allowances with underlying risk.

The fourth mechanism is an early warning system (EWS). The system alerts responsible staff when a customer's account turnover falls below its normal seasonal level, arrears recur or the debt burden increases. Each alert should lead to a defined action, such as contacting the customer, conducting further analysis, intensifying monitoring or assessing restructuring options. Unless the response to each alert is documented, forecasts cannot be translated into traceable management outcomes.

⁴ Aloqabank's 2024 annual report, p. 19. In addition to 21,510 suspicious transactions, the report identifies 3,830 transactions initially flagged for review and subsequently classified as suspicious, giving a total of 25,340 reported transactions. Reporting a transaction as suspicious does not establish that a criminal offence has occurred.

The fifth mechanism is risk-based pricing. Loan income is assessed against funding costs, operating expenses, expected losses and economic capital. This relationship can be expressed through a simplified measure of risk-adjusted return on capital (RAROC):

$$RAROC = \frac{D - R - O - EL}{EC}$$

Here, D is interest and fee income; R is funding costs; O is operating expenses; EL is expected credit loss; and EC is economic capital. The flows in the numerator must relate to the same period. The bank compares this measure with its required rate of return to assess loan pricing and credit limits. This approach supports the management of the economic return on lending alongside loan volume.

The sixth mechanism is regular monitoring of collateral values. In Aloqabank's 2024 collateral distribution, real estate accounted for 53.3% and vehicles for 25.0% [8]. Changes in market prices, depreciation, the time required to sell assets and recovery costs affect collateral's capacity to cover losses. An analytical model can identify assets requiring revaluation, while authorised specialists remain responsible for the final valuation and legal review.

The seventh mechanism strengthens fraud prevention and anti-money laundering (AML) processes. It analyses transaction networks, recurring patterns and deviations from a customer's usual activity. Model outputs serve as alerts for investigation. The model itself must also be subject to independent validation, error analysis, periodic recalibration and the maintenance of an audit trail.

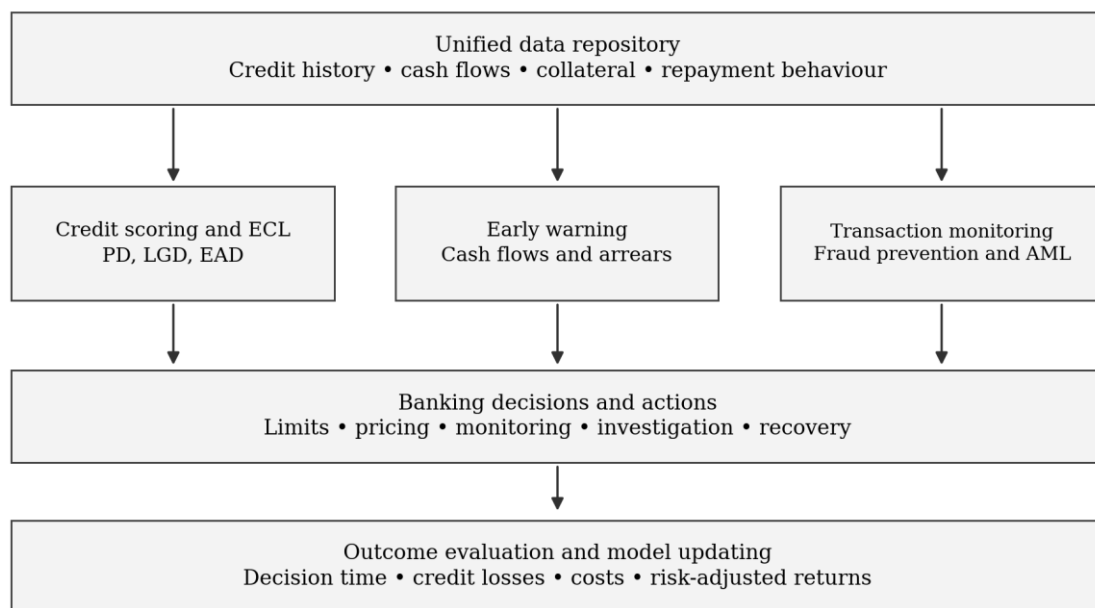


Figure 1. A mechanism for applying AI to lending and risk management

Source: Developed by the author. The diagram presents a proposed implementation framework.

Figure 1 shows the links between data, banking decisions and outcome evaluation. Actual repayments, investigation findings and recovery outcomes are fed back into model updates. Every stage requires appropriate data access rights, information security and human oversight.

Table 3 Implementation tasks and criteria for evaluating outcomes

Mechanism	Implementation task	Evaluation criterion
Unified data repository	Link customer records and verify data quality	Share of complete and reconciled records
Intelligent credit scoring	Estimate default probability and assess lending terms	Prediction error; decision time
ECL estimation	Update PD, LGD and EAD	Difference between expected and realised losses
Early warning	Detect early signs of difficulty	Warning lead time; share of valid alerts
Risk-based pricing	Align income, costs and capital	RAROC; net return on loans
Collateral monitoring	Track changes in value and liquidity	Revaluation coverage; recovery losses
Fraud prevention and AML	Prioritise high-risk transactions for review	False alert rate; review time
Model risk management	Conduct independent validation and maintain an audit trail	Model stability; errors and exceptions

Source: Developed by the author. The criteria are proposed for testing expected benefits and should not be interpreted as achieved results.

Implementation stages and evaluation of economic benefits

For Aloqabank, the first stage should involve a data inventory, data quality checks, the allocation of access rights and measurement of the existing lending process. Baseline indicators should include application processing time, staff time, the share of manual processing and arrears. This baseline provides a basis for evaluating subsequent changes.

The second stage involves a pilot project in one retail segment with sufficient data. The existing scoring system and the new model should be compared on applications assessed under equivalent conditions. Initially, the model may operate in an advisory capacity. Evaluation should account for differences in loan maturity, customer composition and economic conditions; faster processing alone should not justify wider implementation.

In the third stage, solutions demonstrating positive and stable results should be integrated into early warning, collateral monitoring and corporate lending processes. The fourth stage should strengthen integration with transaction monitoring and model oversight across the bank. Risk management, lending, compliance, information security and internal audit units should participate at every stage within their respective mandates.

The evaluation of economic benefits should account for additional income, changes in credit losses and operating cost savings, together with expenditure on software, integration, data preparation, staff training and ongoing monitoring. The effect of a one-off reassessment of loss allowances should be distinguished from recurring operating savings. ROA and ROE may serve as overall performance measures, but attributing changes in them solely to AI requires separate empirical investigation.

CONCLUSION

The analysis supports integrating AI throughout the credit life cycle. A unified data repository, credit scoring, ECL estimation, early warning, risk-based pricing, collateral monitoring and transaction monitoring can make banking decisions more consistent and auditable when they operate as a coordinated system. Realising this potential depends on data quality, organisational accountability and model oversight.

The indicators examined for Aloqabank support the need for analytical tools in managing its loan portfolio, transactions and customer relationships. However, the reported figures do not directly establish the financial benefits of AI. Differences between the accounting bases of the bank's domestic and IFRS reports must be recognised, and the ECL allowance ratio must not be confused with the non-performing loan ratio.

The practical recommendation is to establish data quality and baseline indicators, conduct a credit scoring pilot in a limited segment and expand the system only on the basis of validated results. The principal evaluation criteria are decision time, credit losses, operating costs and risk-adjusted returns.

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