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USING ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF BANKING SERVICES

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Abstract

This thesis examines the theoretical and methodological foundations, practical aspects, and economic efficiency of using artificial intelligence technologies in the development of banking services. Amidst the rapid development of the digital economy, rising demand for financial services, and intensifying competition between banks, artificial intelligence technologies are becoming one of the primary tools for modernizing the banking sector.

The study analyzes the role of artificial intelligence in credit processes, risk management, fraud detection, customer service, financial monitoring, business process automation, and strategic decision-making.

Modern AI technologies such as machine learning, natural language processing, big data, neural networks, and predictive analytics have been studied. Based on international experience, it has been substantiated that the implementation of AI reduces operating costs, increases the accuracy of credit risk assessment, improves customer service quality, and enhances the competitiveness of banks.

Key challenges in implementing AI, including data security, cyber threats, algorithmic errors, specialist shortages, and imperfect regulatory frameworks, have also been identified. The current state of AI use in the banking system of



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Uzbekistan has been assessed, and priority areas for development have been identified.

As a result, scientific and practical recommendations were developed for the effective use of AI in banking services. The research findings are of great importance for the digital transformation of the banking sector.

Keywords: Artificial intelligence, banking services, digital banking, FinTech, machine learning, Big Data, credit scoring, risk management, chatbots, digital transformation, cybersecurity.

Introduction

In recent years, the acceleration of digital transformation processes in the global economy has led to profound changes in the financial and banking system. The development of ICT, the expansion of internet services, and the rapid growth of financial technologies (FinTech) are replacing traditional banking models with innovative approaches.

Artificial intelligence is considered a key factor in the digital transformation of the banking sector. It includes technologies that enable modeling of learning, analysis, and decision-making processes.

Today, machine learning, deep learning, natural language processing, computer vision, and big data analysis technologies are widely applied in the banking sector, increasing customer service efficiency and reducing costs.

International practice shows the active use of AI in banks such as JPMorgan Chase, Bank of America, HSBC, and Citibank, especially in credit scoring, fraud detection, and process automation.



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According to World Bank and IMF data, the implementation of AI reduces operating costs and expands access to financial services. McKinsey & Company notes the significant economic effect of implementing AI in the banking sector. Uzbekistan is implementing reforms to digitalize the banking system, but the level of AI implementation remains insufficient.

Literature review

Research in the field of applying artificial intelligence (AI) in the banking sector has become particularly relevant in recent years due to the accelerated digital transformation of financial markets, the development of the FinTech ecosystem, and increasing competition between credit institutions. Modern scientific literature covers both the theoretical foundations of AI and its applied aspects in banking activities, including risk management, credit scoring, fraud prevention, and business process automation.

The fundamental foundations of artificial intelligence theory were laid in the works of Stuart Russell and Peter Norvig. In their classic work, AI is considered an interdisciplinary field aimed at creating intelligent systems capable of perceiving information, learning from data, logically analyzing, and making decisions similar to human ones. Their approach has become a theoretical basis for developing modern machine learning algorithms and neural networks that are actively used in the banking sector.

Frederic Mishkin made a significant contribution to understanding the role of financial technologies in the development of the banking system, emphasizing that the digitalization of financial services contributes to increasing the efficiency of monetary policy, the stability of the banking system, and reducing information asymmetry in financial markets. In his opinion, the implementation of digital



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technologies, including elements of artificial intelligence, allows banks to more accurately assess borrowers' creditworthiness and improve the quality of financial intermediation.

In World Bank reports, artificial intelligence is considered a key tool for expanding financial inclusion. It is noted that AI technologies allow for the coverage of previously inaccessible categories of the population through alternative methods for assessing creditworthiness, including analysis of digital traces, transactional activity, and behavioral data. This contributes to expanding access to financial services in developing countries and increasing the level of economic inclusion.

The International Monetary Fund (IMF) focuses on the role of AI in increasing the resilience of financial systems. According to his research, machine learning algorithms are capable of significantly improving credit risk management, financial flow monitoring, and early detection of potential crisis phenomena. It also emphasizes the importance of AI in automatically detecting fraudulent transactions and reducing the level of financial losses for banks.

The Organization for Economic Cooperation and Development (OECD) analyzes the impact of artificial intelligence on the transformation of financial markets and the innovative development of the banking sector. OECD studies note that the implementation of AI contributes to the formation of new business models based on financial service personalization, intelligent data analysis, and automated decision-making. This leads to increased competition and the acceleration of innovative processes in the banking sector.

Major consulting firms such as McKinsey & Company, Deloitte, and PwC confirm the significant economic impact of implementing AI in banking activities in their analytical reports. According to their estimates, the use of artificial



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intelligence technologies allows for a 20-30% reduction in bank operating costs, an increase in employee productivity, accelerated processing of customer requests, and improved service quality. Special attention is paid to the use of chatbots, virtual assistants, and automated decision-making systems.

In turn, the Bank for International Settlements (BIS) draws attention not only to the advantages but also to the potential risks of implementing AI in the banking sector. Among the main challenges are the opacity of algorithms ("black box problem"), the risk of errors in machine learning models, as well as threats to cybersecurity and personal data protection. The BIS emphasizes the need to develop effective regulatory mechanisms that ensure a balance between innovation and financial stability.

Additionally, scientific literature emphasizes that the successful implementation of artificial intelligence in the banking sector requires not only technological modernization but also institutional changes. This includes developing the regulatory framework, training qualified specialists in data science, and creating a sustainable digital infrastructure.

Thus, an analysis of existing scientific and analytical sources shows that artificial intelligence is one of the key factors in the transformation of the modern banking sector, having a comprehensive impact on the efficiency, sustainability, and competitiveness of financial institutions.

Research methodology

This study employs a comprehensive interdisciplinary scientific approach based on the combination of theoretical and empirical analysis methods. This approach is due to the complexity of the object under study—the processes of



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implementing artificial intelligence in the banking sector, which encompass technological, economic, organizational, and institutional aspects.

The methodological framework of the study is based on the provisions of modern economic theory, digital economy theory, financial innovation concepts, as well as scientific approaches to the analysis of big data and artificial intelligence. Particular attention is paid to the principles of system analysis, which allows for viewing banking activities as a holistic dynamic system in which AI technologies act as a factor in transforming all key processes.

The following methods were used during the study:

System analysis

It allows for viewing the banking sector as a complex multi-level system that encompasses the interaction of clients, banking institutions, regulators, and technological platforms. Based on this method, the impact of artificial intelligence on key functional blocks of banking activities is studied: lending, risk management, customer service, and internal operational processes.

Statistical analysis

It is used to process quantitative data that characterizes the effectiveness of implementing AI technologies. It is used to assess indicators such as reducing operating costs, changing the processing speed of loan applications, detecting fraudulent transactions, and the dynamics of customer service quality.

Comparative analysis

It is used to compare international experience in implementing artificial intelligence in the banking sector. Within the framework of this method, the practices of banks in developed countries (USA, Great Britain, Germany, China)



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are compared with the current level of digitalization of the banking system in Uzbekistan, which allows for the identification of advanced models and their adaptation to national conditions.

Economic analysis

It is aimed at evaluating the effectiveness of using AI in banking activities. Within this method, the costs and benefits of implementing technologies are analyzed, including their impact on bank profitability, risk reduction, increased productivity, and improved quality of financial services.

Abstraction and Logical Analysis Method

It is applied to identify general patterns in the development of banking technologies, form scientific conclusions, and generalize the results obtained. This method allows for identifying key trends in the digital transformation of the banking sector and determining promising directions for the development of artificial intelligence in the financial sector.

The information base of the study includes a wide range of sources that ensure the reliability and scientific validity of the results. It includes:

- analytical reports of the World Bank;
- publications of the International Monetary Fund (IMF);
- research from the Economic Cooperation and Development Organization (OECD);
- reports of the Bank for International Settlements (BIS);
- analytical materials from consulting companies McKinsey & Company, Deloitte, and PwC;
- statistical data of commercial banks;
- regulatory legal acts and documents in the field of banking activities.



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The use of the specified information base ensures the comprehensiveness of the analysis, the reliability of the conclusions, and the practical significance of the obtained research results.

Analysis and results

Within the framework of this study, a comprehensive analysis was conducted on the impact of artificial intelligence technologies on the development of banking services, as well as an assessment of their practical effectiveness under conditions of digital transformation in the financial sector. The primary focus is on key areas of banking activity where the application of AI has the greatest impact: lending, risk management, fraud prevention, customer service, and automation of internal processes.

The conducted analysis showed that the implementation of artificial intelligence leads to a qualitative transformation of traditional banking models. Banks are transitioning from classical information processing methods to intelligent systems based on big data analysis and machine learning algorithms. This ensures higher speed, accuracy, and adaptability of decisions made.

Main directions and effectiveness of artificial intelligence in banks

Route	Share (%)	Key result
Credit scoring and credit analysis	30%	Quick and accurate credit decision-making
Fraud detection	25%	Increase financial security
Risk management	20%	Reduction of credit risks
Customer service (chatbots)	15%	24/7 service and prompt response
Operational automation	10%	Cost reduction



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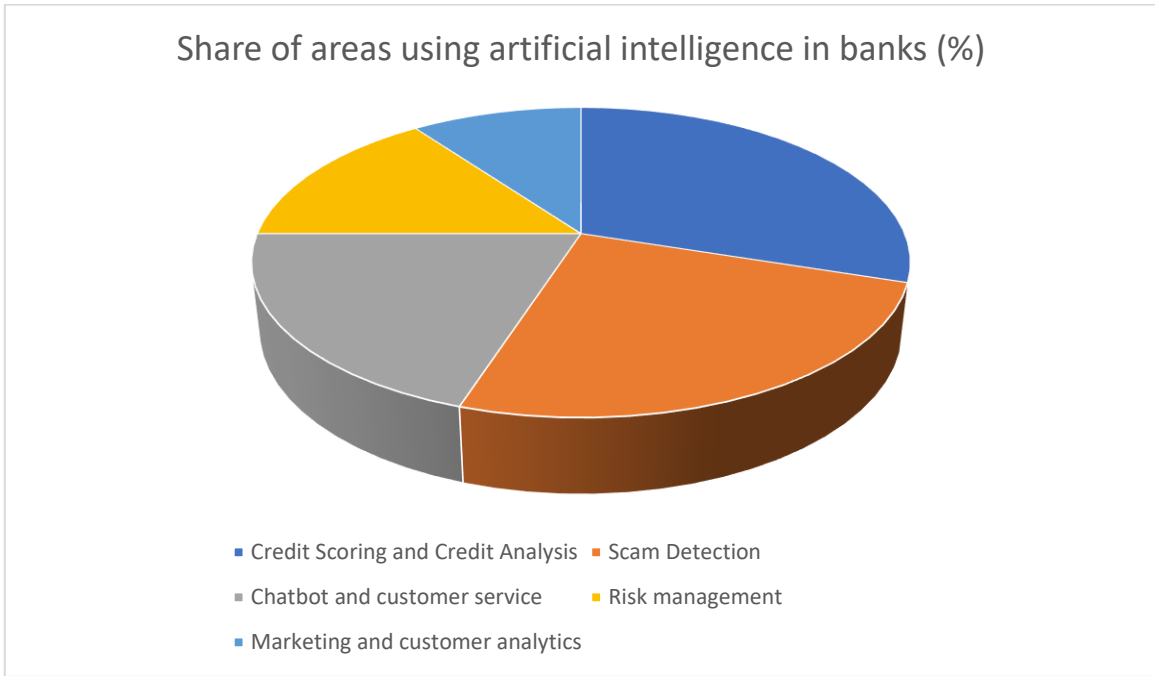
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This table reflects the main application areas of artificial intelligence technologies in the banking sector and their relative share. The largest share is accounted for by credit scoring and credit analysis (30%), which serves to accelerate and increase the accuracy of the banks' decision-making process. Fraud detection (25%) and risk management (20%) play an important role in ensuring financial security and stability. Customer service and the automation of operational processes will help improve the quality of banking services and reduce costs.

Share of areas using artificial intelligence in banks (%)



These data show that the main part of the use of artificial intelligence technologies in banks falls on the areas of credit scoring and credit analysis (30%) and fraud detection (25%). This means that banks primarily focus on reducing credit risks and ensuring financial security. Customer service and chatbot technologies also



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play an important role, contributing to the convenience and speed of banking services.

Also, as a result of the introduction of artificial intelligence technologies, the operational efficiency of banks is increasing every year. According to data from international financial institutions and consulting companies, costs in banks using artificial intelligence have decreased by an average of 20-30%, while customer satisfaction has increased by 15-25%.

In general, the conducted analysis confirms that artificial intelligence technologies are an important factor in the development of banking services, improving the quality of financial services, increasing the efficiency of risk management, and strengthening the competitiveness of banks. At the same time, issues such as data security, technological infrastructure, and a lack of qualified specialists remain the main limitations in the process of widespread implementation of artificial intelligence.

Conclusion

The conducted study made it possible to comprehensively examine the role and significance of artificial intelligence technologies in developing banking services under conditions of digital transformation of the economy. Analysis of theoretical sources, international practice, and the current state of the banking sector has shown that artificial intelligence is becoming one of the key factors in increasing the efficiency, sustainability, and competitiveness of the banking system.

The study established that the implementation of AI technologies has a significant impact on key areas of banking activity, including lending, risk management, fraud detection, customer service, and the automation of internal processes. The use of machine learning and big data analysis algorithms significantly accelerates



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information processing, increases forecasting accuracy, and reduces the impact of the human factor.

The analysis results also confirmed that the application of artificial intelligence contributes to reducing banks' operating costs, improving the quality of financial services, and increasing customer satisfaction levels. At the same time, certain problems related to the implementation of AI have been identified, such as an insufficient level of digital infrastructure, a shortage of qualified specialists, limited quality data, and the need to improve regulatory frameworks.

Thus, it can be concluded that artificial intelligence is a strategically important tool for the development of the modern banking sector and the foundation for its further digital transformation.

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