The Role and Prospects of the Use of Artificial Intelligence Technology in the Credit Activities OF Banking Institutions

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Abstract: Digitization of economic relations contributed to significant transformations in the market of financial services. Today, financial institutions actively use digital technologies in their own activities to improve work efficiency. Artificial intelligence is a technology that banks and other credit institutions are gradually using in their own work. This determines the urgency of researching new possibilities of using artificial intelligence in credit activities, primarily of banking institutions.

The article uses the methodology of economic research for research. In particular, methods of content analysis, observation, abstraction, analysis and synthesis. As a result, promising directions for the use of artificial intelligence technology in the credit activity of banking institutions were determined, which was implemented on the basis of the analysis of specific features of such activity, the specification of the essence of the specified technology and the identification of its basic characteristics.

As a result, it was established that the technology of artificial intelligence has a significant potential for use in the provision of credit services by banking institutions to various types of clients. It was also found that these institutions are already actively using the capabilities of this technology, but to a limited extent, which is due to a number of institutional restrictions and the imperfection of the technology itself. However, current trends show that in the future such obstacles will gradually disappear and the use of artificial intelligence by banking institutions will only expand.

1. INTRODUCTION

Banking institutions are important participants in the development of the financial system of any developed country and play a key role in the development of the national economy. In the modern realities of economic life, it is difficult to im-

agine the existence of financial relations in society without these institutions. Their important role in the functioning of the banking system is also determined by the need to create conditions for their continuous development.

Credit services are one of the most traditional services offered by financial institutions to their clients. In a significant number of countries, it is banking institutions that play a key role in providing loans to economic agents. Accordingly, all the risks that arise in this field of activity of commercial banks also entirely rely on them, which can negatively affect

the general financial condition of banking institutions. That is why complex models of minimizing the occurrence of potential credit risks are used in the modern practice of credit activities of these institutions, and they are constantly being improved and updated. However, experience shows that commercial banks cannot avoid credit risks. There are always situations of non-repayment of loans by clients, which occurs due to a significant number of factors that are quite often difficult to predict. However, banks are constantly looking for new ways to improve the quality of credit risk assessment, using more and more complex models for assessing the creditworthiness of customers.

Modern information and communication technologies have actively penetrated the work of financial institutions. Today, banking and non-banking companies are interested in actively using the potential of such innovations in their activities. Big Data, cloud technologies, automated technologies for providing advice to clients are already commonplace for the functioning of any banking institution. However, in recent years, these institutions have begun to use artificial intelligence technology, which has a significant and still unexplored potential for its application in the financial field.

Thus, the purpose of the article is to substantiate the current trends in the use of artificial intelligence in the credit activity of banking institutions and to determine the possible directions of application of this technology to increase the efficiency of credit operations.

2. LITERATURE REVIEW

Many scientific publications are devoted to the use of artificial intelligence in various spheres of social life. The authors of the article (Locatelli Rossella *et al.*, 2022) are convinced that the application of artificial intelligence in the banking world is becoming more relevant due to the use of larger and larger data sets for credit risk modeling. According to the researchers, the initial challenge for credit risk managers is to find ways to use new AI tools on new data to improve the predictive power of models, while not neglecting interpretability issues while acknowledging ethical dilemmas.

Article (Dhaigude Rahul *et al.*, 2022) is based on research to determine the impact on financial institutions after integrating artificial intelligence to generate credit scores for the lending process. The authors used primary and secondary data to assess the impact of using artificial intelligence to calculate a credit rating. According to the authors, financial institutions can better use artificial intelligence to reach more potential customers and provide better services.

As part of a study (Mhlanga D., 2021), it has been proven that artificial intelligence and machine learning have a strong impact on credit risk assessment using alternative data sources such as public data to deal with the problems of information asymmetry, adverse selection and moral hazard. The authors believe that this will allow lenders to conduct serious credit risk analysis, assess customer behavior and then test customers' ability to repay loans, allowing less privileged people to access credit. The researchers recommend that financial institutions such as banks and credit institutions should invest more in artificial intelligence and ma-

chine learning to ensure that financially excluded households have access to credit.

The purpose of paper (Farah Qureshi et al., 2021) is to investigate artificial intelligence tools integrated into consumer mobile payment platforms that facilitate microcredit in Kenya and alternative lending in the United States. According to the researchers, these digital platforms are more effective and generate less bias than conventional approaches. The authors explore how financial inclusion can not only create channels for prosperity and improvement, but also create debilitating and sometimes precarious financial circumstances for users.

According to academics (Goh Rui Ying *et al.*, 2020), credit scoring is an important tool used by financial institutions to correctly identify delinquents and defaulters. The hybrid models proposed by the authors are compared with standard statistical models in three different data sets commonly used in credit rating research. The results of the study demonstrate that MHS-RF is the most robust in terms of model performance, model explainability, and computation time.

A research paper (Nkomo Busisizwe Kelvin *et al.*, 2020) proposes the use of artificial intelligence, geolocation, and data mining in credit card fraud detection methods to mitigate the shortcomings of current credit card fraud detection methods. According to the authors, the use of artificial intelligence, data mining and geolocation will allow credit card fraud detection methods to analyze and identify trends in customer spending to detect fraudulent transactions.

The authors of the paper (Van Thiel *et al.*, 2019) chose two developed lending markets, chosen because of their advances in digital lending, to test the extent to which lenders can facilitate their lending decisions through personalized risk assessment using artificial intelligence. The researchers describe three experiments that develop artificial intelligence models of the probability of default and compare the quality of the model with that of traditional applied logistic probability of default models. As a result of the research, all experimental models of artificial intelligence showed better results than traditional models.

Paper (Chen Bili *et al.*, 2014) proves that credit scoring is becoming a competitive problem with rapid growth and significant progress. The authors focus on research on the development of artificial intelligence technologies for credit scoring solutions, which covers algorithms including support vector machines, artificial neural networks, genetic algorithms, genetic programming algorithms and their hybridization.

The purpose of article (Dong Y. *et al.*, 2011) is to study the problem of assessing the creditworthiness of customers in a small company. The authors developed a new approach that can estimate customer credit ratings based on daily transaction data alone. Scientists explain the rationality of the proposed approach from the point of view of the company's bankruptcy process, and then show its advantages and limits. The researchers compare the performance and effectiveness of two statistical methods and three artificial intelligence methods, and then point out some issues that need further investigation.

Taking into account the available publications, it should be said that the subject of research related to artificial intelligence is gaining more and more relevance. However, the issues that reveal the role and prospects of using artificial intelligence technologies in the credit activity of banking institutions require further study and deeper research.

3. METHODOLOGY

Conceptual provisions of economic research methodology are used in the article. In particular, the methods of content analysis (to describe the positive and negative consequences of the use of artificial intelligence technology in the activities of banking institutions), observation, comparison and abstraction (to specify the essence of artificial intelligence as a new technology and the features of its use in the credit activity of commercial banks) were used among the general methods of cognition.), analysis and synthesis (when substantiating the advantages of using artificial intelligence technology in the process of providing credit services to clients), graphic visualization (for displaying the basic conceptual provisions of credit operations by banking institutions and the role of artificial intelligence in their implementation).

4. RESULTS

Banking activity is a rather specific type of work that is associated with the circulation of financial resources between various economic entities. In fact, commercial banks, having only information about their customers, make decisions about providing them with financial services. Accordingly, the immateriality of such services determines their riskiness for financial institutions. At the same time, in modern conditions, banking institutions already provide a significant list of their own services to various types of clients, starting from services for attracting financial resources of economic entities, providing settlement services, and ending with the implementation of active operations, i.e. providing the bank's funds at the disposal of various entities management (investment, credit services). However, it is credit services in the activities of the vast majority of banking institutions, unless it is prohibited by law, that play a key role in the formation of income and, accordingly, profit. The following features are inherent in the credit activity of banking institutions:

1) the presence of different types of customers who differ in the purpose of obtaining loans, their economic activity;

2) the need to analyze each specific client before granting him a loan;

3) the banking institution itself simultaneously acts as a lender and a borrower of financial resources, which also requires a balanced approach to borrowing on the financial market;

4) there are different types of loans that can be provided to clients of the same class (several loan options for households, enterprises, state and local authorities);

5) any loan must be formalized by an appropriate agreement between the client and the banking institution;

6) for the analysis of potential customers, banking institutions accumulate and are obliged to use large amounts of individual and commercial information;

7) it is necessary to constantly keep in touch with clients, provide appropriate consulting services, monitor the loan repayment schedule;

8) the need to provide online access for customers to information about their loans, the creation of appropriate online services for consumers of banking services;

9) significant competition between banking institutions in the credit market leads to constant changes in lending conditions, active use of marketing tools for issuing loans, primarily to households, and other features.

The complexity of a seemingly simple credit transaction requires banking institutions to create a complex system of providing credit services. Such a system is presented in Fig. (**1**).

Accordingly, given the complexity of lending, banking institutions are interested in using various technologies to simplify it. In addition to the technologies already involved in their own work, today these institutions began to actively use artificial intelligence technology.

Let's consider the essence of artificial intelligence technology in more detail. Note that this technology is actively used today in many areas of the economy and state administration. The potential of its application according to scientists (Hassan Ali Al-Ababneh et al., 2023; Dayyabu Yusuf Yusuf *et al.*, 2023; Dennis Mayorga Lira Sergio *et al.*, 2023; Heng Yi Sheng *et al.*, 2023; Locatelli Rossella *et al.*, 2022) is colossal.

In general, artificial intelligence (artificial intelligence) is a technology by which a computer can perform tasks that are usually performed by intelligent beings and require intellectual abilities (Copeland B.J., 2023). Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision (Ed, Burns *et al.*, 2023).

In current conditions, the mentioned technology is developing at a fast pace, and an increasing number of business entities, including financial institutions, pay important attention to using the potential of such technology to form new impulses for their own functioning. In Fig. (**2**) presents information on the results of a survey of representatives of banking institutions regarding the possibilities of further use of artificial intelligence in their work.

From the data of Fig. (**2**) shows that the majority of respondents have a positive attitude towards the use of artificial intelligence technology in their activities. It is expected that during 2022-2025, under the current conditions, the number of banking institutions in which artificial intelligence technology will be actively used will constantly increase. If in 2022, 23% of respondents considered this technology critically necessary for the development of a financial institution, then in 2025, according to analysts' estimates, there will be
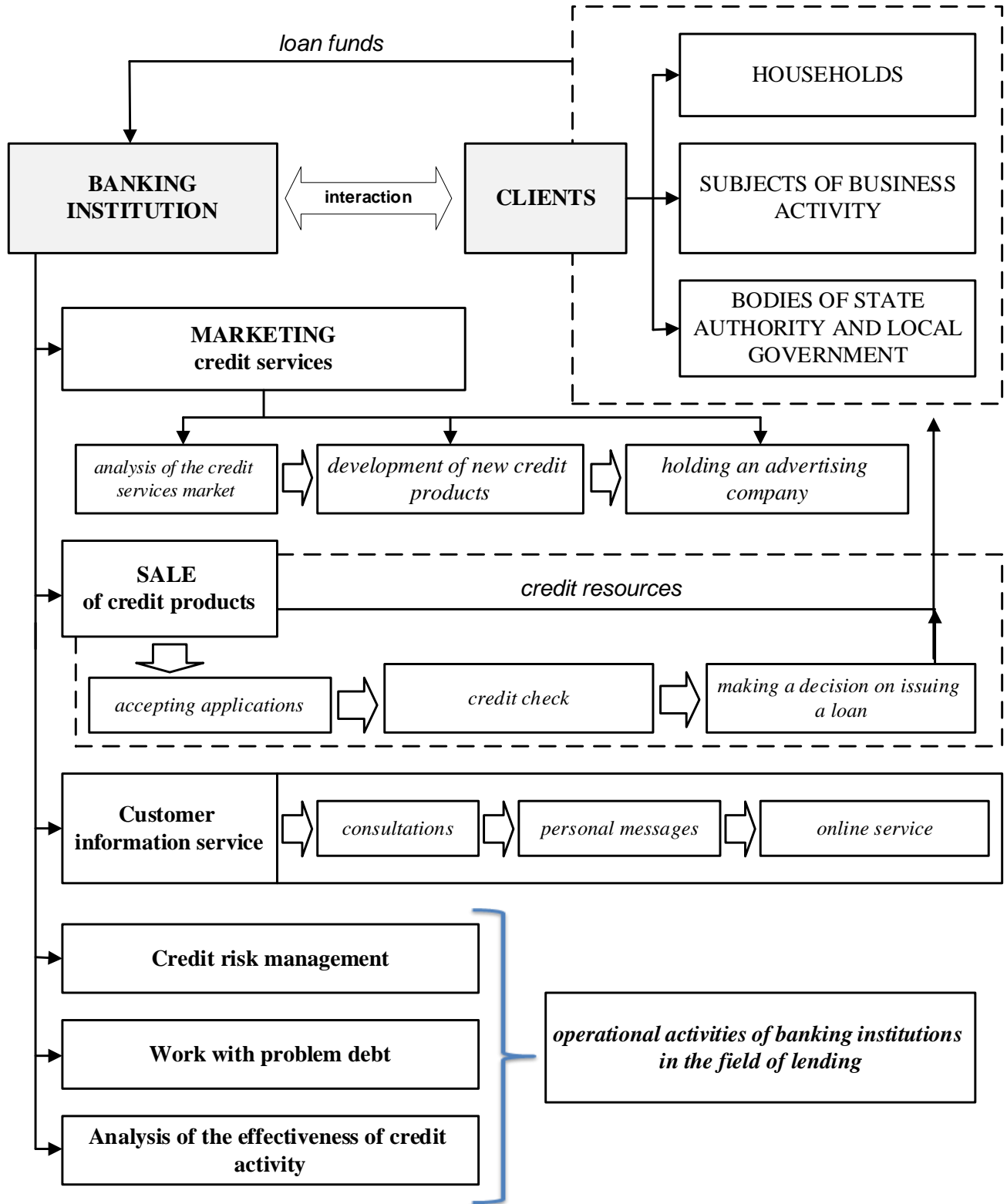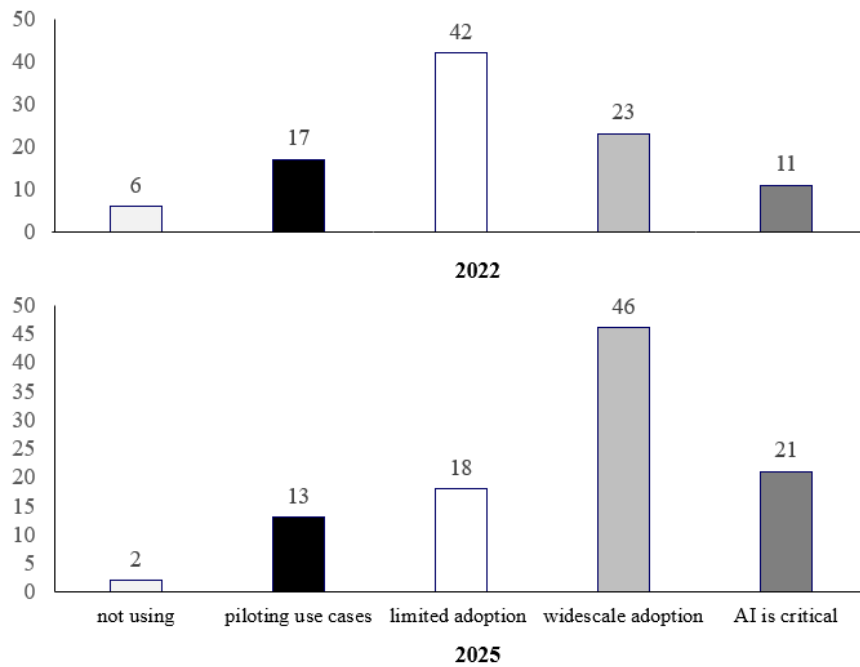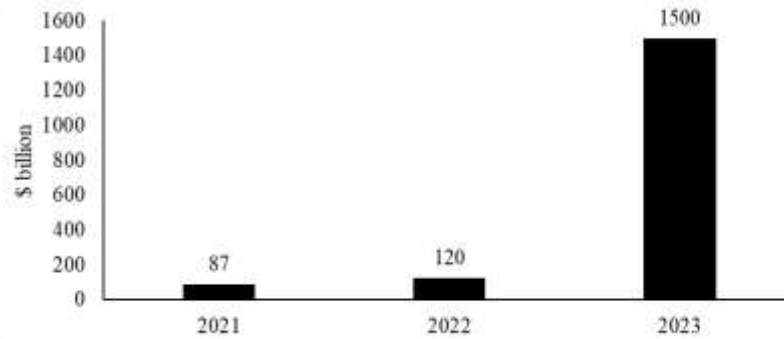
Fig. (1). The system of providing credit services by a banking institution.

Source: systematized by the authors.

Fig. (2). Current trends and potential opportunities for using artificial intelligence in software development.
Source: Statista (Bergur, Thormundsson, 2022).

Fig. (3). Global AI Market, $ billion.

Source: (FedorychakV., 2023).

almost half of such supporters of this technology. At the same time, the specific weight of those representatives of the financial business who are critical and quite skeptical about the use of artificial intelligence in their work will also decrease. The results of the survey generally confirm the irresistibility of using artificial intelligence technology to ensure the competitiveness of banking institutions in the highly competitive market of financial services.

Also, the significant development of artificial intelligence technology throughout the world, including the financial sphere, is confirmed by the forecast values of scientists who predict that in 2023 the volume of the global market for the use of artificial intelligence technology will reach 1.5 trillion USD (Fig. **3**).

Given the outline, let's define the specific features of artificial intelligence technology. These include the following:

- artificial intelligence technology is used in areas where it is necessary to use the mental abilities of a person, his ability to intellectual activity;

- the use of technology is most appropriate when processing large amounts of information and in the process of making management decisions based on it;

– the technology is built on the basis of the use of logical algorithms with the help of the use of modern information and communication technologies;

– artificial intelligence is a technology that is capable of self-learning based on the developed appropriate algorithms, the use of computer linguistics;

– artificial intelligence is quite difficult to use in human creative activity, and it is advisable to use it for work with routine, constantly repeating operations;

- artificial intelligence is primarily designed to work with large amounts of information, and therefore, for its use, the relevant information must be publicly available or already systematized, or available in open sources, etc.

The use of AI in finance has gained significant momentum in recent years. According to a report by McKinsey & Company (2022), AI adoption in the financial services industry is

projected to generate 1.2 trillion USD in additional value by 2030. This indicates the immense potential AI holds in transforming financial markets. Research conducted by Williams et al. (2022) at a leading financial institution demonstrates the tangible benefits of AI adoption. The study found that firms implementing AI technologies experienced an average cost reduction of 22% and a revenue increase of 18%. These statistics highlight the positive impact of AI on financial institutions' bottom lines (Rodrigue Vie, 2023).

Thus, taking into account the essence of artificial intelligence technology and the features of its application, it is possible to substantiate the application provisions of its use in the credit activity of a banking institution (Fig. **4**).

DIRECTIONS FOR THE USE OF ARTIFICIAL INTELLIGENCE TECHNOLOGY IN THE CREDIT ACTIVITY OF A BANKING INSTITUTION

Marketing
– creation of personalized products based on the analysis of publicly available customer information;
- to analyze credit service markets, determine customer needs for such services;
– artificial intelligence-based development of appropriate credit products;
- search for information about potential customers to whom it is possible to offer new credit products;

Sale of credit services
– in the process of scoring the creditworthiness of clients, taking into account their credit history, income and other indicators;
- issuing online loans in short periods of time;
– quick filling out of the loan application;
- quick decision-making on granting loans;

Information and consulting activities
– use of chatbots to provide information about loans to clients, warnings about the next payments;
– reducing the costs of maintaining call centers of banking institutions, reducing their workload;
– the speed of obtaining information about credit services, interest charges, account balances;
– creation of virtual personal financial assistants that help clients with financial decisions, taking into account their individual characteristics;

Informational security
– identification of weak points in the cyber protection of the banking institution;
– identification of threats and their prevention as a result of penetration into the information system of a commercial bank;
– speeding up the investigation of cases of cyberattacks, identifying the movement of financial resources that were lost;
– use for processing the results of video surveillance, which allows to avoid crimes;

Work with credit debt
– searching for up-to-date information about debtors and their property;
- search for approaches to clients with the aim of encouraging them to pay their debts;
– warning about the debt and its amount;
- search for property that can be seized from the client to repay debts;
– automatic preparation of legal documents for debt collection;

Operational activity of a banking institution
- collection of management information on the functioning of separate branches of the banking institution, its systematization and analysis;
- processing of internal financial information about the work of the banking institution
- search for ways to improve the activity of banking institutions
– use for building development strategies and plans for their implementation by banking institutions;
– preparation of analytical information for state regulators;
– construction of better risk management systems, identification of potential threats to the effective operation of the banking institution;
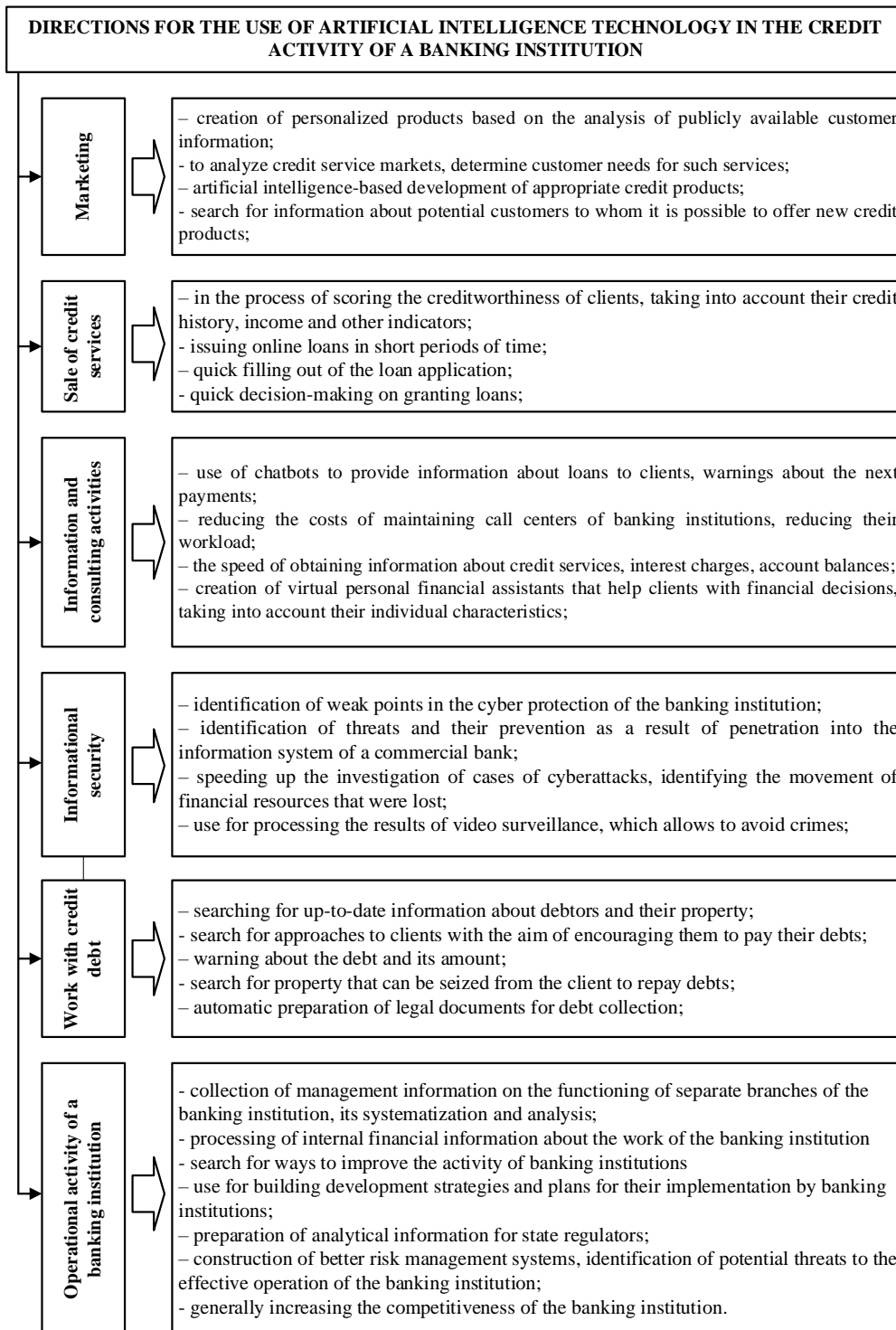- generally increasing the competitiveness of the banking institution.

Fig. (4). Directions for the use of artificial intelligence technology in the credit activity of a banking institution.
Source: compiled by the authors.

Thus, for a banking institution, the use of artificial intelligence technology makes it possible to obtain the following advantages:

– quick adoption of more balanced decisions regarding the provision of loans to clients;

- the possibility of a more detailed study of the financial condition of small and large enterprises for issuing large loans;

- the ability to analyze information about new clients and quickly make decisions about the provision of appropriate financial services;

- reduction of the human factor in the implementation of credit services, especially in routine operations;

– faster and more detailed analysis of large arrays of financial and management information, which is especially relevant for large, systemic banking institutions;

– reducing costs in the process of communication with clients, replacing partially personal communication with appropriate algorithms based on artificial intelligence technology;

- the ability to search and analyze information about customers and their creditworthiness (activity in social networks, in general on the Internet, cash flow, family composition and their financial behavior, timeliness of payment for mobile communication services and utilities);

- warning clients about possible threats to them from fraudsters, identification and analysis of the most vulnerable population groups;

– quick search for fraudsters and criminals who use the same technologies for fraud in different banking institutions;

- reduction of labor costs, as banking institutions today began to replace individual workplaces with automated information systems;

- performing routine operations in the credit sector with the help of artificial intelligence allows you to free up the time of employees for more complex intellectual and creative work, where the capabilities of artificial intelligence are limited, to come up with new non-standard credit products;

- reduction of manifestations of corruption and abuse among employees;

– simplifying the procedure for identifying clients, entering their personal information into the database; artificial intelligence technology allows you to read written data and translate them into computer symbols, fill in the relevant documents;

- reduction of costs for employees of legal departments and banking risk management departments as a result of increasing the efficiency of management information processing and other benefits.

In general, the systematic use of artificial intelligence technology, taking into account its harmonious application in the work of all departments of the banking system, allows, on the one hand, to ensure the deep digitalization of business processes, and, on the other hand, to form a more effective operating model of commercial banking. At the same time, there are also certain threats and disadvantages in the use of such technology in the work of a banking institution. Among them, it is worth highlighting the following:

– the need to spend on adapting artificial intelligence technology to the specifics of a particular bank's functioning;

– the uncontrollability of artificial intelligence technology and its lack of emotion complicate decision-making processes in those areas where there are institutional factors that influence lending decisions (level of trust, good mutual relations, reputation of the borrower, etc.);

– artificial intelligence as a new technology can carry out discriminatory practices in the field of lending, make biased judgments based on the analysis of information from open sources;

- the need to spend money to attract highly qualified employees for the purpose of periodic monitoring of the use of artificial intelligence technology, checking the effectiveness of its application in the credit sector;

- the possibility of artificial intelligence taking into account factors that do not directly correlate with the borrower's creditworthiness, but can in theory worsen it (divorce, new place of residence); in the practice of foreign banks, there are cases when bank clients' credit limits for card credit products were automatically reduced due to the fact that they had to pay for divorce counseling;

– the potential for the objective emergence of new risks in the banking sector when using artificial intelligence technology in credit activities, which will also need to be managed and this will require the involvement of relevant specialists;

- the lack of institutional support for the regulation of relations and processes in the field of the use of artificial intelligence technology by banking institutions, which creates a legal vacuum regarding responsibility for decisions made on the basis of information prepared with the help of such technology;

– loss of personal, more personalized and complete information about customers, which may lead to lawsuits and additional costs for banking institutions;

– a rapid decrease in the relevance of information in open sources can negatively affect relevant analytical data produced by artificial intelligence technology, and, accordingly, contribute to the adoption of poor-quality management decisions in the field of lending;

- there are risks related to the failure of employees of banking institutions to build a truly effective credit risk management system, making maximum use of the capabilities of artificial intelligence technology, etc., when making large financial expenditures.

In Fig. (**5**) presents the information about current trends in the use of artificial intelligence technology by banking institutions in the world.

So, it can be stated that artificial intelligence technology, despite the use of its individual elements by banking institu-
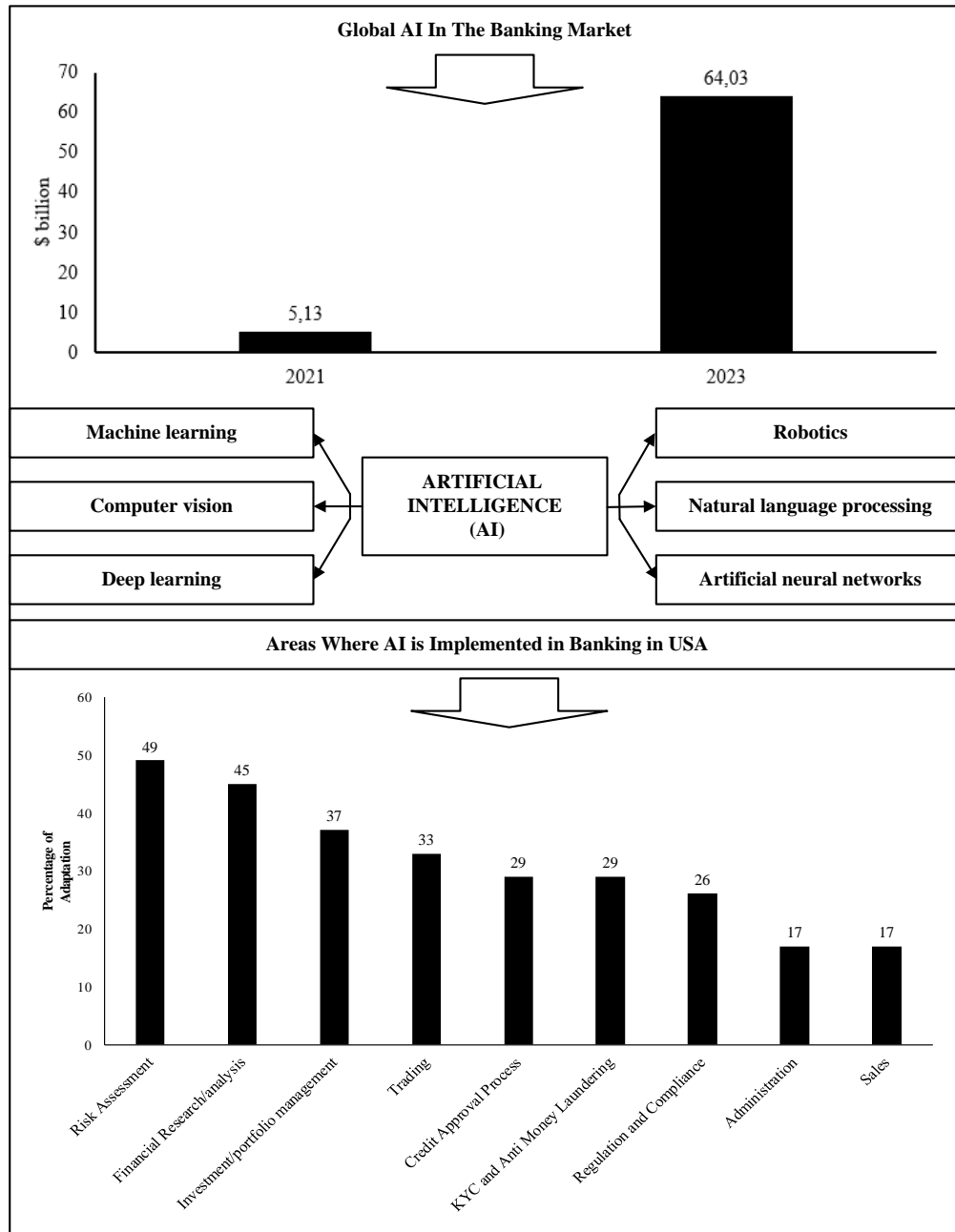
Fig. (5). Modern trends and prospects for the use of artificial intelligence technology in the banking sector.
Source: (Global AI In Banking Market Size By Product (Hardware, Software), By Application (Analytics, Chatbots), By Geographic Scope And Forecast (2021); Keith Delle Donne, 2023).

tions already today, still has a great potential for further application in the work of commercial banks. This technology has its own significant and quite important advantages for ensuring the efficiency of these institutions. At the same time, there are threats that this technology can create for both banks and their clients.

Also, using artificial intelligence technologies specifically in credit activities, a banking institution has the opportunity to significantly improve the quality of its own credit services provided by various types of clients, thereby ensuring an increase in the level of competitiveness in the credit services market. The positive consequences of the active use of this technology for borrowers include the following:

– speed of service, obtaining information about the possibilities of issuing loans;

– quick receipt of information about own loan products, service usage history, archive of payments for a certain type of transaction;

- the presence of a personal financial assistant can recommend individual banking products that are the most profitable in a certain period of time;

– warning about possible threats of loss of own financial funds, warning about risks that exist at a certain point in time; it also makes it possible for banking institutions, based on the monitoring of personal information of clients, to de-

termine the most vulnerable categories of consumers and conduct appropriate work with them;

- round-the-clock information support by the banking institution, the possibility of making transfers through voice messages;

- on the basis of artificial intelligence technology, it is possible to carry out a thorough analysis of the financial condition of a client of banking institutions and develop recommendations for a more rational use of the funds available to him;

- increasing the level of financial inclusion of citizens, including in the field of bank lending, ensuring an increase in the level of financial literacy by receiving personalized financial advice, etc.

5. DISCUSSION

Supporting the opinion of the authors (Hassan Ali et al., 2023), we believe that indeed artificial intelligence contributes not only to increasing the efficiency of business processes, but also to reducing the costs of companies necessary for the implementation of business processes. Within the scope of the article, the authors suggested compiling a list of indicators that describe the effectiveness of artificial intelligence technology in the activities of large companies, and calculating them using the example of a bank branch. The results of the study confirm the increase in the productivity of employees of bank branches due to the automation of processes implemented with the help of artificial intelligence systems and technologies.

Considering research (Dayyabu Yusuf Yusuf et al., 2023) to be relevant, we would like to note the feasibility of the analysis conducted on the use of artificial intelligence methods as a fraud detection mechanism that can effectively and efficiently detect credit card fraud and identify fraudulent financial transactions. Scientists have concluded that the use of artificial intelligence methods provides experts with better accuracy and efficiency in detecting fraudulent transactions.

Emphasizing the timeliness of the study (Dennis Mayorga Lira Sergio et al., 2023), we would like to note the results of the authors' research that artificial intelligence can help measure the credit risk index of a financial institution to avoid losses and thus determine whether to get a loan or not. The authors propose the creation of an application that will show whether a client receives a bank loan or, on the contrary, was rejected based on old clients.

Sharing the opinion of scientists (Heng Yi Sheng et al., 2023), we believe that the emergence of machine learning and artificial intelligence has created new opportunities for data-intensive science in the financial industry. Within the scope of the authors' research, a comprehensive review of studies devoted to the application of machine learning in credit risk modeling was carried out. AI models have been found to mitigate bias and establish trust and compliance with regulators to ensure fair lending in the financial industry.

We consider scientific publications (Dubyna M. *et al.*, 2023; Tkachuk I. *et al.*, 2023; Zhavoronok A. *et al.*, 2022; Kudlaieva N. *et al.*, 2021) relevant for further research, in which the development of the credit market of Ukraine in condi-

tions of macroeconomic instability was studied, the financial influence of political-oligarchic interests of state-sponsored enterprises was modeled on the formation and implementation of financial policy in the state, the role of digital technologies in the transformation of regional models of household financial behavior, and the transformation of household credit behavior in the conditions of digitalization of the financial services market was investigated.

Also, articles (Popelo O. *et al.*, 2023; Tulchynska S. et al., 2023; Revko A. *et al.*, 2022) consider the impact of digitalization and various aspects of the development of economic systems at different levels, namely, the impact of digitalization on the innovative strategy of the development of industrial enterprises is analyzed, the role of digitalization of the national economy in increasing the efficiency of the management of the logistics activities of the enterprise is investigated, and methodological approaches to the assessment are developed innovations in Polish and Ukrainian regions, taking into account digitalization processes.

6. CONCLUSION

The article deals with the issue of using artificial intelligence technology in credit activities of banking institutions. In particular, considerable attention is paid to the description of the features of credit activity by these institutions in the modern conditions of their gradual digitization. Based on the analysis of the essence of artificial intelligence technology and the features of its use, the basic potential areas of application of such technology in the credit activity of commercial banks are also highlighted. At the same time, such directions were grouped according to the main components of the process of providing credit services to clients of the specified financial institutions (marketing, providing credit services, information support for clients, work with accounts payable, etc.).

The article also examines in detail the advantages and disadvantages of using artificial intelligence technology in the credit activity of banking institutions. It was determined that despite the numerous positive points of its application, there are a number of potential risks regarding the negative impact of the consequences of the application of such technology in the work of commercial banks. At the same time, it was established that the persons responsible for such consequences, the specifics of the use of artificial intelligence in the financial sphere, have not been determined by law.

Taking into account the complex nature of artificial intelligence technology, its significant potential, the article substantiates those positives that can be obtained by clients of banking institutions who use their credit products. It was also determined that the specified technology could play a key role in the processes of increasing the level of financial inclusion and increasing the financial literacy of citizens, which will only stimulate the overall development of the banking system.

Further research in this area may be related to the specification of the features and mechanisms of the application of artificial intelligence technology in certain components of the process of providing credit services to borrowers by banking institutions.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors contributed equally to the conception and design of the study.

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