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APPROACHES TO MEASURING THE EFFICIENCY OF ARTIFICIAL INTELLIGENCE IN THE BANKING SYSTEM

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Abstract: Artificial intelligence (AI) is widely used in the banking system and plays an effective role not only in supporting the speed and accuracy of financial transactions, but also in making managerial decisions. By applying AI, banks manage to reduce operating costs, introduce advanced digital technologies, improve financial and economic indicators, and increase competitiveness in financial markets. In parallel, the integration of AI into the banking management system requires huge financial resources, the involvement of qualified human capital, and the formation of computer neural networks, which raises the problem of assessing the effectiveness of AI.

The article proposes an alternative approach to measuring and evaluating the results of applying AI in the banking system.

Keywords: digitalization of banking functions, massive database (Big Data), artificial intelligence effect, decision-making

JEL codes: G14, M15

Research aims: propose approaches to measuring the results of applying artificial intelligence in the banking system.

Research novelty: Proposals have been presented for alternative assessment of the results obtained from the use of artificial intelligence in commercial banks.

Introduction

In recent years, artificial intelligence in the banking system has found its application in the decision-making process, and in this regard, it is constantly being improved, requiring huge financial and non-financial resources for operation. Therefore, the question arises as to how much the expansion of the use of artificial intelligence and the resource expenditure in the banking system are justified and in general, how its effectiveness is measured.

Moreover, if in some sense it becomes possible to measure the costs of using artificial intelligence, then in practice it becomes more difficult to assess this cost-effectiveness, since the results of artificial intelligence in business are diverse, covering economic, financial, and social spheres. In this regard, not only in practice, but also theoretically, a problem arises as to how to measure the effectiveness of artificial intelligence in banking functions. On the one hand, AI supports the speed of financial transactions, increases accuracy, and performs basic financial and banking functions, on the other hand, it gradually participates in decision-making in the financial and economic sphere. That is, AI is involved in multifunctional operations in the banking system is moving from the sphere of support to the field of management. Therefore, there is a need to take a comprehensive approach to measuring the effectiveness of the application of AI and to apply appropriate evaluation indicators.

Literature review

Automating routine tasks is an important aspect of implementing artificial intelligence (AI) in banking system. Monotonous tasks are repetitive operations, that require time and effort from employees, but do not provide significant creative or strategic value to the banks (Belanche, D., Casaly, L. V., & Flavi6n, C. 2019). Using AI to automate such tasks allows to free up staff's time and resources to perform more important and productive tasks. When automating routine tasks, banks can implement various artificial intelligence technologies, such as machine learning, neural networks, natural language processing algorithms, and robotic processes. For example, using machine learning algorithms, it's possible develop a system for automatically classifying and sorting emails, which will significantly simplify working with your inbox and increase employee efficiency. Another example of automating routine tasks can be using robotic processes to perform similar operations within the accounting or loan creditability management department. Robots can independently perform tasks on collecting, processing and analyzing data, freeing employees from monotonous and unproductive operations (Ashta, A., & Herrmann, H. 2021).

Implementation of AI not only improves the operational efficiency of the banks, but also reduces the likelihood of errors and increases the accuracy of task execution. This allows employees to focus on more strategic aspects of work, such as business development, improving customer service and innovative financial projects (Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. 2018).

Optimization of work processes is a key benefit of implementing artificial intelligence (AI) in the banking environment (Truby, J., Brown, R., & Dahdal, A. 2020). It is the process of improving and simplifying the ways of performing tasks and achieving company goals. The use of AI allows banks to automate and optimize their work processes, which leads to increased efficiency and reduced time costs. Optimizing workflows with AI is based on analyzing data and identifying bottlenecks in current processes. AI can process large volumes of information, identify patterns and trends, which helps companies make more informed decisions to optimize their operations (Lazo, Ebardo Sanz, J. L. C., & Zhu, Y. 2021).

Applications of AI can include automating tasks that were previously performed manually, improving resource planning and management, and optimizing logistics and supply chains. For example, machine learning algorithms can predict product demand and optimize warehouse stocks to avoid surpluses or shortages. Optimization can also include improving communication and collaboration between different departments of a banks. AI can help automate data collection and analysis processes, making it easier to share information and make joint decisions (Boustani, N. M. (2022).

Ultimately, optimizing workflows using artificial intelligence not only increases a banking productivity and efficiency, but also helps improve the quality of products or services, increase customer satisfaction, and increase competitiveness in the market. Data analytics for decision making is a key aspect of the use of artificial intelligence (AI) in business. This process involves collecting, processing, analyzing, and interpreting data to identify patterns, trends, and important information that can be used to make

strategic and operational decisions. Using AI in data analytics allows companies to process large amounts of information faster and more efficiently than would be possible using traditional methods. Machine learning and data analytics algorithms can automatically highlight key metrics, identify hidden patterns, and predict future trends based on historical data (Ghandour, A. 2021).

However, artificial intelligence is currently being incorporated into the management decision-making system, which also creates certain risks. Therefore, the authors emphasize the importance of measuring the consequences of the use of artificial intelligence a nd assessing its effectiveness (Manser, Payne, E., H., Peltier, J. & Barger, V., A. 2021).

Research results

Artificial intelligence is divided into “weak AI” and “strong AI”. Weak AI has a more limited economic impact, since its role is limited to solving simple, routine tasks, such as determining what is depicted in a picture or translating the sound of a voice into the corresponding text (Omoge, A. P., Gala, P., & Horky, A. 2022). Strong AI has a significant economic impact due to solving a wide range of tasks related to the creation of robots (machines, computers) that are similar to human mental abilities, that is, not just to operate information, but also to some extent to understand its meaning. The banks itself chooses which type of artificial intelligence to use in its business processes. As a rule, the choice is based on the scope of application, since each type of AI has its own operating characteristics. However, the artificial intelligence market has been growing dramatically in recent years (see Figure 1).

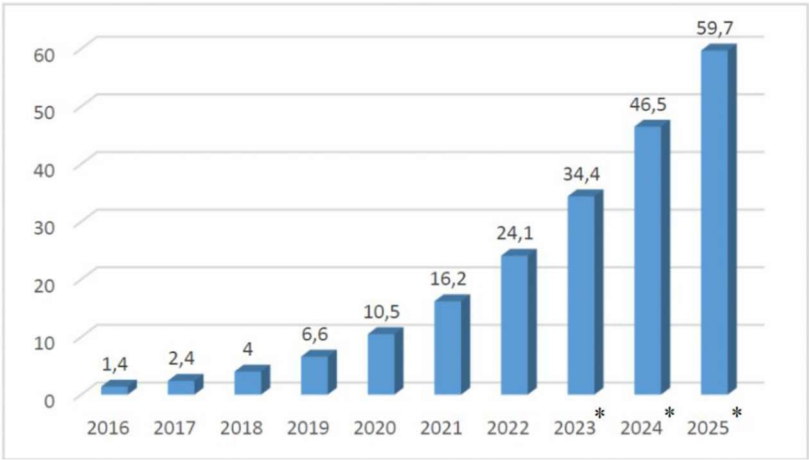

Figure 1. Artificial Intelligence Market Size, USD billion $
Source: *Chigirova, A., S., Rafikov, R., I. 2023*

Numerous researchers have highlighted the potential of artificial intelligence in managerial decision-making processes and have shown its positive impact on individual managerial performance (Lee, J. C., & Chen, X. 2022). This assumption has recently been challenged by other scholars, who argue, that the competence of artificial intelligence depends largely on the context rather than on human decision-making. In addition, some authors point to various tasks for which the algorithmic approach to decision-making is completely ineffective (Kцnigstorfer, F., & Thalmann, S. 2020). Some studies question the applicability of artificial intelligence for strategic decision-making. They show that certain artificial intelligence systems may, rather, complicate decision-making (Haenlein, M., & Kaplan, A. 2019).

Moreover, artificial intelligence systems do not understand either the inputs or the outputs they process or produce. Pure data-driven rationality does not necessarily lead to correct decisions. Thus, when making decisions, algorithms may seek to maximize specific parameters, ignoring morality, specific values of the company, and ethical standards (Ali, M. S., Swiety, I. A., & Mansour, M. H. 2022). By learning from real data, they retrospectively identify patterns to predict the future. Despite the fact that machine judgment based on historical data seems more accurate and less subject to bias than human judgment, scientists have identified a number of negative examples of algorithmic bias, for example, human resource management (Elrefai, A. T., Elgazzar, M. H., & Khodeir, A. N. 2021).

The use of artificial intelligence in the banking system is not an end in itself, and in this regard, the implementation of digital technologies is expected to yield results, which can be financial and non-financial. In this regard, it is important for banks to record the actual achievements that have occurred as a result of the use of AI and compare them with the intended results (see Table 1). Such comparisons can serve as the basis for alternative measures of the effectiveness of artificial intelligence, using the following steps (see Figure 2).

Table 1. The effectiveness of applying artificial intelligence in banking

#	Indicators	Expec-ted	Actual	Achieve-ment rate
1	Increasing the speed of credit transaction processing (time)	1,3	1,6	+1,23
2	Operating cost reduction percentage (%)	5%	7%	+1,4
3	Average bank transfer time (hour)	5	4	+1,25
4	AI operating annual cost growth (%)	8%	11%	-1,37
5	Creditworthiness assessment period (day)	3	2	+1,5
6	Number of e-banking customers (people)	7400	8200	+1,11
			Average	0,85

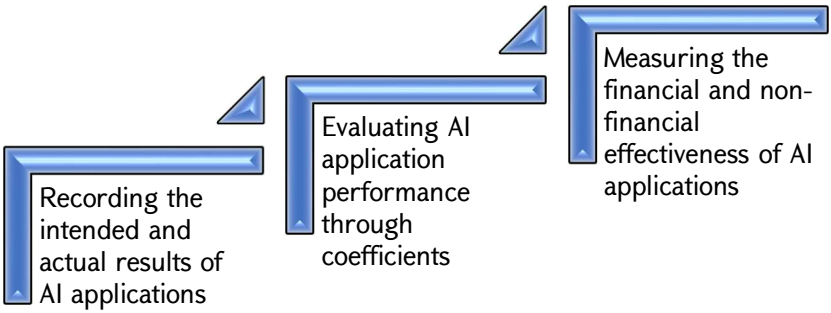

Figure 2. Steps to measure the effectiveness of a performance-based AI application in banking sector

Conclusion

Assessing the effectiveness of AI in the banking system is a complex process, which is why we consider it appropriate to take an alternative approach to this. At the same time, it is important to consider, how to combine the financial and non-financial results from the use of AI and include them in the overall indicator of effectiveness assessment. In this regard, we propose to calculate the performance indicators of AI with relative coefficients, and then, by combining them, determine one generalized aggregate indicator with its average value. Therefore, the formation of the average indicator characterizing effectiveness will be influenced by both the positive and negative performance indicators of AI, which will serve as the basis for making managerial decisions on reforms in the introduction of digital technologies. Consequently, the information in Table 1 indicates that the effectiveness indicator of artificial intelligence is less than 1.0, the reason for which is the increase in annual spending on AI application, which is higher than intended. Therefore, managerial decisions should be aimed at the implementation of artificial intelligence by the bank in the next year, identifying and monitoring overspending in the application of AI.

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ԱՐՀԵՍՏԱԿԱՆ ԲԱՆԱԿԱՆՈՒԹՅԱՆ ԱՐԴՅՈՒՆԱՎԵՏՈՒԹՅԱՆ ՉԱՓՄԱՆ ՄՈՏԵՑՈՒՄՆԵՐԸ ԲԱՆԿԱՅԻՆ ՀԱՄԱԿԱՐԳՈՒՄ

Հայկ Մելքումյան
Երևանի պետական համալսարան, Ֆինանսական մաթեմատիկա, ուսանող

Բանալի բառեր - բանկային գործառույթների թվայնացում, զանգվածային տվյալների բազա (Big Data), արհեստական բանականության էֆեկտ, որոշումների կայացում

Արհեստական բանականությունը (ԱԲ) լայնորեն կիրառվում է բանկային համակարգում և էֆեկտիվ դերակատարում ունի ոչ միայն ֆինանսական գործարքների արագագործության, ճշգրտության օժանդակման, այլև կառավարչական որոշումների կայացման հարցերում: Կիրառելով ԱԲ, բանկերին հաջողվում է կրճատել գործառնական ծախսերը, ներմուծել առաջավոր թվային տեխնոլոգիաներ, բարելավել ֆինանսա-տնտեսական ցուցանիշները, բարձրացնել մրցունակությունը ֆինանսական շուկայաներում:

Զուգահեռաբար, բանկերի կառավարման համակարգին ԱԲ-ի ինտեգրումը պահանջում է հսկայածավալ ֆինանսական ռեսուրսներ, որակյալ մարդկային կապիտալի ընդգրկում, համակարգչային նեյրոցանցերի ձևավորում, որով էլ խնդիր է առաջանում գնահատելու ԱԲ-ի կիրաման արդյունավետու-թյունը:

Հոդվածում առաջարկվում է այլընտրանքային մոտեցում՝ բանկային համակարգում արհեստական բանականության կիրառման արդյունքների չափման և գնահատման ուղղություններով:

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