

## Overview of Artificial Intelligence (AI) application in the banking industry

Zoran Temelkov<sup>1\*</sup>

<sup>1</sup>Associate professor, Faculty of Tourism and Business Logistics, Goce Delcev University, Stip, North Macedonia, [zoran.temelkov@ugd.edu.mk](mailto:zoran.temelkov@ugd.edu.mk)

### ABSTRACT

Many factors have facilitated transformational changes in the banking industry in recent years. Among the most notable drivers of change are technological advances, particularly the development of AI-based solutions. The integration of AI and ML models has caused a significant transformation of banking operations and the overall banking industry. The rapid evolution of AI technology offered solutions for challenges found in traditional banking processes and operations. Consequently, key applications of AI solutions are identified in fraud detection, risk management, customer support, and regulatory compliance.

**Keywords:** Artificial Intelligence, Banking Industry, Machine Learning, Banks, Bank products, Technological developments, Regulatory compliance

**JEL Classification:** G21

### INTRODUCTION

In today's customer-centric economy, the banking industry closely monitors any technological developments in an effort to improve its business processes and augment financial products and services. In the last couple of years, AI technology has experienced significant acceptance among financial institutions, and banks have integrated AI solutions to enhance different processes and operations. The new technology is utilized to improve customer experience, enhance the bank's operations, improve regulatory compliance, and save organizational resources.

Although the benefits are more than evident, the implementation of AI comes with a vast number of challenges that banks need to cope with in the future. They need to cover issues with AI model explainability, implementation costs, data privacy, potential AI bias, and regulatory compliance.

### 1. Applications of AI in Banking

Advances in artificial intelligence (AI) and related technology have resulted in significant transformations in the banking industry and the manner in which financial institutions conduct their day-to-day activities. AI technology has become an integral part of different areas of banking, providing banks with numerous advantages as well as challenges. An overview of the current state of AI in the banking industry indicates that banks utilize the new technology in areas such as (Aaliyah et al., 2023; Divya & Alexander, 2023; Harry et al., 2023; Svoboda, 2023):

#### 1.1 Customer service and engagement

Customer support is among the first areas where banks utilize AI technology to enhance customer experience and satisfaction while controlling or even reducing their costs (Praveen, 2017). Banks have adopted the use of chatbots and virtual assistants to offer real-time support, answer general inquiries, and provide assistance for basic transactions (Khatab, 2020). The application of natural language processing (NLP) enabled banks to offer a system that could correctly understand customer queries and give adequate feedback ((Mi Alnaser. et al., 2023). Accordingly, the ability to set up a system that offers 24/7 support transformed the customer service experience in the banking industry.

Banks are also able to increase the degree of personalization for their customers when using AI to analyze customers' behavior and data. AI algorithms can provide recommendations for suitable services and ease the process of customizing products to cover customers' preferences or experiences. This augments the bank's cross-selling and upselling activities, which ultimately leads to an increase in revenue and augmented customer experience.

### **1.2 Credit scoring and risk assessment**

Increased usage of AI technology for credit scoring and risk assessment enables banks to combine traditional data with non-traditional data sets for the evaluation of customer risk levels (Sadok et al., 2022). Thanks to AI, banks can now incorporate data obtained from sources such as social media profiles in their analysis and conduct more accurate assessments of customer's creditworthiness (Schmitt & Roper, 2023; Kamal, 2021). They can boost their credit scoring and risk assessment models because, unlike traditional technology, AI algorithms can swiftly analyze vast quantities of data. This leads to more informed lending decisions and expansion of the customer base through the inclusion of potential customers who were excluded or marked as risky customers with the traditional scoring models.

### **1.3 Risk management**

Nowadays, banks can employ AI algorithms to improve their techniques for managing risks associated with banking operations (Kamal, 2021). AI technology helps the risk management process by analyzing the impacts and risks associated with different financial products and investments. Accordingly, banks have the opportunity to optimize their portfolio and increase the effectiveness and efficiency of their risk management efforts. The ability of AI and ML models to make market predictions aids banks in detecting market trends and reaching a trading decision. Accordingly, with technologically advanced systems, they can optimize their investment decisions to better cope with market risks.

### **1.4 Investment advisory services and wealth management**

Banks and other financial institutions use AI for easier evaluation and grouping of customers based on their risk profiles. Consequently, they are able to use robo-advisors to deliver automated investment advice for different risk profiles. The AI-powered robo-advisors can now manage investment portfolios and offer efficient investment options.

Moreover, AI has a positive impact on the wealth management services offered by banks and financial institutions by increasing their level of sophistication (Orçun, 2019). The implementation of AI-backed robo-advisors and wealth management services creates an opportunity for the development of portfolios that can be customized to accommodate an individual's financial goals. Traditionally, wealth management services were commonly available to high-net-worth individuals. However, automation increases the cost-effectiveness of these services, making them more accessible to an increased number of customers and customers with lower levels of capital.

### **1.5 Trading activities**

Trading is another area where AI and machine learning technology is heavily utilized. Machine learning algorithms are used to make real-time trading decisions by analyzing market data, relevant news, and sentiment analysis (Orçun, 2019). AI helps the objective of maximizing returns through portfolio rebalancing and risk management. Thus, AI enables the process of developing adequate trading strategies and augmenting trading performance. The capabilities of Natural Language Processing (NLP) enable banks to perform sentiment analysis of market participants using data from social media and other online platforms. Hence, AI helps them better understand customer expectations and identify potential opportunities.

### **1.6 Regulatory compliance and reporting**

The banking industry is among the most heavily regulated industries due to its role in the local, national, and global economic landscape. Hence, they are subject to strict regulation that comes with high compliance costs and complexity. The evolving regulatory landscape means that banks need to constantly monitor for potential changes and comply with new regulations. The role of AI in this regard can be to streamline the process of compliance through the automation of data gathering, analysis, and preparation of reports. Advanced algorithms can support banks in the process of data analysis and identification of potential regulatory compliance issues (Kamal, 2021). On-time identification of problematic areas could offer banks sufficient time for correction of compliance issues before any interference from the authorities. Thus, the risk of penalties can be significantly reduced along with the costs associated with possible compliance failure.

Furthermore, AI significantly contributes toward Anti-Money Laundering (AML) and Know-your-customer (KYC) compliance (Tulcanaza-Prieto et al., 2023). The advanced AI systems and Machine Learning algorithms aid banks in their efforts to detect suspicious activities and transactions and augment customer identity verification processes. Hence, banks AI ensures that banks fulfill defined regulatory requirements.

AI is also a tool with which banks ensure data privacy of customer data and compliance with data protection regulations such as GDPR in Europe or CCPA (California Consumer Privacy Act) in California, USA.

Overall, when it comes to regulation and compliance, AI offers banks a way to automate a significant portion of the labor-intensive processes associated with transaction monitoring, monitoring of changes in regulations, and customer due diligence.

### 1.7 Fraud Detection and Prevention

Advanced systems and algorithms are able to detect unusual behavior and patterns by analyzing large quantities of data. The ability of AI to identify anomalies ensures that banks significantly reduce or even eliminate the possible occurrence of fraudulent activities. AI technology can be employed in the assessment of transaction data and customer behavior in real-time while triggering alerts for additional examination in cases when suspicious activities are detected (Harry et al., 2023). Such a proactive approach in which banks utilize the advantages of AI systems helps them reduce financial losses and potential reputational damages.

### 1.8 Operational efficiency

Additionally, banks may also use AI and ML applications for Robotic Process Automation (RPA) to automate repetitive and rule-based tasks executed in the back office. Automation of tasks such as data entry, document processing, compliance checks, etc., with AI ultimately increases operational efficiency and reduces costs (Svoboda, A. 2023).

It is evident that AI technology has diverse applications in the banking industry. Using AI and ML algorithms, banks can streamline tasks, redesign processes, enhance operations, and simplify the execution of activities while achieving a competitive edge and growth.

There are a vast number of examples of banks across the globe that have redesigned and adapted processes by integrating AI solutions. Different banks implemented AI technology in different areas of their operations. This provides a practical insight into the benefits and limitations associated with the utilization of AI algorithms in banking operations. The following table provides an overview of banks that have implemented or are in the process of integrating AI solutions in specific processes.

**Table 1: Implementation of AI solutions in banking operations**

Bank	Process	Application of AI solutions
HSBC	- Customer service	- Chatbots for customer support - Offer personalized services

	<ul style="list-style-type: none"> <li>- Regulatory Compliance</li> </ul>	<ul style="list-style-type: none"> <li>- Leveraging AI to augment AML processes, which are crucial for compliance and risk management</li> </ul>
Standard Chartered	<ul style="list-style-type: none"> <li>- Process automation</li> <li>- Risk management</li> </ul>	<ul style="list-style-type: none"> <li>- Automation of manual processes</li> <li>- Real-time risk management and fraud prevention</li> </ul>
Wells Fargo	<ul style="list-style-type: none"> <li>- Customer insight</li> <li>- Customer support</li> <li>- Risk management</li> </ul>	<ul style="list-style-type: none"> <li>- Predictive analytics</li> <li>- AI-powered virtual assistants enhance customer interactions and perform routine tasks.</li> </ul>
DBS Bank	<ul style="list-style-type: none"> <li>- Customer support</li> </ul>	<ul style="list-style-type: none"> <li>- AI-driven chatbots for instant personalized customer support</li> </ul>
Scotiabank	<ul style="list-style-type: none"> <li>- Customer experience</li> <li>- Customer support</li> </ul>	<ul style="list-style-type: none"> <li>- AI technology enables to better understanding of customer behavior and preferences.</li> </ul>
UBS	<ul style="list-style-type: none"> <li>- Customer service</li> <li>- Wealth management</li> </ul>	<ul style="list-style-type: none"> <li>- Improvements in wealth management services</li> <li>- Investment banking</li> </ul>
Citigroup	<ul style="list-style-type: none"> <li>- Trading</li> <li>- Data analysis</li> </ul>	<ul style="list-style-type: none"> <li>- AI algorithms are used to analyze different types of market data and detect potential trading strategies.</li> <li>- Predictive analysis to identify payment patterns</li> </ul>
JP Morgan Chase	<ul style="list-style-type: none"> <li>- Trading and portfolio management</li> <li>- Fraud detection</li> </ul>	<ul style="list-style-type: none"> <li>- Algorithmic trading and portfolio management</li> <li>- Fraud Detection with Machine Learning</li> </ul>
Deutsche Bank	<ul style="list-style-type: none"> <li>- KYC and client onboarding</li> <li>- Regulatory compliance</li> </ul>	<ul style="list-style-type: none"> <li>- AI integrated into the compliance monitoring processes to augment regulatory compliance.</li> </ul>
Danske Bank	<ul style="list-style-type: none"> <li>- Regulatory compliance</li> </ul>	<ul style="list-style-type: none"> <li>- Fraud detection</li> <li>- Enhance Anti-Money Laundering (AML) processes</li> </ul>
Capital One	<ul style="list-style-type: none"> <li>- Customer experience</li> </ul>	<ul style="list-style-type: none"> <li>- Data management</li> <li>- Personalized customer recommendations</li> </ul>
ING Group	<ul style="list-style-type: none"> <li>- Loan syndication</li> <li>- Loan approval</li> <li>- Risk management</li> </ul>	<ul style="list-style-type: none"> <li>- AI solution for predictive analytics to identify potential parties interested in syndicated loans</li> <li>- AI algorithms are used to streamline and speed up credit assessment.</li> </ul>
BBVA	<ul style="list-style-type: none"> <li>- Trading</li> <li>- Automation of processes</li> </ul>	<ul style="list-style-type: none"> <li>- Automation of trading process for different assets</li> </ul>

		- AI-powered Robotic Process Automation to automate manual and routine processes.
BNP Paribas	- Customer support - Customer onboarding process	- AI-based virtual assistant in Securities Services units - AI technology is implemented to streamline customer onboarding processes

Source: Prepared by the author

Although the implementation and integration of AI technology in the banking industry is considered to be in its infancy stage, the above examples show that AI experiences widespread acceptance in the banking industry. The implementation of AI solutions is especially evident among larger banks with sufficient levels of resources, a large customer base, and the need for redesigning and automation of crucial processes.

The real-life experience of banks with AI technology indicates that AI-driven chatbots significantly improved response time, bringing multiple benefits for the banks as well as customers. AI-based predictive analytics for analyzing extensive data sets and identification of risk and fraudulent activities decrease the risk exposure of banks. Moreover, AI applications in the AML and compliance process improved the reputation of implementing banks and reduced regulatory penalties while saving time and resources. Using AI and ML algorithms in trading and wealth management operations for analyzing market data and identifying trading patterns contributed toward an increase in profits for trading activities. Certain banks employed AI technology to increase the degree of personalization and customer service. Consequently, they experienced a rise in acceptance of recommended products and recorded increased customer satisfaction and engagement.

Examples shown in Table 1 represent a fraction of banks that implemented or plan to implement AI solutions in their operations. There are numerous other banks and financial institutions that utilize AI-driven processes to enhance processes, improve operational efficiency, enhance customer experience, and mitigate risks. Given the widespread application of AI technology and the wide number of benefits it brings to banks, it is already positioned among the driving forces behind the evolution of the banking industry.

## 2. BENEFITS OF AI IN BANKING

The banking industry records an increased trend of acceptance of Artificial Intelligence technology and application of Machine learning algorithms in different processes. The key aspects behind the transformative power of AI in the banking industry are the benefits coming from its implementation in everyday processes. AI, as a driver of change, changes the way in which banks and financial institutions execute their operations, communicate with customers, adhere to regulations, and deliver financial products and services to the end user (Mi Alnaser. et al., 2023). Accordingly, some of the most notable benefits for banks originating from the implementation of AI solutions are identified in following the areas:

- **Enhanced efficiency**

The automation of repetitive and time-consuming tasks using AI technology decreases the need for human intervention. Hence, banks can now experience faster process times for different banking operations and processes such as data entry, transaction reconciliation, document verification, etc. (Sharma, 2023). Consequently, this enhancement in efficiency while reducing

error rates creates cost-saving opportunities, and employees are able to focus on high-value tasks and activities associated with strategic decision-making.

- **Cost savings**

Automation of repetitive tasks, compliance and reporting processes, data entry, and analysis reduces labor intensity, resulting in a decrease in respective cost levels. Hence, even though initial investment in AI may be higher, banks ultimately record a decrease in operational expenses and cost savings in the long run (Theuri & Olukuru, 2022). Moreover, the implementation of AI and automation of processes enables banks to better manage and allocate their resources, increasing the effectiveness and efficiency of their operations. In addition, the ability of AI solutions to cope with large volumes of customer inquiries and transactions simultaneously reduces customer service costs and transaction processing costs (Kamal, 2021).

- **Enhanced customer experience**

Advances in chatbots and virtual assistants powered with AI technology offer nearly instant and 24/7 customer support, thus improving the overall experience for the bank's customers. AI algorithms enhance the personalization of products and services, increasing the accuracy of recommendations by analyzing customer data and behavior (Tulcanaza-Prieto et al., 2023). Fast response time, round-the-clock support, and an increased level of personalization could ultimately strengthen the relationship with customers and increase customer retention and loyalty.

- **Improved security**

The banking industry is commonly subject to fraud and cyberattacks, which makes security among the top priorities for banks. Consequently, AI has taken on a pivotal role in the process of enhancing banks' security against potential breaches (Joseph & Thomas, 2023; Tulcanaza-Prieto et al., 2023). Employing AI solutions in fraud detection and prevention aids banks in protecting their assets and reputations against potential cyber threats.

- **Advances in risk management**

Thanks to AI and Machine Learning algorithms, banks can augment their risk assessment and credit scoring models and processes, leading to improvements in the lending process (Sharma, 2023). Unlike traditional models, AI-powered assessment and credit scoring models offer better risk evaluations due to the ability to process vast amounts of data from multiple sources (Sadok et al., 2022). Consequently, banks are able to improve their lending decisions and limit the exposure to credit risk. AI gives banks an opportunity to decrease the level of non-performing loans and strengthen the loan portfolio.

- **Augmentation of decision-making processes**

AI, with its advanced data analytic tools, allows banks to better understand their data and gain deeper insights into customer behavior, demand for bank's products and services, impact of various factors on bank operations, etc. Thus, they are able to make informed decisions associated with product developments, marketing decisions, and customer preferences (Sharma, 2023). AI-supported strategic decisions may ultimately lead to gaining competitive advantage and organizational growth (Khatab, 2020).

- **Expansion of customer base through financial inclusion**

The traditional credit scoring and risk assessment models usually limit access to financial products or even fully exclude certain populations from using banks' services. By considering traditional sources, potential customers may be categorized as too risky or deemed too costly to be served where profits are either too low or even negative. Nevertheless, the AI-powered credit scoring models combined with other benefits brought by the AI-based automation of processes offer banks an opportunity to serve the underserved market and increase their customer base. Thanks to AI, banks are now able to better understand underserved segments and adapt their

lending process. Thus, AI technology opens up the doors for banks to expand their market share by enabling the financial inclusion of underserved business entities and households.

Based on the areas in which AI is implemented by banks, it brings a vast number of benefits for financial organizations as well as for banks' customers. Utilization of AI models enhances efficiency, augments customer experience, improves security and data protection, offers better risk management, and offers cost savings opportunities. The future evolution of AI and even further integration of the technology is expected to deepen the benefits and increase the competitive advantages.

### **3. CHALLENGES OF AI IN BANKING**

Even though there are a vast number of benefits for the banking industry, banks are yet to face numerous challenges related to the utilization and employment of AI-powered solutions in their operations. The challenges associated with the current state of employing AI in the banking industry include:

- Need for qualified staff,
- Data privacy,
- Model explainability,
- Implementation costs,
- Regulatory compliance
- Bias and Fairness
- Operational integration

Ensuring successful implementation and integration of AI imposes the need for banks to have access to qualified staff such as AI experts, skilled data scientists, and machine learning engineers. However, identifying and attracting adequate talent can turn out to be a challenge by itself (Harry et al., 2023). Moreover, retaining qualified personnel may prove to be an even bigger challenge given the popularity of AI solutions, which causes the demand to exceed the supply of talent. The challenge to find relevant staff could be even more extensive for smaller banks with limited resources.

Banks have access to and store sensitive and personal information. Thus, among the most notable challenges is the one associated with data security and privacy when using customer data in AI solutions. The challenge for banks is to set up an adequate data protection mechanism against potential data breaches and misuse (Morgan & Edward, 2023). Banks should also ensure compliance with regulations such as GDPR.

Model explainability poses a challenge for banks in a way that AI models and Machine Learning algorithms are not easy to understand or interpret. This might affect the transparency and explainability of AI solutions in the process of covering regulatory requirements and maintaining trust with customers (de Lange et al., 2022). Issues arise with the need to explain or justify decisions made utilizing AI systems or decisions made by AI models.

The utilization of AI solutions in bank operations and processes brings numerous benefits. Nevertheless, a major challenge or even a drawback when it comes to implementing AI technology are the associated costs. As a relatively new technological solution, AI implementation costs may require substantial initial investment in technology, staff training, and infrastructure (Soni, 2019). Moreover, the transition from traditional to AI-based processes also comes with certain financial and non-financial costs that should be considered.

Banks operate in a constantly evolving regulatory environment. Hence, they should ensure that their AI solutions will be easily adaptable to changes in regulations. AI applications and systems should be able to meet legal requirements and ethical standards on an ongoing basis to guarantee regulatory compliance (Harry & Thomas, 2023).

Bias and fairness are two of the major issues associated with AI systems as a result of the potential biases present in the historical data. The challenges for banks are to develop AI and ML applications that will eliminate the bias and possible discrimination in lending processes and other products and services (Harry & Thomas, 2023). Banks should set up mechanisms to detect potential bias and implement mitigation techniques combined with mechanisms to regularly review AI solutions to eliminate bias and guarantee fairness in decision-making processes.

Traditional banking processes and systems were developed and updated without any regard for AI technology since it is relatively new and major advances have been recorded during the last couple of years. Thus, implementing and integrating AI solutions in current banking operations and systems is a rather complex task. Banks need to ensure that the technologically advanced AI solutions are fully integrated and compatible with legacy systems. Consequently, the transition from current systems to AI-based operations is a major operational challenge.

Currently, the AI environment in the banking industry is dynamic and characterized by increased integration and continuous advances in models and technology. Banks that will manage to successfully integrate AI solutions are expected to gain a competitive advantage in multiple areas of their operations.

## **CONCLUDING REMARKS**

Technological advances have always been the driving force of transformational changes in different industries, in particular, the banking industry. The latest developments in AI technology and the vast number of ML models and algorithms lead to the employability of AI solutions in banking operations. The current success stories of banks that integrated AI solutions indicate the degree to which this new technology can augment bank operations and improve customer experience. Thanks to AI and ML models, banks have experienced increased efficiency, improved customer service, security improvements, cost savings, better risk assessment, and advances in risk management techniques.

However, AI application in the banking industry is still in the early stages of development and implementation, and banks are yet to face potential challenges. Banks will need to find a way to overcome the model explainability challenge and the data privacy and security issues to satisfy regulatory requirements. Moreover, while cost savings from utilizing AI solutions are evident, high implementation costs for AI are a major challenge, especially for smaller banks.

Currently, it can be seen that certain banks have already implemented AI and ML solutions in multiple processes within the organization and reaped the associated benefits. Consequently, the successful overcoming of challenges and further evolution of AI technology and its application will bring breakthroughs in the banking industry. Financial products and services will be more accessible, and the utilization of AI should eliminate most or all of the existing limitations when it comes to offering and usage of banking products.

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