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# Review on the Emerging Role of Artificial Intelligence in the Banking Industry

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**Abstract:** The banking industry is undergoing significant and transformative changes, with a primary focus on prioritizing the client as the key driving force behind these reforms. Customers that are highly proficient in technology and regularly interact with cutting-edge technologies expect banks to provide smooth and uninterrupted experiences. In order to meet these requirements, banks have expanded their range of services to encompass the retail, IT, and telecom industries, providing offerings such as mobile banking, ebanking, and real-time money transfers. While these enhancements have granted customers the convenience of accessing a wide range of banking services, they have also resulted in financial costs for the banking sector. While AI in banking and financial services offers advantages, it also brings forward certain drawbacks such as concerns over data security and privacy, algorithmic bias, and potential job consequences. It is crucial to address these concerns and guarantee that AI is used in a morally and responsibly way as it grows more widespread in the banking and financial services industry. This research study aims to analyze the current state of artificial intelligence (AI) in the banking and financial services sector, as well as its potential impact on the industry. The banking and financial services sector has seen substantial operational changes as a result of the growing implementation of artificial intelligence (AI). AI technology is employed in various domains like customer service, fraud detection, risk management, and investment management.

**Keywords:** Artificial Intelligence, banking sector, customer banking, challenges, banking frauds, credit analysis; innovation; financial performance; hierarchical regression; Datastream

### I. INTRODUCTION

Humans possess innate cognitive abilities, commonly referred to as natural intelligence. This encompasses the capacity to receive, analyse, evaluate, and logically deduce information in order to arrive at conclusions or solve issues. Additionally, humans have the ability to learn from past experiences, enhance their skills, and make progress. Artificial Intelligence (AI) and Machine Learning refer to similar capabilities exhibited by machines. The term "artificial intelligence" was coined by computer and cognitive scientist John McCarthy from Stanford University in the United States. It refers to the remarkable ability of a machine to imitate human thinking and make logical decisions to achieve a specific goal. Artificial intelligence (AI) has become a disruptive force in the banking sector, revolutionizing the operations and customer service of financial institutions. The incorporation of AI-driven solutions in the banking sector has resulted in notable enhancements in operational effectiveness, precision, and client contentment. This study paper seeks to investigate the influence of artificial intelligence (AI) on the banking sector, with a particular emphasis on its utilization in domains such as fraud detection, customer service, risk management, and tailored marketing. This article will conduct a thorough examination of industry reports, academic research, and case studies to assess the advantages and difficulties of implementing AI in the banking sector. It will also explore the future impact of this technology on the industry. The primary objective of this research study is to offer valuable insights into the ways in which artificial intelligence (AI) can be utilized by banks to improve their competitiveness, foster innovation, and generate value for their stakeholders.





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#### II. OBJECTIVE OF THE STUDY

To examine and evaluate the primary uses of artificial intelligence (AI) in the banking industry and assess its effects on operational efficiency and overall performance.

The objective is to identify the obstacles related to the implementation of artificial intelligence in the banking sector.

To assess the prospective trajectory of AI, its long-term viability, and its integration into the financial sector.

### III. RESEARCH METHODOLOGY

The study collects data from secondary sources, including books, journals, research papers, websites, and company reports. Books have also been suggested for acquiring the necessary theoretical expertise of the subject. Abundant information pertaining to our research area in professional education or learning can be obtained from several sources, irrespective of the industry being investigated. We have conducted a comprehensive review of many articles from firms such as Deloitte, PWC, Wipro, as well as 10 research papers. The information has been organized in a logical sequence to align with the structure of the paper. Only materials that specifically address the impact of AI on the banking system were consulted for this study. The requisite theoretical material on the issue has also been sourced from books. We have conducted both theoretical and statistical study on the financial system and its functions.

### IV. REVIEW OF LITERATURE

This article examines the impact of artificial intelligence (AI) utilization on the credit score evaluation procedures of banks and other financial institutions. These constraints establish the basis for a new era of economic legislation that include the verification of AI algorithms and data utilized by banks.

(Chandrima Bhattacharya, 2022) This study provides an understanding that literature review and theoretical research have been conducted on various international and Indian banks about the integration of AI to improve customer interactions and internal banking procedures. Chatbot utilization in banking systems is generally evaluated based on customer experience. Practical/Theoretical implications: Considering the overall impact of AI integration in banking operations, Indian banks that are evolving should prioritize the most prominent use cases to attract consumers. The association between the utilization of Chatbots and the benefits for Indian banks can also help them expand their

According to the study conducted by Board in 2017, the lack of interpretability or "auditability" of AI and machine learning techniques could pose a significant risk at a larger scale. Likewise, the extensive usage of opaque styles can sometimes result in unintended repercussions. Like any novel product or service, there are crucial issues around appropriate risk management and supervision. It is crucial to assess the utilization of AI and machine learning due to their associated risks, such as compliance with data privacy rules, behavioural risks, and cybersecurity. Thorough examination and instruction of equipment, together with unbiased information and feedback systems, are crucial to ensure that programs function as intended. In general, artificial intelligence and machine learning systems demonstrate significant potential, provided that their inherent risks are effectively mitigated. The last stage provides a first perspective on governance and the enhancement of models, as well as the ability to be audited by institutions and supervisors.

(Neeraj Gupta, 2020) This study examines the impact of different factors specific to financial institutions, such as size, capitalization ratio, risk, price-to-earnings ratio, investment price, sales diversification, labour productivity, and age, on the performance of these institutions. The examination findings indicate that the performance of commercial banks in India is influenced by three important factors: the number of financial institutions, the percentage of non-performing mortgages, and sales diversification. Furthermore, the results indicate that the size and age of financial institutions, as well as worker productivity and sales diversification, have a substantial impact on the overall performance of Indian banks during times of crisis.

The report from 2020 states that these technologies possess the capacity to profoundly alter the way we communicate with one another, operate our businesses, and even govern for the benefit of our population. While the use of AI differs across different regions, there are certain businesses, even in advanced countries, that are increasingly embracing AI to enhance customer service and achieve economies of scale. The authorities have stated that in order to meet India's growing demands, banks must utilize technology, including artificial intelligence and big data. All has the potential to

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transform India's banks by improving customer experience, enabling more informed credit underwriting decisions, detecting fraud and defaults at an early stage, enhancing collections, and increasing employee productivity.

Ankur Aggarwal (2022) stated that in the past, banking services mostly focused on individuals with a regular income. However, these services have now become an essential aspect of our lives. The current state is predominantly influenced by the extent of artificial intelligence in enhancing customer experience and implementing robotic process automation in the banking sector in India. The majority of clients experience a strong positive association between AIbased services provided by banks and associated characteristics.

Saloni Tripathi, in 2022, highlights the impact of AI platforms in the banking sector and their role as a major disruptor. Current technology employing clever algorithms poses issues for banks by replacing human labor. In order to maintain competitiveness, companies must incorporate artificial intelligence (AI) into their business goals and practices.

(Omar H. Fares, 2022), The literature on AI in banking encompasses three significant study areas: Strategy, Process, and Customer, as revealed by the findings. In his study paper, he also mentioned a Service Blueprint that outlines the customer journey, front stage, backstage, and support method in banks for a systematic consumer credit solution application.

(Sindhu J, 2019) This study examines the implementation of artificial intelligence (AI) in five Indian commercial banks—SBI, ICICI, Axis, HDFC, and HSBC—by considering the cost-benefit analysis. The data is collected from secondary sources, specifically literature, to ascertain the information utilized in the banking industry. Retrieve information on artificial intelligence technology services available in India.

(Mehrotra, 2019) In this article, the author explores the potential for artificial intelligence (AI) to replace human workers in the banking and financial services sector. This could unintentionally lead to the loss of personalized attention and the unique customer experience that is highly valued in industries like banking and financial services, which are known for their trustworthy and accountable practices. In addition, he asserted that AI cannot completely substitute human intervention due to its inability to manage intricate personalized inquiries, interpret emotions, develop trust, or form an emotional connection with a consumer to engage their attention and cultivate their devotion to a company.

# V. THEORETICAL BACKGROUND: THE ROLE OF ARTIFICIAL INTELLIGENCE IN BANKING **SERVICES**

In order to enhance efficiency, humanity have consistently advanced the development of more modern machinery. Reflect upon the significant impact that bicycles and later vehicles had on human mobility, since they enabled humans to travel greater distances and at higher speeds. These machines were constructed utilizing internal combustion engines and wheels, both of which were versatile technologies. Artificial intelligence (AI), the latest general-purpose technology, is currently being employed to transform the banking industry and commercial economics, similar to the way the computer and Internet did in the past (Accenture). The financial services industry is experiencing a major upheaval due to the advancement of artificial intelligence. Many banks are now striving to innovate by incorporating AI-powered technologies to improve their existing business operations. For example, artificial intelligence is altering the way we engage with technology and transferring a portion of the mental burden from humans to robots. In contemporary times, one may simply consult Google, Siri, or Alexa to obtain information, whereas in the past, individuals had to possess knowledge about the appropriate sources and methods to do a task.

The banking sector has experienced increased volatility and competition due to the process of globalization and the greater economic openness. Modern customers have an increased expectation for exceptional treatment when utilizing a company's products or services, which can be more accurately described as a heightened emphasis on client satisfaction. Thanks to the increasing adoption of advanced technologies such as artificial intelligence, the banking industry has experienced significant growth in recent decades. As a result, client loyalty is expected to continue to increase. The present corporate environment is constructed in such a way that almost every organization, including those involved in deposit-taking, lending, investment banking, and asset management, relies on artificial intelligence applications. Hence, the implementation of autonomous data management systems, devoid of human interference, can greatly benefit banks by improving their speed, accuracy, and efficiency. The various applications of AI in the banking industry can be classified into four distinct areas. There exist front-office applications designed for clients and back-

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office programs designed for operations. The second concern pertains to the regulations and laws that regulate trading and portfolio management. While the majority of banks are now in the testing phase, a few have successfully integrated advanced technology into their operations. Furthermore, artificial intelligence is being explored as a potential tool to investigate online financial fraud. Due to the increasing popularity of online and mobile payments, credit card fraud has rapidly emerged as a prevalent kind of cybercrime. Consequently, several organizations have begun employing artificial intelligence (AI) algorithms to compare the quantity and whereabouts of present credit card transactions with past ones, in order to authenticate their legality in real-time.

Financial organizations are also exploring the use of AI technology in the realm of chatbots. Chatbots are digital aides that can engage with bank customers through written or spoken communication in order to fulfil their requirements without the need for human staff. Financial institutions are also exploring the use of artificial intelligence (AI) to analyse and extract relevant information from reports and legal documents, such as annual reports. AI software may generate models by analysing data and employing back testing to learn from past mistakes. Over time, several financial technology tools have transformed into highly accurate AI solutions. Examples of such tools include online financial planning tools that aid consumers in making more informed purchasing and saving choices, robot advisers that facilitate complete automation in certain asset management tasks, and a recent estimate by PWC indicating that artificial intelligence (AI) could potentially add approximately \$16 trillion to the global economy by 2030. Reportedly, the global investment in AI applications has exceeded \$5 billion. By 2030, the banking industry is projected to achieve savings of \$1 trillion through the utilization of AI, mostly due to the closure of branches.

Recent technological advancements have enabled artificial intelligence (AI) to offer cognitive computing solutions in the workplace. This involves integrating algorithms into applications to support organizational processes (Tarafdar et al., 2019). The goal is to enhance the efficiency of information analysis, generate more precise and dependable data outputs, and empower employees to perform complex tasks. AI-based solutions have demonstrated their efficacy and value in recent years. Nevertheless, numerous corporate executives remain uncertain regarding the strategic implementation of AI in their organizations. Although 85% of corporate executives recognize AI as a vital tool for providing organizations with a lasting competitive advantage, Ransbotham et al.'s (2017) study found that only 39% of company leaders have a strategic plan for implementing AI due to uncertainty about its application within their organizations.

Artificial intelligence (AI) is employed in the banking sector across different areas, such as the front office (utilizing voice assistants and biometrics), middle office (handling complex legal and compliance procedures, monitoring antifraud risks), and back office (facilitating credit underwriting through smart contracts infrastructure).

Front Office	Middle Office	Back Office
<ul><li>Conversational</li><li>Chat Bot</li></ul>	<ul><li>Anti Fraud</li><li>Auditing</li></ul>	<ul><li> Underwriting</li><li> Data Processing</li></ul>

### **Front Office**

Scientists have uncovered that artificial intelligence (AI) has significantly influenced the whole banking sector. At this stage of banking operations, many technologies such as voice assistance, chatbots, and biometric systems are being utilized. Previously, this task was executed by individuals. These jobs must be assigned to an individual, however with the implementation of AI, there have been significant changes. Chatbots are essential because they possess the ability to engage with users in a manner that closely resembles human interaction. 24/7 tech support lines are now accessible to address client inquiries outside of regular business hours. They have the capacity to handle several inquiries. Despite their extended tenure, they exhibit meticulousness and an inability to commit errors. The cost has lowered while the client experience has improved.

### **Back Office**

They play a crucial role in banking services. Artificial intelligence has been utilized to improve the intermediate operations of banks. The intermediate level operations exert a substantial influence on all instances of banking fraud. At this level, we do Know Your Customer (KYC), Anti-fraud Machine Learning (ML), and other monitoring activities.

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Artificial Intelligence is employed to facilitate historical transaction-based notifications and CIBIL monitoring. Banks can derive advantages from increased use of robotic process automation in various domains, including loan approval, account opening, automated report generation, anti-money laundering, and KYC. AI is used in banking services for various purposes. These include using facial recognition for the first transaction, analysing micro-expressions with virtual loan officers, using biometric authentication and authorization, employing machine learning to detect fraud and cybercrimes, and conducting real-time transaction analysis to prevent fraud.

### **Artificial Intelligence Revolutionizes Customer Banking**

Customers consistently seek convenience. Customers were able to access a vital service even outside of banking hours, therefore contributing to the popularity of the ATM. That level of convenience has spurred the creation of other technologies. Customers may now conveniently open bank accounts from the comfort of their couches using their cell phones. A decision management system (DMS) facilitates the expeditious collection of Know Your Customer (KYC) data, while concurrently minimizing inaccuracies, hence enhancing enterprises' efficiency in processing times. In addition, the implementation of company decisions can be streamlined and expedited by utilizing appropriate business rules software, thus eliminating the need for cumbersome procedures. McKinsey's worldwide AI survey study reveals that virtual assistants and conversational interfaces employed in front-office settings constitute approximately 32% of the overall AI technology. Customer expectations are rising in tandem with the use of digital banking. Internet usage had a significant increase of up to 50% during the COVID-19 epidemic, and it is expected that this trend would continue even after the pandemic has concluded. Approximately 45% of consumers may soon stop visiting branches on a regular basis. Therefore, it is imperative to uphold and construct a digital banking platform that is easy for users to navigate and use. Chatbots significantly enhance the banking experience for clients by providing 24/7 support and offering valuable advice.

# AI's role in detecting and preventing frauds in the banking sector Fraud and anti-money laundering

On a daily basis, a significant volume of digital transactions occurs when clients utilize applications or online accounts to settle invoices, retrieve funds, submit checks, and perform various other activities. Consequently, the banking industry must intensify its endeavours in cybersecurity and fraud detection. The utilization of artificial intelligence in the banking sector can prove to be advantageous in this particular scenario. Artificial intelligence (AI) has the potential to mitigate risks, monitor system issues, and enhance the security of online banking for financial institutions. Artificial intelligence and machine learning have the capability to rapidly identify fraudulent behaviour and promptly notify both banks and customers. For example, Danske Bank, the primary financial institution in Denmark, transitioned from a system that relied on predetermined rules to a system that used algorithms for detecting and preventing fraudulent activities. AI provides robust anti-money laundering safeguards to safeguard the funds of its clients. AI provides robust anti-money laundering safeguards to safeguard the funds of its clients. Artificial intelligence devises multiple strategies to safeguard bank accounts from these fraudulent individuals.

**Supervised learning,** which relies on a large number of accurately labelled transactions, is the predominant kind of machine learning. Each transaction is categorized as either fraudulent or non-fraudulent. The models are trained using substantial amounts of labelled transaction data, which they analyse to identify patterns that strongly indicate genuine actions. The accuracy of a supervised model is directly influenced by the amount of clean and relevant training data utilized to generate it. Unsupervised models are employed to detect anomalous behaviour in situations when there is limited or non-existent annotated transaction data. In such circumstances, it is necessary to utilize self-learning techniques in order to discover data patterns that are overlooked by conventional analytics.

### Cost benefits of implementing AI and ML in banks

The BFSI industry is increasingly leveraging artificial intelligence (AI). Last year, almost 85% of banks, as reported by IDC, used AI solutions to facilitate intelligent decision-making and automated processes for corporate know-your-customer (KYC) procedures. This implementation resulted in a considerable reduction in the time required to authorize enrolments for new corporate accounts. Furthermore, AI technologies and conversational interfaces are augmenting personalization, efficiency, and reaction time.





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Based on the findings of the Autonomous Next study, it is projected that banks might achieve a total cost savings of \$447 billion by 2023 with the implementation of AI applications. Out of this amount, around \$416 billion is expected to be saved in front and middle office expenses.

Autonomous, a financial research organization, reports that there are over 22 billion smart computing devices globally, surpassing the human population by a ratio of three. A recent study conducted by Autonomous has demonstrated that traditional financial institutions have the potential to reduce expenses by 22% by the year 2030 through the implementation of artificial intelligence technologies. Presently, banks possess a significant opportunity to employ artificial intelligence in order to enhance their operations and simultaneously enhance client satisfaction.

As per Forbes, a majority of organizations, specifically 51%, view cost savings as the primary benefit of artificial intelligence technology. Moreover, based on a 2019 projection by Juniper Research, the expected global operational cost reductions resulting from the implementation of chatbots in the banking sector is estimated to increase from \$209 million in 2019 to \$7.3 billion by 2023.

### How is artificial intelligence reducing expenses?

### 1) The integration of chatbots into digital banking systems-

A bank is obligated to cover its expenditures by means of physical branches, which encompass the acquisition or rental of the premises, energy consumption, and the remuneration of its staff. AI-powered chatbots can simulate human representatives, enabling banks to operate for longer periods without incurring overtime costs and efficiently handle several clients simultaneously with consistent accuracy.

For instance, Ally Financial, a fully digital bank, generated a total revenue of US\$6.394 billion and achieved a net income of US\$1.721 billion. It offers services such as portfolio management, self-directed trading, and mortgage lending. Discover Bank is another notable example.

### 2) Minimize human workforce errors

Artificial intelligence (AI) can be utilized to reduce errors resulting from human labor, including inaccuracies in calculations and mistakes made by humans. Human error is responsible for 38% of financial losses in the banking industry, leading to a decrease in revenue. By reducing losses, a bank has the potential to enhance its net income.

For instance, OSP provides Role-Based Access Control, AI-driven Audit Reporting, Audit Planning Systems, intelligent Data Sampling, and Journal Entry Testing. High Radius provides a cloud-based solution for bank reconciliation.

### D) ARTIFICIAL INTELLIGENCE FOR CREDIT ANALYSIS

Conventional credit decisions rely on a limited number of data points, such as credit bureau scores and information provided by the borrower in their application. The determination of an individual's risk profile is a complex task for banking professionals due to the numerous elements involved in assessing credit risk. Business borrowers have a more challenging procedure as they need to gather and analyse data from several time periods and attributes in order to generate a comprehensive risk assessment. An AI system can generate a more comprehensive borrower profile by integrating alternative data such as utility bills and rent payments with legally permissible information like the borrower's credit history from other lenders.

### VI. FINDINGS

- 1) Financial services prioritize establishing a personal rapport with clients to provide both automated financial advice and expert counsel to assist clients in making informed financial choices. Additionally, it evaluates market volatility and provides suggestions on how users can effectively handle their portfolios to achieve their financial goals.
- 2) The availability of technology allows customers to access financial services using voice commands and touch displays, leading to a progressive disappearance of the need for physical presence. Natural language processing technology has the capability to analyze queries, offer information, answer inquiries, and connect users with further financial services. Consequently, the process becomes more organized, leading to a decrease in mistakes made by
- 3) Artificial intelligence is affecting the Indian financial business. Leading participants in the banking sector are integrating artificial intelligence technology into some operations to enhance the effectiveness of banking.

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Consequently, the banking industry will have additional time to allocate towards other duties that will improve banking operations and alleviate it from monotonous tasks.

- 4) Advancements in speech processing and natural language processing technologies will result in prompt resolution of consumer complaints pertaining to the banking sector. The era in which machines may handle the majority of customer support inquiries is swiftly approaching. The reduction of waiting in line would result in improved customer service.
- 5) Our analysis indicates that the banking system is falling behind in terms of protecting its back-end operations. Data shows that only 15%-20% of resources are committed to data privacy and protection, while the majority of the focus is on revenue generation.
- 6) Currently, most Indian banks are either planning to implement artificial intelligence (AI) to enhance customer effectiveness and operational efficiency, or they have previously experimented with certain AI/machine learning (ML) models. However, it is essential for every business to assess their current position in the AI process and determine their level of maturity in order to develop and possess a high-quality AI/ML system for production. Subsequently, the bank can make a decision on the appropriate course of action by considering the evaluated level of maturity.
- 7) Banks face a significant issue in collecting large amounts of consumer data in order to train AI algorithms. This requires organizations to invest in the production and storage of big volumes of data. The AI rewards that have been earned are directly linked to the amount and excellence of data that these businesses have collected or preserved.

### VII. CONCLUSION

According to the data cited earlier, it can be deduced that banks are actively investigating and adopting artificial intelligence (AI) to transform customer management, in response to the growing popularity of this technology. The banking sector will derive substantial benefits from the implementation of artificial intelligence in the future. The implementation of AI has granted clients the autonomy to carry out transactions at their own convenience, eliminating the necessity of enduring lengthy lineups at the bank. The goal of artificial intelligence is to provide customized, highquality services that are also fast and efficient. By employing artificial intelligence, the bank has effectively reduced costs related to repetitive work through automation. Artificial Intelligence (AI) has also assisted banks in reducing fraud and evaluating credit risk. Nevertheless, AI encounters additional challenges. The difficulty lies in collecting a substantial amount of data for every individual customer of the bank. The bank bears costs for the creation and upkeep of data. Undoubtedly, artificial intelligence (AI) has immense potential in the finance industry. Over time, we can anticipate substantial advances in the field of artificial intelligence.

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