

# Leveraging Artificial Intelligence and Machine Learning for Digital Transformation in the Banking Sector

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## Abstract:

Over the years, technology has revolutionized our world. It has changed our lives from barter system to currency system, and now it has upgraded to Artificial Intelligence powered system. It has also changed the way we think, the way we communicate, the way we bank and transact. The technology is getting better and smarter day-by-day leading human life become easier, faster, and convenient. In this digitalized era, like all other industrial sectors, it has become imperative for banking sectors to embrace digital transformation and to adopt new technologies like artificial intelligence and machine learning. Banks that fail to make the leap to digital transformation will risk being overtaken by competition and deserted by their customers. This paper provides a detailed review about Artificial Intelligence and Machine learning in banking, covering key areas such as customer services, fraud detection, personalised banking services, credit scoring, operational efficiency, and sophisticated product development.

**Keywords:** Digital transformation, Artificial Intelligence, Machine learning, Banking sectors.

## I. Introduction

Information technology is one of the most important facilitators for the transformation of Indian banking industry. The banking industry, which was formerly distinguished by its conventional brick-and-mortar operations, is currently leading the way in digital innovation. In order to ensure that financial institutions continue to provide value, convenience, and security to their consumers in the twenty-first century, they must make major operational transformations as we enter the era of digital banking. Digital transformation in banking is the process of bringing cutting-edge techniques and digital technologies to the financial services industry to boost client satisfaction and operational effectiveness. Through this process, traditional banking systems, procedures, and business models are modernised to allow banks to provide secure and convenient services via a variety of digital channels.

Important facets of banking's digital transition include:

- **Omni-channel banking:** offering users a smooth, integrated experience through a variety of channels, including ATMs, mobile apps, online banking, and physical branches.
- **Personalisation:** Adapting goods and services to the unique requirements and preferences of each client by utilising data analytics, AI, and machine learning.
- **Automation and process optimisation:** Using artificial intelligence and robotic process automation (RPA) to improve efficiency, cut costs, and streamline internal operations.

- **Advanced security measures:** Using cutting-edge cybersecurity techniques and solutions to safeguard client information, stop fraud, and guarantee adherence to legal requirements.
- **Data-driven decision making:** Using sophisticated algorithms and large data analytics to maximise risk management, spur innovation, and make well-informed strategic decisions.
- **Working together with Fintech and open banking:** To promote innovation, enhance customer experiences, and broaden service offerings, collaborating with Fintech start-ups and supporting open banking efforts is recommended.

## II. Review of Literature

Srihari Subudhi (2019) studied Banking on artificial intelligence: opportunities and challenges for banks in India. The study inferred that the traditional banking has evolved and more banks are adopting new technologies like Artificial intelligence and Blockchain to cut down their operating expenses, to provide superior customer service and improve overall efficiency in the banks. The study further concluded that integrating artificial intelligence in the dynamic industry of banking has several benefits. Some of these include accuracy, reduction in human error, cost cuts, scalability, etc. Another important activity that will become easy to perform with AI is data analytics. Machine Learning can effortlessly process a large amount of data swiftly. Patterns can be observed and customer service can be enhanced accordingly. The right customer can be contacted at the right time with the right product, leading to rapid business growth. Jobs will have to be enriched in rely to emerging technology being used as an aid to human intelligence. In spite of all challenges, banks in India will get smarter and more intelligent to implement Artificial Intelligence in all possible areas so that it can provide better customer service, reduce bank's risks and cost of operations and also bring efficiency.

Tejinder Singh & Nitin Pathak (2020) studied Emerging role of Artificial intelligence in Indian banking sector. In their study made an attempt to give a brief overview of banks in India which are making tremendous progress in the adoption of artificial intelligence and also stated about State Bank of India's AI based technological innovation-SIA that has the potential of responding to approximately 10,000 inquiries per second or 864 million in a day which is about 25% of the total queries processed by Google every day. A Bangalore based company named "Payjo" has designed the platform for SIA and doing it in a errorless manner for a bank with approximately 420 million customers.

Vinoth S & Preetha Chandran (2022) studied Artificial Intelligence and transformation to digital age in Indian banking industry. The study concluded that Artificial intelligence is going to be stronger and smarter in the future, which will help any customer to have a secure banking experience and it has the potential to improve company operations, provide customized services, and aid with wider aims like financial inclusion. In banking sectors, AI has been used in areas such as core banking, operational performance, customer assistance and analytics, in order to help customer to have a secure banking experience and also to improve company reputation. The study further inferred that Chatbots and Robotics are widely used applications in Indian banking industry and at the same time, Machine learning algorithms are also deployed in the fields like KYC, fund transfers, and fraud detections.

The Impact of Artificial Intelligence in the Banking Sector with Reference to Private Banks in India was researched by Sharan Kumar Shetty et al. in 2022. According to the study, artificial intelligence (AI) is leading the way in bringing about a radical transformation in the financial sector, and the world of banking is changing quicker than ever. In the banking industry, a variety of AI technologies have been used in areas like analytics, customer service, operational performance, and core banking. AI sees

banking as a whole, a modern universe rather than simply physical branches. According to the study, of the 200 responses, 170 came from consumers and 30 from bankers. This indicates that the majority of young people are aware that AI is being used in banks. Additionally, although it is simple to use, additional understanding is needed for the same. The response from bankers reveals that although implementing AI in banks is costly, it lessens job pressure and unintentional errors. Thus, the majority of them benefited from the use of AI in banks.

R Karthiga, et al (2023-24) studied about the impact of Artificial Intelligence in the banking sector. The study concluded that the AI is poised to reshape the future of banking, driving innovation, efficiency and customer centricity. By embracing AI-powered solutions, including chatbots, predictive analytics, fraud detection systems, and algorithmic trading algorithms, have enabled banks to enhance efficiency, improve decision-making, and deliver personalized experiences to customers. By leveraging advanced analytics, machine learning algorithms, and big data technologies, banks have unlocked new opportunities for innovation, growth, and competitiveness in a rapidly evolving digital landscape.

### III. Objectives of the study

Rich literature is available about evolution, application and adoption of latest AI innovations as a strategic key success factor in banking sectors of developed countries. The present study is descriptive in nature which mainly focuses on leveraging Artificial Intelligence and Machine learning for digital transformation in the day-to-day banking activities.

The specific objectives of this study are;

1. To study the applications of Artificial Intelligence in banking.
2. To study the benefits of Artificial Intelligence and Machine learning in the banking sectors.
3. To study the challenges in implementing AI in banking industry.

### IV. Artificial Intelligence and Machine learning in banking sectors

These days, artificial intelligence—the technology that makes machines resemble human intelligence—is a crucial component of the financial sector. Artificial intelligence (AI) is a fact that is changing how banks function and provide for their clients; it is no longer science fiction. Artificial intelligence comprises diverse technologies such as computer vision, natural language processing, and machine learning, which collaborate to analyse information, make judgements, and automate procedures.

Artificial Intelligence is being applied in banking to improve client experiences, security, and efficiency. By automating repetitive processes like fraud detection and data entry, it lowers operating expenses. On the other hand, machine learning algorithms use client data analysis to identify anomalous transactions, improve security, and customise services. Additionally, artificial intelligence assists with portfolio management and investment strategy optimisation. Conversely, natural language processing facilitates the analysis of customer input for improved product creation. All things considered, banking is revolutionised by AI and ML since it simplifies processes, lowers risks, and provides consumers with specialised services.

### V. Applications of Artificial Intelligence in banking

- **Customer service/ engagement (Chatbot):** It is one of the most commonly used applications of AI across industries. Chatbots can effectively tackle most commonly accessed tasks such as balance inquiry, assessing mini statements, fund transfers, etc.,

- **Robo advice:** A robo-advisor attempts to understand a customer's financial health by analysing data shared by them, as well as their financial history. Based on this analysis and goals set by the client, the robo-advisor will be able to give appropriate investment recommendations in a particular product class, even as specific as a specific product or equity.
- **General purpose/ Predictive analytics:** One of AI's most common use cases includes general-purpose, semantic and natural language applications and broadly applied predictive analytics. AI can detect specific patterns and correlations in the data, which legacy technology could not previously detect. These patterns could indicate untapped sales opportunities, cross-sell opportunities, or even metrics around operational data, leading to a direct revenue impact.
- **Cybersecurity:** AI can significantly improve the effectiveness of cybersecurity systems by leveraging data from previous threats and learning the patterns and indicators that might seem unrelated to predict and prevent attacks. In addition to preventing external threats, AI can also monitor internal threats or breaches and suggest corrective actions, resulting in the prevention of data theft or abuse.
- **Credit scoring/Direct lending:** AI is instrumental in helping alternative lenders determine the creditworthiness of client by analyzing data from a wide range of traditional and non-traditional data source. This helps lenders develop innovative lending systems backed by a robust credit scoring model, even for those individuals or entities with limited credit history.

## VI. Benefits of AI and ML in Banking sectors

Artificial intelligence and machine learning in the banking sector will forever shape how banks work and perform their duties. The banking sector extensively uses AI and ML to automate processes and make them easier. A few major use-cases where these emerging technologies used are:

- **For fraud detection:** Theft, fraud and security penetrate the banking area because of the sensitive information and cash. Information security is fundamental to an effective bank and keeping up client trust. Renowned banks are on the curve regarding embracing artificial intelligence and machine learning as a business technique- a fundamental undertaking for any significant association looking for an edge over their rivals. With a particularly massive and conveyed client base, the bank needs to keep on developing to best help their client. They are doing this with artificial intelligence to improve the items and contributions for their client.
- **Customer service:** Client support is a fundamental part of banking and frequently has the greatest effect wherein a bank a forthcoming client picks. It's obvious then that this is a zone where banks are testing the most with artificial intelligence in banking to upgrade client connections and improve the gender client bank communication. Conversational artificial intelligence and machine learning are now changing financial client support by accommodating chatbots, feedback and many more, which give a more customized satisfaction on the web and versatile financial experience for the client. Virtual assistants such as Alexa, Siri, Cortana and so on, upheld by AI, utilize prescient investigation to decide the correct pathways to coordinate clients and smooth the way toward drawing in with the bank. Clients can interface with these artificial intelligence banking bots through messaging or tapping through orders on their screens.
- **Credit service and loan decisions:** Using machine learning and artificial intelligence along these lines, banks get a clear image of risks and danger and possible return for every individual, promoting more secure choices and fewer people defaulting on their credits. Credit service and loan decisions

with advance choices have verifiably been made by investigating financial assessments, records, and other past practices. This is nothing but a precise science, and banks frequently lose cash due to having incorrect information. AI and ML are used to investigate elective information in advance, and credit score will raise some protection, moral and legitimate concerns for every individual through their respective banks. Banking sectors with these two technologies may very well make a conceivable pardon give credit to the individuals who are in a terrible danger.

- **Meets regulatory compliance:** With artificial intelligence capacity and machine learning modes, banking is more likely to identify extortion through continuous investigation and incorporation with network safety frameworks. As of now, banks are, perhaps the most profoundly directed foundations worldwide and should conform to exacting government guidelines to forestall defaulting or not getting monetary violations inside their frameworks and policies. On top of examining client conduct, artificial intelligence and machine learning in banking can log key examples and other data for answering administrative frameworks, which means less human information section, is required.

## VII. Challenges faced in the integration of AI in the banking sector

The widespread adoption of cutting-edge technologies like AI in banking is not without its hurdles. When utilising AI technologies, banks face a number of obstacles, from a lack of reliable, high-quality data to worries about data security. The challenges are:

- **Lack of clear strategy for AI:** Many banks struggle due to the absence of a well-defined strategy for AI adoption. Without a clear roadmap, it becomes challenging to move beyond experimentation and scale AI technologies across the organisation.
- **Data security:** To prevent breaches and violations, strong security measures are essential given the enormous volume of data generated in the banking business. To guarantee the correct treatment of customer data, banks must look for a technology partner with experience in both AI and banking and who can offer a variety of security choices.
- **Legal and ethical issues:** Concerns about algorithmic bias, privacy, security, and transparency are some of the ethical and legal issues that AI brings up for banks. Banks have to tread carefully in these waters.
- **Lack of high-quality data:** In order to train and validate a comprehensive AI-based financial system, banks need to have access to well-structured and high-quality data. The efficacy of the algorithm in practical situations is contingent upon the use of high-quality data. In addition, banks that are embracing AI more quickly must review and adjust their data rules to mitigate privacy and regulatory issues, especially when working with non-machine-readable formats.
- **Explainability issues:** Although AI-based systems save time and reduce errors in decision-making processes, they may unintentionally reinforce prejudices from previous human error incidents. The reputation and operational integrity of a bank are seriously at risk from even small anomalies in AI systems that have the potential to grow rapidly. In order to prevent future disasters, banks need to make sure that all judgements and suggestions made by AI models can be adequately explained. It becomes essential to comprehend, validate, and articulate these models' decision-making process in order to promote trust and reduce risks.
- **Resistance to change:** Cultural resistance within organisations can hinder AI adoption. Employees may fear job displacement or struggle to adapt to new ways of working.

### VIII. Integration of AI in few banks of India

**State Bank of India:** With 420 million customers, SBI is the biggest public bank in India. The bank is starting its AI journey with input from both consumers and staff. In order to further its AI mission, SBI organised a nationwide hackathon called "Code For Bank," inviting developers, startups, and students to create creative concepts and solutions for the banking industry using technologies like digital payments, blockchain, fintech, predictive analytics, IoT, AI, machine learning, BOTS, and robotic process automation.

SBI has introduced SIA (SBI Intelligent Assistant), an AI-powered chat assistant that assists customers with routine banking transactions and responds to their inquiries instantaneously, much like a bank person. Payjo, a Bengaluru-based and Silicon Valley-based startup, created SIA. Payjo claims that since its debut, the chatbot has answered millions of inquiries from thousands of clients. SIA has the capacity to process 864 million queries a day, or close to 10,000 queries every second. That represents around 25% of the daily inquiries that Google processes.

**HDFC Bank:** Bengaluru-based Senseforth AI Research created the AI-powered chatbot "Eva" for HDFC Bank. Eva, which stands for Electronic Virtual Assistant, has conducted 1.2 million chats, answered more than 2.7 million consumer inquiries, and engaged with over 530,000 distinct individuals since its introduction. According to the bank, Eva can process information from thousands of sources and deliver straightforward responses in less than 0.4 seconds. Eva has responded to over 100,000 inquiries from thousands of users in 17 different countries in the first several days after its launch. Customers of the bank may now instantly access information about its goods and services thanks to the launch of Eva. There is no need to look up, browse, or give a call. As Eva gains knowledge from its contacts with customers, it also gets smarter. Eva would eventually be able to manage actual banking transactions as well, allowing HDFC Bank to provide its clients with the full potential of conversational banking.

**ICICI Bank:** The ICICI bank is the very first in the country and one of a few international banks to deploy new technology known as "robotic applications" — a sort of applications normally focused on accomplishing an office function, which emulates human activities to automate and execute repetitive, high-volume and time-consuming small business tasks.

Application robots at ICICI Bank have significantly increased the lender's productivity and efficiency by reducing client response times by up to 60% and improving accuracy by 100%. Additionally, it has made it possible for bank employees to focus more on customer- and value-related tasks. All of ICICI Bank's software robots are programmed to perform tasks like data entry and analysis, automatic partitioning, multi-format message generation, text mining, workflow acceleration, reconciliations, and money exchange rate processing, among other things. They can also recognise patterns, capture and interpret data from systems, and execute business processes across multiple programmes. Conversely, this bank has also introduced iPal, a chatbot. With 3.1 million users and a 90% accuracy rate, the Chatbot iPal has answered around 6 million queries since its introduction. The majority of the iPal services are categorised into three main classes and are part of the iMobile programme.

- **Category 1** - It entails FAQs, which can be straightforward questions that you might choose to request your lender executive for that you will find easy, organized replies.
- **Category 2** - It entails financial transactions, whereas you are able to earn fund transfers from person-to-person, cover your bills or recharge your cell phone bills using inquiries.

- **Category 3** - This entails helping individuals find new capabilities. All these are easy how-to jobs like how to reset your ATM pin, which is somewhat more developed and is similar to interacting with your lender.

AXIS Bank: Axis Bank established the "Thought Factory," an innovation centre, to hasten the development of cutting-edge AI technology choices for the financial sector. The Thought Factory offers an accelerator programme wherein the bank works with entrepreneurs for a three-month period in addition to an internal innovation group. The entrepreneurs that make the short list are then enrolled in an organised mentorship programme to help them refine, support, and grow their business. It required repetitive manual labour because it deployed AI across 125+ cognitive and processes automation across 90 procedures. Many processes, including account maintenance and service, loan disbursements, majority trading procedures, and ATM support, are currently fully automated by robotic procedure automation (RPA).

## IX. Conclusion

Artificial intelligence is a game-changer in the financial sector, not just a trendy term. AI is changing how banks work, from using chatbots to provide better customer service to protecting your money from fraud. The combination of blockchain technology and AI promises even more revolutionary advancements in the future. Thus, keep in mind that AI is enhancing your banking experience in the background, whether you're asking for a loan, checking your account balance, or getting investment advice. However, this technology gives banks the benefit of digitalization by reducing the amount of pen and paper work they must do, which helps them compete with Fintech companies. In fact, according to a joint study by the National Business Research Institute and Narrative Science, roughly 32% of financial service providers are already utilising AI technology like voice recognition and predictive analytics.

## References

1. Bartlett, W., Yu, M., & Sanders, N. R. (2020). Machine learning in credit risk. *Journal of Business Research*, 113, 209-222.
2. Bartoletti, S., Cortesi, A., & Ferri, F. (2019). Machine learning interpretability: A credit scoring case. *Expert Systems with Applications*, 134, 96-113.
3. Bennett, D., Kavitha, V., & Chidambaram, M. (2021). AI and Blockchain Based Fraud Detection System in Banking. In *2021 International Conference on Computational Intelligence and Intelligent Systems (CIIS)* (pp. 168-172). IEEE.
4. Bhattacharya, S., & Bhaumik, P. (2021). Machine Learning Based Fraud Detection in Banking. In *Emerging Trends in Intelligent Computing and Informatics* (pp. 557-566). Springer, Singapore.
5. A. C., P., Somashekar, M.T. (2024). "Fuzzy Image Segmentation Technique Applied in Digital Watermarking", *International Journal of Science & Engineering Development Research* ([www.ijrti.org](http://www.ijrti.org)), ISSN:2455-2631, Vol.9, Issue 1, page no.10 - 16, January-2024, Available :<http://www.ijrti.org/papers/IJRTI2401003.pdf>
6. A. C., P., Somashekar, M.T. (2024). An Approach for Detecting and Restoring Tampering in Digital Image Watermarking. In: Aradhya, V.N.M., Mahmud, M., Srinath, S., Mahanand, B.S., Bharathi, R.K. (eds) *Cognitive Computing and Information Processing. CCIP 2023. Communications in Computer and Information Science*, vol 2044. Springer, Cham. [https://doi.org/10.1007/978-3-031-60725-7\\_14](https://doi.org/10.1007/978-3-031-60725-7_14)

7. IBS Intelligence. (2018). Role of RPA and AI in Transforming Banking Operations. [https://ibsintelligence.com/files/media\\_temp/HexawareRole\\_of\\_AI&RPA\\_in\\_transforming\\_Banking\\_Operations\\_v9.pdf](https://ibsintelligence.com/files/media_temp/HexawareRole_of_AI&RPA_in_transforming_Banking_Operations_v9.pdf)
8. Vijai, C. (2019). Artificial Intelligence in Indian Banking Sector: Challenges and Opportunities. *International Journal of Advanced Research*, 7(4), 1581–1587. <https://doi.org/10.21474/ijar01/8987>
9. VeeranjanyuluVeerla (2021). To Study the Impact of Artificial Intelligence asPredictive Model in Banking Sector: Novel Approach. January 2021| IJIRT | Volume 7 Issue 8 | ISSN: 2349-6002
10. Aazhvaar, V. (2019). Artificial Intelligence In Indian Banking Sector: Challenges And Opportunities. *International Journal Of Advanced Research*, April 7(5), 1581-1587.
11. Tejinder Singh & Nitin Pathak (2020). Emerging Role Of Artificial Intelligence In Indian Banking Sector. *Journal Of Critical Reviews*.(Issn- 2394-5125)
12. A C, P., S, L., Somashekara, M. (2023). 'An Improved Method for Reconstruction and Enhancing Dark Images based on CLAHE', *International Research Journal on Advanced Science Hub*, 5(02), pp. 40-46. doi: 10.47392/irjash.2023.011
13. M.Sabharwal. “The use of AI based technological applications by Indian banks”, *International Journal of AI*,1-5,2014.
14. Srihari Subudhi (2019). Banking On Artificial Intelligence: Opportunities & Challenges For Banks In India. *International Journal Of Research In Commerce, Economics & Management*. <http://ijrcm.org.in/>
15. Vinoth S &PreethaChandran (2022).Artificial Intelligence and Transformation to the Digital Age in Indian Banking Industry – A Case Study . *Turkish Online Journal of Qualitative Inquiry (TOJQI)* /January 2022: 689-695
16. Padmanabhan&PrincyMetilda. (2021). An Impact of Aritificial Intelligence in Indian Banking Industries. *International Research Journal of Education and Technology*, 1(4), 39–45.
17. KrithiChandrashekar. (2018). Embracing Artificial Intelligence-An Inevitable Challenge for Banking Industry in India. *Journal of Emerging Technologies and Innovative Research*, 5(10), 79–83.
18. Kumar, K. S., Aishwaryalakshmi, S., &Akalya, A. (2020). Impact and Challenges of Artificial Intelligence in Banking. *Journal of Information and Computational Science*, 10(2), 1101–1109.
19. A.C, Pavan and Somashekara, Dr. M.T., Watermarking for Tamper Detection, Copyright Protection, and Rightful Ownership of a Digital Image: A Literature Survey (December 15, 2022). Available at SSRN: <https://ssrn.com/abstract=4304022> or <http://dx.doi.org/10.2139/ssrn.4304022>
20. A C, P., M T, S. (2023). 'An Overview on Research Trends, Challenges, Applications and Future Direction in Digital Image Watermarking', *International Research Journal on Advanced Science Hub*, 5(01), pp. 8-14. doi: 10.47392/irjash.2023.002