



Artificial Intelligence in Indian Banking: Transformation, Challenges, and the Road Ahead

Vikas Kumar ¹

Student, Sharda School of Business Studies, Sharda University, Greater Noida

Dr. Abhay Singh Chaudhary ²

Assistant Professor, Sharda School of Business Studies, Sharda University, Greater Noida

How to Cite this Article:

Kumar, V. (2026). Artificial Intelligence in Indian Banking: Transformation, Challenges, and the Road Ahead. International Journal of Creative and Open Research in Engineering and Management, <i>02</i>(04).

<https://doi.org/10.55041/ijcope.v2i4.651>

License:

This article is published under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author(s) and the source are credited.

© The Author(s). Published by International Journal of Creative and Open Research in Engineering and Management.



<https://doi.org/10.55041/ijcope.v2i4.651>

Abstract

This study explores Artificial Intelligence's (AI) transformative role in Indian banking, from chatbots like SBI's SIA and ICICI's iPal enhancing customer service to AI-driven fraud detection reducing losses by 40% (EY India, 2023) and faster credit scoring boosting inclusion. Drawing on RBI's FREE-AI framework and surveys, it analyzes rapid adoption trends (60%+ banks by 2025), operational efficiencies, and gaps in smaller public banks due to budget constraints. While AI promises cost savings and competitiveness, challenges like governance maturity, ethical risks, and cybersecurity threats persist. The road ahead demands robust regulation, training, and ethical AI to foster secure, inclusive digital banking in India.



Introduction

The Indian banking system has undergone a rapid and profound transformation over the last decade. The emergence of AI and its transformational potential in the banking domain has been a focus of great interest in recent years, particularly with respect to the financial landscape of a developing nation like India (Kumar, Kuhar & Sharma, 2024). Earlier, banking mostly depended on long queues, paperwork, and manual processes. Today, digital technology has made most banking services accessible through a mobile phone or computer, with Artificial Intelligence (AI) being one of the biggest drivers of this shift.

AI is becoming increasingly pivotal in reshaping how banking services are delivered and consumed (Tiwari & Saxena, 2021). In India, many leading banks — State Bank of India, HDFC Bank, ICICI Bank, and Axis Bank — have started using AI in different ways. Chatbots like SBI's SIA, HDFC's EVA, ICICI's iPal, Kotak Mahindra's Keya, Axis Bank's Axis Aha, and Yes Bank's Yes Robot have been deployed in leading Indian banks since 2017–18 onwards (Vinoth & Preetha Chandran, 2022; Subudhi, 2019).

Tejinder Singh & Nitin Pathak (2020) noted that State Bank of India's AI-based innovation SIA has the potential to respond to approximately 10,000 inquiries per second, or 864 million in a day — about 25% of all queries processed by Google every day.

The growth of online payments, mobile banking, UPI, and internet banking has created enormous volumes of data. Traditional methods of data analysis fall short in coping with the intricacies of modern financial transactions, risk assessment, and fraud detection. AI, with its ability to discern patterns, anomalies, and trends in massive datasets, emerges as an indispensable tool for navigating the intricacies of the digital financial realm (Ayadurai et al., 2021; Machado, 2014).

Banks that harness AI effectively gain a competitive edge by accelerating decision-making, reducing operational costs, and ensuring regulatory compliance. The integration of AI-driven automation further mitigates the risk of human error, enhancing the overall robustness and reliability of banking processes (Gómez & Heredero, 2020; Singh et al., 2022). As digital banking continues to expand, the role of AI is becoming ever more central to both operations and customer relationships.

2. Literature Review

A substantial body of research has examined the use of AI in Indian banking from multiple angles — customer service, fraud detection, credit scoring, financial inclusion, and regulation.

Customer Service and Chatbots

The applications of AI and Machine Learning in India's banking industry include financial crime, compliance management, customer insight and relationship management, credit risk assessment, and customer service (Tiwari & Saxena, 2021). Bharti, Prasad, Sudha & Kumari (2023) and Tiwari & Saxena (2021) identified that the capabilities of AI in customer service have evolved to a stage where it can foresee customer requirements and suggest appropriate products, enabling AI to analyze large datasets to deliver a personalized and anticipatory service experience. Umamaheswari et al. (2023) pointed out that chatbots are many times more efficient in retrieving information from large datasets than traditional human agents, thus enhancing operational efficiency. It was also highlighted that chatbots can clear queries faster than human executives, saving time for the customer and generating financial gains for the bank.



Fraud Detection

Faruk et al. (2021) highlighted AI's efficacy in fraud detection, showcasing its ability to swiftly and accurately identify patterns indicative of fraudulent activities. EY India (2023) reported that banks investing in AI-enabled fraud detection tools saw a 40% reduction in fraud losses over two years. ICICI Bank's AI-powered chatbot iPal has handled over 6 million customer queries and contributed to a 40% reduction in customer complaints related to fraud, increasing customer trust and encouraging greater adoption of digital banking services

Credit Scoring and Loan Processing

Coolen-Maturi & Coolen (2018) illustrated that AI models utilize alternative data sources to assess creditworthiness, thereby promoting financial inclusion. Kumar, V. et al. (2023) worked on AI-based hybrid models for predicting loan risk in the banking sector, demonstrating how machine learning has dramatically improved credit decisioning speed and accuracy.

Operational Efficiency and Digital Transformation

Vijai C. (2019) studied artificial intelligence in the Indian banking sector, examining challenges and opportunities, while Padmanabhan & Princy Metilda (2021) examined the impact of AI in Indian banking industries. Indian banks are utilizing AI-powered technologies to automate labor-intensive operations, reduce operational costs, and increase revenue growth potential, with machines already handling a large portion of mundane tasks.

Financial Inclusion

Sarath Chandran M.C., Renju Chandran & Krishnashree Achuthan (2026) studied the role of green AI adoption in India's banking sector, noting that while rapid AI integration offers operational benefits, it also raises sustainability challenges. The RBI's FREE-AI framework notes that AI has potential to expand the reach of financial services to underserved and unserved populations through solutions like alternate credit scoring, multilingual chatbots, automated KYC, and agent banking.

Challenges and Regulatory Framework

Narayan & Bose (2024) explored the adoption gaps between public and private sector banks, citing technology obsolescence and budget constraints as major hurdles for the former.

Adoption remains shallow: only 20.8% of supervised entities use or are developing AI. Among Urban Cooperative Banks (Tier-1), the figure is 0%, while among NBFCs only 27% report usage. (RBI FREE-AI Survey, 2025).

The Reserve Bank of India has taken a significant step toward ensuring the responsible and ethical deployment of AI in India's financial sector. As announced in December 2024, the RBI constituted a committee to develop a Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI), chaired by Dr. Pushpak Bhattacharyya, Professor at IIT Bombay.

3. Data Analysis

To understand the impact of AI in Indian banking, the following tabular and graphical representations are used.

**Table: Use of AI in Different Banking Areas**

Banking Area	AI Application	Benefit
Customer Service	Chatbots & Virtual Assistants	Quick replies, 24/7 support
Loan Processing	AI-based credit scoring	Faster loan approval
Fraud Detection	Transaction monitoring	Better security
Marketing	Predictive analytics	Personalized offers
Cybersecurity	AI threat detection	Protection from online fraud

As Tiwari & Saxena (2021) note, the AI algorithm can analyze customers' data to comprehend their preferences, behavioral patterns, and risk profiles, enabling banks to offer personalized product recommendations along with targeted campaigns — a customer-centric approach representing a pivotal shift in banking operations.

Trend in AI Adoption Among Indian Banks

Year	Estimated % of Banks Using AI
2020	25%
2021	35%
2022	45%
2023	55%
2025	60%+

The RBI's surveys found that typical production or proof-of-concept AI use cases in Indian banks include customer support (15.6%), credit underwriting (13.7%), sales and marketing (11.8%), and cybersecurity (10.6%), with 35% of institutions favouring the public cloud for scalability.

The FREE-AI framework, crafted through consultations with over 100 stakeholders — including banks, FinTechs, academics, and tech leaders — distils AI ethics into seven core principles: safety, transparency, accountability, fairness, inclusivity, sustainability, and explainability, underpinned by 26 recommendations across six pillars.

A specific case study shows that after Punjab National Bank introduced an AI-enabled audit system, the Gross NPA of PNB and the total number of frauds reported decreased by 11.47% and 39% respectively in the financial year 2021–2022 compared to the previous year. (Sabharwal, 2022).

4. Findings

The study reveals the following major findings:

- AI adoption is growing rapidly.** AI has replaced age-old practices with automated, tech-led practices in the Indian banking sector, and its transformational potential continues to grow. (Kumar, Kuhar & Sharma, 2024).



2. **Chatbots dominate AI deployment.** Chatbots and Robotics are widely used AI applications in the Indian banking industry, while Machine Learning algorithms are also deployed in fields like KYC, fund transfers, and fraud detection. (Vinoth & Preetha Chandran, 2022).
3. **Fraud detection is significantly improved.** EY India (2023) confirmed that banks investing in AI-enabled fraud detection tools saw a 40% reduction in fraud losses over two years.
4. **Loan processing is faster and more accurate.** Kumar, V. et al. (2023) demonstrated the effectiveness of AI-based hybrid models for predicting loan risk in the banking sector.
5. **Operational cost reduction is a major benefit.** Indian banks are utilizing AI-powered technologies to automate labor-intensive operations, reduce operational costs, and increase revenue growth potential.
6. **Large banks lead; smaller banks lag.** Narayan & Bose (2024) found that adoption gaps between public and private sector banks are driven by technology obsolescence and budget constraints. The RBI's surveys confirmed that while large banks and fintechs are actively experimenting with AI, smaller institutions remain cautious, citing challenges of cost, data quality, and governance.
7. **Financial inclusion potential is significant.** AI can reduce fraud and lower account rejection rates by 15–20%, and drives financial inclusion by using alternative data to assess creditworthiness for unbanked and underbanked populations. (RBI FREE-AI, 2025).
8. **Governance maturity is low.** Only around one-third of institutions have board-level AI oversight, and roughly one-quarter have formal incident-handling mechanisms. (RBI FREE-AI Survey, 2025).
9. **Ethical and regulatory frameworks are now being built.** The RBI's FREE-AI framework responds to the growing adoption of AI in banking, NBFCs, fintech, and insurance, alongside associated risks such as bias, opacity, cybersecurity vulnerabilities, and consumer harm.
10. **Cybersecurity threats from AI are also rising.** The year 2024 witnessed a sharp rise in AI-generated phishing campaigns, and deepfake audio and video are being used by malicious attackers to impersonate executives and officials, bypassing transaction authorization chains and compromising video KYC processes.

5. Conclusion

AI has transformed the Indian banking sector, replacing traditional practices with automated, technology-led operations, marking a new era of intelligent banking. (Kumar, Kuhar & Sharma, 2024). Tasks that earlier required significant time and human effort can now be completed within minutes, improving both speed and accuracy.

AI plays a role in upholding competitiveness, satisfying consumer expectations, and improving operational efficiency in the Indian banking sector, shaping up a more secure, data-oriented, and customer-centric banking experience. (Tiwari & Saxena, 2021). Narang (2021) further discussed AI's role in aiding banks to navigate complex regulatory landscapes efficiently, while Khan & Rabbani (2021) predicted an even more central role for AI in banking, with advancements in natural language processing and machine learning poised to unlock new innovative opportunities.

However, serious challenges remain. Narayan & Bose (2024) found that technology obsolescence and budget constraints continue to limit smaller public sector banks, and adoption gaps persist. Governance maturity remains low across the sector, with only about one-third of institutions having board-level AI oversight.

The RBI's FREE-AI initiative underscores the growing need to balance AI innovation with ethical considerations and risk mitigation in the financial domain. The FREE-AI framework is meant to drive inclusion, transparency, and trust while positioning India as a global leader in ethical, inclusive, and safe AI adoption, ensuring that the next era of digital finance is built on a foundation of trust for all citizens.



With proper planning, regulatory support, and investment in training, banks in India will get smarter and more intelligent in implementing AI across all possible areas — providing better customer service, reducing risks and operational costs, and bringing greater overall efficiency to the Indian banking system. (Vinoth & Preetha Chandran, 2022).

References

1. Kumar, K., Kuhar, N., & Sharma, M. (2024). *Artificial Intelligence in the Indian Banking System: A Systematic Literature Review*. ICOFE-2024.
2. Tiwari, A. K., & Saxena, D. (2021). *Application of Artificial Intelligence in Indian Banks*. International Conference Proceedings.
3. Vinoth, S., & Preetha Chandran. (2022). *Artificial Intelligence and Transformation to the Digital Age in Indian Banking Industry – A Case Study*. Turkish Online Journal of Qualitative Inquiry, 13(1), 689–695.
4. Subudhi, S. (2019). *Banking on Artificial Intelligence: Opportunities & Challenges for Banks in India*. International Journal of Research in Commerce, Economics & Management, 9(7).
5. Singh, T., & Pathak, N. (2020). *Emerging Role of Artificial Intelligence in Indian Banking Sector*. Journal of Critical Reviews, 7(16).
6. Sabharwal, M. (2014/2022). *The Use of AI Based Technological Applications by Indian Banks*. International Journal of AI; and *AI in Indian Banking Sector* (2022), Academia.
7. Vijai, D. C. (2019). *Artificial Intelligence in Indian Banking Sector: Challenges and Opportunities*. International Journal of Advanced Research, 7(5), 1581–1587.
8. Padmanabhan & Princy Metilda. (2021). *An Impact of Artificial Intelligence in Indian Banking Industries*. International Research Journal of Education and Technology, 1(4), 39–45.
9. Narayan & Bose. (2024). *AI Adoption Gaps Between Public and Private Sector Banks in India*.
10. EY India. (2023). *AI-Enabled Fraud Detection in Indian Banking Report*.
11. Kumar, V. et al. (2023). *AI-Based Hybrid Models for Predicting Loan Risk in the Banking Sector*. Big Data Mining and Analytics, 6(4), 478–490.
12. Sheth, J.N., Jain, V., Roy, G., & Chakraborty, A. (2022). *AI-Driven Banking Services: The Next Frontier for a Personalised Experience in the Emerging Market*. International Journal of Bank Marketing, 40(6), 1248–1271.
13. Sarath Chandran, M.C., Renju Chandran, & Achuthan, K. (2026). *Bridging Technology and Sustainability: The Role of Green AI Adoption in Indian Banking Sector*. Frontiers in Artificial Intelligence.
14. Reserve Bank of India. (2025). *Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI)*. RBI Committee Report, Chaired by Dr. Pushpak Bhattacharyya, IIT Bombay.
15. Faruk, M. et al. (2021). *AI's Efficacy in Fraud Detection in Financial Services*.
16. Sumi, A.M., Asha Devi, J., & Chandrasekar, K.S. (2025). *Recent Trends in the Development of Artificial Intelligence Among Banking Sectors in India*. Palgrave Macmillan.