
Artificial Intelligence in Indian Banking and Financial Services: RBI's Regulatory Framework and Emerging Opportunities

Abhinav Kumar Bhagat

Research Scholar,

University Department of Economics

Ranchi University, Ranchi

Email: abhinavbhagat108@gmail.com

Abstract

The rapid expansion of Artificial Intelligence (AI) and Machine Learning (ML) technologies is reshaping global banking and financial services. India has one of the world's largest digital financial system which is growing at a fast pace, hence India occupies a central position in this transformation. This paper studies the trajectory of the adoption of AI in Indian banking sector, analyses the emerging regulatory architecture and highlights the systemic opportunities and challenges. The study adopts a descriptive and analytical research design based on secondary data from authoritative government and quasi government sources. The paper traces adoption trends across public and private sector banks, identifies major use cases across fraud detection, credit assessment, customer service and risk management and critically evaluates the regulatory framework constituted by RBI in December 2024. It has also examined the supportive legislative architecture provided by the Digital Personal Data Protection Act released in 2023 and the IndiaAI mission. The findings presents significant policy implications for the adoption and development of AI under the vision of Viksit Bharat 2047.

Keywords: Artificial Intelligence, Indian Banking, RBI, Financial Inclusion, IndiaAI Mission, Machine Learning, Digital Finance, Regulatory Framework

1. Introduction

Banking has changed drastically in the last few years. Technology has entered every part of banking work. AI has been at the heart of this. Machine Learning, Natural Language Processing, Robotic Process Automation and the new generative models all fall under AI. Banks today use these in many ways. A loan approval is given by an algorithm. A chatbot in Hindi or Tamil answers a customer at midnight. A risk model spots a bad transaction in seconds. So the way a bank works at every level is being rewritten. India is in the middle of

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

all this. We have 12 public sector banks and 21 private sector banks. The customer base is over 1.4 billion. The numbers in payments are also huge. UPI alone did 131.16 billion transactions in FY 2023-24 with a value of about Rs. 199.89 lakh crore (NPCI, 2024). Such large volumes of real time data are exactly what ML systems need. Hence the raw material for AI is already with us in plenty. But there is another side. India still has banking problems that are old and deep. Around 190 million adults are underbanked. NPAs continue to bother the system. Digital fraud has gone up sharply in recent years. Micro enterprises and rural households cannot get credit easily. AI can help in each of these. The solutions can also be scaled. The catch is in the rules. If AI is used without proper rules, it can do harm. It can leave people out. It can become a black box. And it can make the system fragile, mainly because of dependence on a few tech vendors. In this backdrop, RBI has created the FREE-AI Committee in December 2024. FREE-AI is a Framework for Responsible and Ethical Enablement of Artificial Intelligence. The step is a big one. The aim is to give India a principle based way to govern AI in finance. The present paper does three things. One, it looks at where AI adoption stands today in Indian banking. Two, it goes through the FREE-AI framework. Three, it brings out the opportunities and the risks for the years ahead.

2. Review of Literature

Writing on AI in finance has grown in volume since 2016. The pace of adoption was fast and regulators had to respond quickly. The literature can be grouped into three buckets. One, global adoption trends. Two, India focused empirical work. Three, regulatory theory.

At the global level, the Bank for International Settlements (BIS, 2022) is a useful reference. The report finds that AI in finance is mostly driven by three reasons. These are cost cutting, better risk management and a better customer experience. The same report points to a worry. AI tools are concentrated with a small number of big technology vendors. So a third party operational risk is created. There is no real precedent for it in old banking rules. Hence early action by regulators becomes important.

In the Indian context, the strongest empirical work so far is by Goel, Raut, Kumar and Sharma in the RBI Bulletin (2024). The authors apply text mining to the annual reports of 32 commercial banks for the period FY 2015-16 to FY 2022-23. They find a positive link. The link is between a bank's capital adequacy and its AI adoption intensity. Capital adequacy here is the Capital to Risk weighted Assets Ratio or CRAR. The result is statistically significant. The present paper picks up this thread. Why? Because the result shows that AI adoption is not equal across the Indian banking system.

On the policy side, NITI Aayog's National Strategy for Artificial Intelligence (2018) is the starting point. It gave the well known 'AI for All' vision. AI was placed as a tool for inclusive growth. It was not seen as something only for big technology firms. The follow up report titled AI for Viksit Bharat (2024) makes a strong claim. AI driven gains in compliance, fraud detection, risk management and credit decisioning could unlock USD 50 to 55 billion extra for India's financial services by 2035.

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

On regulatory theory, Arner, Barberis and Buckley (2017) is widely cited. The argument is simple. Finance regulation must move from a rule based system to a principle based system. The FREE-AI framework follows this thinking. Then there is the Digital Personal Data Protection (DPDP) Act, 2023. The Act gives the legislative base for data governance in AI banking. Individuals get rights over their personal data. These rights decide how a bank can collect, process and keep the data that trains its AI systems.

3. Objectives of the Study

The present study is guided by the following objectives:

- i) To examine the trends and patterns of AI adoption across public and private sector banks in India during FY 2015-16 to FY 2022-23 including the dominant use cases and the differences between sectors.
- ii) To analyse the RBI's FREE-AI regulatory framework of December 2024 covering its guiding principles, strategic pillars and key recommendations.
- iii) To identify the opportunities and the challenges of AI deployment in Indian banking and to suggest evidence based policy recommendations.

4. Methodology and Data Sources

The present study is descriptive and analytical in design. It uses only secondary data. The data comes from the official government and quasi government bodies. The method has three parts. Content analysis, comparative review and policy assessment. The main sources for this research are the RBI Bulletin released in October 2024, the RBI Financial Stability Report released in December 2024, the FREE-AI Committee Report released in December 2024, NITI Aayog reports, MeitY's IndiaAI Mission documents, NPCI product statistics and the DPDP Act 2023. All data and events refer to the period upto December 2024. No primary data has been collected for the study.

5. Artificial Intelligence in Indian Banking Sector: Adoption Trends and its Use Cases

5.1 The Adoption Trajectory (Period FY 2015-16 to FY 2022-23)

Goel, Raut, Kumar and Sharma (2024) is the most detailed quantitative study on the AI adoption in Indian banks. The authors use text mining on bank annual reports. The sample has 32 commercial banks. The period is eight fiscal years. The idea is to count how often banks talk about AI in their reports. The frequency works as a proxy for actual AI exploration and use. The headline finding is striking. AI adoption has gone up sharply. But the gap between the public and the private sector is also clear. Private sector banks saw their AI mentions go up around six times between FY 2015-16 and FY 2022-23. The lead came from HDFC Bank, ICICI Bank, Axis Bank and Kotak Mahindra Bank. Public sector banks started from a smaller base. They saw a more than threefold rise in the same period. In recent years, the AI interest at several public sector banks has reached parity with private peers (RBI, 2024). Then there is the link with CRAR. Banks with stronger CRAR are also adopting more AI. The link is statistically significant in the Goel et al. study. Bank size and capital strength turn out to be the main drivers. Profitability, efficiency ratios and NPAs are weaker predictors. The implication is straightforward. The bigger and better capitalised banks are leading the AI race.

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

They have the money to bear the infrastructure and the talent costs. Smaller cooperative banks and regional rural banks are still sitting on the side. The RBI's Financial Stability Report (November 2024) survey gives more useful evidence. The survey covered 12 public sector banks and 19 private sector banks. The result is telling. Over 80 per cent of these banks rely fully or partly on outside vendors for at least one new technology application. Hence the outsourcing dependency is structural. The implication for systemic resilience is real (RBI FSR, 2024).

5.2 Dominant Use Cases in Indian Banking

The RBI FSR survey (2024) and the FREE-AI Committee analysis bring out four main areas of AI use. These are customer service and sales, marketing, risk management and KYC verification. The below table, Table 1 shows the major use cases with the key evidence.

Table 1: Major AI Use Cases in Indian Banking and Financial Services

Domain	AI Application	Key Evidence
Fraud Detection	ML based mule account detection and real time anomaly detection	MuleHunter.AI by RBIH, piloted in two PSBs in December 2024
Credit Assessment	Alternative data scoring and ML based risk models	PSB Loans in 59 Minutes platform for MSME credit
Customer Service	NLP chatbots and voice based query resolution	SBI YONO and HDFC Bank EVA process millions of queries every year
KYC and Compliance	Video KYC, biometric verification and AML transaction screening	More than 50 regulated entities deployed video KYC after the RBI circular of 2020
Risk Management	NPA early warning systems and predictive portfolio analytics	31 banks using AI or ML in risk monitoring as per RBI FSR (2024)

Source: Compiled from RBI FSR (December 2024), FREE-AI Committee Report (December 2024) and RBI Bulletin (October 2024)

5.3 MuleHunter.AI: A Case Study in Regulatory AI Deployment

December 2024 also brought MuleHunter.AI into action. This was a first for the RBI. It was the regulator's first direct operational use of AI in banking. The tool was built by the Reserve Bank Innovation Hub (RBIH) along with commercial banks. It uses ML algorithms. The algorithms have been trained on 19 distinct behavioural patterns of mule accounts. Mule accounts are the ones used to route cyber fraud proceeds. The system looks at transaction

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

flows, account links and behavioural anomalies. It flags suspicious accounts faster and more accurately than the older rule based methods. Two large public sector banks ran the first pilots. The detection rates went up in a measurable way (RBI, 2024). Why was the tool needed at this point? The fraud numbers give the answer. Data placed before Parliament shows the scale of the problem. Bank fraud cases more than trebled. Bank fraud cases has increased from 8,752 in FY 2021-22 to 32,363 in FY 2023-24 in volume terms. At the same time the average value per fraud has reduced. The pattern is clear. Fraudsters are now doing higher frequency but lower value transactions. This is exactly the kind of activity that ML models trained on behavioural signatures can catch best (Ministry of Finance, 2024).

6. India's Regulatory Framework for AI in Finance

6.1 The FREE-AI Committee: Genesis and Mandate

The RBI announced the FREE-AI Committee in its Statement on Developmental and Regulatory Policies dated 6 December 2024. The Committee was formally set up on 26 December 2024. This is a watershed in India's financial regulatory history. Dr. Pushpak Bhattacharyya of IIT Bombay heads the Committee. The other members are drawn from HDFC Bank, Microsoft India, NASSCOM and the RBI's FinTech Department. Former NASSCOM President Debjani Ghosh is also a member. The mandate is clear. The Committee has to develop a principle based framework that will guide responsible and ethical AI use in the financial sector. Why now? The numbers explain. The Committee's own survey shows that around 21 per cent of financial entities are already using or building AI systems. This includes banks, NBFCs and fintechs. Around 67 per cent more such financial entities have shown interest in trying out AI use cases (FREE-AI Committee Report, 2024). The IndiaAI Mission has picked up speed. Fintech is moving fast. So a unified framework was overdue. Without one, regulated entities were unsure about investing in AI. Consumers were also unsure about how they would be protected. The FREE-AI framework has three parts that work together. Part one is the seven guiding sutras which form the ethical base for AI use. Part two is the two complementary sub frameworks. One sub framework is for innovation enablement. The other is for risk mitigation. Part three is the six strategic pillars, namely Governance, Risk Management, Data and Privacy, Model Validation, Consumer Protection and Systemic Risk Monitoring. Twenty six actionable recommendations sit under these pillars. Together they take on AI risk at the institutional, sectoral and systemic levels.

6.2 The Seven Guiding Sutras

The seven sutras work as overarching principles. They inform and constrain all the 26 recommendations. The table below, Table 2 shows each sutras with its primary obligation for regulated entities.

Table 2: FREE-AI Framework: Seven Guiding Sutras

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

S.No.	Sutra	Core Obligation for Regulated Entities
1	Fairness	AI systems must give unbiased and non discriminatory outcomes for all groups.
2	Responsibility	Entities running AI systems are fully accountable for every AI driven decision and its result.
3	Ethics	Ethical standards must be built into the full AI lifecycle which covers design, deployment and review.
4	Explainability	AI driven decisions, mainly in credit and risk areas, must be interpretable and the reasons must be communicable to the affected party.
5	Autonomy	Consumer autonomy is protected and every individual has the right to seek a human review of any AI driven decision.
6	Inclusivity	AI deployment must not exclude or disadvantage vulnerable, underserved or marginalised groups.
7	Security	Entities must build strong safeguards against cyber threats, data breaches and AI specific systemic risks.

Source: FREE-AI Committee Report, Reserve Bank of India (December 2024)

The framework gives greater weight to explainability and to autonomy. This matters a lot in the Indian context. An AI driven credit denial can hurt a person in a serious way. The same is true for an AI flagged account freeze. People who do not have other channels of finance feel the worst pinch. The Committee has also proposed something called a 'tolerant supervisory stance' for first time AI errors by entities that show good governance. The signal from the RBI is clear. The aim is to encourage responsible adoption rather than scare entities through harsh penalties (FREE-AI Committee Report, 2024).

6.3 Complementary Legislative and Policy Architecture

The FREE-AI framework does not work alone. The Digital Personal Data Protection Act, 2023 is the foundational legal layer for data governance in AI banking. The Act gives individuals rights over their personal financial data. These rights cover consent, access, correction and erasure. Hence the Act has changed the conditions under which banks may collect, process and retain data for AI training and inference. Banks running AI for credit scoring, customer profiling and fraud detection now have a clear duty. Their training datasets must be built with proper consent. The resulting models must also avoid the discriminatory biases that has been drawn from past unequal lending. The IndiaAI Mission was approved by the Cabinet in March 2024. The five year budget outlay is Rs. 10,371.92 crore. The Mission

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

gives the public investment base for AI. There are seven pillars in the Mission. They cover compute infrastructure, foundational model development, curated datasets, AI application development, future skills, startup financing and safe AI governance. Together these pillars address the supply side bottlenecks that have kept smaller financial firms away from AI till now. The Mission also focuses on India specific large language models and on financial datasets in regional languages. This is highly relevant to banking. Vernacular AI can finally serve the rural and semi urban people who do not speak English.

7. Opportunities and Challenges

7.1 Transformative Opportunities

The biggest opportunity for AI in Indian banking is in financial inclusion. Around 190 million adults are still outside formal credit. The reason is plain. Old credit assessment models depend on tax returns, salary slips and formal collateral. People in informal jobs, in agriculture and in micro enterprise simply do not have these. AI based credit scoring can change this picture. It can use alternative data signals. These include digital transaction history, mobile usage patterns, utility payment records and GST compliance. With this data, banks can assess people who were earlier invisible to underwriting. The PSB Loans in 59 Minutes platform is a good early example. It uses AI on GST and income tax data. MSME loan applications can be processed in under an hour.

Then there are the gains in efficiency and in fraud prevention. NITI Aayog's 2024 report puts the value at USD 50 to 55 billion. This is the extra value AI can unlock for India's financial services by 2035. The areas are compliance automation, fraud detection and credit risk management. AI chatbots are another big gain. SBI YONO and HDFC Bank's EVA are good examples. They cut the per interaction cost of customer service by orders of magnitude. They are also available 24x7 and they support many languages. In fraud prevention, real time AI anomaly detection works at very large scale. NPCI runs ML based monitoring on billions of UPI transactions every day. Rule based systems cannot do this at this scale.

NPA management is the third area. AI can read real time signals from many sources. These include GST filings, power consumption, supply chain activity and digital payment behaviour. Together such signals can predict borrower stress. The warning can come months before the formal NPA classification. The bank can then act early. Both the lender and the borrower benefit from such timely action.

7.2 Systemic Challenges and Risks

But the opportunities also come with serious challenges. The first concern is algorithmic bias. AI credit models are trained on past lending data. Past lending in India was not equal. Women, members of Scheduled Castes and Scheduled Tribes, and residents of poorer states received less credit historically. If AI is built on this old data, the bias may stay. It may even get worse. Hence careless AI deployment can institutionalise exclusion. It cannot dismantle it. The Fairness Sutra of FREE-AI takes on this issue directly. AI systems must be designed, tested and audited periodically for discriminatory outcomes. A second concern is third party concentration risk. The RBI FSR survey (2024) made one finding very clear. Over 80 per cent of surveyed banks rely on outside vendors for at least one AI application. In many cases,

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

multiple applications come from the same vendor cluster. Now think about the implication. A big chunk of Indian banks' AI runs on a few global cloud and AI providers. If one of them goes down, many banks are hit at once. The trigger could be a tech failure, a geopolitical action or a cyberattack. Several systemically important institutions could be impaired together. There is no real precedent for this in the pre AI regulatory landscape. The FREE-AI framework's call for minimum in house AI capability is a direct response to this risk. Another major concern is model opacity. Complex ML models are often a black box. Such opacity poses real challenges. The challenges are to fairness, to consumer protection and to regulatory oversight. Suppose an AI denies a loan or freezes a transaction. The customer asks why. If the bank cannot explain, the customer has no real path to redress. This conflicts with the DPDP Act. It also conflicts with the established banking consumer protection rules. The Explainability Sutra requires interpretable models. Tools like SHAP and LIME help in this area. But for institutions running deep learning architectures, interpretability is a serious technical and operational challenge. And then there is the digital divide. AI banking can stay limited to urban and digitally literate users. If that happens, the inclusion gap will not close. It will widen. Rural users, the elderly and people who do not speak English may be left behind. Unless AI products are designed deliberately for these groups, the gap will only grow.

8. Key Findings and Policy Recommendations

8.1 Key Findings

i) AI adoption in Indian banking has gone up sharply between FY 2015-16 and FY 2022-23. Private banks recorded around six times the growth in AI activity, while public banks recorded about three times. Capital adequacy (CRAR) and asset size are statistically significant predictors of adoption intensity. So the bigger and stronger banks are leading the way. This raises a structural equity concern about how the benefits of AI are spread across the banking system.

ii) The dominant AI use cases match India's most pressing banking challenges. The use cases are fraud detection, credit assessment, customer service, KYC verification and risk management. The market is moving in line with institutional need, which is a good sign of convergence.

iii) Around 21 per cent of surveyed financial entities are using or building AI today. Hence the transformation is still in its early phase. The FREE-AI framework is therefore being established at the right time. Adoption patterns are not yet locked in. Fixing structural issues now will be far cheaper than fixing them later.

iv) The seven sutras and the 26 recommendations of the FREE-AI Committee provide a sound base for governance. The framework is principle based. It fits the diversity and the scale of India's financial system. The balance between innovation and risk is also calibrated, which is in line with global best practice.

8.2 Policy Recommendations

i) Tiered Compliance Architecture: The FREE-AI framework should be applied with a tiered approach. Smaller cooperative banks and regional rural banks should face lighter

The Voice of Creative Research

Vol. 8 & Issue 2 (April 2026)

compliance. Systemically important institutions with large AI deployments should face stricter rules.

ii) **Mandatory Algorithmic Audits:** All entities using AI in credit decisioning, fraud detection or customer profiling should be required to do annual third party algorithmic audits. The disaggregated findings should be disclosed to the RBI. This will operationalise the Fairness and Explainability Sutras and will give regulators the evidence base needed for enforcement.

iii) **Targeted Public Sector Bank Support:** Public sector banks need help to catch up. A capacity building mechanism funded by the IndiaAI Mission can do this work. The aim is to grow AI use and to build in house capability in PSBs. PSBs currently lag private peers in both adoption and AI governance maturity.

iv) **Vernacular AI Priority:** IndiaAI Mission resources should be focused on regional language AI for finance. This will make AI based credit tools, KYC interfaces and customer service systems available in the major Indian languages. Rural and semi urban users will benefit the most. They are also the primary target of financial inclusion policy.

v) **Third-Party Risk Standards:** The RBI should issue specific prudential guidance on AI vendor concentration. Regulated entities should do AI specific vendor due diligence. They should keep documented business continuity plans for AI dependent operations and disclose material third party AI dependencies in their annual reports.

9. Conclusion

India is at a defining point in the evolution of its banking and financial services sector. AI offers a set of opportunities not seen before. Formal credit can reach the underbanked. Fraud can be detected and prevented at scale. The cost of financial intermediation can come down. Credit risk can be managed at a level of detail that manual processes cannot match. The data already shows the direction. AI activity in private sector banks grew about six times between FY 2015-16 and FY 2022-23. Public sector banks grew about three times in the same period (Goel et al., 2024). The setting up of the FREE-AI Committee in December 2024 is a clear signal. The deployment of MuleHunter.AI in the same month is another. India's financial regulators are no longer just observers. They have moved into the role of active architects of the AI in finance space. The seven sutras of the FREE-AI framework are Fairness, Responsibility, Ethics, Explainability, Autonomy, Inclusivity and Security. Together they give a coherent base for governance. The base is principle based, proportionate and ready for a fast moving technology. But none of this is automatic. The benefits of AI will not flow on their own. Without deliberate policy choices, AI may even deepen the divide. Tiered compliance, mandatory audits, targeted PSB investment, vernacular AI development and strong third party risk standards are needed. Otherwise the gains will go to those who are already well served. The risks will be borne by the wider financial system and by its weakest users. Viksit Bharat 2047 is the larger goal. A developed economy, inclusive growth and digital transformation are at its core. Hence AI must be governed not just as a technology of efficiency. It must also be treated as an instrument of economic justice.

References

- Arner, D. W., Barberis, J., & Buckley, R. P. (2017). FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business*, 37(3), 371–414.
- Bank for International Settlements (BIS). (2022). *AI and Machine Learning in Central Banking: Approaches and Challenges*. BIS Papers No. 117. Basel: BIS.
- Cabinet Committee on Economic Affairs. (2024, March 7). *IndiaAI Mission Cabinet Approval Note*. Press Information Bureau. New Delhi: Government of India.
- International Monetary Fund (IMF). (2024). *Fintech and Financial Inclusion in Emerging Markets*. IMF Working Paper WP/24/15. Washington D.C.: IMF.
- Ministry of Finance. (2024). *Replies to Unstarred Questions on Bank Frauds Data*. Lok Sabha and Rajya Sabha. New Delhi: Government of India.
- Ministry of Law and Justice. (2023). *The Digital Personal Data Protection Act, 2023 (Act No. 22 of 2023)*. *The Gazette of India Extraordinary, Part II, Section 1*. New Delhi: Government of India.
- National Payments Corporation of India (NPCI). (2024). *UPI Product Statistics for FY 2023-24*. Mumbai: NPCI. Retrieved from <https://www.npci.org.in>
- NITI Aayog. (2018). *National Strategy for Artificial Intelligence: #AIforAll*. New Delhi: Government of India.
- NITI Aayog. (2024). *AI for Viksit Bharat: The Opportunity for Accelerated Economic Growth*. New Delhi: Government of India.
- Reserve Bank of India Innovation Hub (RBIH). (2024). *MuleHunter.AI Initiative Overview*. Mumbai: RBIH.
- Reserve Bank of India. (2024a). *How Indian Banks are Adopting Artificial Intelligence? RBI Bulletin, October 2024*, pp. 93–106. Authors: Shobhit Goel, Dirghau K. Raut, Madhuresh Kumar, Manu Sharma. Mumbai: Reserve Bank of India.
- Reserve Bank of India. (2024b). *Financial Stability Report, December 2024*. Mumbai: Reserve Bank of India.
- Reserve Bank of India. (2024c). *Report of the Committee to Develop a Framework for Responsible and Ethical Enablement of Artificial Intelligence (FREE-AI) in the Financial Sector*. Mumbai: Reserve Bank of India.
- Reserve Bank of India. (2024d). *Statement on Developmental and Regulatory Policies, December 6, 2024*. Mumbai: Reserve Bank of India.
- World Economic Forum (WEF). (2023). *AI Governance Alliance: Responsible AI in Financial Services*. Geneva: WEF.