VOLUME - 14, ISSUE - 11, NOVEMBER - 2025 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Commerce

ASSESSING THE ROLE OF ARTIFICIAL INTELLIGENCE IN CREDIT RISK MANAGEMENT AMONG INDIAN BANKS

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ABSTRACT

Artificial Intelligence (AI) is radically transforming credit risk management among Indian banks, enabling more accurate risk prediction, faster decision-making, and enhanced regulatory compliance. This paper assesses how AI algorithms, machine learning, and data analytics are deployed to revolutionize credit scoring, fraud detection, and portfolio management in India's diverse banking sector. Through case studies, regulatory review, and technology analysis, the paper identifies best practices, challenges, and a roadmap for sustainable AI integration that balances innovation with consumer protection. AI adoption emerges as a critical enabler for Indian banks to reduce non-performing assets, optimize underwriting, and foster financial inclusion.

KEYWORDS : Artificial Intelligence, Credit Risk Management, Indian Banks, Machine Learning, Fraud Detection, Regulatory Compliance, Predictive Analytics

INTRODUCTION

India's banking industry is undergoing a digital revolution driven by the adoption of Artificial Intelligence (AI) technologies. With the growing volume and complexity of financial data, coupled with evolving regulatory mandates and customer expectations, traditional credit risk management practices are increasingly inadequate. AI provides dynamic, data-driven insights that help banks assess creditworthiness, identify fraud, and mitigate risk more effectively.

This paper explores the pivotal role of AI in transforming credit risk management across Indian banks, encompassing public, private, and non-banking financial companies (NBFCs). It reviews methodologies, technology frameworks, regulatory guidelines, and practical case studies. The ultimate aim is to articulate a strategic roadmap that Indian banks can follow to sustainably harness AI for superior risk governance and customer-centric services.

Literature Review

Extensive literature demonstrates AI's growing influence on credit risk strategies worldwide and in India. Smith and Kumar (2023) highlight how machine learning algorithms outperform traditional credit scoring models by incorporating alternative and unstructured data for holistic borrower profiles. Sharma et al. (2024) discuss the use of Natural Language Processing (NLP) to analyze customer communications and detect early warning signals in repayment behavior.

The Reserve Bank of India's guidelines on AI governance (RBI, 2025) emphasize model transparency, explainability, and ethical AI use to prevent biases and ensure customer protection. Patel and Singh (2024) raise concerns over data privacy and the need for robust regulatory oversight, especially given the AI models' complexity.

Emerging case studies from Indian banks confirm that AI adoption leads to measurable reductions in non-performing assets through predictive analytics and real-time fraud detection.

AI Applications in Credit Risk Management

Credit Scoring and Underwriting

AI revolutionizes credit scoring by integrating diverse datasets including transaction history, social signals, biometric data, and repayment patterns beyond traditional bureau scores. Machine learning models dynamically update risk scores with evolving borrower behavior, enabling more accurate loan eligibility decisions. For example, HDFC Bank implements AI-driven underwriting systems that have reduced loan processing times by 40%, enabling faster disbursements and improved customer satisfaction.

Fraud Detection and Anomaly Identification

AI algorithms continuously analyze transactions for anomalous patterns that may indicate identity theft, account takeover, or loan application fraud. Advanced pattern recognition and neural networks detect subtle signals that human analysts might miss. ICICI Bank's AI-powered fraud detection system reportedly prevented significant credit losses by flagging suspicious activities in real-time.

Predictive Portfolio Risk Management

AI-powered predictive analytics assess portfolio risk concentrations by simulating economic scenarios and borrower defaults. Models forecast potential losses in downturns, helping banks adjust credit lines, provisioning, and capital reserves ahead of time. AI also facilitates "early warning systems" that prompt proactive interventions on high-risk accounts.

Customer Behavior Insights

AI analyzes repayment behavior, spending patterns, and engagement metrics to tailor credit products to individual needs. This personalization enhances portfolio quality and supports financial inclusion by extending credit to underserved segments with alternative data credit scoring.

Regulatory Framework And Ethical Challenges

India's regulatory regime, led by the RBI, mandates strict compliance regarding the use of AI in banking. The RBI's 2025 Guidelines on AI Governance require models to be transparent, auditable, and fair. Key principles include:

- Explainability: Banks must justify automated credit decisions, enabling borrowers to understand rejection reasons.
- Data Privacy: Customer data used in AI models must comply with the IT Act and forthcoming Personal Data Protection Bill stipulations, including strict data localization and consent norms.
- Bias Mitigation: Regular model audits are necessary to identify and correct discriminatory practices, especially against vulnerable groups.
- Operational Resilience: Banks must implement robust cybersecurity and disaster recovery plans to protect AI systems.

While the regulatory framework supports innovation, challenges persist in balancing AI-driven efficiency with accountability and consumer protection.

Case Studies of AI Deployment in Indian Banks

ICICI Bank

ICICI Bank uses AI extensively in credit risk management through automated credit scoring and fraud detection. Its AI platform incorporates machine learning models trained on diverse customer data, improving risk prediction accuracy by over 25%. AI-enabled early warning systems have helped reduce the bank's non-performing assets ratio by 1.5% over two years.

HDFC Bank

HDFC Bank employs AI for real-time credit underwriting and portfolio risk analysis. By automating document verification, AI has accelerated loan approvals by 40%, improving customer experience. The bank's AI-driven predictive analytics also guide risk provisioning, dynamically adjusting exposure limits.

Roadmap for Responsible AI Integration in Indian Banks

To sustainably harness AI in credit risk management, Indian banks should adopt the following practices:

- Transparent Model Governance: Develop AI models with clear design rationales, documented assumptions, and explainability features accessible to regulators and customers.
- Robust Data Security: Implement strong encryption, anonymization, and access controls to safeguard sensitive borrower data.
- Regulatory Collaboration: Establish dedicated AI governance teams to liaise with RBI and other regulators, ensuring updated compliance.
- Bias Auditing and Remediation: Conduct periodic reviews of AI outcomes for fairness, incorporating feedback loops to address detected inequalities.
- Staff Training and Cultural Adaptation: Invest in workforce upskilling on AI systems, ethical considerations, and risk management frameworks.
- Innovation through Sandbox Environments: Use RBI regulatory sandboxes to trial AI innovations in controlled settings prior to full deployment.

FUTURE PROSPECTS AND CONCLUSION

AI's role in credit risk management will deepen in Indian banks as data availability improves, computational power rises, and regulatory clarity evolves. The COVID-19 pandemic accelerated digital transformation, and AI now underpins not only risk governance but also personalized financial services and operational efficiency.

By embracing responsible AI frameworks, Indian banks can significantly curb defaults, enhance credit access to unbanked populations, and elevate stakeholder trust. Collaborations between fintech, regulatory bodies, and academia will be vital to address ethical risks and optimize AI's societal benefits.

In conclusion, AI is a cornerstone technology for India's banking future, promising sustainable financial stability through smarter credit risk management and customer-centric innovation.

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