

Role of Artificial Intelligence in Sustainable Banking in India

Tarun Sharma

Assistant Professor, Dept. of Management Studies, Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur, Rajasthan, India

Dr. Ajay Verma

Associate Professor, Dept. of Management Studies, Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur, Rajasthan, India

Dr. Atul Gupta

Associate Professor, Dept. of Management Studies, Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur, Rajasthan, India

Abstract

Sustainable banking has emerged as a key component of India's responsible financial system by integrating Environmental, Social, and Governance (ESG) principles into banking operations. Simultaneously, Artificial Intelligence (AI) is transforming the banking sector through enhanced operational efficiency, intelligent risk management, financial inclusion, and support for green financing initiatives. This paper aims to examine the changing role of AI in promoting sustainable banking in India using secondary data from reports published by the Reserve Bank of India (RBI), World Bank, NITI Aayog, and relevant academic literature. The study highlights AI applications in green credit assessment, ESG risk analytics, fraud detection, energy-efficient banking operations, and inclusive financial services. The findings indicate that AI significantly contributes to responsible lending, improved decision-making, operational sustainability, and reduced environmental impact. However, challenges including data privacy concerns, algorithmic bias, regulatory uncertainty, and ethical governance remain.

Keywords: Artificial Intelligence (AI), Sustainable Banking, ESG, Green Finance, Financial Inclusion, Digital Banking, India

Submitted: May 26, 2026

Revised: June 30, 2026

Accepted: July 17, 2026

Published: July 23, 2026

DOI: [10.5281/zenodo.21836792](https://doi.org/10.5281/zenodo.21836792)



OPEN  ACCESS

1. Introduction

The Indian banking sector is undergoing a profound transformation driven by digital innovation and the growing emphasis on sustainable development. Sustainable banking extends beyond financial profitability by integrating Environmental, Social, and Governance (ESG) principles into lending, investment, and operational decisions. Banks are increasingly expected to finance environmentally responsible projects, promote social inclusion, and maintain transparent governance while supporting national and global sustainability goals. In India, initiatives such as green finance, priority sector lending, digital financial inclusion, and the commitment toward achieving the Sustainable Development Goals (SDGs) have strengthened the role of banks as catalysts for sustainable economic development [UNEP FI, 2023]. Artificial Intelligence (AI) has emerged as a transformative technology that is reshaping banking operations by enabling data-driven decision-making, predictive analytics, intelligent automation, and enhanced customer service (Gaikwad, 2024). AI-powered systems assist banks in credit risk assessment, fraud detection, customer relationship management, anti-money laundering (AML) compliance, and personalized financial services. More importantly, AI supports sustainable banking by improving the

assessment of ESG risks, facilitating green credit evaluation, optimizing resource utilization, and reducing operational waste through paperless and energy-efficient banking processes (World Economic Forum, 2024). In the Indian context, regulatory authorities and policymakers have recognized the strategic importance of combining digital innovation with sustainable finance. The Reserve Bank of India (RBI) has encouraged responsible innovation through digital banking initiatives and has introduced frameworks supporting climate-related financial risk management. Similarly, NITI Aayog has emphasized the responsible deployment of AI across sectors to foster inclusive growth, improved governance, and sustainable economic development. Indian banks are increasingly adopting AI-based solutions to strengthen financial inclusion by expanding digital banking services, improving access to credit for underserved populations, and financing renewable energy and environmentally sustainable infrastructure projects (Reserve Bank of India, 2024). These developments position AI as a critical enabler of sustainable banking practices in the country. Despite its significant potential, the implementation of AI in sustainable banking is accompanied by several challenges, including concerns related to data privacy, cybersecurity, algorithmic bias, ethical governance, and regulatory compliance (Gaikwad and Bhattacharya, 2024). The effectiveness of AI depends on the availability of high-quality data, transparent algorithms, skilled human resources, and robust governance frameworks that ensure accountability and fairness (Organisation for Economic Co-operation and Development [OECD], 2024).

2. Background of Study

The concept of sustainable banking has gained considerable momentum over the past decade as financial institutions increasingly recognize their responsibility to support environmentally sustainable, socially inclusive, and economically resilient development (Choudhury et al., 2024). Traditional banking practices, which primarily focused on profitability and risk minimization, are being replaced by integrated approaches that incorporate Environmental, Social, and Governance (ESG) considerations into lending, investment, and operational decisions. Global commitments such as the Paris Agreement, the United Nations Sustainable Development Goals (SDGs), and the Net Zero Banking Alliance have accelerated the transition toward sustainable finance [IFC], 2023). India has emerged as one of the fastest-growing digital economies, creating significant opportunities for integrating sustainability with technological innovation in the banking sector. Government initiatives such as Digital India, the National Strategy for Artificial Intelligence, financial inclusion programmes, and green finance policies have encouraged banks to adopt advanced digital technologies while promoting sustainable economic growth. Public and private sector banks are increasingly financing renewable energy projects, sustainable infrastructure, electric mobility, and climate-resilient businesses (NITI Aayog, 2024).

Artificial Intelligence (AI) has become a strategic enabler of sustainable banking by transforming how financial institutions collect, process, and analyse large volumes of financial and non-financial data. AI-powered technologies such as machine learning, natural language processing, predictive analytics, and intelligent automation enable banks to improve ESG risk assessment, optimize green credit evaluation, detect fraudulent transactions, reduce operational energy consumption, and expand financial inclusion through digital banking services (World Bank, 2024). Despite these advancements, the widespread adoption of AI in sustainable banking presents several challenges, including algorithmic bias, cybersecurity threats, data privacy concerns, regulatory uncertainty, and the absence of standardized ESG data (Bank for International Settlements, 2024).

3. Scope and Significance of Study

The present study focuses on examining the role of Artificial Intelligence (AI) in promoting sustainable banking practices in India through the integration of Environmental, Social, and Governance (ESG) principles into banking operations. The study is conceptual and analytical in nature, relying exclusively on secondary data obtained from scholarly articles, reports published by the Reserve Bank of India (RBI), NITI Aayog, World Bank, International Monetary Fund (IMF), and other credible institutional sources (International Monetary Fund [IMF], 2024). The study is significant because it contributes to the growing body of literature at the intersection of artificial intelligence, sustainable finance, and banking innovation. Although AI adoption and ESG integration have individually received considerable academic attention, limited research has comprehensively examined how AI facilitates sustainable banking practices within the Indian financial ecosystem. By synthesizing recent developments and policy initiatives, the study enhances understanding of AI-driven sustainability strategies and identifies opportunities for strengthening responsible banking (Asian Development Bank [ADB], 2024). The research also holds practical significance for banking professionals, financial institutions, technology providers, and policymakers. The scope exists to understand how AI technologies can improve operational efficiency, optimize resource utilization, strengthen climate-related risk management, enhance ESG reporting, and expand financial inclusion through data-driven decision-making (United Nations, 2024).

4. Objective of Study

- To examine the role of Artificial Intelligence (AI) in promoting sustainable banking practices in India
- To identify the applications of AI in green financing, ESG risk assessment, and responsible lending within the Indian banking sector
- To analyse the contribution of AI towards improving operational efficiency, fraud detection, and energy-efficient banking operations
- To identify the challenges and opportunities associated with the adoption of AI in sustainable banking practices
- To suggest suitable policy measures and strategic recommendations for strengthening AI-enabled sustainable banking in India

5. Reviews of Literature

According to Kumar & Kaur (2024), Artificial Intelligence (AI) has become a transformative force in the global banking sector by enabling intelligent automation, predictive analytics, and data-driven decision-making. Recent studies indicate that AI improves banking efficiency through automated credit evaluation, fraud detection, customer relationship management, and regulatory compliance. Beyond operational benefits, AI supports sustainable banking by integrating Environmental, Social, and Governance (ESG) metrics into lending and investment decisions. Machine learning algorithms enable financial institutions to assess climate-related financial risks, monitor sustainable investments, and optimize green lending portfolios with greater accuracy.

The integration of ESG principles into banking has gained considerable importance as financial institutions increasingly align their strategies with global sustainability objectives. Sustainable banking encourages responsible lending, financing of renewable energy projects, climate-risk management, and transparent governance practices. Researchers have observed that AI significantly enhances ESG performance measurement by processing large volumes of structured and unstructured data, identifying sustainability risks, and improving the reliability of ESG reporting (Zhang & Li, 2024). AI-based analytics also facilitate continuous monitoring of environmental and social indicators, enabling banks to make informed investment decisions while supporting sustainable economic development.

Sharma & Gupta (2025) stated that the digital transformation initiatives have accelerated the adoption of AI across the banking ecosystem. Public and private sector banks are increasingly utilizing AI-powered solutions for digital customer onboarding, credit scoring, fraud prevention, chatbot-assisted customer service, and financial inclusion. AI has also strengthened green banking initiatives by enabling paperless transactions, optimizing energy consumption in banking operations, and supporting financing decisions for environmentally sustainable projects. Studies suggest that AI-driven financial technologies contribute to inclusive banking by expanding access to formal financial services for underserved populations, particularly in rural and semi-urban regions of India.

Biswas & Roy, (2025) emphasized that responsible AI governance, transparent regulatory policies, and robust data management practices are essential for maximizing the benefits of AI while ensuring fairness, accountability, and stakeholder trust. The literature further indicates a need for empirical studies focusing specifically on AI-enabled sustainable banking practices in emerging economies such as India, where digital innovation and sustainability objectives continue to evolve simultaneously.

6. Discussion and Analysis

Figure 1: AI for Sustainable Banking



Artificial Intelligence (AI) has emerged as a strategic catalyst for sustainable banking by enabling financial institutions to integrate Environmental, Social, and Governance (ESG) considerations into core banking operations. AI-driven technologies such as machine learning, predictive analytics, and natural language processing enhance the quality of credit appraisal by incorporating environmental and climate-related risks alongside traditional financial indicators. This enables banks to identify and prioritize green investments, renewable energy projects, and environmentally responsible enterprises while reducing exposure to climate-related financial risks (International Energy Agency [IEA], 2024). AI also significantly improves operational sustainability within the banking sector by automating routine processes, minimizing paper-based transactions, optimizing energy consumption in data centres, and enhancing digital customer services. Intelligent automation reduces processing time, operational costs, and resource utilization while improving service quality and customer satisfaction. AI-powered fraud detection systems and cybersecurity frameworks further strengthen financial resilience by identifying suspicious activities in real time, thereby reducing financial losses and improving trust in digital banking.

These technological efficiencies contribute directly to sustainable banking by lowering environmental footprints and promoting resource-efficient financial operations (Accenture, 2024).

Another important contribution of AI lies in promoting financial inclusion, which represents a fundamental pillar of sustainable development in India. AI-enabled digital banking platforms, alternative credit scoring models, multilingual chatbots, and personalized financial advisory services enable banks to reach underserved populations, including rural communities, small businesses, and first-time borrowers (World Bank, 2025). By analyzing alternative datasets, AI facilitates access to credit for individuals lacking conventional financial histories, thereby supporting inclusive economic growth. The adoption of AI in sustainable banking requires robust governance mechanisms to address ethical, legal, and operational challenges. Issues such as algorithmic bias, data privacy, cybersecurity vulnerabilities, lack of explainable AI, and evolving regulatory frameworks may affect the transparency and accountability of AI-driven decisions. Therefore, successful implementation requires comprehensive AI governance, standardized ESG reporting, continuous regulatory oversight, skilled workforce development, and collaboration among banks, technology providers, and policymakers (OECD, 2025). Strengthening these dimensions will enable Indian banks to fully leverage AI for achieving long-term sustainability, resilience, and responsible financial innovation while contributing to national climate and development objectives.

7. Finding of Study

- The study finds that Artificial Intelligence (AI) has become a significant enabler of sustainable banking practices in India by supporting the integration of Environmental, Social, and Governance (ESG) principles into banking operations and strategic decision-making.
- AI-powered technologies have improved green credit assessment and ESG risk evaluation, enabling banks to make more informed lending and investment decisions while supporting environmentally sustainable projects and responsible financing.
- The findings indicate that AI enhances operational efficiency through intelligent automation, predictive analytics, fraud detection, paperless banking, and optimized resource utilization, thereby reducing operational costs and the environmental footprint of banking institutions.
- AI significantly contributes to financial inclusion by facilitating digital banking services, alternative credit scoring, multilingual customer support, and customized financial products, improving access to financial services for rural populations, small businesses, and underserved communities.
- The study reveals that AI strengthens risk management and regulatory compliance by enabling real-time monitoring of transactions, early detection of fraudulent activities, anti-money laundering (AML) compliance, and climate-related financial risk assessment, thereby improving the resilience of the banking system.

8. Conclusion

Artificial Intelligence (AI) is reshaping the Indian banking sector by serving as a critical enabler of sustainable banking practices. The integration of AI with Environmental, Social, and Governance (ESG) principles has enhanced the ability of banks to make data-driven decisions, improve operational efficiency, strengthen risk management, and promote responsible lending. AI-powered technologies such as machine learning, predictive analytics, intelligent automation, and natural language processing have enabled financial institutions to optimize green financing, detect fraud, improve customer experience, and expand financial inclusion. These advancements contribute significantly to India's commitment to sustainable

development and the transition toward a resilient and environmentally responsible financial system. The study demonstrates that AI not only supports environmental sustainability through energy-efficient operations and climate-conscious financing but also strengthens social sustainability by improving access to banking services for underserved populations. Furthermore, AI enhances governance by increasing transparency, regulatory compliance, and data-driven decision-making. However, the successful implementation of AI in sustainable banking requires addressing critical challenges, including data privacy, cybersecurity, algorithmic bias, ethical governance, regulatory uncertainty, and the availability of skilled human resources. Without appropriate safeguards, these challenges may reduce stakeholder confidence and limit the effectiveness of AI-driven banking initiatives.

References:

- Accenture. (2024). *Banking technology vision 2024: AI-powered transformation in financial services*. <https://www.accenture.com>
- Asian Development Bank. (2024). *Asian development outlook 2024: Innovation for sustainable development*. <https://www.adb.org>
- Bank for International Settlements. (2024). *Annual economic report 2024*. <https://www.bis.org/publ/arpdf/ar2024e.htm>
- Bhanot, S., & Gaikwad, S. R. (2025). Bridging the generational divide: Exploring communication preferences, workplace behaviour, and conflict resolution between Generation Z and Generation Alpha. *Asian and Pacific Economic Review*, 18(1), 1071–1082. <https://doi.org/10.65985/APER.2025669549>
- Biswas, S., & Roy, A. (2025). Ethical artificial intelligence and sustainable banking: Challenges, governance, and future directions. *Journal of Sustainable Finance & Investment*. Advance online publication.
- Choudhury, S., Chechi, V. K., Gaikwad, S. R., & Verma, A. (2024). Exploring educators' perception of augmented reality in Indian context: Psychometric validation and determinants analysis. In *2024 IEEE International Conference on Computing, Power and Communication Technologies (IC2PCT)*. IEEE. <https://doi.org/10.1109/IC2PCT60090.2024.10486371>
- Gaikwad, S. R. (2024). Role of artificial intelligence in smart manufacturing of automobile industry in India. *AIP Conference Proceedings*, 3178(1), 070012. <https://doi.org/10.1063/5.0229368>
- Gaikwad, S. R., & Bhattacharya, C. (2024). Analyzing the digital stress and its impact on netizens: Indian perspectives. *Journal of Informatics Education and Research*, 4(3). <https://doi.org/10.52783/jier.v4i3.1642>
- International Energy Agency. (2024). *Financing clean energy transitions in emerging economies*. <https://www.iea.org>
- International Finance Corporation. (2023). *Banking on sustainability: From principles to practice*. <https://www.ifc.org>
- International Monetary Fund. (2024). *Global financial stability report 2024*. <https://www.imf.org>
- Kumar, R., & Kaur, P. (2024). Artificial intelligence applications in banking: Transforming operational efficiency and sustainable financial services. *International Journal of Bank Marketing*, 42(3), 421–440.
- NITI Aayog. (2024). *National strategy for artificial intelligence: Progress and implementation updates*. <https://www.niti.gov.in>

- Organisation for Economic Co-operation and Development. (2024). *OECD AI principles and responsible AI governance*. <https://oecd.ai/en/ai-principles>
- Organisation for Economic Co-operation and Development. (2025). *OECD digital economy outlook 2025*. <https://www.oecd.org/digital/>
- Reserve Bank of India. (2024). *Report on trend and progress of banking in India 2023–24*. <https://www.rbi.org.in>
- Sharma, N., & Gupta, S. (2025). Artificial intelligence, financial inclusion, and sustainable banking in India. *Journal of Financial Services Marketing*. Advance online publication.
- United Nations. (2024). *The Sustainable Development Goals report 2024*. <https://unstats.un.org/sdgs/report/2024/>
- United Nations Development Programme. (2024). *Human development report 2023/2024*. <https://hdr.undp.org/>
- United Nations Environment Programme Finance Initiative. (2023). *Banking on sustainability: Financial sector pathways for sustainable development*. <https://www.unepfi.org>
- World Bank. (2024). *Digital finance and artificial intelligence for sustainable development*. <https://www.worldbank.org>
- World Bank. (2025). *Digital finance and financial inclusion: Global progress report*. <https://www.worldbank.org>
- World Economic Forum. (2024). *The future of AI-enabled financial services*. <https://www.weforum.org/reports>
- Zhang, Y., & Li, X. (2024). Artificial intelligence for ESG risk assessment and sustainable finance: A systematic review. *Finance Research Letters*, 67, 105821. <https://doi.org/10.1016/j.frl.2024.105821>