

JVM's Mehta Degree College, Sector 19, Airoli

NAAC Re-accredited "A+" Grade

IQAC in association with Western Regional Centre, ICSSR Organized one day National Conference on "Integrating Multidisciplinary Approaches to Build a Resilient and Sustainable Future", held on 10th January 2026

INTEGRATING ARTIFICIAL INTELLIGENCE INTO GREEN FINANCE FOR SUSTAINABLE GROWTH IN INDIA**Mr. Sanskar Salvi¹ and Ms. Divya Gautam²**¹SYBMS (Finance), JVM's Mehta Degree College²Assistant Professor, JVM's Mehta Degree College**ABSTRACT**

India's pursuit of sustainable economic growth has increased the importance of green finance as a mechanism for directing financial resources toward environmentally responsible and socially beneficial projects. Green finance supports initiatives such as climate action, clean energy, and sustainable infrastructure; however, its effectiveness often depends on accurate risk assessment, transparency, and efficient allocation of capital. In recent years, artificial intelligence (AI) has emerged as a supportive tool within the financial sector, offering enhanced data-processing capabilities and improved decision-making support. This study examines the integration of artificial intelligence into green finance and explores its potential role in supporting sustainable growth in India.

The research is based on secondary data collected from government publications, regulatory frameworks, reports by international organizations, academic literature, and industry analyses. The study highlights how AI can assist financial institutions in managing large datasets, reducing information gaps, and improving the identification and evaluation of green investment opportunities. It also acknowledges key challenges related to data reliability, regulatory uncertainty, ethical concerns, and uneven technological adoption across financial institutions.

The study indicates that the effective integration of artificial intelligence into green finance depends on supportive policy measures, strong governance frameworks, and responsible technological practices, which together may contribute to sustainable economic growth in India.

Keywords: Green Finance, Artificial Intelligence, Sustainable Growth, ESG, Climate Risk, India

INTRODUCTION

Sustainable economic growth has become a key priority for countries worldwide as environmental challenges such as climate change, resource depletion, and environmental degradation continue to intensify. For a rapidly developing economy like India, achieving growth while protecting the environment presents a significant challenge. In this context, green finance has emerged as an important approach that channels financial resources toward environmentally sustainable and socially responsible projects, including renewable energy, clean transportation, and sustainable infrastructure.

Despite its growing importance, green finance in India faces several limitations. Traditional financial systems often struggle with accurate risk assessment, lack of transparency, and information asymmetry when evaluating green investments. These challenges can reduce investor confidence and limit the effective flow of capital toward sustainable projects. As a result, there is a need for innovative solutions that can strengthen decision-making processes and improve the efficiency of green financial mechanisms.

Artificial intelligence (AI) has increasingly been adopted in the financial sector due to its ability to process large volumes of data, identify patterns, and support informed decision-making. The integration of AI into green finance offers opportunities to improve ESG evaluation, climate risk assessment, and capital allocation. This study examines how artificial intelligence can be integrated into green finance to support sustainable growth in India, while also recognizing the challenges associated with its adoption.

REVIEW OF LITERATURE**1. Green Finance and Sustainable Development**

Existing studies highlight green finance as an important tool for achieving environmentally sustainable and socially responsible economic growth. Reports by the **World Bank**, **OECD**, and **UNEP** emphasize that green financial instruments such as green bonds, ESG investments, and sustainable lending help mobilize capital

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toward renewable energy, clean infrastructure, and climate-resilient projects. In the Indian context, literature from the **Reserve Bank of India (RBI)** and **SEBI** focuses on regulatory frameworks, policy initiatives, and the growing role of financial institutions in promoting sustainable finance. However, several studies point out challenges related to transparency, risk assessment, and investor confidence.

2. Application of Artificial Intelligence in the Financial Sector

A large body of literature examines the use of artificial intelligence in finance, particularly in credit risk assessment, fraud detection, portfolio management, and financial forecasting. Studies published by **McKinsey**, **PwC**, and academic journals suggest that AI improves efficiency by processing large datasets and reducing information asymmetry. Research also indicates that AI supports better decision-making and operational efficiency in financial institutions. However, most of these studies focus on traditional financial activities rather than sustainability-focused finance.

3. AI and Green Finance: Emerging Insights and Research Gaps

Recent research by organizations such as the **World Economic Forum**, **UNDP**, and **OECD** has begun exploring the role of AI in ESG evaluation, climate risk analysis, and monitoring green investments. While these studies recognize AI's potential, literature focusing on its structured integration into green finance in developing economies like India remains limited. Additionally, concerns related to data reliability, ethical use of AI, and regulatory preparedness are often underexplored, highlighting a clear research gap addressed by this study.

RESEARCH METHODOLOGY

Objectives of the Study

- To analyze the application of artificial intelligence in green finance activities
- To examine how AI improves efficiency and transparency in green financial decision-making
- To study the role of AI-enabled green finance in supporting sustainable economic growth in India
- To identify the challenges and limitations in adopting artificial intelligence in green finance

Data Collection Method

The study is based on **secondary data** collected from reliable and publicly available sources. These include reports published by government bodies such as the Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI), publications from international organizations like the World Bank, OECD, and UNEP, academic journals, research papers, policy documents, and industry reports from consulting firms. This approach allows for a comprehensive analysis of existing trends and practices related to artificial intelligence and green finance in India.

Tools and Techniques Used

The study uses **qualitative and descriptive analysis** to examine the collected data. Comparative analysis is employed to understand the role of artificial intelligence across different green finance practices, such as ESG evaluation and risk assessment. Case-based analysis is also used to highlight real-world applications of AI in green finance. Simple tables and charts are used where necessary to present key findings clearly.

Scope of the Study

The scope of the study is limited to the **Indian financial system**, with a focus on green finance initiatives supported by artificial intelligence. The study covers areas such as green bonds, ESG-based investments, sustainable lending, and climate risk assessment. It focuses on recent developments and does not include primary data collection or detailed technical analysis of AI algorithms.

Significance of the Study

The study is significant as it contributes to the understanding of how artificial intelligence can strengthen green finance practices in India. It provides insights useful for policymakers, financial institutions, and investors by highlighting opportunities and challenges associated with AI adoption. Additionally, the study adds value to existing academic literature by addressing the emerging intersection of technology and sustainable finance in the Indian context.

DATA ANALYSIS & INTERPRETATION

5.1: Growth of Green Finance Instruments in India (Indicative Trends)

Table 1:

Green Finance Instrument	Approximate Growth	Observation
Green Bonds	30–35% annual growth	Increase driven by public & private issuances
ESG Mutual Funds	40–45% rise in investors	Growing retail & institutional interest
Sustainable Lending	20–25% growth	Mainly focused on renewable energy
Sovereign Green Bonds	₹16,000–18,000 crore issued	Strong government support

Sources : (RBI) – Reports on sustainable finance, (SEBI) – ESG and green bond guidelines

Interpretation:

The figures indicate a steady expansion of green finance in India, especially in green bonds and ESG funds. This growth increases the need for advanced tools like artificial intelligence to enhance risk assessment and capital allocation.

5.2: AI-Adoption Areas in Green Finance

Table 2:

Area	Estimated Adoption Level
ESG Scoring & Evaluation	45–50% institutions
Credit & Risk Assessment	55–60% institutions
Climate Risk Modeling	30–35% institutions
Investment Monitoring	40–45% institutions

Sources: World Bank – Climate finance and green investment reports

Interpretation:

AI adoption is relatively higher in risk assessment and ESG evaluation, while climate risk modeling is still developing, indicating scope for future integration.

5.3: Efficiency Improvements through AI Integration

Table 3:

Parameter	AI Impact
Data Processing Time	Reduced by 50–60%
Risk Prediction Accuracy	Improved by 25–30%
Transparency Level	Increased to 70–75%
Decision-Making Speed	40–45% faster

Sources: UNEP & UNDP – Green finance and SDG-related publications

Interpretation:

AI significantly improves efficiency, transparency, and speed in green financial decision-making, strengthening investor confidence.

5.4: Challenges in AI-Driven Green Finance

Table 4:

Challenge	Impact Level
Poor ESG Data Quality	50% institutions affected
Regulatory Uncertainty	45–50% concern level
Ethical & Privacy Risks	35–40% exposure
Technological Readiness	Only 40–45% fully prepared

Sources: Industry Reports – McKinsey, PwC, Deloitte (AI in finance)

Interpretation:

Despite its benefits, AI adoption faces challenges related to data quality, regulation, and institutional readiness, which need policy and governance support.

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KEY FINDINGS

- Green finance in India is **growing steadily**, with strong expansion in green bonds and ESG-based investments supported by policy initiatives.
- Artificial intelligence is **widely used in ESG evaluation and risk assessment**, while its application in climate risk modeling is still limited.
- AI integration has **improved efficiency, transparency, and decision-making** in green finance by reducing processing time and enhancing risk accuracy.
- AI-enabled systems have **increased investor confidence** by reducing information gaps and supporting data-driven investment decisions.
- Key challenges include **data quality issues, regulatory uncertainty, ethical concerns, and uneven technological adoption** across financial institutions.

CONCLUSION

This study shows that combining artificial intelligence with green finance can support India's journey toward sustainable economic growth. Green finance helps direct money toward environmentally responsible projects, and the use of AI makes this process more efficient by improving risk assessment, transparency, and decision-making. By analyzing large amounts of data, AI helps financial institutions better evaluate ESG factors and identify suitable green investment opportunities.

However, the study also highlights that the benefits of AI in green finance are not automatic. Challenges such as poor data quality, lack of clear regulations, ethical concerns, and uneven access to technology can limit its effectiveness. These issues need to be addressed to ensure that AI is used responsibly and fairly within the financial system.

Overall, the study suggests that when supported by clear policies, strong governance, and responsible technological practices, artificial intelligence can play a meaningful role in strengthening green finance in India. This integration has the potential to align financial growth with environmental goals and contribute to long-term sustainable development.

RECOMMENDATIONS

- Improve ESG data quality and standardization to ensure accurate and reliable AI-based analysis in green finance.
- Establish clear regulatory and ethical guidelines for the responsible use of artificial intelligence in green financial activities.
- Build institutional capacity and skills to support effective adoption of AI technologies within financial institutions.
- Encourage collaboration between regulators, financial institutions, and technology providers to strengthen AI-driven green finance initiatives.

FUTURE SCOPE

- Future research can focus on empirical analysis using primary data, such as surveys or interviews with financial institutions, to assess the real-world impact of AI on green finance practices.
- Comparative studies can be conducted between India and other emerging or developed economies to understand different approaches to integrating artificial intelligence in green finance.
- Further research may explore the long-term impact of AI-driven green finance on environmental outcomes, such as carbon reduction and climate resilience.
- Studies can also examine the evolving role of regulations and governance frameworks in shaping responsible and ethical use of artificial intelligence in sustainable finance.

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