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Research Paper

Green Accounting and Sustainability in India: Emerging Trends and Future Prospects

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ABSTRACT

This paper explores the evolving landscape of green accounting in India and its critical role in promoting sustainable economic development. Green accounting—also known as environmental accounting—integrates environmental costs, natural resource depletion, and ecosystem services into conventional accounting systems to support informed decision-making and long-term sustainability. Drawing on secondary data from corporate sustainability reports, SEBI's Business Responsibility and Sustainability Reporting (BRSR) framework, UN-SEEA guidelines, and policy documents from 2022–2024, the study provides a comprehensive analysis of emerging practices, technological advancements, and policy frameworks influencing green accounting adoption in India. The research identifies major trends such as the growing influence of ESG-based disclosures, the integration of artificial intelligence (AI) and blockchain for data accuracy and traceability, and the expansion of green finance mechanisms such as sustainability-linked loans and green bonds. Through case studies of leading Indian firms—Tata Group, Infosys, Hindustan Unilever, Wipro, Adani Renewables, and ITC—the paper highlights how corporate initiatives are aligning business strategies with India's net-zero commitments and the Sustainable Development Goals (SDGs). Findings reveal that green accounting enhances transparency, investor confidence, and operational efficiency while facilitating better policy design and financial innovation. However, key challenges persist, including the absence of standardized valuation metrics, high implementation costs for small and medium enterprises (SMEs), and limited assurance mechanisms. The study proposes actionable policy measures focused on standardization, capacity building, technological infrastructure, financial incentives, and regulatory enforcement.

Keywords: *Green Accounting, SDGs, SMEs, Capacity Building and Financial Incentives*

Green accounting, also referred to as environmental accounting, extends the boundaries of traditional financial accounting by systematically capturing environmental costs, natural resource depletion, and ecosystem services within economic decision-making frameworks. Unlike conventional accounting, which focuses primarily on financial transactions and profit measurement, green accounting emphasizes the valuation of natural capital and the economic consequences of environmental degradation. This integration provides a more holistic assessment of a nation's or organization's true

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economic performance by recognizing the interdependence between economic growth and ecological balance.

In India, rapid economic growth, urbanization, and industrialization over the past few decades have placed significant stress on natural resources such as water, forests, and energy. The resulting challenges—pollution, deforestation, biodiversity loss, and climate change—have underscored the urgent need for more sustainable models of economic development. Integrating environmental costs into corporate and national accounts helps align business and policy decisions with sustainability objectives, improves transparency in environmental reporting, and supports more informed policymaking. By internalizing environmental externalities, green accounting enables governments and businesses to make decisions that balance short-term economic gains with long-term ecological resilience.

The concept also complements India's broader commitments to sustainable development, particularly its adherence to the United Nations Sustainable Development Goals (SDGs) and its pledge to achieve net-zero carbon emissions by 2070. In this context, green accounting serves as both a measurement tool and a strategic instrument for sustainable policy formulation and environmental management.

LITERATURE REVIEW

Author & Year	Methodology	Findings	Research Gap
Gupta & Sharma (2022)	Survey of Indian firms	Large firms report sustainability disclosures; SMEs lag due to cost and capacity constraints.	SME-focused adoption pathways
Reddy & Nair (2022)	Technology review	AI and blockchain can enhance measurement accuracy and traceability in emissions reporting.	Need for pilot implementations and standards
Kumar et al. (2023)	Regulatory analysis	BRSR improved disclosure by listed firms but consistency remains an issue.	Uniform metrics and assurance mechanisms
Singh & Verma (2023)	Policy evaluation	Government incentives and subsidies accelerate uptake in energy-intensive sectors.	Long-term enforcement and monitoring
Iyer & Rao (2024)	Case-based analysis	Green finance instruments linked to measurable environmental outcomes support SDGs.	Quantitative impact assessments across sectors
Choudhury & Patel (2022)	Framework assessment	SEEA and GRI alignment aid comparability but require localization for India.	Local valuation methods for ecosystem services

METHODOLOGY

This study adopts a qualitative, secondary-data research methodology to analyze the current trends, challenges, and future prospects of green accounting in India. The research design emphasizes a descriptive and analytical approach, aimed at synthesizing existing knowledge

from credible and updated secondary sources. The use of secondary data is particularly appropriate for this study, as it focuses on understanding broad policy trends, institutional frameworks, and corporate practices rather than collecting primary field data.

The data sources include corporate sustainability and annual reports of leading Indian companies, Business Responsibility and Sustainability Reporting (BRSR) disclosures mandated by the Securities and Exchange Board of India (SEBI), and official documents from international organizations such as the United Nations System of Environmental-Economic Accounting (UN-SEEA) and the World Bank. In addition, the study incorporates findings from peer-reviewed academic journals, policy briefs, and thematic reports published between 2022 and 2024 to ensure the relevance and timeliness of the analysis.

The data analysis process combines qualitative thematic synthesis with descriptive statistical representation. Thematic synthesis is employed to identify recurring patterns, themes, and insights related to the implementation of green accounting, technological adoption (AI and block chain), and policy evolution. Descriptive charts and tables are used to visually represent trends such as sector-wise adoption, perceived benefits and challenges, and the progression of green accounting frameworks over time.

CONCEPT OF GREEN ACCOUNTING

Green accounting, also known as environmental accounting, is an emerging discipline that integrates environmental dimensions into traditional accounting systems. It goes beyond the conventional focus on profit, expenditure, and income by incorporating the costs and benefits associated with environmental protection, natural resource management, and ecosystem preservation. This approach enables policymakers, corporations, and economists to assess the real sustainability of economic growth and development.

Essentially, green accounting captures environmental costs-including pollution control, waste management, remediation, and environmental restoration activities-alongside the depletion of natural resources such as forests, minerals, and water reserves. It also accounts for ecosystem services like pollination, carbon sequestration, and water purification, which are often overlooked in financial statements despite their critical contribution to human well-being and economic productivity. These values are represented in both monetary and physical terms, providing a dual perspective that links economic activity with ecological outcomes.

Green accounting can be classified into three major approaches:

1. **Environmental Cost Accounting (ECA):** Focuses on identifying, measuring, and allocating environmental costs within business operations, helping organizations improve efficiency, reduce waste, and comply with environmental regulations.
2. **Natural Capital Accounting (NCA):** Involves the valuation of natural resources and ecosystem services in monetary terms, reflecting their contribution to national wealth and long-term sustainability. It supports the creation of "Green GDP," which adjusts economic performance by accounting for environmental degradation.
3. **Integrated Reporting (IR):** Aligns financial and non-financial disclosures by incorporating environmental, social, and governance (ESG) performance metrics. This helps investors and stakeholders evaluate a company's sustainability alongside its profitability.

The objective of green accounting is to make the interdependence between the economy and the environment visible within accounting and policy frameworks. By doing so, it guides both corporate strategies and public policy decisions toward more sustainable outcomes. In the Indian context, green accounting is instrumental for achieving national sustainability goals, supporting regulatory mechanisms such as SEEA and BRSR, and encouraging industries to internalize environmental externalities within their financial systems.

Current Scenario & Recent Developments (AI, blockchain, ESG, net-zero policies)

In recent years India has seen a steady rise in corporate sustainability disclosures driven by SEBI's BRSR mandates for top listed companies, increased investor interest in ESG, and the national commitment to net-zero by 2070. Technological developments are shaping practice:

- **AI and analytics:** enable real-time monitoring, anomaly detection in energy use, and automated ESG data extraction from documents.
- **Block chain:** supports traceability (e.g., supply chain emissions, renewable energy certificates) improving trust in offsets and credits.
- **Green finance:** Sustainability-linked loans and green bonds in India are increasingly tied to measurable KPIs, incentivising green accounting.

  These developments create opportunities but also call for standardized metrics, third-party assurance, and capacity building.

Case Studies

The following case summaries illustrate how major Indian firms implement green accounting and sustainability strategies.

- **Tata Group:** Tata's conglomerate approach includes Tata Power and Tata Cleantech investments in renewables. The Group reports emissions, renewable capacity additions, and targets for carbon neutrality across several subsidiaries.
- **Infosys:** Infosys has reported carbon-neutral operations in recent years, uses smart-building controls and AI-driven energy management across campuses, and publishes detailed GHG inventories and water-use accounts.
- **Hindustan Unilever (HUL):** HUL follows GRI-aligned reporting, pursues zero-waste-to-landfill targets, and invests in sustainable packaging and water stewardship programs across supply chains.
- **Adani Renewables:** Adani's renewable arm has rapidly expanded solar and wind capacity. The group publishes renewable generation, emissions avoidance estimates, and investments in grid-scale storage.
- **Wipro:** Wipro integrates sustainability in IT services operations, reports energy and water metrics, and links part of executive compensation to sustainability KPIs.
- **ITC:** ITC incorporates sustainability in its agribusiness and FMCG operations, emphasising sustainable sourcing, watershed projects, and carbon footprint reporting.

Benefits & Challenges

Benefits:

- Improved decision-making by internalizing environmental costs
- Enhanced investor confidence and access to green finance
- Operational efficiencies and long-term cost savings
- Better alignment with national climate goals and SDGs

Challenges:

- Lack of standardized measurement and valuation methods

- High implementation costs, especially for SMEs
- Data gaps, limited technical expertise, and weak assurance mechanisms
- Regulatory fragmentation and enforcement challenges

Data Analysis (graphs & tables)

This section presents illustrative graphs and a summary policy table. Charts are derived from synthesized sectoral indicators and public disclosures.

Figure 1: Adoption trend of green accounting.

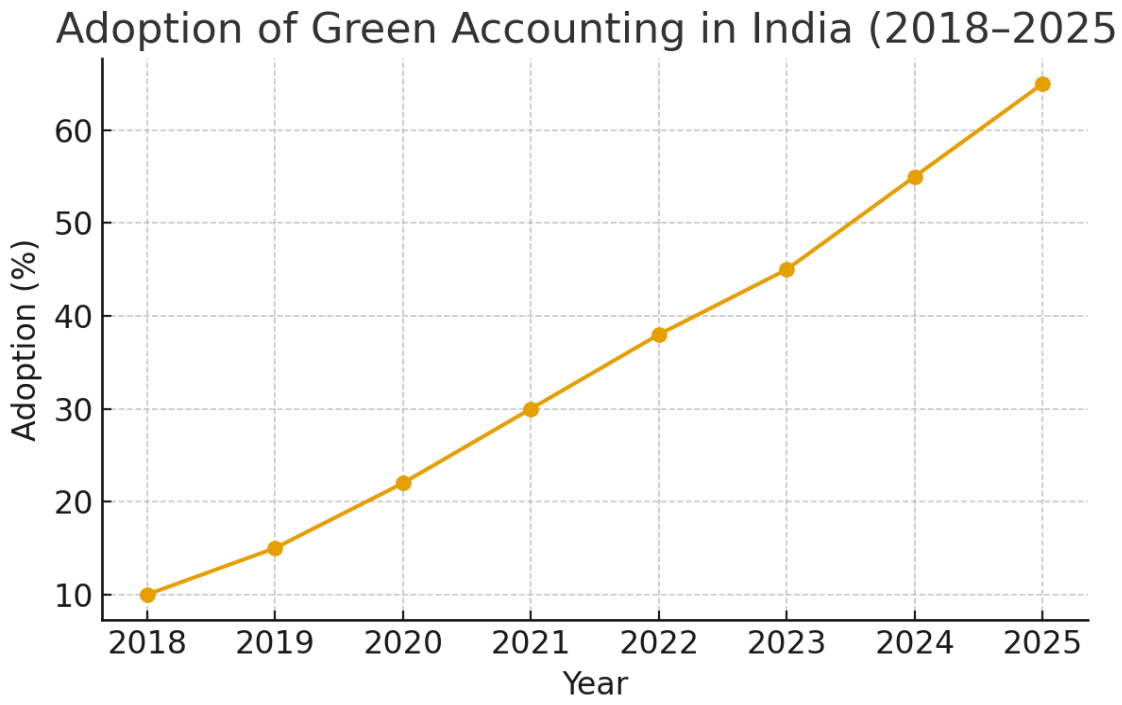


Figure 2: Perceived benefits vs challenges.

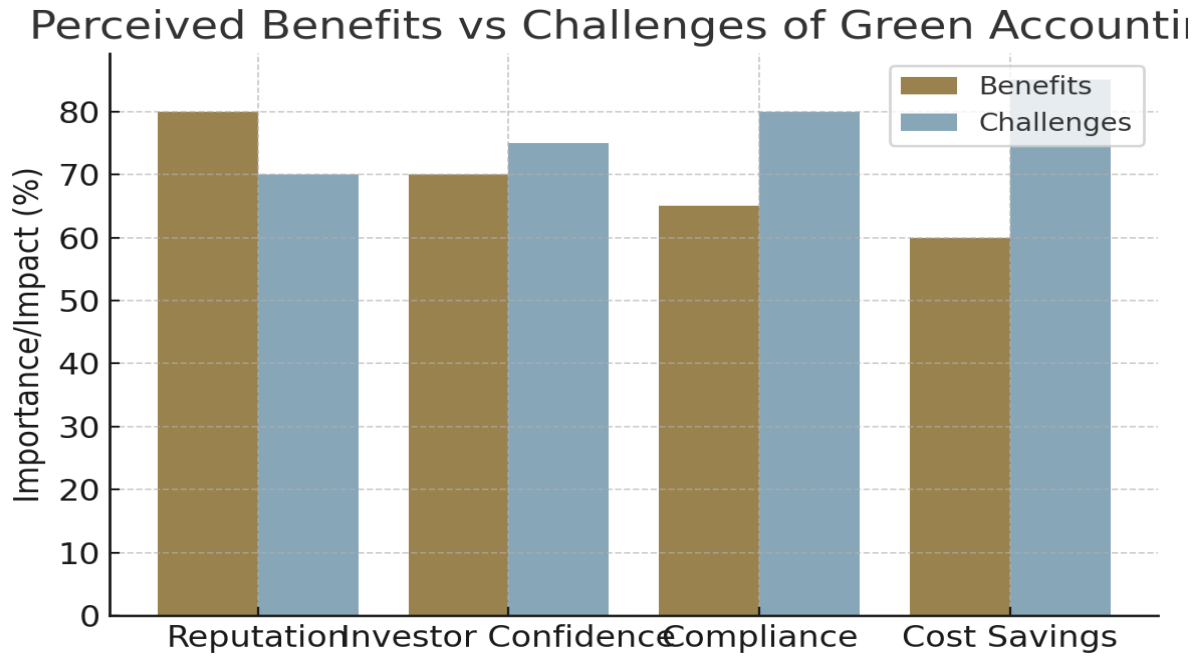
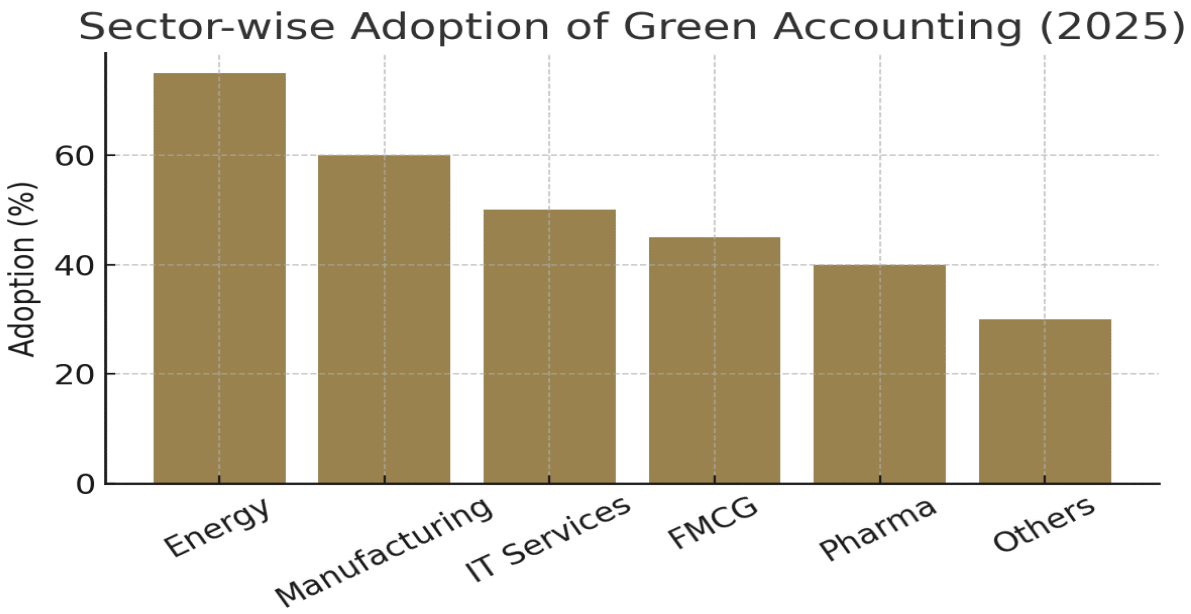


Figure 3: Sector-wise adoption 2025.



Policy Frameworks: Summary Table

Framework / Standard	Scope	Relevance to India
SEEA (UN)	National environmental-economic accounts	Basis for Green GDP and national resource accounts
GRI Standards	Corporate sustainability reporting	Widely used by Indian corporates for disclosures
BRSR (SEBI)	Mandatory disclosures for top listed companies	Drives standardised disclosures for top 1000 firms
ISO 14001	Environmental management systems	Adopted by firms to demonstrate EMS compliance
Natural Capital Accounting (India pilots)	Valuation of ecosystem services	Used in pilot state-level green accounting initiatives

Policy Implications & Future Prospects

To mainstream green accounting in India, policy action should focus on:

1. Standardisation: Develop clear national guidelines that harmonise SEEA, GRI and BRSR metrics.
2. Capacity Building: Provide technical assistance and subsidized tools for SMEs.
3. Digital Infrastructure: Promote AI and blockchain pilots with public–private collaboration to ensure scalable solutions.
4. Financial Incentives: Encourage green bonds, tax incentives, and sustainability-linked finance tied to verified environmental outcomes.
5. Assurance & Enforcement: Mandate third-party assurance for key environmental disclosures and strengthen enforcement mechanisms.

CONCLUSION

Green accounting has emerged as a vital instrument for guiding India's economic development toward a more sustainable and environmentally responsible future. By integrating ecological considerations into traditional accounting frameworks, it bridges the gap between economic growth and environmental preservation. As India strives to balance

rapid industrialization with its commitments under the Paris Agreement and the Sustainable Development Goals (SDGs), green accounting provides the necessary framework for measuring, managing, and reporting the true environmental costs of economic activity.

In recent years, there has been a noticeable increase in environmental awareness among corporate leaders, financial institutions, and policymakers. The growing emphasis on Environmental, Social, and Governance (ESG) disclosures and the implementation of the Business Responsibility and Sustainability Reporting (BRSR) framework by SEBI reflect this paradigm shift toward responsible and transparent business practices. However, despite these advances, substantial challenges remain. The absence of standardized measurement methodologies, inconsistent valuation of ecosystem services, and limited availability of technical expertise continue to hinder the widespread adoption of green accounting, especially among small and medium enterprises (SMEs) that often face resource and capacity constraints.

Technological innovations such as artificial intelligence (AI), block chain, and data analytics hold significant promise in improving the accuracy, traceability, and reliability of environmental reporting. Yet, for these tools to be effective, robust institutional frameworks and policy mechanisms are needed to ensure uniform implementation, third-party assurance, and compliance monitoring. Furthermore, educational and capacity-building initiatives are essential to equip professionals with the skills required for effective environmental accounting and reporting.

Ultimately, green accounting must evolve from being a voluntary disclosure tool to becoming an integral component of India's financial and policy architecture. Its successful integration will not only enhance transparency and investor confidence but also support sustainable decision-making at both corporate and national levels. By institutionalizing green accounting practices, India can pave the way for a resilient, low-carbon, and inclusive economy-one that harmonizes economic growth with ecological integrity for future generations.

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Conflict of Interest
The author(s) declared no conflict of interest.

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