

Original Article

Sustainable Finance and Cleantech Entrepreneurship in India: Catalysts for a Low-Carbon and Inclusive Economy

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ABSTRACT: *The importance of sustainability continues to grow in the context of climate change, environmental degradation, and limited resources. This transition is driven by sustainable finance, cleantech entrepreneurship, governance frameworks, and changing consumer preferences in India. Sustainable finance focuses on projects that are good for the environment and society, and cleantech companies work on innovations related to the renewable energy sector; sustainable mobility, waste management and resource efficiency. This study explores the concept of sustainable financing and green entrepreneurs in the process of India's transformation to a low-carbon and inclusive economy. The research design is descriptive and exploratory in nature, and the research evidence comes from the academic literature, government reports, international reports and the sustainability database. The result shows that the market for green bonds and loans, ESG investments, sustainability-centric financing and mechanisms for funding climate change is growing. The analysis also presents the role of cleantech start-ups in fostering technological innovation and solving environmental issues in various fields. In addition, consumers are becoming more aware of the importance of sustainable business practices and increased corporate responsibility, which is driving businesses to become more sustainable and accountable. The study concludes that the synergy of financial innovation, policy support, entrepreneurial efforts, and governance that incorporates sustainable considerations and consumer responsibility is building a more sustainable India and enabling long-term economic, environmental, and social growth.*

KEYWORDS: Sustainable Finance, ESG Reporting, Green Entrepreneurship, Cleantech Innovation, Sustainable Development.

JEL CLASSIFICATION: G38, M14, Q56, Q58

1. INTRODUCTION

The concept of sustainable development has made its way into the international agenda because of concerns about social inequality, resource depletion, environmental degradation and climate change. The conventional economic growth has rarely been accepted as a good model, as it is mainly focused on an increase in output and industry expansion, and it has been criticized for its negative environmental and social impacts. In response, international initiatives have driven countries to also adopt development paths that consider both economic growth and environmental sustainability and social well-being, including the United Nations Sustainable Development Goals (SDGs) and the Paris Climate Agreement (Schoenmaker & Schramade, 2019).

As one of the fastest-growing economies in the world, India is confronted with challenges of sustaining economic growth while tackling environmental issues. Urbanisation, industrialisation and the growing energy needs have worsened problems like carbon emissions, air pollution, waste production, and resource shortage. At the same time, India has been stepping up its efforts towards sustainability by increasing the penetration of renewable energy, making strides towards climate action, and its pledge towards net-zero emissions by 2070 (Bhattacharyya, 2022). For achieving these goals, a significant investment, technological innovation and a supportive institutional framework are essential. Sustainable finance has become a key instrument in the drive to redirect capital flows towards environmentally and socially responsible activities in this context. Sustainable finance is about using Environmental, Social and Governance (ESG) standards in investment and financing decisions to generate sustainable economic value and solve sustainability issues (Schoenmaker & Schramade, 2019). Financial instruments/products like green bonds, sustainability-linked loans and advances, ESG investment funds, and climate finance instruments have been increasingly used for financing the renewable energy, sustainable infrastructure development, cleantech, and to make resource efficient production systems. Sustainable financial systems have a key role in shaping investments to environmental protection and long-term economic stability (Ziolo et al., 2019).

The Indian sustainable finance ecosystem has grown significantly in the last ten years. The rising trend of green bonds, environmental and social investments, and sustainability-linked financing demonstrates that the environment and social aspects have an impact on business performance and investment results. In addition, the Business Responsibility and Sustainability Reporting (BRSR) framework prescribed by SEBI has enhanced the transparency and sustainability reporting of the companies

(Rajawat & Mahajan, 2024). In addition to the financial innovation, sustainable entrepreneurship and cleantech innovation have become key catalysts for India's green transition. Sustainable entrepreneurship generates economic value and simultaneously tackles environmental and social issues with innovative solutions (Johnson & Schaltegger, 2020). The business sector is becoming more engaged in the areas of renewable energy, electric mobility, waste management, sustainable agriculture, and water conservation. Previous research indicates that environmental issues frequently result in new possibilities for innovation and sustainable business development (Cohen and Winn, 2007; Schaltegger and Wagner, 2011). Incorporating ESG principles into the corporate governance framework has further bolstered sustainability-oriented business practices. Sustainability is associated with increased stakeholder trust, increased resilience, and increased long-term performance for organizations with low to high sustainability performance (Eccles et al., 2014). Studies in India also show that sustainability reporting has a positive impact on the firm's reputation and performance (Minimol et al., 2025; Bhaskar et al., 2026). Moreover, eco-consciousness has gained momentum, and consumers are more inclined to choose products that are good for the environment and business practices that respond to their needs, which have led to market opportunities for companies to pursue sustainability-oriented approaches (Verma & Chandra, 2018).

While there is an increasing amount of research on sustainable finance, ESG reporting, entrepreneurship and consumer behaviour, sustainable finance and consumer behaviour are rarely studied together. Their joint influence on sustainability transitions has been barely investigated. Thus, the present study aims to explore the impact of sustainable finance along with cleantech entrepreneurship, ESG integration, policy support, and consumer behaviour on the transition of India towards a low-carbon and inclusive economy, thereby gaining a holistic perspective of the changing sustainability landscape of India.

2. REVIEW OF LITERATURE

2.1. ESG INTEGRATED APPROACH AND SUSTAINABLE FINANCE

In recent years, sustainable finance has become an important part of modern economies, as it can help to channel financial resources to projects that have a positive impact on the environment and society. According to Schoenmaker & Schramade (2019), sustainable finance is not just integrated with the conventional investment process but also integrates ESG into financial decision-making processes. Likewise, Ziolo et al. (2019) highlight the significance of sustainable financial systems in advancing renewable energy development, climate resilience, sustainable infrastructure, and economic stability in the long term. Sustainable finance has seen significant development in India as a consequence of the rise of green bonds, funds that focus on environmental, social and governance principles, climate finance, and sustainable finance lending. India has become one of the top three developing economies in the field of green bond issuance, especially in the renewable energy and infrastructure segments. In addition to this, Bhattacharyya (2022) pointed out the growing importance of financial institutions and regulators in promoting sustainable investment practices. There is also significant progress in sustainability reporting and ESG disclosure practices, as shown in the literature. According to Rajawat & Mahajan (2024), sustainability reporting has seen substantial enhancements in reporting quality for banks in India, as a result of regulatory mandates and stakeholder demands. Patel & Desai (2025) also observed that green loan disclosure practices have improved the sustainability reporting frameworks by urging environmentally responsible lending. Similarly, the study by Mohanty et al. (2025) revealed that regulatory focus and investor awareness have been driving the adoption of ESG in India, but challenges such as the comparability and standardization of reporting remain. There are several studies that have proven the positive correlation between creating sustainable practices and organizational performance. In the study on strong sustainability by Eccles et al. (2014), it was shown that companies implementing a strong sustainability approach have better long-term financial results and organizational effectiveness. Likewise, Minimol et al. (2025) identified an increase in stakeholder trust and competitiveness in the long term when sustainability reporting. Overall, these studies indicate that the incorporation of ESG is becoming more of a business imperative than a compliance obligation.

2.2. SUSTAINABLE ENTREPRENEURSHIP AND CLEANTECH INNOVATION

Entrepreneurship has been well established as one of the drivers for sustainable development. Cohen & Winn (2007) believed that the imperfection of the environmental markets provides innovation opportunities for entrepreneurs to find solutions to ecological problems. Following this line of thinking, Schaltegger & Wagner (2011) noted the need for sustainability-oriented entrepreneurship to foster eco-innovation, which can be achieved in terms of new products, new technologies and new business models. Johnson & Schaltegger (2020) also theorized that sustainable entrepreneurship is a mechanism that creates value for the economy, for society, and for the environment. Their framework brings attention to the importance of entrepreneurial innovation as a means to connect sustainability goals and market opportunities.

The Indian start-up ecosystem is now more in line with these values. According to Agarwal & Sharma (2021), cleantech businesses flourished in various sectors such as renewable energy, waste management, sustainable agriculture, and electric mobility, with significant growth observed in all these areas. Likewise, Singh & Gupta (2023) concluded that the role of green start-ups in innovation, job creation, and environmental sustainability is noteworthy. Thus, it can be inferred from the literature that sustainable entrepreneurship is becoming an important aspect of the green economic transformation in India.

2.3. SUSTAINABLE CONSUMER BEHAVIOUR

One aspect of sustainability transitions is the behaviour of consumers. Peattie & Crane (2005) suggested that the increase in environmental consciousness affects consumer preference for environmentally responsible products and services. Further research has since validated the fact that sustainability is also a key factor in the purchasing process. While the traditional factors like price, quality and convenience also play a role in purchasing decisions, sustainability attributes are found to have a significant impact on the choice behaviour of consumers by Verma & Chandra (2018). Verma & Kapoor (2022) noted that there has been a rise in green consumerism in the Indian context, especially among urban, younger consumers. But the researchers reported that there are still some obstacles to the use of sustainable consumption, such as limited awareness and affordability issues. The literature indicates that consumer awareness can be a market-based tool that makes companies think about sustainability from the product design, marketing strategy and operational process.

2.4. GOVERNMENT POLICY AND SUSTAINABILITY TRANSITION

The government policies and regulations have become a crucial enabler with regard to sustainable finance and the development of cleantech businesses. Various government initiatives like the 'National Action Plan on Climate Change (NAPCC)', the 'National Solar Mission', FAME Schemes, Production Linked Incentive (PLI) Schemes, and the Green Hydrogen Mission (GHM), have facilitated the sustainability efforts of the Indian government. Ghosh & Nanda (2022) discovered that these policy-regulatory measures have contributed significantly to the investment patterns in renewable energy and to the development of cleantech or green businesses. Besides, Mishra & Das (2023) observed that the mandatory requirement for sustainability reporting has resulted in greater transparency and investors' confidence. Supporting regulatory framework, the public-private partnership arrangements, and fiscal incentives have been remarked repeatedly in the literature as the key tools for supporting sustainability transitions.

2.5. GAP IN EXISTING RESEARCH

Even though the concept and dimensions of sustainable finance have attracted substantial attention in recent academic research, there is a lack of a coherent, holistic body of work. Most studies examine these dimensions individually and do not consider the inter-relationships between these dimensions in the relatively wider sustainability ecosystem. Moreover, there is an abundance of sector-specific analyses and few integrated approaches to financial innovation, entrepreneurial activity, support from the regulatory environment, the integration of environmental, social and governance (ESG) aspects, and consumer awareness. In view of the recent developments in India's sustainability landscape, such as the mushrooming of green finance instruments, the introduction of mandatory ESG disclosure rules, and the increasing number of sustainability-focused start-ups, there is a need for detailed synthesis studies. To fill this gap, the present study aims to focus on the cumulative impact of sustainable finance, policy measures, entrepreneurial innovation, integration of Environment, Social and Governance (ESG) principles and consumer behaviour on the low-carbon and inclusive economy transition in India.

3. MATERIALS AND METHODS

3.1. RESEARCH DESIGN

This research is descriptive and exploratory, which uses a systematic review and synthesis of secondary data. As the field of sustainable finance and the incorporation of environmental, social and governance (ESG) principles into business practice continuously evolves in India, a conceptual review method was deemed suitable for the purposes of this study to explore emerging trends and inter-linkages between the dimensions of sustainable finance and ESG integration, as well as the concepts of green entrepreneurship and sustainability-oriented business practice. The study aims to offer a holistic view of the contribution of sustainable finance and cleantech entrepreneurship in enabling India's shift towards a low-carbon, inclusive economy.

3.2. SOURCES OF DATA

This study uses secondary data only, which are obtained from various national and international sources. Peer-reviewed research articles published in Scopus, Web of Science, ScienceDirect, SpringerLink, Taylor & Francis, Wiley Online Library and Google Scholar were retrieved from academic literature. The sources for documentation on government publications and policy documents included institutions like Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Ministry of New and Renewable Energy (MNRE), NITI Aayog, Startup India, Invest India and Ministry of Environment, Forest and Climate Change (MoEFCC). Further, information from international bodies such as the International Energy Agency (IEA), United Nations Environment Programme (UNEP), World Bank, International Finance Corporation (IFC) and Climate Bonds Initiative (CBI) has been utilized to gain the latest insights on sustainable finance, reporting on environmental, social and governance (ESG) performance, renewable energy investments and sustainability transitions.

3.3. LITERATURE SELECTION AND CRITERIA FOR INCLUSION

A systematic search was used to locate suitable literature. To ensure the study's timeliness, the studies were selected from 2015 to 2025. During the search process, the following keywords were used: sustainable finance, green finance, ESG reporting, green bonds, sustainable entrepreneurship, cleantech start-ups, investment in renewable energy, green buildings, sustainable consumption, and India's sustainability transition. Studies were included if they covered at least one of the themes listed below:

- Sustainable supply chain management; and
- Achieving sustainable development goals; and
- Productivity and sustainability; and
- Technical cooperation and capacity building; and
- Sustainable consumer behaviour and green markets, and Government policies to facilitate the sustainability transitions.

Duplicate records, non-academic sources that lacked credibility and the studies with limited relevance to the research goals were excluded from the review.

3.4. DATA SYNTHESIS AND ANALYSIS METHODS

Thematic content analysis was used to analyse the collected data. The studies and reports were then systematically classified according to 5 thematic areas: (i) sustainable finance ecosystem, (ii) policy & regulatory support, (iii) green entrepreneurship & innovation, (iv) sector-wise sustainable transformation, and (v) ESG integration & sustainable consumer behaviour. The analysis was based on the identification of trends and patterns, as well as on inter-relationships between the nature of financial mechanisms, policy interventions, entrepreneurial activities and market responses. The diverse quantitative pointers like the green bond issuance, investments in renewable energy resources, and adoption of ESG, green infrastructure certifications, and cleantech start-ups growth patterns were analysed to support the discussion of the study.

3.5. CONCEPTUAL FRAMEWORK

The study has the premise of sustainable finance being a catalyst for sustainability-oriented innovation and investment. Green entrepreneurs provide solutions to environmental problems, and the institutional framework is given by government policies. ESG practices provide more transparency and accountability, while environmentally conscious consumers drive demand for sustainable products and services. All these are contributing towards the acceleration of India's journey towards a low-carbon and inclusive economy.

3.6. LIMITATIONS OF THE STUDY

The study only uses secondary data, which means that it relies on the quality, reliability, and availability of the literature and published reports used in the study. No primary data collection and no statistical testing were done, so the results are conceptual and exploratory in nature. However, a combination of different sources of authoritative information gives a detailed picture of the changing sustainability ecosystem in India.

4. RESULTS AND DISCUSSION

4.1. SUSTAINABLE FINANCE ECOSYSTEM IN INDIA

The results show that Sustainable Finance is one of the most important enablers of the Indian sustainability agendas. In the last ten years, environmental, social and governance (ESG) factors have been increasingly incorporated into financial decision-making processes. Sustainability is becoming increasingly seen as a key element of long-term value creation and risk management by financial institutions, investors, regulators and corporations. Green bonds, sustainability-linked loans, ESG funds, climate funds and green banking are clear indicators of a paradigm shift in India's financial landscape. Green bonds are a key source of capital for renewable energy projects as well as for sustainable infrastructure and investments that are resilient to climate change. Table 1 presents the growth of sustainable finance instruments in the Indian economy.

TABLE 1 Growth of Sustainable Finance Instruments in India

Sustainable Finance instruments	Early Stage (2015-16)	Recent Status (2024-25)	Major Impact
Green Bonds	Emerging market	Among the leading emerging markets globally	Mobilized capital for renewable energy and infrastructure
ESG Mutual Funds	Limited availability	Rapidly growing investor participation	Increased sustainable investment options
Sustainability-Linked Loans	Negligible adoption	Widely adopted by large firms	Encouraged sustainability-linked corporate performance
Climate Funds	Few initiatives	Multiple domestic and international funds	Supported climate-resilient projects
Green Banking Initiatives	Voluntary practices	Integrated into banking strategies	Improved environmental risk management

Source: RBI (2024), SEBI (2024), Climate Bonds Initiative (2024).

The study not only explores the funding role of sustainable finance but also its strategic potential to mobilise resources for climate-resilient infrastructure, renewable energy and sustainable business activities. In the instruments, green bond issues are becoming more accepted, as mentioned in Figure 1.

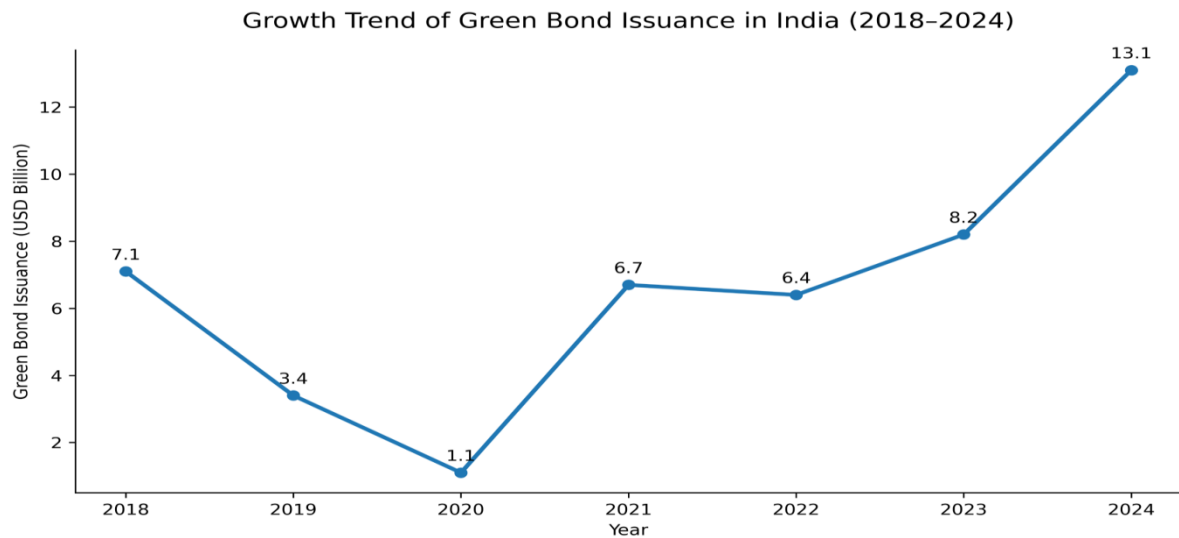


FIGURE 1 Growth Trend of Green Bond Issuance in India (2018–2024)

Source: Compiled from Climate Bonds Initiative (CBI), RBI, and SEBI reports (2024).

Investors' growing confidence in environmentally responsible investments is reflected in the growth trajectory of sustainable financial instruments. Sustainable finance is no longer a niche concept and is now a key investment tool that organisation can use to raise funds for climate mitigation and adaptation projects. The results, as a consequence, indicate that sustainable finance is a tool for financing sustainable development, rather than just a funding tool.

4.2. POLICY SUPPORT AND REGULATORY FRAMEWORK

The data analysis shows that the role of the government is a key one to enable sustainable finance and green investments. There have been major policy and regulatory developments that have minimized risks for investment and helped attract private sector investment in sustainability efforts. The Government of India has introduced various key policies, including the National Solar Mission, FAME Scheme, Production Linked Incentive (PLI) Scheme, Business Responsibility and Sustainability Reporting (BRSR) and the Green Hydrogen Mission, which have all contributed to India's sustainability transition. The government initiatives towards sustainable investing practices in India are given in Table 2. Moreover, green building rating tools like GRIHA and IGBC, along with policy initiatives like Energy Conservation Building Code (ECBC), Smart Cities Mission and AMRUT, have contributed towards sustainable urban development and resource-efficient infrastructure. The results show that regulations can help not only to drive sustainable investment but also to build investor confidence, increase corporate accountability, and speed up the implementation of environmentally responsible business practices.

TABLE 2 Major Government Initiatives Supporting Sustainable Investments in India

Policy/Initiative	Year	Focus Area	Expected Outcome
National Action Plan on Climate Change (NAPCC)	2008	Climate mitigation and adaptation	Sustainable economic development
National Solar Mission	2010	Renewable energy	Expansion of solar power capacity
Faster Adoption and Manufacturing of Electric Vehicles (FAME)	2015	Electric mobility	Reduced fossil-fuel dependence
Production Linked Incentive (PLI) Scheme	2020	Clean manufacturing and solar modules	Green industrial development
Business Responsibility and Sustainability Reporting (BRSR)	2021	ESG disclosure	Improved corporate transparency
Green Hydrogen Mission	2023	Clean energy transition	Decarbonisation of industry

Source: Government of India, NITI Aayog, MNRE, SEBI.

4.3. CLEANTECH START-UPS AND GREEN ENTREPRENEURSHIP

The one thing that has been highlighted as one of the most prominent developments in the study is the rapid advancement of cleantech entrepreneurship. Sustainable start-ups have proven to be significant players in the field of environmental innovations by bringing technology-based solutions to sustainability problems. Favourable conditions have been created for the development of green enterprises due to the growth of venture capital investments, government incubation programmes, innovation hubs and start-up support schemes. Business transformation of environmental issues to business opportunities is rapidly gaining traction among start-ups in fields of renewable energy, electric mobility, waste management, sustainable agriculture, water conservation and the circular economy. The segment-wise cleantech start-up in India is shown in Table 3.

TABLE 3 Major Cleantech Start-up Segments in India

Sector	Typical Innovations	Sustainability Benefits
Renewable Energy	Solar technologies, energy storage	Reduced carbon emissions
Electric Mobility	EV manufacturing, charging infrastructure	Cleaner transportation
Waste Management	Recycling and circular economy solutions	Reduced landfill waste
Sustainable Agriculture	Precision farming, bio-fertilizers	Resource conservation
Water Management	Smart water monitoring systems	Improved water efficiency
Green Construction	Eco-friendly materials and smart buildings	Reduced energy consumption

Source: Startup India (2024), NASSCOM (2024), Invest India (2024).

Figure 2 shows the percentage share of clean technology (Clean Tech) projects by sectors in India. It focuses on the relative relevance and focus on projects in various sectors with sustainability relevance.

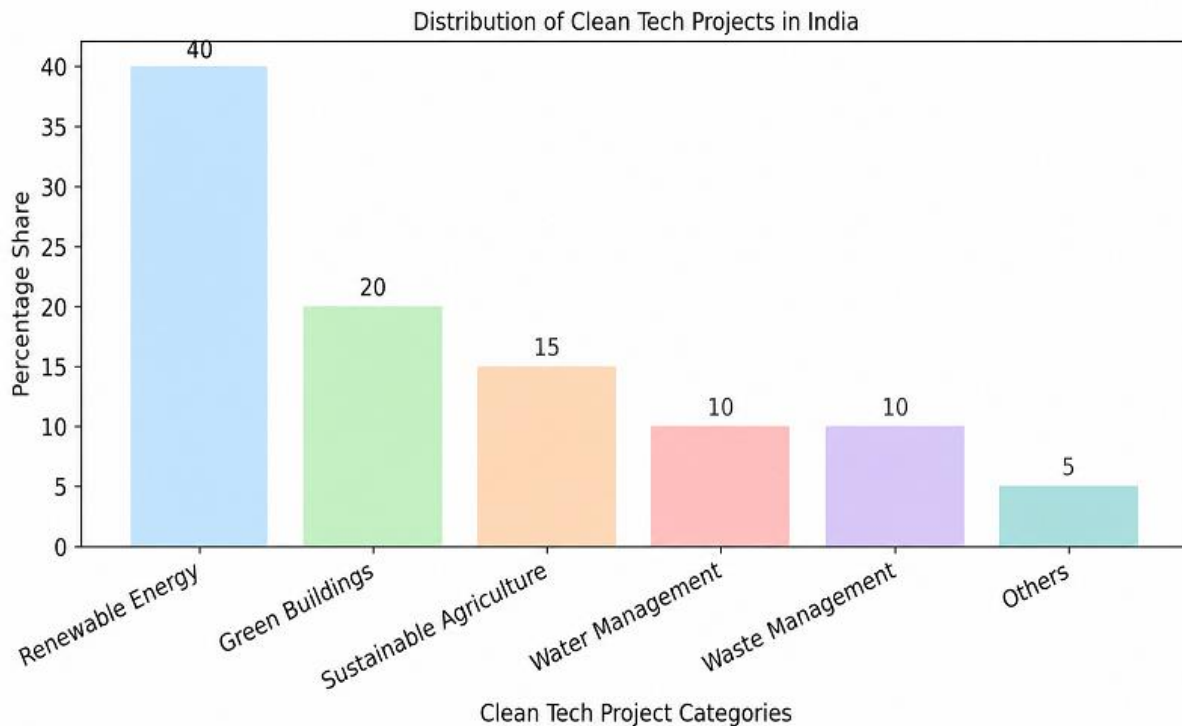


FIGURE 2 Distributions of Sustainable Investments by Sector

Source: Conceptual illustration developed by the author based on trends reported in RBI, SEBI, Climate Bonds Initiative, and IEA publications.

Figure 2 shows the distribution of the Clean Technology (Clean Tech) projects across major industry sectors and the relative importance of various sustainability-related initiatives in India. The new sector that is emerging as the top one is Renewable Energy, which is 40 per cent of the total projects, reflecting India's keen interest in promoting renewable energy sources, such as solar and wind power, as part of its efforts to move toward a low-carbon economy. The second largest category, accounting for 20% of all green buildings, is Green Buildings, where more and more investments are being made into energy-efficient construction and sustainable urban infrastructure. Sustainable Agriculture covers 15 per cent of the projects, indicating a growing focus on the sustainable use of natural resources, the conservation of natural resources and innovations that help mitigate the effects of climate change on agriculture. Water Management and Waste Management each make up 10 percent of the total projects and show that their recycling and waste reduction are needed to achieve sustainable development goals. The

neglected 5% are areas that are emerging and other specialized Clean Tech areas. When looked at in the context of all the Clean Tech projects, the figure indicates that Renewable Energy and Green Buildings account for 60 percent of the total portfolio, indicating energy transition, sustainable infrastructure development as the main focus areas in India's Clean Tech ecosystem. The distribution also shows great potential to redirect investments more towards agriculture, water conservation, waste management and other new green technologies to have a more balanced and complete development.

The results indicate that while renewable energy continues to be the biggest investment segment for clean tech, the other areas of clean tech investment are green buildings, sustainable agriculture, water management, and waste management. This trend is seen in the sustainability space both in terms of the policy focus and investor choice. From a practical perspective, entrepreneurship innovation can create economic value, environmental benefits and social impact, as shown in the successful startups of BluSmart, ZunRoof and Carbon Masters. Sustainable entrepreneurship is hence an important aspect of Indian green growth.

4.4. SECTOR-WISE SUSTAINABILITY TRANSFORMATION

In India, the transition to sustainability is not limited to a particular sector. Instead, it is seen in various sectors of industry and in economic activities. A summary of sector-wise sustainability transition in India is presented in Table 4.

TABLE 4 Sector-wise Sustainability Transformation in India

Sector	Major Sustainability Practices	Key Outcomes
Renewable Energy	Solar, wind, and hybrid energy projects	Increased clean energy capacity
Construction	Green buildings, energy-efficient design	Reduced environmental footprint
Manufacturing	Resource efficiency and ESG compliance	Lower emissions and waste
Transportation	Electric vehicles and public transport electrification	Reduced carbon emissions
Consumer Goods	Eco-friendly packaging and ethical sourcing	Growth of green consumerism
Financial Services	ESG investing and green finance	Sustainable capital allocation

Source: IEA (2024), UNEP (2024), World Bank (2024).

The biggest gains have been made in the renewable energy industry, with more investment in solar, wind, and hybrid power initiatives. Sustainable finance mechanisms have been an important component in enabling the growth of clean energy capacity. In recent years, the building industry has embraced green construction methods that focus on energy conservation, water-wise design, sustainable materials and low carbon emissions. The movement of certified green buildings seems to be gaining momentum as a trend in awareness of sustainable development of infrastructure. In addition, there is a growing trend towards companies focusing on the efficiency of their resources, the reduction of their emissions, the minimization of waste, and the compliance with ESG requirements for manufacturing companies. The transportation sector is in a state of change with EV adoption and public transport electrification. Consumer goods companies are also looking to meet the growing demand for sustainable packaging, ethical sourcing and eco-friendly products. The developments are a reflection of the fact that sustainability has now firmly taken root in India's industrial and economic transformation.

4.5. ESG INTEGRATION AND THE CORPORATE SUSTAINABILITY

The results show that the principles of ESG are now more and more a part of the strategy and governance of enterprises. The sustainability performance has become a key investor confidence measure, a brand differentiator, a critical operational risk mitigation and a tool for sustained competitiveness. Adoption of BRSR requirements has enhanced the sustainability reporting in listed companies, thereby enhancing the transparency. ESG indicators are now being used in investment decisions, pushing companies to have more responsible business practices.

TABLE 5 Interrelationships between Sustainable Finance and Sustainability Outcomes

Driver	Mechanism	Sustainability Outcome
Sustainable Finance	Green bonds, ESG funds, green loans	Increased investment in sustainable projects
Government Policies	Incentives, regulations, and reporting standards	Improved investor confidence
Green Start-ups	Technological innovation	Environmental problem-solving
ESG Integration	Corporate sustainability practices	Better governance and transparency
Consumer Awareness	Demand for sustainable products	Expansion of green markets
Collaborative Ecosystem	Interaction among stakeholders	Accelerated low-carbon transition

Source: Compiled from Eccles et al. (2014), Johnson & Schaltegger (2020), Ziolo et al. (2019), SEBI (2024), RBI (2024).

It is evident that the integration of ESG brings about better governance, trust from stakeholders, best risk management and performance in the long-term as indicated by the evidence. As a result, the sustainability reporting is transforming from a regulatory framework requirement to a strategic business tool.

4.6. CONSUMER BEHAVIOUR AND GREEN MARKET DEVELOPMENT

Consumer awareness is seen as a key need-side enabler of sustainability transitions. The results indicate a trend among consumers to consider the environmental characteristics of the purchased products increasingly. Consumer preferences are increasingly affected by factors like eco-friendly packaging, ethical sourcing, energy efficiency, and a company's sustainability commitments. But the high cost of sustainable consumption, lack of awareness and information are still a problem for the mass market. Overall, the industry is progressing towards a greater acceptance of green products and sustainable brands, especially among younger and urban consumers, despite these hurdles. As more and more people are interested in sustainable products, businesses are turning to incorporating environmental concerns into product development, marketing, and supply chain management. Figure 3 depicts an Illustrative index showing growth in consumer participation and market penetration of green finance and cleantech initiatives. *Base year 2016 = 100.*



FIGURE 3 Consumer Market Share Trend in Green Finance and Cleantech Projects in India (2016-2025)

Source: Conceptual illustration developed by the author based on trends reported in RBI, SEBI, Climate Bonds Initiative, and IEA publications.

The index suggests that the market for green finance and cleantech projects has penetrated the market by more than fourfold in the past 10 years, with consumers increasingly engaging in the transactions. Since 2020, growth has been boosted by the rise of ESG investing, the issuance of green bonds, the development of renewable energies, the introduction of electric mobility and the funding of climate-tech products. All of these are accounted for by the sharp uptick in 2023-2025, which is driven by sovereign green bonds, sustainable finance efforts, investments in climate-tech and India's energy transition push.

4.7. INTEGRATED SUSTAINABILITY ECOSYSTEM IN INDIA

Another important insight gained from the analysis is the interdependence of sustainable finance, policy support, entrepreneurial innovation, integration of environmental, social, and governance (ESG) principles, and consumer behaviour. Sustainable finance is a source of funding to drive innovation and green investments. Government policies create institutional structures that facilitate sustainability. Cleantech start-ups are developing new solutions to the challenges in the environment. ESG practices ensure transparency and accountability, and environmentally conscious consumers generate market demand for sustainable products and services. These factors have formed a sustainable ecosystem, which needs to be further reinforced to speed up India's transition towards a low-carbon and inclusive economy.

The trends of key indicators of sustainability in India are shown in Figure 3 for 2015–2025. Indices of Green Bonds, ESG Assets, Cleantech Start-ups, Renewable Energy and Green Buildings are shown in normalized units with 2015 as the base year (2015 = 100).

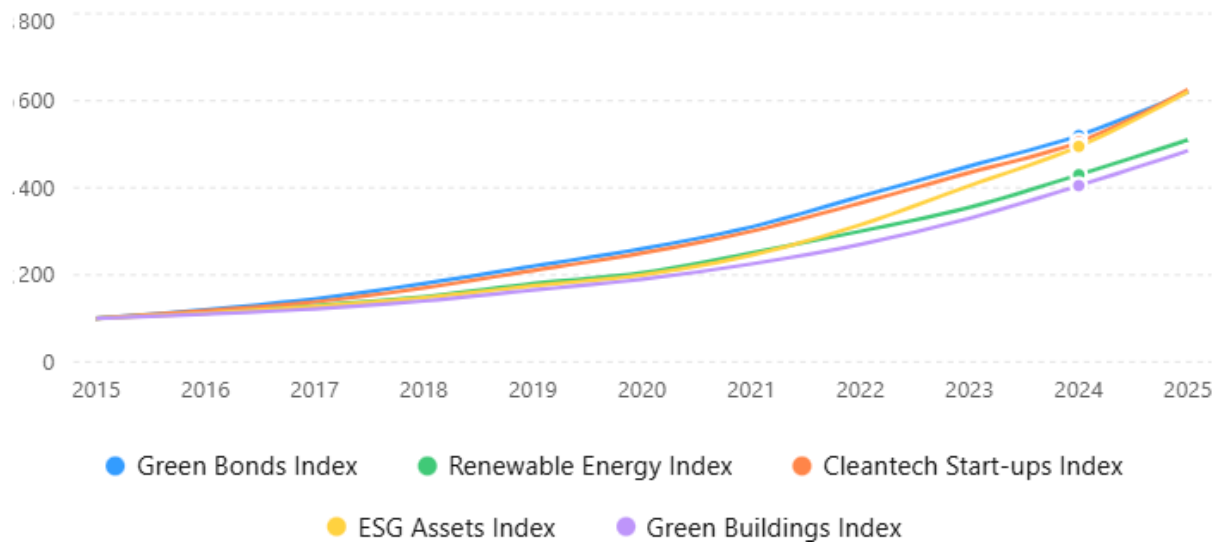


FIGURE 4 The Trends of Key Indicators of Sustainability in India (2015–2025)

Sources: Climate Bonds Initiative (CBI), Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), Ministry of New and Renewable Energy (MNRE) and Industry publications.

The values in Figure 4 are indices (2015 = 100) that were prepared for analytical and illustrative purposes. The chart shows significant development in each of the sustainability-related indicators throughout the period of 2015-2025. Green Bonds and Cleantech Start-ups see the greatest growth and will surpass the index 620 in 2025. ESG Assets also demonstrate rapid growth following 2021, as investor interest in sustainable investments grows. There is sustained growth in Renewable Energy and steady growth of Green Building certifications at a relatively slow pace. Overall, the figure shows the growing synergy among the three pillars of sustainable finance, technological innovation, and environmental governance in India's journey towards a low-carbon economy. After 2020, the convergence of trends in green finance, renewable energy investments, ESG adoption, green building development and entrepreneurial innovation is a testament to the maturing of India's sustainability ecosystem.

5. POLICY IMPLICATIONS

The results indicate the following implications for policymakers, financial institutions, businesses, and entrepreneurs. To begin with, sustainable finance mechanisms should be broadened, with increased support for green bonds, sustainability-linked lending, and climate finance. The current scarcity of ESG framework standardization and the lack of disclosure requirements would benefit from improving transparency and investor confidence. Second, increased investment is needed in entrepreneurship support activities, including particular climate venture capital funds, green incubators, innovation grants, and technology transfer processes. This would help to scale sustainable business solutions. Third, the involvement of financial institutions in the integration of ESG in lending and investment decisions should be enhanced. Better sustainability risk assessment tools can have a positive impact on both financial and environmental goals. Fourth, sustainability should not be regarded as just a compliance requirement, but a source of strategic advantage for businesses. Integrating ESG values into corporate governance and business practices can boost firms' competitiveness, resilience, and stakeholder confidence. Finally, the key to scaling up green markets and promoting sustainable consumption lies in consumer awareness campaigns and consumer sustainability literacy programmes. Awareness-raising can contribute to improving market demand for sustainable products and services, which provides a boost to sustainability transitions.

6. CONCLUSION

The study focused on how sustainable finance and cleantech entrepreneurship are influencing India's shift towards a low-carbon and inclusive economy. The results show that sustainable finance has emerged as a powerful instrument to direct resources toward investments that prioritise sustainability and environmental responsibility, and that the government has laid the foundation for green growth and sustainable innovation investments. Innovative solutions in renewable energy, electric mobility, sustainable agriculture, waste management and green infrastructure have been driven by the quick growth of cleantech start-ups. In parallel, the incorporation of ESG has enhanced the accountability and transparency of companies and consumers' awareness of sustainable products and services has boosted demand. These dimensions also indicate that they are not independent of each other. Rather, sustainable finance, policy, entrepreneurial creativity and ESG-based activities and choices are all interwoven and interconnected. They are changing the business scenario of India and accelerating India's progress towards the SDG goals. In conclusion, India's sustainability transition is driven by a combination of financial

innovations, regulations, entrepreneurship, corporate responsibility, and market forces. Building up these interdependent pillars will be key to a global low-carbon, resilient and competitive economy in the next decades.

CONFLICTS OF INTEREST

There is no conflict of interest regarding this study.

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Not applicable in this study

APPENDIX

Not applicable

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