

Sustainable and Green Economy Strategies for Achieving Viksit Bharat @2047**Dr. Sanjay Kumar¹, Amrit Kumar Porte², Smt. Ratna Porte³; Umend Singh Chourke⁴****DOI : <http://doi.org/10.5281/zenodo.21726121>****Review: 05/06/2026****Acceptance: 08/07/2026****Publication: 28/07/2026****Abstract**

Balancing sustained economic growth with environmental sustainability remains one of the most pressing challenges for emerging economies in the twenty-first century. As India moves toward its aspiration of becoming a developed nation under the vision of Viksit Bharat 2047, it becomes increasingly important to meaningfully integrate green growth initiatives with digital transformation. Such an approach can support a model of development that is inclusive, resilient, and better equipped to respond to future uncertainties. Against this backdrop, the study proposes an integrated conceptual framework that brings together public policy, technological advancement, and corporate strategy to support and accelerate India's transition toward a more sustainable and balanced growth trajectory. Drawing on global experiences, policy perspectives, and academic research, the paper examines the evolving role of advanced digital technologies including artificial intelligence, big data analytics, the Internet of Things, block chain, and digital finance in enabling sustainability. These technologies offer significant potential to reduce carbon emissions, enhance resource efficiency, and promote inclusive development. The study further explores their applications across key sectors such as energy, agriculture, supply chains, and urban governance. Building on this analysis, the paper outlines a phased and actionable roadmap for advancing the goals of Viksit Bharat 2047. It emphasizes the importance of enabling policy measures, including the expansion of green finance, adaptive regulatory frameworks, and strengthened institutional capacities. In parallel, it highlights the role of corporate responsibility through the integration of ESG principles, the adoption of Green Human Resource Management practices, and the development of circular, resource-efficient supply chains.

To monitor progress effectively, the study proposes a set of measurable indicators aligned with the Sustainable Development Goals (SDGs) and underscores the need for strong coordination among institutions to ensure successful implementation. Overall, the analysis underscores that aligning digital innovation with coherent policy frameworks and responsible corporate practices presents a significant opportunity for India to achieve economic competitiveness while maintaining environmental sustainability.

Key words: Green growth, Digital transformation, Viksit Bharat, Sustainability.

Introduction:

India's vision of Viksit Bharat 2047 goes beyond achieving higher per capita income; it also emphasizes the need for social inclusion and environmental sustainability. The 2030 Agenda for Sustainable Development (United Nations, 2015) and the global push for net-zero emissions sharpen the urgency for development pathways that are both economically productive and ecologically sustainable. Green growth the pursuit of economic expansion while preserving ecological systems - is thus integral to national development planning (OECD, 2011).

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At the same time, the rapid spread of digital technologies has reshaped governance, industry, and everyday life. India's expanding digital infrastructure such as Aadhaar, UPI, and wider broadband access offers a powerful foundation for advancing sustainability through data-driven decision-making, more efficient markets, and greater financial inclusion. Bringing together green growth and digital transformation has the potential to drive far-reaching changes across sectors like energy, transport, manufacturing, and agriculture. However, making this integration effective requires thoughtful policy design, strong institutional coordination, capacity building, and a clear focus on equity and the long-term sustainability of digital systems.

India's vision of Viksit Bharat 2047 is not limited to increasing per capita income; it also seeks to ensure social inclusion and environmental resilience. The 2030 Agenda for Sustainable Development (United Nations, 2015) and the global push for net-zero emissions sharpen the urgency for development pathways that are both economically productive and ecologically sustainable. Green growth, the pursuit of economic expansion while preserving ecological systems is thus integral to national development planning (OECD, 2011). India, as one of the fastest-growing economies in the world, stands at a critical juncture where economic progress must harmonize with environmental stewardship and social equity. The vision of Viksit Bharat@2047 envisions India as a developed nation by the 100th anniversary of its independence, calls for a transformative approach that aligns economic growth with the Sustainable Development Goals (SDGs). This article explores the evolving landscape of the Indian economy, its alignment with SDGs, and the policy and infrastructural shifts that are shaping inclusive and sustainable development.

1. India's Economic Transformation: Growth, Sustainability, and Inclusive Development:

1.1 Economic Progress in India:

A Transformative Decade India's economic trajectory over the past decade has been marked by resilience, innovation, and structural reform. Despite global headwinds such as the COVID-19 pandemic and geopolitical tensions, India's GDP growth has rebounded strongly, reaching 7.8% in the first quarter of FY 2023–24 (Ministry of Finance, 2023). This growth is driven by robust performance in sectors like manufacturing, services, digital technology, and renewable energy. The digital economy, in particular, has emerged as a powerful engine of growth. Initiatives like Digital India, UPI, and JAM trinity (Jan Dhan, Aadhaar, Mobile) have expanded financial inclusion and improved service delivery.

The rise of startups and unicorns reflects a vibrant entrepreneurial ecosystem that contributes to employment and innovation. Agriculture, though challenged by climate variability, continues to support nearly half of India's workforce. Government schemes such as PM-KISAN and the push for organic and climate-resilient farming are helping transition towards sustainable agricultural practices (NITI Aayog, 2022). Meanwhile, the services sector-especially IT, education, and healthcare - has shown strong export potential and domestic expansion.

The Make in India and Production Linked Incentive (PLI) schemes are boosting manufacturing competitiveness and attracting foreign investment. India's ranking in the Sustainable Development Goals Index has improved significantly, moving from 112th in 2023 to 99th in 2025, with a score of 67 out of 100 (Sustainable Development Solutions Network, 2025). This reflects progress in infrastructure, basic services, and digital connectivity, though challenges remain in areas like inequality, climate resilience, and institutional transparency.

1.2 SDGs and Economic Development Sectoral Synergies:

The SDGs provide a comprehensive framework for integrating economic development with social and environmental goals. Several SDGs are directly linked to economic progress, including. SDG-1 No Poverty - India has made strides in reducing poverty through targeted social protection schemes, rural employment programs (MGNREGA), and direct benefit transfers. The proportion of population living below the national poverty line has declined, though multidimensional poverty persists in tribal and remote regions (Ministry of Statistics and Programme Implementation, 2025). The SDG-8 Decent Work and Economic Growth, Employment generation, skill development, and entrepreneurship are central to India's economic strategy. Programs like Skill India and Startup India aim to empower youth and marginalized communities with livelihood opportunities. SDG 9: Industry, Innovation, and Infrastructure, India's infrastructure push includes highways, railways, airports, and digital connectivity.

The PM Gati Shakti initiative integrates planning across ministries to accelerate infrastructure development. Investments in renewable energy solar, wind, and green hydrogen-are also expanding under SDG 7 (Affordable and Clean Energy). SDG10: Reduced Inequalities, Economic inclusion of Scheduled Castes, Scheduled Tribes, women, and persons with disabilities is being addressed through affirmative action, targeted subsidies, and institutional reforms. However, income and regional disparities remain a concern.SDG-11 Sustainable Cities and Communities; urban development missions like Smart Cities and AMRUT are improving housing, sanitation, and mobility.

These efforts contribute to economic vibrancy while addressing environmental sustainability. India's National Indicator Framework (NIF) tracks progress on these goals using data from ministries and agencies. For example, indicators under SDG 1 include the number of Self-Help Groups (SHGs) linked to bank credit and the proportion of population covered by social protection systems (NITI Aayog, 2025).

1.3 Policy Orientation and Inclusive Growth:

Building a Resilient Economy India's policy orientation has increasingly embraced sustainability, inclusion, and long-term resilience. The Union Budget 2023–24 emphasized green growth, digital infrastructure, and inclusive development. Key policy instruments include: Green Bonds and Climate Finance, India has issued sovereign green bonds to fund renewable energy and clean transportation projects. These instruments align with SDG 13 (Climate Action) while stimulating economic activity. Social Protection and Welfare Schemes like Ayushman Bharat (health insurance), PM Awas Yojana (housing), and PM Ujjwala Yojana (clean cooking fuel) address basic needs and empower vulnerable groups. Education and Skill Development,

The National Education Policy (NEP) 2020 and expansion of vocational training centers support human capital development, crucial for sustained economic growth. Marginalized Sector Empowerment, Tribal development programs, gender budgeting, and disability inclusive policies are helping bridge gaps in access and opportunity. The economic upliftment of these groups is essential for achieving SDG 10 and ensuring that growth is truly inclusive. GDP and Fiscal Management, India's GDP is projected to reach \$5 trillion by 2027, supported by fiscal prudence, tax reforms (GST), and improved ease of doing business. The government's focus on capital expenditure and infrastructure is expected to crowd in private investment and boost productivity. Despite these advances, challenges persist. Climate risks, unemployment, informal labour, and regional disparities require

sustained attention. The vision of Viksit Bharat@2047 envisions India as a developed nation by the 100th anniversary of its independence.

1.4. Research Questions

This research paper reflects the following research question.

1. In what ways can public policy, technological innovation, and corporate strategy be effectively aligned to promote green growth in India on its journey toward Viksit Bharat 2047?
2. How can India effectively integrate sustainable development principles into its economic growth strategy to achieve the vision of Viksit Bharat @2047?
3. What role will renewable energy transitions (solar, wind, and green hydrogen) play in driving India's green economy, and what are the key challenges in their implementation?
4. How effective are existing government policies and initiatives in promoting a sustainable and green economy in India?
5. What major financial, technological, institutional, and social barriers limit the adoption of green economy strategies in India, and how can they be effectively addressed?

1.5 Research Objectives:

The key objectives of this study are outlined below:

- I. To explore how digital technologies can be effectively utilized to drive green growth in India, with a focus on enhancing resource efficiency, minimizing environmental impact, and fostering inclusive development outcomes.
- II. To formulate a well-integrated policy and institutional framework capable of aligning digital transformation efforts with sustainable and environmentally responsible development pathways.
- III. To construct a comprehensive corporate strategy toolkit incorporating elements such as Green Human Resource Management (Green HRM), environmentally sustainable and circular supply chain systems, and ESG (Environmental, Social, and Governance) reporting, aimed at scaling responsible and sustainable business practices.
- IV. To develop a structured and implementable roadmap, supported by a strong Monitoring and Evaluation (M&E) mechanism, to assess progress and effectively steer India's journey toward achieving the vision of Viksit Bharat 2047.

2. Review of Literature

2.1 Redefining Green Growth and Its Importance:

Green growth can be understood as a way of pursuing economic progress without placing unsustainable pressure on the environment. Instead of allowing development to come at the cost of natural resources, it emphasizes a more balanced path one where growth is supported by efficient use of resources, cleaner energy systems, and the protection as well as restoration of ecosystems. Scholars such as Barbier (2016) and the OECD (2011) highlight that this approach is not limited to technological improvements alone. It also requires meaningful changes in how societies function, including shifts in consumption patterns, environmentally responsible fiscal measures, and stronger, more accountable governance structures (Bowen & Hepburn, 2014). In the Indian context, the idea of green growth fits closely with broader national priorities. Efforts to expand energy access, generate rural livelihoods, and modernize industry can all be aligned with environmentally sustainable practices (TERI,

2022). However, this alignment is not automatic it requires carefully designed policies that ensure economic aspirations do not exceed ecological limits. In this sense, green growth is not just a policy choice but a necessary framework for long-term, inclusive development.

2.2 Digital Transformation as a Driver of Sustainability:

The rise of digital technologies has opened up new possibilities for advancing sustainability in practical and measurable ways. These technologies can improve transparency in governance, enable more efficient use of resources, and create new forms of economic activity that are less resource-intensive (George, Merrill, & Schillebeeckx, 2021). Among them, Artificial Intelligence (AI) stands out for its transformative potential. It allows for more accurate prediction of energy demand, leading to better management of power systems, while also enhancing the efficiency and reliability of electricity grids. Beyond the energy sector, AI and data-driven tools are increasingly being used in agriculture to guide decision-making helping farmers optimize inputs like water and fertilizers, reduce waste, and minimize environmental harm. In this way, digital transformation does not merely support sustainability; it actively reshapes how development can be achieved in a more responsible and forward-looking manner.

Internet of Things (IoT): Enables continuous, real-time tracking of environmental parameters such as water usage, air quality, and energy consumption.

Blockchain Technology: Helps ensure transparency and traceability in sustainable supply chains, while supporting accurate carbon tracking and reporting.

Big Data Analytics: Assists in smarter urban planning, strengthens disaster risk management, and supports informed, data-driven policy decisions.

Digital Finance / Fintech: Expands access to green finance, promotes sustainable investments, and enables mechanisms like carbon trading, particularly for MSMEs. However, digitalization entails environmental footprints (data centers, electronic waste) and equity concerns (digital divide), necessitating policies that promote green IT and inclusive access (World Bank, 2023).

2.3 Policy Instruments and Governance for Green Digital Transitions:

Policy frameworks that combine regulation, incentives and public investment have been effective in other settings (European Commission, 2020). Policy tools like carbon pricing, renewable energy requirements, sustainable public procurement norms, and targeted green public investments have played a key role in driving the transition toward low-carbon economies in OECD countries. In the context of digitally enabled sustainability transitions, governance frameworks also need to incorporate emerging concerns such as data management, system interoperability, and the security of interconnected digital-physical systems. In India, institutions such as NITI Aayog, the Ministry of Environment, the Ministry of Power, and the Ministry of Electronics and IT already form an important foundation for this transformation; however, their efforts are often fragmented due to limited inter-agency coordination. Integrated institutional arrangements have been proposed to overcome fragmentation and align incentives across ministries (NITI Aayog, 2023).

2.4 Business Approaches for Sustainability:

Corporations have a key role in implementing and scaling sustainable green practices across industries. Concepts such as Green Human Resource Management (Renwick, Redman, & Maguire, 2013), Sustainable Supply Chain Management (Seuring & Müller, 2008), and ESG integration are increasingly mainstream. India-specific mechanisms such as SEBI's Business Responsibility and Sustainability Reporting (BRSR) provide regulatory pressure and reporting standards that guide corporate behavior (CII, 2023). Despite progress, many firms especially SMEs still face barriers such as limited access to green finance, technology, and skills. Targeted policies that reduce investment risks and provide technical support can help speed up the adoption of sustainable practices.

2.5 Theoretical Framework:

This study is based on an integrated socio-technical framework that locates digital technologies within interconnected policy and market systems. It consists of three interrelated layers:

- i. **Policy and Institutional Layer:** Regulatory frameworks, fiscal incentives, and governance mechanisms that shape and enable sustainable development pathways.
- ii. **Digital and Technological Layer:** Digital infrastructure and emerging technologies that enable efficient data use, monitoring, and system optimization.
- iii. **Corporate and Social Practices:** Organisational strategies, business models, and community-level actions that put sustainability into practice.

Sustainability transitions emerge through the continuous interaction of these layers, where policy drives innovation, and technological advancements, in turn, open up new avenues for more effective governance and implementation.

3.0 Methodology:

This study follows a conceptual and policy-oriented design using a multi-method approach, including:

- **Systematic Literature Review:** Synthesis of peer-reviewed research, policy documents, and global initiatives to identify key themes.
- **Comparative Policy Analysis:** Study of selected countries (Denmark, South Korea, Singapore) to understand successful integration of digital and green policies.
- **Document Analysis:** Review of major Indian policies such as NAPCC, National Hydrogen Mission, Digital India, and BRSR reporting framework.
- **Framework Development:** Integration of insights from policy, industry, and civil society, aligned with SDG indicators to build a cohesive analytical framework.

3.1 Analysis and Discussion:

This section integrates the conceptual, policy, and technological perspectives developed earlier to explore how digital transformation can meaningfully advance India's green growth agenda. The discussion is organized around the four core objectives of the study:

- i. Examining how digital technologies can drive sustainable and environmentally responsible economic growth.
- ii. Proposing an integrated policy and institutional framework to enable coordinated green and digital transitions.
- iii. Identifying corporate strategy tools that support sustainable and future-ready business models.
- iv. Outlining a strategic roadmap with a monitoring framework to support progress toward Viksit Bharat 2047.

3.2 Leveraging Digital Technologies for Green Growth:

Digital technologies are key system enablers that can transform the relationship between environmental systems and major economic sectors such as energy, agriculture, and manufacturing. Tools like artificial intelligence, IoT, blockchain, and big data analytics collectively improve resource efficiency and help reduce carbon emissions across value chains.

In the energy sector, AI-based demand forecasting combined with IoT-enabled smart grids can better manage renewable energy variability and enhance overall grid efficiency, helping to reduce transmission and distribution losses. In agriculture, IoT sensors and satellite monitoring support precision farming, enabling targeted use of water and fertilizers, with potential savings of 20–30% while improving yields (FAO, 2022). These examples show that digital technologies act as strong enablers of sustainability when supported by effective data governance and strong institutional capacity. Moreover, India's digital public infrastructure such as Aadhaar, UPI, and Digi-Locker strengthens access to green finance by enabling micro-credit and insurance for small enterprises and farmers engaged in sustainable activities. Overall, this supports Objective 1 by showing how digital transformation advances environmental sustainability, economic efficiency, and social inclusion the three pillars of green growth.

3.3 Institutional and Policy Integration:

To address Objective 2, India's current policy environment remains fragmented, with key ministries such as energy, environment, IT, and industry often working in isolation. To improve coordination, this paper proposes the establishment of a **National Council for Green Digital Transformation (NCGDT)** as a central coordinating authority to align green growth and digital initiatives. The council would be responsible for developing unified standards for green digital infrastructure, including energy-efficient data centres, eco-design principles, and sustainable public procurement norms, as well as strengthening implementation at state and local levels through targeted capacity-building support. International experiences such as the European Green Deal (2020) and South Korea's Green Digital Strategy (2022) demonstrate that stronger policy coherence can significantly enhance innovation and investment. Similarly, the use of regulatory sandboxes for emerging areas like AI-based carbon

trading and IoT-enabled energy systems can support innovation while managing risks. In this way, improved institutional coordination can transform fragmented efforts into a unified and effective policy framework, thereby fulfilling Objective 2.

4.0 Roadmap and Implementation Strategy:

The proposed roadmap is structured into three progressive phases:

Phase I (2024–2030): Foundation and Integration

This phase focuses on establishing the National Council for Green Digital Transformation (NCGDT) and launching a national Green Digital Mission. Key priorities include digitising systems for renewable energy monitoring, waste management, and agricultural advisory services, along with large-scale digital skill development programme's centred on green competencies.

Phase II (2030–2040): Acceleration and Innovation

This phase emphasizes scaling innovation through blockchain-enabled carbon trading systems and circular economy platforms. It also encourages wider industry adoption of AI-based resource optimization tools through targeted fiscal incentives. In addition, sustainability indicators will be integrated into both national and corporate reporting systems.

Phase III (2040–2047): Consolidation and Global Leadership

In this stage, India aims to emerge as a global exporter of green digital technologies. The focus will be on strengthening South–South cooperation through open-data ecosystems and facilitating green technology transfer. National progress will be aligned with key SDGs (7, 9, 11, 12, and 13) using real-time monitoring systems linked with NITI Aayog platforms.

4.1 Monitoring and Evaluation (M&E):

The M&E framework will adopt a hybrid set of indicators covering environmental performance (such as carbon intensity and energy efficiency), digital inclusion (including broadband access and data literacy), and economic outcomes (green jobs and innovation capacity). This integrated approach ensures continuous, evidence-based policy adjustment and supports the achievement of Objective 4.

4.2 Synthesis:

The four analytical strands collectively point to a reinforcing cycle among technology, policy, and corporate responses. Digital technologies generate real-time insights, policy frameworks create the necessary enabling environment, and corporate strategies convert innovation into measurable sustainability outcomes. This interplay suggests that India's journey toward Viksit Bharat 2047 should be understood as an evolving co development process, where governance systems, technological advancements, and societal priorities continuously shape and influence one another. In this sense, green digital transformation represents not a simple

addition of tools and policies, but a deeper structural shift in national development thinking toward resilience, inclusivity, and long-term sustainability.

5.0 Limitations:

This study is conceptual in nature and does not involve primary empirical data collection. Its primary aim is to contribute to policy discourse and academic understanding through an evidence-informed analytical framework.

Conclusion:

The convergence of green growth and digital transformation reflects a deeper reconfiguration of development thinking rather than a simple policy alignment. India's journey toward Viksit Bharat 2047 requires a shift in how technology is understood moving beyond efficiency gains to recognizing its role in advancing ecological balance, social equity, and accountable governance. The sectoral pathways examined in this study illustrate how emerging technologies such as artificial intelligence, the Internet of Things, blockchain, and data analytics can enable low-carbon transitions across key areas including energy, agriculture, industry, and urban systems. However, technological progress on its own cannot ensure sustainable outcomes unless it is anchored in principles of equity and environmental justice. Realising this transition will require sustained investment in digital literacy, green skill development, and inclusive innovation ecosystems that actively engage and empower local communities. Equally important are strong public-private partnerships, interoperable and transparent data systems, and supportive regulatory frameworks that can enable the large-scale adoption of green digital solutions.

In a world where climate-oriented innovation is becoming a key driver of competitiveness, India has the opportunity to define a distinct model of "Digital Green Growth"—one that is inclusive in design, circular in approach, and adaptable across different socio-economic contexts. Ultimately, the vision of Viksit Bharat 2047 is not confined to economic progress alone; it is equally about harmonising technological advancement with environmental responsibility and human well-being. By institutionalising a Green Digital Mission and embedding sustainability across all levels of policy, industry, and society, India can position itself as a leading example of equitable and resilient green digital transformation in the Global South.

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