3 Digital Transformation for Sustainability: Role of AI in Balancing Economic and Environmental Perspective of SDGs

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Abstract

Digital transformation has emerged as a critical enabler of sustainable development, particularly in balancing economic growth with environmental sustainability within the framework of the Sustainable Development Goals (SDGs). This study examines the role of Artificial Intelligence (AI) in driving this transformation in the Indian context. India's digital economy is projected to reach USD 1 trillion by 2030, contributing nearly 20% to GDP, reflecting the growing significance of AI-led innovation. The study adopts a descriptive and analytical approach based on secondary data collected from government reports, international organizations, and recent industry studies (2020–2025). The findings reveal that AI significantly enhances sectoral performance by improving productivity, efficiency, and resource optimization. In agriculture, AI-driven precision farming increases productivity by 15–20% while reducing water consumption by 20–30%. Similarly, AI-enabled smart energy systems improve efficiency by up to 25%, while applications in manufacturing and logistics reduce operational costs by 10–15%. These advancements contribute directly to multiple SDGs, including SDG 2, 7, 9, and 13. However, the study also highlights emerging environmental challenges associated with AI expansion, such as rising energy consumption in data centres, projected to reach 57 TWh by 2030, along with increasing water usage and e-waste generation. The study concludes that while AI-driven digital transformation offers substantial opportunities for sustainable growth, it also necessitates the adoption of Green AI practices, renewable energy integration, and robust policy frameworks. A balanced and strategic approach is essential to ensure inclusive, environmentally responsible, and long-term development in India.

Keywords: Digital Transformation, Artificial Intelligence, Sustainable Development Goals (SDGs), Green AI, Environmental Sustainability.

Introduction

Digital transformation has become a central force in redefining development trajectories across the globe, particularly in the context of sustainability and the

achievement of the SDGs. In India, this transformation is being driven by rapid advancements in AI, big data, cloud computing, and digital infrastructure. As one of the fastest-growing digital economies, India is leveraging these technologies to simultaneously pursue economic growth and environmental sustainability. However, this dual objective presents both opportunities and complex challenges that require careful balancing. India's digital ecosystem has expanded significantly in recent years, supported by increasing internet penetration, government-led initiatives such as Digital India, and rising investments in AI infrastructure. The country's data centre capacity has grown from approximately 375 MW in 2020 to about 1,500 MW by 2025, reflecting the rapid expansion of AI and cloud-based services. Furthermore, India currently hosts nearly 20% of the world's data, yet accounts for only about 3% of global data centre capacity, indicating substantial future growth potential. This expansion is expected to continue, with total data centre demand projected to rise sharply to nearly 4.5 GW by 2030, driven primarily by AI adoption and digital transformation.

AI plays a transformative role in advancing sustainability by improving efficiency, optimizing resource utilization, and enabling data-driven decision-making across sectors. In agriculture, AI technologies support precision farming, enhancing productivity while reducing water and fertilizer usage. In energy systems, AI-enabled smart grids and predictive analytics help improve energy efficiency and integrate renewable sources. Similarly, AI-driven solutions in urban governance, waste management, and transportation contribute to reducing carbon emissions and promoting sustainable urbanization. These applications align with key SDGs, including SDG 2 (Zero Hunger), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 13 (Climate Action). Despite these benefits, the rapid expansion of AI and digital infrastructure raises critical environmental concerns. Data centres, which form the backbone of AI systems, are becoming increasingly resource-intensive. In India, data centres consumed approximately 13 TWh of electricity in 2024, accounting for about 0.8% of total national electricity demand, and this is projected to increase to nearly 57 TWh (2.6%) by 2030. Additionally, they currently account for around 0.5% of national electricity consumption and utilize nearly 150 billion litres of water annually, with both figures expected to more than double by 2030. The increasing reliance on fossil-fuel-based energy further intensifies carbon emissions, posing challenges to India's climate commitments.

Moreover, the surge in AI-driven digitalization has led to a significant increase in energy demand, with studies indicating up to a 160% rise in data centre energy consumption due to AI and cloud computing technologies. The sector is also expected to grow at a compound annual growth rate (CAGR) of 20-24% between 2025 and 2035, highlighting the scale and speed of this transformation. Alongside

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energy concerns, India is also grappling with rising electronic waste, generating over 1.7 million tonnes annually, further complicating sustainability efforts. Therefore, while AI-driven digital transformation offers immense potential for economic development and SDG achievement, it also necessitates the adoption of sustainable practices such as Green AI, renewable energy integration, and efficient data infrastructure.

In the Indian context, achieving a balance between economic progress and environmental sustainability requires a strategic, policy-driven approach that integrates technological innovation with ecological responsibility. This study aims to examine the role of AI in facilitating this balance and to explore how digital transformation can be aligned with sustainable development priorities in India.

Objectives

- To examine the role of AI in driving digital transformation for sustainable development in India.
- To analyse how AI contributes to balancing economic growth with environmental sustainability under the SDGs.
- To evaluate the impact of AI-based applications on key sectors such as agriculture, energy, and urban development.
- To identify the environmental challenges associated with AI adoption, including energy consumption, carbon emissions, and e-waste generation.
- To suggest strategic measures and policy recommendations for promoting sustainable and responsible use of AI in India.

Methodology

The study is based on a descriptive and analytical research design, utilizing existing data sources. Relevant information has been gathered from government reports (such as NITI Aayog and the Ministry of Electronics and IT), international organizations (UNDP, World Bank), research journals, industry reports, and credible online databases published between 2020 and 2025. The study adopts a qualitative approach to examine the role of AI in digital transformation and its implications for sustainability in the Indian context. Comparative and thematic analysis methods are used to evaluate how AI contributes to economic growth and environmental sustainability in alignment with the SDGs. Recent statistical data, case studies, and sector-specific examples are incorporated to provide a comprehensive understanding of trends and challenges. The methodology also includes a critical analysis of environmental impacts such as energy consumption and e-waste, ensuring a balanced perspective on the opportunities and risks associated with AI-driven digital transformation.

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Expansion of AI Ecosystem and Digital Infrastructure

AI has emerged as a foundational pillar of India's digital transformation, supported by rapid expansion in digital infrastructure, policy initiatives, and data availability. Government programs such as Digital India, National AI Strategy by NITI Aayog, and India AI Mission have significantly accelerated AI adoption. India's digital economy is projected to contribute nearly 20% of GDP (USD 1 trillion) by 2030, indicating the scale at which digital technologies, particularly AI, are transforming economic structures.

The increasing penetration of smartphones (over 750 million users) and internet connectivity (more than 850 million users in 2025) has enabled large-scale data generation, which is critical for AI development. Moreover, India's data centre capacity has grown fourfold from 375 MW in 2020 to around 1,500 MW in 2025, reflecting the rising demand for AI-driven services. This expansion highlights how AI is not only a technological tool but also a catalyst for digital infrastructure development, enhancing India's competitiveness in the global digital economy.

Sectoral Transformation through AI Integration

AI is significantly transforming key sectors of the Indian economy by improving productivity, efficiency, and decision-making. In agriculture, AI-driven precision farming techniques have increased crop yields by 15-20% while reducing input costs and water usage by nearly 25-30%. In the energy sector, AI-enabled smart grids and predictive maintenance systems have enhanced energy efficiency by up to 20-25%, contributing to reduced transmission losses.

Similarly, in healthcare, AI-based diagnostics and telemedicine have improved service accessibility, particularly in rural areas, reducing diagnosis time by nearly 30-40%. The manufacturing and logistics sectors are also leveraging AI to optimize supply chains, reducing operational costs by 10-15% and improving overall efficiency. These sectoral transformations demonstrate that AI is not only facilitating economic growth but also supporting inclusive development by bridging rural-urban gaps.

AI-Driven Economic Impact and Employment Dynamics

AI is significantly transforming India's economic structure by improving productivity, operational efficiency, and innovation across key sectors. It is accelerating digital transformation while influencing employment patterns through automation and skill shifts. AI integration enables better resource management and data-driven decision-making. Consequently, traditional systems are evolving into more efficient and sustainable models. Table 1 presents recent sector-wise indicators of AI-driven digital transformation in India, highlighting its economic and operational impact.

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Table 1: Sector-wise Impact of AI-Driven Digital Transformation in India

Sector	AI Application	Main Impact (%)	Economic/Operational Outcome
Agriculture	Precision Farming	15–20% increase in productivity	25–30% reduction in water use
Energy	Smart Grids	20–25% improvement in efficiency	Reduced transmission losses
Healthcare	AI Diagnostics	30–40% faster diagnosis	Improved rural access
Manufacturing	Automation & Predictive AI	10–15% cost reduction	Increased production efficiency
Logistics	AI Supply Chain Optimization	10–12% fuel savings	Reduced delivery time

Source: NITI Aayog, MeitY Reports (2023–2025), and industry estimates.

As shown in Table 1, AI adoption has resulted in measurable improvements across sectors. Agriculture records a 15–20% increase in productivity along with 25–30% reduction in water usage, indicating strong resource efficiency. The energy sector shows a 20–25% improvement in efficiency, while healthcare demonstrates 30–40% faster diagnosis, enhancing service delivery. Manufacturing benefits from a 10–15% reduction in costs, reflecting improved operational efficiency. In logistics, AI contributes to 10–12% fuel savings, leading to reduced delivery time and lower environmental impact. Overall, these figures highlight the substantial role of AI in driving economic growth and sustainability, although balanced adoption across sectors remains necessary.

AI as a Driver of Green Economic Growth

AI is increasingly functioning as a strategic tool for achieving a balance between economic expansion and environmental sustainability in India. With the country aiming to become a USD 5 trillion economy, AI-driven digital transformation is enabling productivity gains without proportionate increases in resource consumption. AI contributes to decoupling economic growth from environmental degradation, a key principle underlying sustainable development.

For instance, AI-enabled automation and predictive analytics have improved industrial productivity by 10-15%, while simultaneously reducing energy consumption per unit of output. This aligns with SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation, and Infrastructure). Furthermore, AI is facilitating the transition toward a circular economy by optimizing resource utilization, minimizing waste generation, and promoting sustainable consumption patterns. In India, industries adopting AI-based energy management systems have reported 15-20% reductions in carbon emissions, indicating that technological innovation can support both economic and environmental objectives simultaneously.

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Sectoral Contribution of AI to Environmental Sustainability

AI applications across sectors are significantly contributing to environmental sustainability while maintaining economic efficiency. In agriculture, AI-driven climate-smart practices help farmers adapt to changing weather patterns, reducing crop losses by 20-25% and improving resilience. This supports SDG 2 (Zero Hunger) and SDG 13 (Climate Action). In the renewable energy sector, AI is enhancing solar and wind energy forecasting accuracy by 25-30%, leading to better grid integration and reduced reliance on fossil fuels. India's renewable energy capacity has already crossed 180 GW, and AI is playing a critical role in optimizing its utilization. In urban governance, AI-powered smart city solutions have reduced traffic congestion and fuel consumption by approximately 10-12%, contributing to lower urban emissions.

Moreover, AI-based waste management systems in Indian cities have improved waste segregation efficiency by 30-40%, promoting recycling and reducing landfill dependency. These sector-specific interventions highlight how AI is operationalizing multiple SDGs simultaneously, ensuring that economic development does not come at the cost of environmental degradation.

Quantitative Assessment of AI's Dual Impact on Economy and Environment

AI is driving both economic growth and environmental sustainability in India. It enhances productivity, reduces costs, and improves resource efficiency across sectors. Simultaneously, AI supports sustainable practices by lowering emissions, conserving energy, and improving waste management. This dual role aligns with India's sustainable development goals. Table 2 presents sector-wise evidence of AI's impact on economic performance and environmental sustainability.

Table 2: Sector-wise Dual Impact of AI

Sector	Economic Impact (%)	Environmental Impact (%)	Relevant SDGs
Agriculture	15–20% income increase	20–30% water savings	SDG 2, 12, 13
Energy	10–15% cost efficiency	20–25% emission reduction	SDG 7, 13
Manufacturing	10–15% productivity	15–20% energy savings	SDG 9, 12
Urban Transport	8–12% cost reduction	10–12% emission reduction	SDG 11, 13
Waste Management	5–8% operational savings	30–40% improved recycling	SDG 11, 12

Source: NITI Aayog, Ministry of Environment Reports, and industry studies (2023–2025).

As shown in Table 2, AI generates measurable dual benefits across sectors. Agriculture achieves 15–20% income growth and 20–30% water savings, while energy records 10–15% efficiency and 20–25% emission reduction. Manufacturing

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shows 10–15% productivity gains with 15–20% energy savings. Urban transport and waste management reflect moderate economic gains (5–12%) but strong environmental improvements, especially 30–40% better recycling. Overall, AI supports both economic efficiency and environmental sustainability, though balanced adoption is essential for inclusive growth.

AI in Agriculture and Rural Development

AI has significantly transformed India's agricultural sector by addressing productivity constraints and resource inefficiencies. With agriculture contributing nearly 18% to India's GDP and employing over 40% of the workforce, AI-driven interventions are critical for sustainable rural development. Precision agriculture tools powered by AI, such as soil health monitoring, crop prediction models, and automated irrigation systems, have enhanced farm productivity by 15–20% while reducing input costs by approximately 20-25%.

Moreover, AI-enabled weather forecasting systems have improved prediction accuracy by 25-30%, helping farmers mitigate risks associated with climate variability. This is particularly relevant in India, where over 50% of agriculture is rain-fed. AI applications also support supply chain optimization by reducing post-harvest losses, which traditionally account for 6-10% of total agricultural output. Thus, AI is not only improving economic outcomes for farmers but also strengthening food security and climate resilience.

AI in Energy, Industry, and Urban Systems

In the energy and industrial sectors, AI is playing a transformative role in enhancing operational efficiency and reducing environmental impact. India's growing energy demand, projected to increase by 35-40% by 2030, necessitates intelligent systems for efficient resource management. AI-powered smart grids and predictive maintenance technologies have improved energy efficiency by 20-25%, reducing transmission and distribution losses.

In manufacturing, AI-driven automation and process optimization have led to 10–15% increases in productivity and significant cost savings. These improvements are crucial for strengthening India's position as a global manufacturing hub under initiatives like "Make in India." Additionally, AI-based solutions in urban systems, including traffic management and smart infrastructure, have reduced congestion by 10-12% and improved service delivery efficiency. These advancements highlight how AI contributes to both economic growth and sustainable urbanization.

AI in Healthcare and Service Delivery Systems

AI is transforming healthcare and public service delivery in India by improving efficiency, accessibility, and decision-making. It enables faster diagnostics, optimized resource use, and better service reach, especially in rural areas. Overall, AI is

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enhancing socio-economic outcomes and service quality. Table 3 presents sector-wise impacts of AI applications in India in terms of efficiency and service outcomes.

Table 3: Sector-wise Impact of AI Applications on Efficiency and Service Delivery

Sector	AI Application	Efficiency Gain (%)	Socio-Economic Outcome
Agriculture	Precision Farming	15–20% productivity	20–25% lower input costs
Energy	Smart Grid Management	20–25% efficiency	Reduced power losses
Healthcare	AI Diagnostics & Telemedicine	30–40% faster services	Improved rural access
Manufacturing	AI Automation	10–15% productivity	Cost reduction
Urban Services	Smart Traffic Systems	10–12% efficiency	Reduced congestion

Source: NITI Aayog, Ministry Reports, and industry data (2023–2025).

As shown in Table 3, healthcare leads with 30–40% faster services, improving access. Agriculture records 15–20% productivity gains and 20–25% cost reduction. Energy achieves 20–25% efficiency, while manufacturing shows 10–15% productivity improvement. Urban services improve by 10–12%, reducing congestion. Overall, AI enhances efficiency and service delivery, though inclusive adoption remains necessary.

Rising Energy Demand and Carbon Emissions from AI Infrastructure

While AI is driving economic efficiency, its rapid expansion in India has led to a substantial increase in energy consumption. AI systems rely heavily on data centres, which are energy-intensive due to continuous data processing, storage, and cooling requirements. India's data centre capacity has expanded significantly, with electricity consumption reaching approximately 13 TWh in 2024, and projected to rise to nearly 57 TWh by 2030, accounting for about 2.5-3% of national electricity demand.

This growing demand poses a serious challenge in a country where a significant portion of electricity is still generated from fossil fuels. As a result, AI-driven infrastructure contributes indirectly to rising carbon emissions, potentially offsetting sustainability gains achieved in other sectors. Furthermore, the increased use of AI in industries and digital services is expected to raise overall electricity demand by 30-40% in the next decade, intensifying pressure on India's energy resources. Thus, while AI enhances productivity, it simultaneously creates environmental trade-offs that must be carefully managed.

Water Consumption and Resource Intensity of Data Centres

Another critical environmental concern associated with AI adoption is the high level of water consumption required for cooling data centres. In India, data centres currently consume approximately 150-200 billion litres of water annually, a figure projected to increase significantly with the expansion of AI infrastructure. This

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is particularly concerning in a country already facing water stress, with nearly 50% of districts experiencing water scarcity.

AI infrastructure also demands substantial raw materials, including rare earth elements and metals used in hardware production. The extraction and processing of these materials contribute to environmental degradation, including land pollution and biodiversity loss. Moreover, the rapid growth of AI technologies accelerates the lifecycle of electronic devices, leading to increased consumption of finite resources. These factors highlight that AI, while digital in nature, has a substantial physical and environmental footprint that cannot be overlooked in sustainability discussions.

E-Waste Generation and Sustainability Risks

The rapid growth of AI in India is increasing environmental pressures through higher energy use, resource consumption, and waste generation. While AI supports economic development, it also raises sustainability concerns. Expanding digital infrastructure and data centres are contributing to a rising ecological footprint. Therefore, assessing environmental risks is essential for sustainable progress. Table 4 presents main environmental challenges associated with AI adoption in India, with current data and 2030 projections.

Table 4: Environmental Challenges of AI Adoption and Sustainability Risks

Environmental Factor	Current Status (India)	Projected Trend (2030)	Environmental Risk
Energy Consumption	13 TWh (2024)	57 TWh	Increased carbon emissions
Electricity Share	0.8% of total demand	2.5–3%	Pressure on power infrastructure
Water Usage	150–200 billion litres/year	Expected to double	Water scarcity
E-Waste Generation	1.7 million tonnes/year	2.5 million tonnes	Land and soil pollution
Carbon Emissions	Increasing trend	Significant rise expected	Climate change impact

Source: CEEW, Ministry of Environment, and industry reports (2023–2025).

As shown in Table 4, AI expansion is linked to rising environmental impacts. Energy consumption is projected to increase from 13 TWh to 57 TWh, and electricity demand from 0.8% to about 3%, stressing power systems. Water use, currently 150–200 billion litres annually, is expected to double, raising scarcity concerns. E-waste generation may grow from 1.7 to 2.5 million tonnes per year, contributing to pollution. These trends indicate increasing carbon emissions and environmental risks, highlighting the need for energy-efficient systems, renewable energy use, and effective e-waste management.

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Strengthening Policy Frameworks and Institutional Mechanisms

To ensure that AI contributes effectively to sustainable development in India, robust policy frameworks and institutional mechanisms are essential. While initiatives such as the National Strategy for AI and the India AI Mission provide a foundational roadmap, there remains a need for stronger regulatory alignment with environmental sustainability goals. India aims to achieve net-zero carbon emissions by 2070, and AI policies must be integrated with climate action strategies to support this target.

The government has already allocated over ₹10,000 crore under the India AI Mission (2024) to promote AI innovation, infrastructure, and research. However, policy interventions should go beyond economic growth and explicitly incorporate sustainability metrics such as carbon footprint reduction, energy efficiency, and responsible data usage. Additionally, implementing mandatory environmental impact assessments for large-scale AI and data centre projects can help mitigate ecological risks. Strengthening inter-ministerial coordination between technology, environment, and energy sectors will also ensure a more holistic governance approach.

Promoting Green AI and Sustainable Infrastructure Development

A key strategic priority for India is the adoption of "Green AI," which emphasizes energy-efficient algorithms, low-carbon infrastructure, and sustainable computing practices. Currently, data centres in India consume approximately 13 TWh of electricity, with projections reaching 57 TWh by 2030. Transitioning these facilities toward renewable energy sources is critical to reducing carbon emissions.

India has made significant progress in renewable energy, with installed capacity exceeding 180 GW, providing an opportunity to power AI infrastructure sustainably. Encouraging public-private partnerships (PPPs) can accelerate investments in green data centres and energy-efficient technologies. Moreover, improving cooling technologies to reduce water consumption currently estimated at 150-200 billion litres annually is essential for addressing resource constraints. In addition, incentivizing companies to adopt sustainable AI practices through tax benefits and green certifications can drive industry-wide transformation. These measures will not only reduce environmental impact but also enhance India's global competitiveness in sustainable technology innovation.

Capacity Building, Inclusive Growth, and Technological Equity

Capacity building and technological equity are critical for ensuring that AI-driven development in India remains inclusive and sustainable. Strengthening human capital, improving resource efficiency, and expanding digital access can help reduce inequalities while supporting economic growth. A balanced integration of technology and sustainability is essential for long-term development. Table 5 presents main strategic measures for sustainable and inclusive AI adoption in India along with their estimated impacts.

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Table 5: Strategic Measures for Sustainable and Inclusive AI Adoption in India

Strategic Area	Policy Measure	Expected Impact (%)	Outcome
Renewable Energy Use	Green Data Centres	30–40% emission reduction	Lower carbon footprint
Energy Efficiency	AI Optimization Algorithms	20–25% energy savings	Reduced operational costs
Water Conservation	Advanced Cooling Systems	30–35% water savings	Sustainable resource use
E-Waste Management	Recycling & Circular Economy Policies	40–50% waste reduction	Reduced environmental pollution
Skill Development	AI Training & Digital Literacy Programs	25–30% workforce enhancement	Inclusive economic growth

Source: NITI Aayog, MeitY, and sustainability reports (2023–2025)

As shown in Table 5, sustainability-focused measures yield significant benefits. Green data centres can reduce emissions by 30–40%, while AI optimization enables 20–25% energy savings. Water-saving technologies contribute 30–35% conservation, and e-waste policies show the highest impact with 40–50% reduction. Skill development initiatives enhance workforce capacity by 25–30%, supporting inclusive growth. Overall, the data highlights that integrating environmental sustainability with skill development and technological advancement is essential for balanced and inclusive AI-driven transformation in India.

Discussion of Findings

The findings indicate that AI is a key driver of digital transformation in India, significantly enhancing productivity, efficiency, and cost optimization across sectors. Empirical evidence shows sectoral improvements, including 15–20% productivity gains in agriculture, 20–25% efficiency in energy, and 30–40% faster diagnostics in healthcare, reflecting AI's contribution to SDG-oriented development and economic advancement.

The study further reveals that AI supports green economic growth by improving resource efficiency and reducing environmental impact. AI-enabled systems contribute to 10–20% reductions in energy use and emissions, while advancements in smart grids, renewable integration, and waste management strengthen sustainability outcomes aligned with SDGs 7, 9, 12, and 13.

However, the expansion of AI infrastructure presents significant environmental challenges. Data centre energy consumption is projected to rise from 13 TWh to 57 TWh by 2030, with electricity demand increasing from 0.8% to nearly 3%. Additionally, 150–200 billion litres of water usage and rising e-waste from 1.7 to 2.5 million tonnes highlight growing ecological pressures.

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The findings emphasize the importance of policy interventions and sustainable strategies. Measures such as green data centres and circular economy practices can achieve 30–40% emission reduction and 40–50% e-waste reduction, while 25–30% workforce enhancement through skill development supports inclusive growth.

Overall, AI-driven transformation presents a dual impact driving economic growth while posing environmental risks. A balanced approach integrating Green AI, renewable energy, and inclusive capacity building is essential for achieving sustainable and equitable progress toward the SDGs.

Conclusion

The study establishes that AI-driven digital transformation is a powerful catalyst for achieving a balance between economic growth and environmental sustainability in India, in alignment with the SDGs. The findings demonstrate that AI enhances productivity, efficiency, and innovation across sectors while simultaneously supporting resource optimization and emission reduction. However, the increasing energy consumption, water usage, and e-waste associated with AI infrastructure present significant sustainability challenges that cannot be overlooked. Therefore, a strategic and integrated approach is essential, combining technological advancement with environmental responsibility. The adoption of Green AI practices, renewable energy-powered data infrastructure, and robust policy frameworks will be critical in mitigating ecological risks. Additionally, strengthening capacity building and ensuring technological inclusivity will promote equitable growth. Overall, sustainable AI implementation offers India a transformative opportunity to achieve long-term, inclusive, and environmentally responsible development.

References

1. Addimulam, S. (2024). Digitalization and AI for sustainable development: expectations from the Sustainable Action Conference 2024 (SAC 2.0). *Digitalization & Sustainability Review*, *4*(1), 1-15.
2. Alojail, M., & Khan, S. B. (2023). Impact of digital transformation toward sustainable development. *Sustainability*, *15*(20), 14697.
3. Bajpai, N., & Biberman, J. (2021). *Digital transformation and the 2030 sustainable development agenda* (No. 44). ICT India Working Paper.
4. Feroz, A. K., Zo, H., & Chiravuri, A. (2021). Digital transformation and environmental sustainability: A review and research agenda. *Sustainability*, *13*(3), 1530.
5. Garg, N., & Singh, B. (2022). Sustainable development-adopting a balanced approach between development and development induced changes. *Electrochemical Society Transactions*, *107*(1), 15-31.

ISBN: 978-93-49468-69-6

6. Goel, A., Masurkar, S., & Pathade, G. R. (2024). An overview of digital transformation and environmental sustainability: Threats, opportunities, and solutions. *Sustainability*, *16*(24), 11079.
7. Jain, V., & Mitra, A. (2025). Artificial intelligence and machine learning for sustainable development: Enhancing health, equity, and environmental sustainability. In *Machine and Deep Learning Solutions for Achieving the Sustainable Development Goals* (pp. 107-124). IGI Global Scientific Publishing.
8. Kumar, S., Verma, A. K., & Mirza, A. (2024). Digital transformation, artificial intelligence and society. *Springer. https://link. springer. com/book/10*, *1007*, 978-981.
9. Nayal, K., Kumar, S., Raut, R. D., Queiroz, M. M., Priyadarshinee, P., & Narkhede, B. E. (2022). Supply chain firm performance in circular economy and digital era to achieve sustainable development goals. *Business Strategy and the Environment*, *31*(3), 1058-1073.
10. Raihan, A. (2023). The influence of digital transformation on environmental sustainability. *artificial intelligence*, *8*(9).
11. Roy, S. (2025). Integration of green IoT and artificial intelligence for advancing environmental sustainability and SDG indicators. *GeoJournal*, *90*(5), 263.
12. Ryan, M., Antoniou, J., Brooks, L., Jiya, T., Macnish, K., & Stahl, B. (2020). The ethical balance of using smart information systems for promoting the United Nations' sustainable development goals. *Sustainability, 12*(12), 4826.
13. Sachs, J. D., Schmidt-Traub, G., Kroll, C., Lafortune, G., & Fuller, G. (2022). Sustainable Development Report 2022: From Crisis to Sustainable Development. Cambridge University Press.
14. Saha, A., Raut, R., Kumar, M., & Ghoshal, S. (2025). To explore the relationship between sustainability, digital technology, and sustainable development goals. *Business Strategy & Development*, *8*(1), e70076.
15. Saini, N., & Kharb, R. (2025). Empowering sustainable development through digital transformation: insights from digital India. *Journal of Asia Business Studies*, *19*(3), 606-634.
16. Singh, H. L., Khaturia, S., & Chahar, M. (2021). Energy Efficiency. In Introduction to AI Techniques for Renewable Energy System (pp. 185-200). CRC Press.
17. Siriman, N., Ali, M. S., Siddiqui, T. A., Rohin, G., Vejju, B., & Cherupelly, N. (2025). Green finance and AI in India: A synergistic approach to sustainable development and climate resilience. *International Journal of Environmental Sciences*, *11*(1), 207-216.

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