

## Smart Technologies and the Green Economy An AI-Driven Approach to Sustainable Development Goals

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### Abstract

Achieving the Sustainable Development Goals (SDGs) of the UN depends on the shift to a green economy, especially in light of growing environmental issues and resource limitations. By increasing productivity, maximizing resource utilization, and assisting with evidence-based decision-making, artificial intelligence (AI) has become a potent enabler in hastening the green economic transformation. With an emphasis on how AI-driven solutions support sustainable production, energy management, waste reduction, and climate action, this exploratory study explores the connections between AI, the green economy, and the SDGs. The paper analyses important potential, difficulties, and ethical issues related to AI adoption in green economy projects using an exploratory research design based on secondary data, policy documents, and current literature. The results show that while AI can greatly aid in achieving the SDGs, ethical AI frameworks, inclusive policies, and responsible governance are essential to guaranteeing fair and long-lasting results. The report provides policymakers, managers, and development practitioners with insights and adds to the expanding conversation on technology-enabled sustainability.

**Keywords:** Artificial Intelligence; Green Economy; Sustainable Development Goals; Sustainable Development; Digital Sustainability; Environmental Governance

### Introduction

In the twenty-first century, the idea of a "green economy" has become essential to attaining sustainable development. It places a strong emphasis on economic development and growth that enhances social justice and human well-being while drastically lowering ecological hazards and scarcity. The green economy seeks to strike a balance between environmental preservation and economic advancement, in contrast to the conventional growth model, which mostly depends on the exploitation of natural resources.

The United Nations Sustainable Development Goals (SDGs), which were approved in 2015, offer a comprehensive framework for nations to follow in order to achieve equitable and sustainable growth. The tenets of a green economy are strongly associated with many of these goals, including SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land).

In addition to promoting environmental sustainability, a green economy stimulates innovation, generates green jobs, and builds long-term economic resilience. It promotes

spending on green infrastructure, sustainable agriculture, renewable energy, and effective resource management—all of which have a direct impact on reaching the SDGs.

Examining how green economic practices can hasten the achievement of global sustainability goals, this exploratory study aims to investigate the relationship between the green economy and the Sustainable Development Goals (SDGs). This study intends to provide light on how countries can successfully incorporate green economic strategies into their sustainable development agendas by examining existing trends, policies, and obstacles.

### **Objectives Of the Study**

1. To investigate the idea and tenets of the green economy and how they relate to sustainable growth.
2. To determine the main obstacles and possibilities in putting green economy policies into practice for long-term, sustainable growth.
3. To evaluate how the business sector, civic society, and government policies contribute to the development of a sustainable and green economy.

### **Research Questions**

1. In what ways does the green economy aid in the accomplishment of the SDGs?
2. How can artificial intelligence improve the practices of the green economy?
3. What are the main obstacles and dangers associated with combining AI with green economy tactics?
4. How can legislators guarantee that AI is used responsibly and inclusively for sustainability?

### **Scope Of the Study**

- Focuses on AI applications in energy, agriculture, manufacturing, urban planning, and waste management.
- Emphasizes sustainability, ethics, and governance rather than technical AI design.

### **Review Of Literature**

According to the OECD (2020), artificial intelligence (AI) and digital transformation can promote green growth by increasing productivity while reducing environmental harm. The study stressed that smart technologies must be supported by inclusive digital policies.

AI's function in smart manufacturing, logistics, and environmental management was examined by Dwivedi et al. (2021) as a driver of sustainable development. The necessity of responsible AI governance was underlined by the writers.

In their study on AI governance and sustainability, Floridi et al. (2022) emphasized the need for moral AI frameworks to guarantee that intelligent technologies have a positive impact on green economic results.

The significance of inclusive and ethical AI for sustainable development was underlined by UNESCO in 2022, which also cautioned that unrestrained AI deployment could exacerbate social and economic inequality, which would impact SDG 10.

AI-powered smart city projects and their role in sustainable urban development were examined by UN-Habitat in 2023. The study connected SDG 11 to energy-efficient infrastructure, smart mobility, and pollution monitoring.

In their study of AI-enabled smart technologies for environmental sustainability, Kharrazi et al. (2023) discovered that AI greatly enhances decision-making in urban sustainability planning and climate adaptation.

With a focus on cross-sector cooperation and policy integration, the World Economic Forum (2024) emphasized AI as a transformative driver for climate action and green prosperity.

In their integrative analysis of AI, the green economy, and the SDGs, Zhang et al. (2024) came to the conclusion that, as long as inclusive policies and ethical governance are maintained, AI-driven smart technologies are essential for attaining long-term sustainability.

### **Research Gaps**

- Limited integrative studies linking AI, green economy, and SDGs in a single framework.
- Lack of empirical evidence from developing economies.
- Insufficient focus on ethical risks and governance mechanisms.
- Need for sector-specific analysis of AI-driven green initiatives.

### **Research Methodology**

• **Research method:** In order to comprehend the new connections between artificial intelligence, the green economy, and the Sustainable Development Goals, the study uses an exploratory research method. The dynamic nature of AI applications in sustainability makes this architecture appropriate.

• The study's nature is qualitative, descriptive, and dependent on secondary data.

• Data sources include academic journals (2020–2024), reports from the World Economic Forum, UNEP, UNDP, OECD, and policy documents; case studies on AI-driven green initiatives that have been published; and more.

• **Sampling Technique:** To choose pertinent books and studies that are specifically about AI, the green economy, and the SDGs, a purposive sampling technique is employed.

### **Tools Of Analysis**

- Content analysis
- Thematic analysis
- Comparative analysis of AI applications across SDGs

### **Limitations Of The Study**

- Limited availability of empirical evidence in developing economies
- Rapid technological changes may affect long-term relevance
- Dependence on secondary data

### **Significance Of The Study**

- Closes the gap between development studies, sustainability, and technology.
- Offers guidance to planners and legislators creating AI-enabled green initiatives.
- Adds to the body of knowledge on AI for sustainable development in academia.

- Assists companies in coordinating digital transformation with the Sustainable Development Goals.

### **Managerial & Policy Implications**

- AI can be used by managers to monitor emissions, improve energy efficiency, and create sustainable supply chains.
- Lawmakers ought to create moral AI rules that complement environmental objectives.
- For inclusive growth, investments in green digital skills are essential.
- AI-driven green technologies can be scaled through public-private collaboration.

### **Conclusion**

According to the study, AI plays a vital role in enabling the green economy by boosting renewable energy, improving resource efficiency, and facilitating sustainable production and consumption. The accomplishment of important SDGs, especially those pertaining to energy, infrastructure, cities, and climate action, is greatly aided by the integration of AI with green economy methods. However, strong governance frameworks, moral AI practices, and inclusive digital policies are necessary for the successful implementation of AI-driven sustainability. AI has the potential to worsen inequality and environmental problems if it is not implemented responsibly. Thus, attaining long-term sustainable development requires coordinating AI innovation with sustainability ideals.

### **Future Research Directions**

- Empirical research on green economic projects in poor nations made possible by AI.
- A sector-specific examination of the use of AI in manufacturing, agriculture, and renewable energy
- Analysis of sustainable development frameworks for ethical AI.
- Evaluation of AI's effects on social sustainability and employment in green economies.
- Analyses that compare country AI strategies in line with the SDGs.

### **References**

- [1] Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., Duan, Y., Dwivedi, R., Edwards, J. S., Eirug, A., Galanos, V., Ilavarasan, P. V., Janssen, M., Jones, P., Kar, A. K., Kizgin, H., Kronemann, B., Lal, B., Lucini, B., ... Williams, M. D. (2021). Artificial intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice, and policy. *International Journal of Information Management*, 57, 102–138.
- [2] Floridi, L., Cowsls, J., Beltrametti, M., Chatila, R., Chazerand, P., Dignum, V., Luetge, C., Madelin, R., Pagallo, U., Rossi, F., Schafer, B., Valcke, P., & Vayena, E. (2022). AI4People—An ethical framework for a good AI society. *AI & Society*, 33(4), 689–707.
- [3] Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2021). The circular economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768.
- [4] International Energy Agency. (2020). Digitalisation and energy. IEA.
- [5] Kharrazi, A., Qin, H., & Zhang, Y. (2023). Urban big data and artificial intelligence for sustainable city development. *Sustainability*, 15(3), 2154.

- [6] Organisation for Economic Co-operation and Development. (2020). Digital transformation and the green economy. OECD Publishing.
- [7] UNESCO. (2022). Ethical artificial intelligence for sustainable development. UNESCO Publishing.
- [8] UN-Habitat. (2023). Smart cities for sustainable development. United Nations Human Settlements Programme.
- [9] Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Felländer, A., Langhans, S. D., Tegmark, M., & Nerini, F. F. (2019). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature Communications*, 11(233).
- [10] World Economic Forum. (2019). Harnessing artificial intelligence for the earth. WEF.
- [11] World Economic Forum. (2024). Artificial intelligence for climate and green growth. WEF.
- [12] Zhang, Y., Li, X., & Chen, S. (2024). Artificial intelligence, green economy, and sustainable development goals: An integrative review. *Technological Forecasting and Social Change*, 197, 122–135.