Chapter 10
Holistic Study of the Role of AI in Sustainable Development:
Study of the Jurisdictions of the United States of America, the European Union, and India

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ABSTRACT

This chapter explores the evolving role of Artificial Intelligence (AI) in driving sustainable development. It begins by defining AI as per the 2024 EU AI Act and assessing current global advancements. The discussion focuses on AI's contributions to the Sustainable Development Goals (SDGs), with examples in healthcare, education, climate action, and urban planning. It also raises critical concerns, including algorithmic bias, privacy risks, environmental impact, and exclusion of marginalized communities. Key regulatory frameworks from the EU, USA, China, and India are examined to highlight governance gaps and opportunities. The chapter asks whether AI can be a reliable force for equity and sustainability and proposes solutions like

DOI: 10.4018/979-8-3373-2372-5.ch010

ethical-by-design systems, global cooperation, and participatory policymaking. It concludes that AI, if responsibly governed, can significantly accelerate sustainable outcomes while upholding human dignity and environmental balance.

INTRODUCTION

Artificial Intelligence (AI) is increasingly recognized as a transformative general-purpose technology reshaping economies, societies, and the environment (Vinuesa et al., 2020). Its applications range from automating industrial processes to augmenting human decision-making in complex tasks, with significant implications for sustainable development. Sustainable development, as encapsulated by the United Nations' 2030 Agenda, comprises 17 Sustainable Development Goals (SDGs) aimed at balancing economic prosperity, social inclusion, and environmental stewardship (Kirikkaleli et al., 2025). Harnessing AI for these goals presents a promising pathway to "turbocharge" progress on global challenges like poverty, health, and climate change (OHCHR, 2024). Indeed, senior UN officials have noted that AI "can accelerate progress towards the SDGs" and even *"enhance decision-making and drive innovation"* if applied safely (Alexandra Bustos, 2024).

At the same time, the rapid proliferation of AI technologies has raised concerns about ethical, social, and environmental risks. AI's potential cuts both ways: it offers unprecedented capabilities to analyze data and optimize systems for sustainability, yet it can also entrench biases or create new inequalities if poorly governed (Vinuesa et al., 2020). For instance, advanced machine learning models can help predict and manage resource use, but their opaque decision processes and massive data requirements may undermine transparency, privacy, and energy efficiency. As a result, the role of AI in sustainable development has become a focal point for policymakers, researchers, and practitioners striving to maximize AI's benefits while mitigating its harms (Wang et al., 2024). This chapter provides a comprehensive examination of that role, beginning with definitions and the current state of AI, then exploring how AI intersects with sustainable development imperatives. We will highlight AI's contributions to various SDGs (with real-world case studies), consider the opportunities it offers, discuss key challenges and risks, survey policy and regulatory responses in different regions, and outline approaches to ensure the ethical and responsible development of AI (Kirikkaleli et al., 2015). Throughout, we have grounded the discussion in scholarly and institutional analyses to maintain a rigorous, evidence-based perspective.