Chapter 9
Sustainable Digital Evolution:
Addressing Challenges and Embracing Opportunities

K. S. Girisaran
https://orcid.org/0009-0007-2704-6171
Lovely Professional University, India

Pooja Khanna
https://orcid.org/0000-0001-7310-3332
Lovely Professional University, India

ABSTRACT

The fast progress of digital technologies has revolutionized our lives and also come with liabilities such as the destruction of the environment, inequality, and ethical issues. Sustainable Digital Evolution is the solution to these problems as it focuses on the environmental, social, and economic effects of digital technologies. The method addresses the relevant issues of e-waste, energy usage, privacy, and digital divide inequalities, and reaps maximum advantages by enhancing resource use efficiency, social connectivity, and innovation. Sustainable Digital Evolution should be attained through cooperation between governments (with sustainability policies), businesses (with sustainable practices), and civil society (with advocacy). The multi-stakeholder approach will make digital technologies a part of the sustainable and balanced future.

DOI: 10.4018/979-8-3373-6380-6.ch009

1. INTRODUCTION

The digital revolution has fundamentally changed the world's economic landscape, bringing about unprecedented connectivity, innovation, and technical development that has entirely transformed the way societies work, businesses are conducted, and people communicate (Rosario & Dias, 2022). The integration of artificial intelligence, big-data analytics, the Internet of Things (IoT), and cloud-computing technologies, which has led to the emergence of this transformation, has generated significant economic value and simultaneously posed challenging sustainability challenges that must be addressed immediately (Feroz et al., 2021). With growing digitisation, the idea of Sustainable Digital Evolution has risen to prominence as a critical paradigm to balance technological advances with environmental responsibility, social justice, and sustainable economic sustainability.

Sustainable Digital Evolution is a paradigm shift that goes beyond the traditional paradigms of digital transformation by explicitly integrating the concept of sustainability into the design, implementation, and governance of digital technologies (Pasqualino et al., 2021). This method recognises that despite the enormous potential of digital technologies to solve global issues (climate change, resource scarcity, and social inequality), they also introduce significant environmental and social consequences that need to be carefully handled (Zhou et al., 2022). The topicality of the topic is supported by the latest empirical data showing that the carbon footprint of the digital sector is growing at an extremely fast pace; data centres alone contribute to the total electricity demand of the world by approximately 1 per cent, which is expected to grow to 3–5 per cent by 2030 (Ma et al., **2022).**

1.1 The Dual Nature of Digital Impact

Digital technologies are an inherent contradiction in sustainability campaigns. On the one hand, they offer unprecedented possibilities for monitoring the environment, optimising resources, and developing sustainably, as demonstrated by applications such as smart grids, precision agriculture, and circular economy platforms (Melnyk et al., 2019). Recent empirical research illustrates that digital solutions can help reduce global greenhouse gas emissions by up to 15 percent with increased efficiency in a wide variety of areas (Savchenko et al., 2020). Additionally, digital ecosystems enable the transition to renewable energy systems through better grid management, improved control over energy storage, and demand responsiveness, which enhances the adoption of solar, wind, and other clean energy technologies (Jung and nymed, 2021).

However, the increased pace of development of digital gadgets and infrastructure has spawned immense environmental and social issues. The production of electronic