Chapter 3
Smart Logistics Integrating AI, IoT, Blockchain, and Robotics for a Sustainable Future

Kirubhakaran Marisamy
https://orcid.org/0009-0003-2832-6379
Nehru Institute of Engineering and Technology, Coimbatore, India

Aarthi Selvakumar
https://orcid.org/0009-0006-9064-2091
Marwadi University, Rajkot, India

Balakrishnan Rajasekar
https://orcid.org/0009-0008-0932-7532
M.S. Ramaiah University of Applied Sciences, Bengaluru, India

Ravikumar Natarajan
https://orcid.org/0009-0009-3705-1681
Marwadi University, Rajkot, India

Anorgul Atajanova
https://orcid.org/0009-0000-5468-8187
Urgench State Pedagogical Institute, Urgench, Uzbekistan

Samariddin Makhmudov
https://orcid.org/0009-0008-2046-8889
Termez University of Economics and Service, Termez, Uzbekistan

ABSTRACT

The rapid integration of intelligent technologies is transforming global logistics, driving a shift from reactive processes to agile, information-driven systems. Intelligent Technologies for the Future of Logistics explores the impact of AI, IoT, Robotics, and Blockchain on supply chains, highlighting how these tools improve visibility, efficiency, and sustainability. The chapter evaluates each technology's core functions and their role in addressing logistics challenges like waste, opacity, and environmental harm. It also showcases real-world applications in transport logistics and emphasizes the synergy between technologies such as AI and blockchain. Despite notable benefits, barriers like high investment and workforce adaptation

DOI: 10.4018/979-8-3373-2434-0.ch003

are discussed. Drawing insights from logistics, IT, and environmental science, the chapter offers a multidisciplinary roadmap for creating resilient, green, and intelligent supply chains.

INTRODUCTION

The dynamic development of smart technologies has completely changed the world logistics. The reactive logistics processes based on traditional solutions are being swapped with dynamic and data-driven networks enabling flexible decision making and efficient operations. This shift is changing how goods are moved, used and managed through the global supply chains. Major accelerators of this revolution are Artificial Intelligence (AI), the Internet of Things (IoT), Robotics, and Blockchain. Their adoption in the logistics processes increases visibility, resource use, and general performance. These smart systems allow organizations to predict disruptions, computerize mundane jobs, and bring more visibility through the supply chain. The chapter is a critical analysis of how intelligent technologies are changing logistics and supply chain management (Anozie et al., 2024). It addresses theoretical backgrounds, examines the features of enabling technologies and discusses their synergistic effect on present-day logistics issues. Moreover, the chapter points out practical implementations and environmental consequences of digitalization in logistics. The goal is to offer not only scholarly along with practical knowledge on the development of logistics systems that are agile, resilient but also environmentally sustainable.

Overview of the Digital Transformation in Logistics

The increasing demand of speed, transparency and operational efficiency in the complicated global supply chains is executing the digital transformation of logistics. Digital technologies in the operations of logistics providers are becoming more integrated to keep them competitive and aligned to the expectations of the market, as manual processes and legacy systems are phased out. The key to this transition is the technologies of IoT, AI, big data analytics, blockchain, and automation (Ferreira & Reis, 2023). These tools allow monitoring the entire supply chain, predictive maintenance, automatic decision making and advanced communication. Logistics solutions that are data driven provide better performance and visibility than the old and paper-based systems. This transition does not only enhance operative performance but also contributes to sustainability, reducing waste and emissions, as well as resource usage. Digital technologies thus play a central role in the process of shifting the logistics to more intelligent, and eco-friendly patterns.

Broad Perspective of Smart Home Technology in 2024

Joseph M. Schulzand Jack S. Scilla (2024). *International Journal of Smart Technologies (pp. 1-27).*

www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186

Broad Perspective of Smart Home Technology in 2024

Joseph M. Schulzand Jack S. Scilla (2024). *International Journal of Smart Technologies (pp. 1-27).*

www.irma-international.org/article/broad-perspective-of-smart-home-technology-in-2024/350186