Chapter 2
AI and IoT-Powered Smart Logistics:
Transforming Supply Chains for Efficiency and Sustainability

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ABSTRACT

This chapter explores the transformative role of Artificial Intelligence (AI) and the Internet of Things (IoT) in revolutionizing logistics and supply chain management. It examines how the integration of these technologies enhances operational efficiency, end-to-end visibility, and sustainability. Key applications such as AI-powered demand forecasting, route optimization, and IoT-driven real-time monitoring are highlighted, demonstrating their capacity to reduce costs, improve decision-making, and minimize environmental impact. Furthermore, the chapter addresses the challenges associated with AI and IoT adoption, including data privacy, cybersecurity, and integration with legacy systems. Through industry case studies, the chapter illustrates the tangible benefits and real-world impact of smart logistics. Finally, it outlines future research directions and prospects for further advancements in these transformative technologies.

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INTRODUCTION TO SMART LOGISTICS

Today's logistics is so much more than the traditional methods of goods transportation and storage. One may imagine now that Smart Logistics is something that is happening today because logistics is entering into a change from a paradigm that's truly different, part that is engendered by the rapid expansion of AI and IoT. Smart logistics is the use of digital technologies to facilitate exchange of real time data, intelligence automation, as well as prediction across supply chain networks. An operational upgrade leveraging AI and IoT technologies within logistics systems is not an operational upgrade but an innovation that engages strategic integration of AI and IoT technologies into logistics systems and ultimately leads to redefining efficiency, responsiveness and sustainability in supply chains. Smart logistics is important because it can give end to end visibility, optimizes the decision-making processes and agility in very complex supply chain ecosystems. Bolstering backwards nostalgic outraged nostalgia about things: living through 2020 forced us to be new. Instead, it is critical that companies undergo digital transformation, and smart logistics becomes the marker of competitive advantage. Through which intelligence and connectivity are embedded in logistics operations, firms anticipate the challenges, proactively respond to them and align operational changes to focus on wider environmental and social governance (ESG) goals. Scholastic debate on smart logistics focuses on the remark that smart logistics is not just a technological evolution but a strategic reorientation of the management of supply chain (Ding et al., 2021). IoT device deployment like smart sensors, RFID tags, GPS trackers are used for continuous monitoring of goods, assets and environmental conditions across the logistics network. At the same time, AI based analytics churns through the onslaught of data coming from these devices to deliver it in a form that is actionable for dynamic route optimization, predictive maintenance, real-time inventory management (Kang et al., 2024; Selvakumar et al., 2025). They also extend logistics capabilities towards integration of transportation services and are enhancing operational efficiency through reduced costs, waste, and carbon emissions that are in line with overall environmental, social, and economic sustainability goals of global supply chains.

First, the COVID 19 pandemic has further accelerated the need for smart logistics to reveal weaknesses within traditional logistics systems and emphasize the requirement for resilience and live balancing. The 2022 Global Supply Chain Survey shows that companies who already had invested in digital logistics infrastructures were able to be more agile in responding to supply chain disruptions (Modgil et al., 2022). According to Modgil et al. (2022), those that were using AI and IoT had a 20 percent faster recovery rate versus the conventional systems users. These empirical findings allow for backup of a paper at hand that reaffirms the important role played

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