


Chapter 5

Smart Logistics for a Sustainable Supply Chain Future

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ABSTRACT

The fast growth of global supply chains has increased demand for ecologically sustainable, efficient, and intelligent logistics solutions. Because supply chains are constantly changing at a rapid pace, people now require logistics systems that are both sustainable and effective. This chapter examines how green logistics techniques, meant to cut down the environment's impact, can be combined with smart technology. This covers smart logistics, methods for industry sustainability, and how new technology helps achieve both types of goals. Besides, the chapter studies the changes ahead for the logistics industry, how performance is measured, and the difficulties of executing new changes. A growing number of studies give us useful directions on how to create smarter and greener supply chain systems everywhere.

INTRODUCTION TO THE INTEGRATION OF SMART TECHNOLOGIES FOR SUSTAINABILITY

The concepts articulated in the chapter title are effectively exemplified by the incorporation of sophisticated smart technologies, including Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain inside the logistics sector. These technologies are boosting operational capabilities while actively contributing to the overarching objective of developing sustainable logistics systems. This section

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elucidates how digital innovations are transforming the logistics sector to address the increasing demands for environmental accountability and operational efficiency.

In recent years, the logistics sector has seen a significant upheaval. This transition is primarily motivated by the pressing necessity to enhance sustainability, augment responsiveness, and elevate efficiency throughout global supply networks. As enterprises and governmental entities increasingly prioritize sustainable and intelligent solutions, logistics has emerged as a crucial area for innovation and transformation.

There are two main themes that have become clear in this changing environment. The first one is intelligent or smart logistics, which uses computerized and data-driven methods to make logistics work more efficiently. The second type is environmental or “green” logistics, which tries to make sure that moving, storing, and distributing things has as little of an effect on the environment as possible. Not only do these two themes go together, they also go well with each other.

They paved the way for the supply chain's expansion in a new path where environmental sustainability and technology advancement coexist. This chapter lays the groundwork for a more thorough examination of how smart mobility technologies could transform and improve supply networks in the future when applied in accordance with environmental objectives. Logistics has become more intelligent through the use of IoT, AI, blockchain, robotics, and data analytics. This has improved operations management, increased visibility, and allowed for better decision-making (Ding et al., 2021; Song et al., 2020). The application of effective transportation, carbon emission management, and waste reduction reduces the adverse environmental effects of green logistics (Srivastava, 2007; Murphy & Poist, 2000). Because of globalisation and the growing complexity of supply chains, businesses must now incorporate eco-friendly practices with contemporary technologies. The core green goals of resource management and emission reduction depend on intelligent logistics solutions, which include real-time monitoring, future maintenance planning, and efficient use of available resources (Chung, 2021; Chen et al., 2024).

As consumers' awareness of climate change, legislation, and purchasing decisions increases, businesses are investing in smart and environmentally friendly logistics solutions. Min and Kim (2012) and Sarkis (2012). Integrating intelligent and ecologically sensitive logistics on a global scale has never been more crucial than it is right now. More and more groups are trying to address the existing logistical issues by making them more environmentally friendly and providing support to companies that care about the environment.

It is now evident that current logistics systems are shifting towards digital solutions in an attempt to reduce negative environmental consequences (Kamewor et al., 2024; Verbivska et al., 2023). According to Gruchmann (2018) and Shee et al. (2021), companies all over the world are utilising technology in the modern world to manage operations, improve service quality, and comply with regulatory obligations.

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