

Chapter 5

Perspectives, Applications, Challenges, and Future Trends of IoT–Based Logistics

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ABSTRACT

The emergence of the internet of things (IoT) has revolutionized many sectors of the economy, including logistics and supply chain management. By seamlessly integrating IoT into logistics operations, real-time tracking and monitoring of shipments becomes a reality, and optimizing routes and equipment performance becomes a breeze. Accordingly, supply chain operations have become streamlined like never before. This study delves into the various perspectives, applications, and challenges of deploying IoT in the logistics industry, offering a comprehensive overview for stakeholders, researchers, and students alike. With the potential for improved efficiency, effectiveness, and sustainability, the benefits of IoT in logistics are undeniable. The authors highlight future directions of this exciting field and learn how IoT shapes how we do business.

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INTRODUCTION

Logistics refers to the orderly, efficient movement and storage of various goods and services, as well as any other associated information, from their place of origin to their site of utilization (Tran-Dang et al., 2022). This domain is progressively considered a core industry sector capable of boosting the economy's overall growth and playing an essential role in the efficient functioning of supply chains and global trade. Additionally, it is continuously becoming a vital factor for the success of many organizations in different sectors of the economy, including manufacturing, agriculture, and transportation, among others.

Getting goods and services to the right place at the right time and in a suitable condition to meet the needs of clients and businesses is the main objective of logistics (Alakaş & Eren, 2022). To realize that goal, various activities such as transportation, warehousing, distribution, information systems, and communication networks must be integrated efficiently and effectively. However, the complexity of supply chains and high labor costs have rendered the logistics industry a capital-intensive sector, negatively affecting the return on investments in the deployed logistics infrastructure (Song et al., 2021). Furthermore, the efficiency and effectiveness of local, regional, and global trade and supply chains are hampered, which minimizes the competitiveness of the firms and countries involved. Hence, there is a need for more ingenious methods to enhance the efficiency and effectiveness of logistical operations and minimize the costs involved.

The logistics sector has undergone tremendous transformation due to recent advancements in modern information and communication technologies (ICTs), which have made it possible to control the flow of goods, services, and information efficiently and effectively along the supply chain. ICT tools and systems are being deployed to plan and coordinate transportation routes, track and monitor the movement of goods, and manage inventory levels. Additionally, these technologies and tools make it easier for suppliers, manufacturers, distributors, retailers, warehouses, and customers to collaborate and communicate. (Lagorio et al., 2022).

Enabled by tremendous innovations in ICTs and key support techniques, including Big Data Analytics (BDA), IoT, and artificial intelligence (AI), smart logistics has added new dimensions that have optimized and transformed the traditional logistics industry (Ding et al., 2021). Smart logistics aims to enhance efficiency, minimize costs, and improve customer satisfaction using real-time data and automated decision-making. Additionally, smart logistics is supported by IoT technologies such as wireless sensor networks (WSN), radio frequency identification (RFID), and Global Positioning System (GPS), whose convergence allows for a seamless, ubiquitous, and pervasive communications network between them (Shee, 2023).

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