Chapter 9
Smart Warehousing: Automation and Real-Time Monitoring

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ABSTRACT

Warehousing is an integral component of supply chain management, serving as a link between procurement and distribution. After witnessing a downfall during the COVID-19 pandemic, the 3PL market has experienced a rebound due to the adoption of digital solutions and technology. Gone are the days when organisations were using traditional warehouse management systems to manage and track the activities of a warehouse. Modern warehouse managing systems are software-based and are designed to be cost-effective, improve order fulfillment and delivery times, optimise inventory levels, improve lead times, reduce logistics costs and increase competitive advantage. This chapter focuses on introducing and analyzing the concept of smart warehousing. This chapter aims to enable the students to understand how the supply chain industry is embracing digital transformation by using Artificial Intelligence, IoT and analytics, advanced robotics and automation, RFID, automated guided vehicles (AGV) and Blockchain Technology.

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LEARNING OBJECTIVES

After reading this chapter the learners will be able to:

1) Understand the importance of automation and integration of AI in supply chain management.
2) Describe the processes and technologies used in smart warehousing.
3) Identify the future trends and challenges related to AI-driven warehouse automation systems.
4) Analyse the importance of regulatory provisions regarding the use of AI in warehousing.

OPENING STORY – AMAZON 'THE AUTOMATION JOURNEY'

Amazon, an American MNC is the world's largest online retailer. Amazon has a variety of distribution facilities including- CDC (cross-dock centers), fulfillment centers, sortation centers, receive centers, delivery stations, and hubs. Amazon expanded its distribution network from two fulfillment centers in 1997 to over 185 fulfillment centers globally. These fulfillment centers are large warehouses also known as "Amazon FBA -Fulfillment by Amazon" where Amazon receives, stores, packs, and ships customer orders and handles customer service. These fulfillment centers are equipped with advanced technology and software systems for quick and efficient order processing. Amazon has been relying heavily on automation and robotics for managing its warehousing and logistics system. As a commitment to invest in and encourage innovation, Amazon has set up a $ 1 billion corporate venture capital fund known as 'Amazon Industrial Innovation Fund' which provides direct investment to emerging technology companies.

Amazon's next-generation fulfillment center in Shreveport, Louisiana is highly powered by AI and robotics where the employees work hand in hand with a fleet of robotic systems. Following are a few landmarks of Amazon's automation journey:

- 2010 -AWS collaborated with NVIDIA to improve product search capability.
- 2012 - Amazon acquired Kiva Systems now known as Amazon Robotics.
- 2014 - Amazon launched Alexa which used natural language processing and machine learning algorithms to fulfill customer's requests.
- 2019 -Amazon purchased Canvas Technology thus entering into building robotic vehicles with guided vision.
- 2019 - Amazon collaborated with other vendors like CMC, Smart Pac, etc.
- 2024 -Amazon partnered with AI-RAN Alliance for wireless communications.