Chapter 11
The Role of Artificial Intelligence in Transforming Supply Chain Management

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ABSTRACT

Artificial Intelligence (AI) is transforming Supply Chain Management (SCM) through intelligent, data-driven decision-making and process optimization. This chapter explores AI's impact on key SCM areas such as demand forecasting, inventory control, logistics, and risk management. Technologies like Machine Learning, NLP, and Computer Vision enhance efficiency and responsiveness, while integration with IoT and Big Data enables real-time insights. Applications include predictive ana-

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lytics for inventory, route optimization in logistics, and fraud detection. Innovations like autonomous vehicles and AI-powered chatbots are reshaping operations and customer service. Despite notable benefits cost reduction, improved accuracy, and customer satisfaction challenges remain, including data privacy, integration issues, and skill gaps. The chapter also highlights emerging trends such as generative AI and reinforcement learning in SCM, emphasizing their potential to drive future advancements and operational excellence.

1. INTRODUCTION

1.1 Overview of Supply Chain Management (SCM)

SCM which means the systematic administration of a range of organizations involved in the ultimate delivery of a product or service to customers. It involves the acquiring, creating, moving, and delivering products and services as well as information. The objective of SCM is to enhance efficiency & effectiveness of the supply chain, reduce cost and improve processes, and deliver products & services to the consumers at the right time and at a right price. SCM is a challenging process of coordinating such a network of suppliers, manufacturers, warehouses, retailers, as well as materials, information, and monetary flows. Manual SCM practices, use of spreadsheets and legacy systems are still prevalent in many organizations and they are time-consuming, error prone and often cause delays. However, with the advancement in the global trade and market requirements the need to have intelligent fast and efficient SCM has become an essential factor. New challenges such as e-commerce, globalization, and the evolving customer wants and needs, have put pressure on organizations to cut operating expenses, deliver faster, and better serve their clients. These changes have made SCM more complex and this increasing complexity needs new ways of enhancing the strategic and operational aspects of SCM.

1.2 Role and Significance of AI in SCM

AI is fast becoming an influential technology in enabling the transformation of SCM by providing real-time analytical tools to improve operations. AI uses algorithms, machine learning, NLP and big data to sort through vast amounts of information, recognize patterns that are beyond the capability of the human mind to discern, and make conclusions that decision makers could not have made. AI can help organizations to enhance the efficiency of supply chain processes while at the same time decreasing their expenditures, as well as to build agile supply chains that are less sensitive to disruptions. Predictive analytics is one of the main ways through

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