Chapter 9
AI-Powered Workforce Planning and Optimization:
AI-Driven Workforce Optimization in Logistics and Supply Chain Management

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ABSTRACT

This article explores how Artificial Intelligence (AI) transforms workforce optimization in logistics and supply chain operations. By integrating technologies like machine learning, predictive analytics, robotic process automation, natural language processing, computer vision, and digital twins, organizations can shift from

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manual, reactive workforce planning to proactive, data-driven strategies. AI enables dynamic scheduling, real-time task reassignment, predictive labor forecasting, and continuous performance monitoring, improving efficiency and reducing costs. The article also addresses ethical concerns such as transparency, bias, and privacy, and outlines key implementation challenges including data quality, employee resistance, and digital skills gaps. Ultimately, it argues that AI is not just a tool for automation but a catalyst for strategic transformation, helping organizations create agile, resilient, and human-centered workforce ecosystems suited for today's complex supply chain landscape.

1. INTRODUCTION TO AI IN WORKFORCE OPTIMIZATION

Artificial Intelligence (AI) refers to the capability of machines and computer systems to perform tasks that typically require human intelligence (Zhou, 2023). These tasks include learning from data, recognizing patterns, making decisions, and solving complex problems. In the context of logistics and supply chain management (SCM), AI is revolutionizing the way organizations manage, operate, and optimize their end-to-end processes.

AI in logistics and SCM encompasses a broad spectrum of technologies such as machine learning, natural language processing (NLP), computer vision, robotics, and intelligent automation (Zeng & Yi, 2023). These technologies enable supply chain networks to become more agile, predictive, and resilient, especially in today's volatile and highly competitive market environment. AI applications in logistics and supply chain management can be categorized into several key areas: