Smart Logistics: The AI Revolution in Supply Chain Optimization and its Challenges

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Abstract: *Artificial Intelligence (AI) and data analytics are entering into the logistics industry, to transform supply chain operations having the potential for more efficiency of the supply chain at a minimum cost with transparency. Leveraging traditional logistics systems which are often clunky and underproductive via AI-enabled route optimization as well as predictive maintenance/inventory management are currently used by these to improve the processes. A mixed-methods study including qualitative case studies and quantitative data from logistics firms using AI solutions This research presents the following findings: 80% of logistics companies that are using AI route optimization have reduced delivery times by 25%, inventory stock outs have reduced by 40% and predictive maintenance has dropped down the equipment failures by 35% Adopting these loose hurdles, cybersecurity risks emerge along with regulatory grotesqueness and morale integration on a significant level. These matters will necessitate cybersecurity expenditure, scaling of regulations for AI, and upskilling programs in the workforce. The research finds that AI is here to stay — it will become the future of logistics and that autonomous transportation will run on AI-integrated blockchain solutions for security sustainable logistics practices. This research should investigate the next research direction on AI to be beneficial in self-driving freight, green supply chains, and last-mile delivery approaches to keep logistics on an even keel in the changing digital economy.*

Keywords: Supply Chain Optimization, Route Optimization, Warehouse Automation, Predictive Analytics, Artificial Intelligence (AI), Machine Learning (ML), Real-Time Data Analytics, AI-Based Predictive Maintenance, Demand Forecasting Accuracy, Last-Mile Delivery, Inventory Management, Business Intelligence Tools, Autonomous Vehicles, Blockchain in Logistics, Strategic AI Adoption