

Managing Supply Chain Risks Using Digital Twins

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Abstract

In the context of International Trade, Supply Chains are intricate, interconnected networks. Unpredictable demand patterns, natural disasters, geopolitical tensions, and technology disruptions pose a number of risks to these interconnected networks. Risks associated with the supply chain are complex and include financial, strategic, environmental, and operational risks. Labor shortages, equipment breakdown, and logistical hiccups can all result in operational risks. Currency fluctuations, mismatches in supply and demand, and price swings in raw materials can all be sources of financial risk. Changes in the competitive landscape, technological obsolescence, and market dynamics are examples of strategic risks. Natural disasters, climate change, and regulatory demands have made environmental risks more significant. Organizations need to execute comprehensive risk management strategies that integrate proactive methods like predictive analytics with reactive ones like contingency planning in order to effectively manage these risks. In order to guarantee seamless operations and business continuity in the organizations, these risks must be managed. Virtual copies of real assets, systems, or processes, or "digital twins," have become a ground-breaking instrument for supply chain risk mitigation in recent years. Despite their value, traditional supply chain risk management techniques frequently fail to keep up with the increasing complexity of global supply networks. Digital twins offer a revolutionary remedy in this situation. Digital twins facilitate proactive decision-making, improve resilience, and advance sustainability objectives by utilizing real-time data, simulation capabilities, and advanced analytics. This paper explores the concept of digital twins in supply chain management, managing risks in supply chains, forecasting risks, identifying disruptions, enabling end-to-end visibility using digital twins, and highlighting their role in enhancing sustainability.

Keywords: Supply chain sustainability, Digital twins, geopolitical tensions, global supply networks, circular supply chain