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Risk Management in Digital Transformation Projects

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Abstract

The COVID-19 pandemic has disturbed global supply chains. It has pushed organizations to speed up their digital transformations toward resilience and continuity. This paper throws due light on the risk management practices in digital transformation projects while focusing on the adoption of advanced supply chain solutions. The paper discusses the key risk factors for supply chains that are operating in the post-pandemic era. This includes supply disruptions, cybersecurity threats, and integration challenges. The study

argues that digital technologies, such as blockchain, IoT, AI, predictive analytics, etc. help handle these risks better. This helps to understand meaningful risk mitigation strategies such as supplier diversification, real-time tracking, predictive analytics, and insurance coverage. This paper analyzes the proactive management of contemporary supply chain risks through digital transformation, thereby giving opportunities for practical applications for businesses.

Keywords: supply chain risk, risk management, supply chain resilience, digital transformation, blockchain, AI, business resilience, COVID-19, Pandemic

Introduction

The COVID-19 pandemic has disrupted businesses, economies, and global supply chains. The coronavirus has impacted about 94% of the Fortune 1000 companies. It has also collapsed the upstream and downstream supply chains globally (Fortune 2020) ^[6]. As the supply chain has a lean and global structure, it is susceptible to damage during the Pandemic outbreak (Ivanov and Dolgui, 2020) ^[9]. The bottlenecked supply chains caused an interruption in the supply of raw materials, resulting in the shutdown of production facilities (Deloitte, 2020) ^[3]. This results in inconsistencies between the demand and the supply of the products (Donaldson, 2020) ^[4]. The disruptive impact of COVID-19 on the global supply chain has damaged the global economy, human health, and the job market (Sharma *et al*, 2020). Apart from the Pandemic, organizations that operate globally are affected by unforeseen incidents that threaten their existence and profitability. Events such as floods, earthquakes, and hurricanes can disrupt logistics and lead to supply chain delays (Colon *et al*, 2019) ^[2]. Political instability, trade disputes, and changes in regulations can also create uncertainties. Understanding such risks is crucial for organizations to ensure resilience and continuity (Patel, 2021) ^[14].

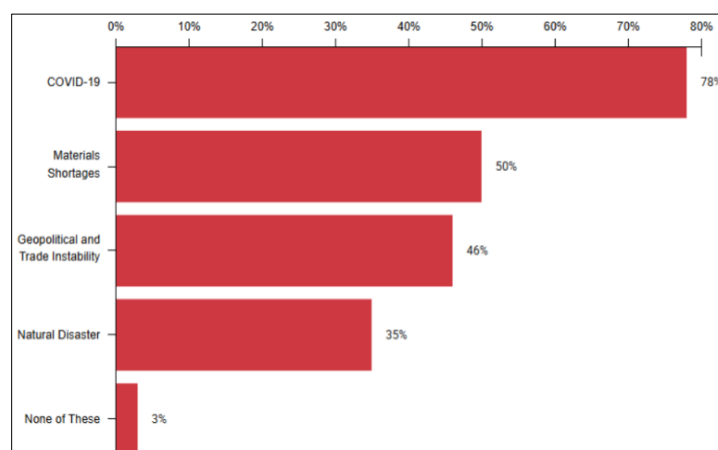


Fig 1: Factors affecting supply chain efficiency

Supply chain risks can lead to serious threats to the continuity of the business in the long run. Therefore, supply chain risk evaluation should become a format part of the decision-making process at every level in the enterprise (Christopher & Peck, 2004). It is mandatory to create a risk management culture in the business, and this refers to fostering and sharing values and beliefs regarding supply chain resilience. The interest in supply chain risk mitigation strategies has increased significantly to mitigate their negative impacts effectively (Chang *et al*, 2015). In light of the mentioned shortcomings, the purpose of this paper is to study the supply chain risks and mitigation strategies. The study also explores digital transformation trends and their impact on supply chain risk management.

Supply chain risks and mitigation strategies in the aftermath of COVID-19:

Understanding the consequences of potential risks in supply chains is a critical factor in devising effective risk management strategies. Supply chain risks can threaten the economy in several ways: revenue losses, higher operational costs, long-lasting financial consequences, and more. For instance, geopolitical events and natural disasters may disrupt transportation routes. A damaging event like a product recall due to quality issues may have a negative impact on brand perception. During the Pandemic, businesses suffered from not being able to transport things securely and on time. Thus, risk assessment with regular updates with respect to changing circumstances will ensure that organizations remain agile and stay prepared to navigate supply chain risks (Okoye *et al*, 2021) ^[13].

- **Diversifying suppliers:** Diversifying suppliers is a key strategy to mitigate risks that are associated with dependency on a single source (Burke *et al*, 2007).

Organizations should engage with multiple suppliers to source raw materials and other critical components. By fostering relationships with a diverse pool of suppliers, organizations can allocate production on the basis of reliability and availability (Meixell and Norbis, 2008) ^[11].

- **Establishing backup routes and utilizing multiple carriers:** This initiative will mitigate the reliability of a single path. This helps to minimize the disruptions caused by natural disasters and geopolitical tensions (Patel, 2021) ^[14].
- **Real-time tracking and monitoring systems:** Implementing real-time tracking and monitoring systems across the supply chain will help organizations mitigate risks on goods transformation. This technology enables quick recognition of potential disruptions, allowing timely intervention and shipment re-routing (Okoye *et al*, 2021) ^[13].
- **Predictive Analytics:** Investing in predictive analytics will empower organizations to forecast potential risks on the basis of market trends, historical data, and other external factors (Chermack, 2011). Predictive analytics also facilitate scenario planning, thus allowing organizations to prepare for a range of potential disruptions.
- **Comprehensive insurance coverage:** Comprehensive insurance coverage is an essential requirement for risk management (Pavlov *et al* 2019) ^[15]. Insurance policies should be diversified according to the hazards they cover, such as natural catastrophes, supply chain disruption, and political instability. This wraparound serves as a provision against future unforeseen events (Nwankwo *et al*, 2021) ^[12].

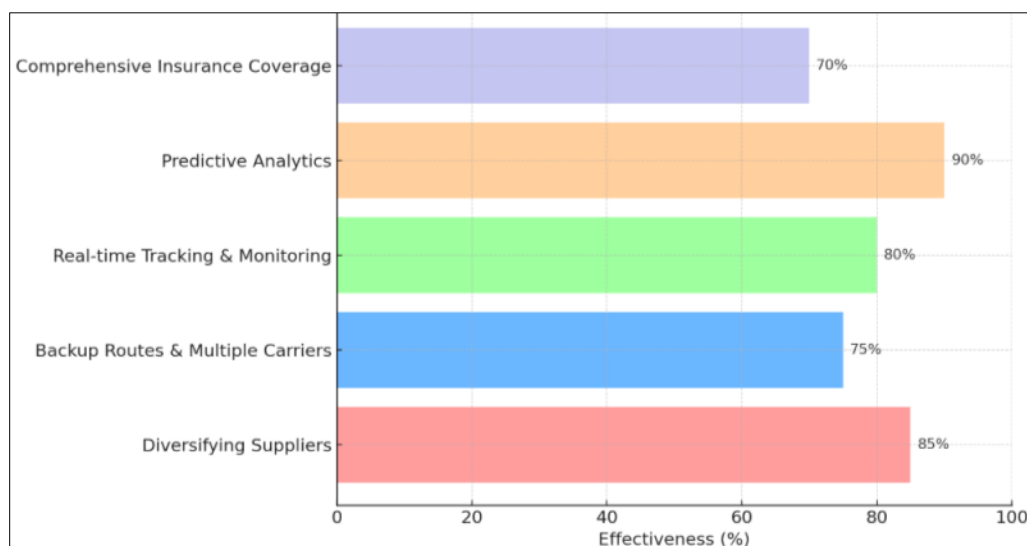


Fig 2: Effectiveness of supply chain risk mitigation strategies

Digital transformation trends and their impact on risk management after the Pandemic:

Supply chains globally can be affected by a number of risks. Natural disasters and the COVID-19 pandemic have resulted in delays and disruptions in the supply chain (Colon *et al*,

2019) ^[2]. Trade disputes, political instability, changes in regulations, and labor strikes can lead to supply chain disruption. With the adoption of digital transformation techniques, it is possible to mitigate the effect of such risks on supply chains.

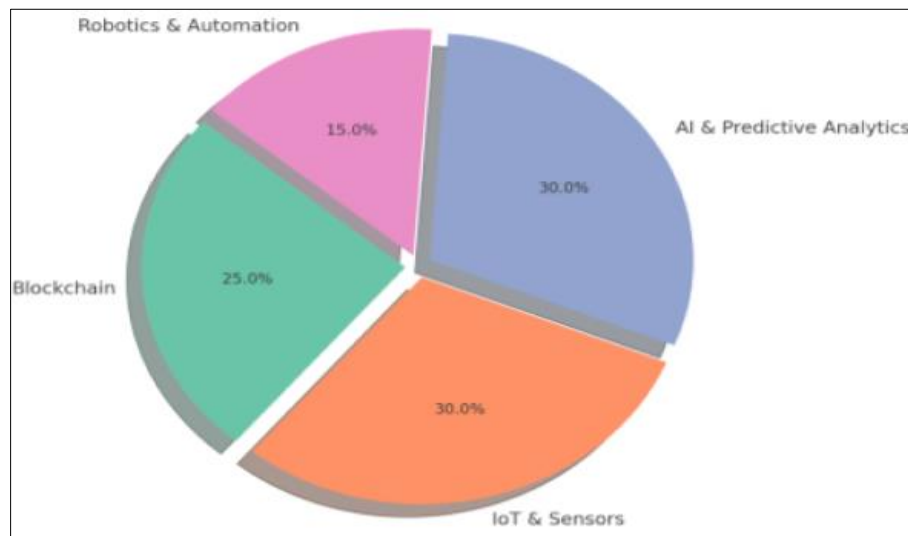


Fig 3: impact of digital technologies on supply chain risk management

a) Blockchain technology

A perfect technology for risk management is expected in international supply chains from the blockchain (Cole *et al*, 2019) ^[1]. Thus, its distributed and transparent character allows for easy traceability and visibility along the supply chain. Smart contracts in the blockchain also automate agreements and their enforcement, reducing the risk of contractual disagreement. Regarding cyber threats and unauthorized access, the fact that the blockchain cannot be tampered with provides a better safeguard of supply chain data (Etemadi *et al*, 2021) ^[5].

b) Internet of Things (IoT) and Sensors:

Different IoT devices and sensors are used to retrieve real-time data on the location, condition, and status of goods in transit. This level of detail allows organizations to monitor and respond to risk immediately. For example, temperature sensors can detect deviations in storage conditions for perishable goods to avert spoilage. With IoT being integrated into supply chain functioning, risk visibility is augmented, and proactive decisions can be made (Birkel and Hartmann, 2020).

c) AI and predictive analytics:

They enable more advanced risk forecasting and scenario analysis. Machine learning algorithms analyze vast amounts

of data to find patterns with possible disruption predictions. AI predictive insights prepare organizations for impending risks in the supply chain, optimizing inventory and facilitating decisions. From this, AI is moving work from incidental risk resolution to a proactive and predictive approach.

d) The application of robotics and automation in warehouses and distribution centers:

This reduces dependence on human work and decreases the risk of operational interruptions due to labor shortages or strikes. Robotics also improves efficiencies and accuracy in order picking and packing (Schwarz *et al*, 2018) ^[16]. The integration of these technologies, on the downside, raises challenges, including cybersecurity provisions against potential threats to automated systems.

Market growth and analytics:

In light of the COVID-19 pandemic, digital transformation in supply chains has taken a remarkable role and transformed the operating module of many industries. This is known from the global investments in industries that attained \$1.8 trillion by the year 2021. It is projected to reach \$2.8 trillion by the year 2025 (IDC, 2021) ^[8]. This statistic reflects a CAGR of 16.3%.

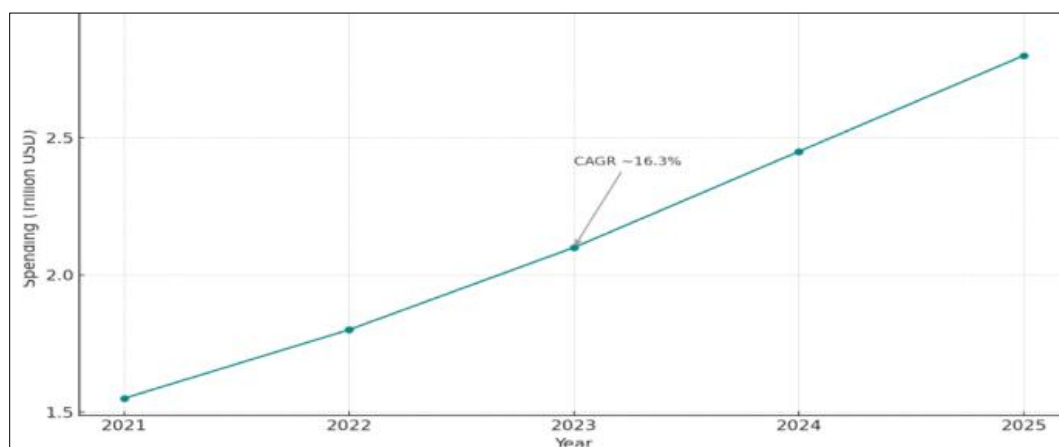


Fig 4: Global spending on digital transformation

The key risks for global supply chains in light of the Pandemic were data privacy issues, cybersecurity threats, workforce adaptability, integration challenges, etc (Ghash, 2021). The post-COVID environment also introduced additional uncertainties, such as supply chain disruptions, remote work vulnerabilities, etc. (Kraus *et al*, 2021). Advanced AI and analytical tools are used to forecast and reduce the risks in real-time to enhance supply chain resilience (Chatterjee *et al*, 2021). Companies that leverage predictive analytics report a 25% reduction in failures and project overruns (McKinsey, 2021)^[10].

Recommendations

- Future research studies in risk management in digital transformation projects should focus on the exploration of adaptive, data-driven risk frameworks that evolve along with emerging digital ecosystems. A major dimension should involve real-time risk intelligence platforms, integrating AI, IoT, and blockchain data for dynamic risk detection and risk mitigation.
- Modeling of cyber risks associated with complex, multi-tiered digital supply chains remains less explored. Future research should promote assessing and prioritizing risks across decentralized networks, observing how an effective risk mitigation strategy behaves under different circumstances.
- Another area requiring exploration consists of human-related risk factors like resistance to change, gaps in digital competency, and cross-functional coordination amid hybrid working arrangements.
- Comparative studies of agile vs. traditional risk management techniques in the context of digital supply chain projects could provide tangible benefits for project managers.
- Finally, the modeling of industry-specific risk management that is tailored to sectors such as health, manufacturing, logistics, etc., could assist organizations in customizing their digital transformation initiatives to achieve greater resilience and competitive advantages.

Conclusion

Digital transformation in supply chain systems is inevitable in the post-COVID-19 scenario. The Pandemic revealed serious vulnerabilities in the supply chain. It also highlighted the necessity of technologies like AI, IoT, blockchain, and predictive analytics to enhance resilience across global supply chains. These technologies improve visibility concerning risk and empower proactive decision-making to deal with exploits in case of disruptions. It also endows strategic measures such as supplier diversification, real-time monitoring, and scenario-based planning to further enhance the risk mitigation approach. Future research has to focus on dynamic risk frameworks and human-centric risk management models. Overall, effective risk management could be one of the main enablers of future and resilient digital supply chains to withstand any disruption and continue business operations.

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