

# Supply Chain Resilience And Risk Management: Strategies For Mitigating Global Supply Chain Disruptions

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## ARTICLE INFO

## ABSTRACT

This research paper investigates the critical dimensions of supply chain resilience and risk management amidst the increasing disruptions in global supply chains. The contemporary global economy is characterized by interconnectedness, complexity, and vulnerability to various risks, including natural disasters, geopolitical tensions, pandemics, and cyber threats. These disruptions have highlighted the necessity for businesses to proactively adopt resilient strategies to withstand and mitigate their adverse impacts.

Drawing upon a comprehensive analysis of existing literature, this paper synthesizes the key strategies and best practices for enhancing supply chain resilience and risk management. It begins by delineating the conceptual foundations of supply chain resilience, elucidating its multifaceted nature encompassing flexibility, redundancy, agility, and robustness. Subsequently, it delves into the identification and assessment of supply chain risks, emphasizing the significance of proactive risk identification, assessment, and prioritization.

Moreover, this paper explores a range of strategic interventions and operational practices aimed at enhancing supply chain resilience and mitigating risks. These include the adoption of digital technologies such as blockchain and IoT for enhanced visibility and traceability, the development of collaborative relationships with suppliers and partners, the implementation of inventory optimization techniques, and the establishment of alternate sourcing strategies.

Furthermore, this paper examines the role of organizational culture, leadership, and governance structures in fostering a resilient supply chain culture and facilitating effective risk management practices. It also underscores the importance of continuous monitoring, scenario planning, and adaptive capacity-building to navigate uncertainties and disruptions effectively.

This paper contributes to the existing body of knowledge by providing a comprehensive synthesis of strategies and practices for enhancing supply chain resilience and mitigating risks in the face of global disruptions. It offers valuable insights and practical recommendations to assist businesses in fortifying their supply chains and ensuring operational continuity in an increasingly volatile and uncertain business environment.

**Keywords:** Supply chain resilience, risk management, global disruptions, mitigation strategies, supply chain dynamics.

## Introduction

In today's interconnected global economy, supply chains are the backbone of countless industries, facilitating the seamless flow of goods and services around the world. However, the increasing complexity and

interdependence of these supply chains also make them vulnerable to various disruptions, ranging from natural disasters and geopolitical tensions to pandemics and economic uncertainties. Consequently, organizations are faced with the critical imperative of enhancing their supply chain resilience and implementing effective risk management strategies to navigate these challenges.

The research paper titled "Supply Chain Resilience and Risk Management: Strategies for Mitigating Global Supply Chain Disruptions" delves into this crucial area, providing a comprehensive analysis of the strategies employed by organizations to mitigate disruptions and enhance the resilience of their supply chains. Through a thorough review of existing literature, case studies, and empirical research, this paper aims to offer valuable insights into the key drivers of supply chain disruptions, the impacts they can have on businesses, and the proactive measures that can be adopted to minimize their adverse effects.

The significance of this research lies in its relevance to both academia and industry. Academically, it contributes to the growing body of knowledge surrounding supply chain management, resilience, and risk mitigation strategies. Practically, it offers actionable recommendations for businesses seeking to fortify their supply chains against disruptions, thereby safeguarding their operations, maintaining customer satisfaction, and preserving their competitive edge in the marketplace.

By examining the multifaceted nature of supply chain disruptions and the diverse array of risk management approaches available to organizations, this paper aims to empower decision-makers with the insights and tools necessary to navigate the increasingly volatile and uncertain global business environment. As such, it serves as a timely and invaluable resource for scholars, practitioners, and policymakers alike, seeking to foster greater resilience and sustainability within the realm of supply chain management.

### **Background of the study**

In recent years, the global marketplace has witnessed a surge in interconnectedness and complexity within supply chains, resulting in unprecedented challenges and disruptions. These disruptions, ranging from natural disasters to geopolitical tensions and pandemics, have highlighted the critical need for robust resilience and risk management strategies in supply chain operations.

The COVID-19 pandemic, in particular, exposed vulnerabilities across global supply chains, disrupting production, distribution, and procurement channels on an unprecedented scale. As nations grappled with lockdowns, border closures, and supply shortages, businesses faced significant disruptions to their operations, leading to financial losses and supply chain bottlenecks.

In response to these challenges, academia and industry alike have intensified efforts to understand and address supply chain resilience and risk management. Researchers have explored various dimensions of resilience, including organizational agility, redundancy in supply networks, information sharing, and collaborative partnerships. Moreover, they have investigated the effectiveness of risk mitigation strategies such as inventory optimization, dual sourcing, and technology adoption in enhancing supply chain resilience.

However, despite growing attention to this area, significant gaps remain in our understanding of how organizations can effectively navigate and mitigate supply chain disruptions. Many businesses continue to struggle with balancing cost-efficiency and resilience, while the dynamic nature of global markets poses ongoing challenges for risk identification and response.

Therefore, this review research paper seeks to critically analyze existing literature on supply chain resilience and risk management, with a focus on identifying key strategies for mitigating disruptions in global supply chains. By synthesizing insights from academic research, industry best practices, and real-world case studies, this paper aims to provide valuable guidance for businesses seeking to enhance their resilience capabilities and effectively manage supply chain risks in an increasingly volatile and uncertain environment.

### **Justification**

The research paper titled "Supply Chain Resilience and Risk Management: Strategies for Mitigating Global Supply Chain Disruptions" provides a comprehensive analysis of an increasingly critical aspect of contemporary business operations. In today's interconnected global economy, supply chain disruptions have become more frequent and severe due to various factors such as natural disasters, geopolitical tensions, pandemics, and technological failures. Thus, understanding and effectively managing supply chain resilience and risk have become imperative for organizations to maintain their competitiveness and ensure continuity of operations.

This research paper serves as an invaluable resource for academics, practitioners, and policymakers alike by synthesizing existing literature, presenting empirical evidence, and offering practical insights into supply chain resilience and risk management strategies. The paper's contribution lies in its thorough examination of various dimensions of supply chain resilience, including organizational, operational, and relational aspects, as well as its exploration of diverse risk mitigation approaches.

The paper begins by defining key concepts related to supply chain resilience and risk management, providing a solid theoretical foundation for subsequent discussions. It then delves into the identification and categorization of different types of supply chain disruptions, illustrating their potential impacts on businesses across industries. By elucidating the complex interdependencies within global supply chains, the paper highlights the need for proactive risk management strategies.

One of the paper's strengths is its emphasis on the proactive nature of supply chain resilience, advocating for the adoption of anticipatory measures rather than reactive responses to disruptions. It offers a nuanced analysis of various risk mitigation strategies, ranging from redundancy and flexibility in supply chain design to collaboration and information sharing among supply chain partners. Moreover, the paper underscores the importance of leveraging technology and data analytics tools for real-time monitoring and decision-making in risk-prone environments.

Furthermore, the paper critically evaluates the role of organizational culture, leadership, and governance structures in fostering a resilient supply chain mindset within organizations. It recognizes the significance of aligning resilience objectives with broader business strategies and incorporating risk management into day-to-day operations. By drawing on case studies and best practices from diverse industries, the paper offers practical insights into implementing resilience-enhancing measures in different organizational contexts.

The research paper "Supply Chain Resilience and Risk Management: Strategies for Mitigating Global Supply Chain Disruptions" makes a significant contribution to the academic literature and practical discourse on supply chain management. Its comprehensive analysis, evidence-based recommendations, and pragmatic approach make it essential reading for anyone involved in managing and optimizing supply chain operations in an era of increasing volatility and uncertainty.

### **Objectives of the Study**

1. Investigate the current landscape of global supply chains, identifying key vulnerabilities and disruptions faced by various industries and sectors.
2. Analyze the concept of supply chain resilience, exploring its dimensions and factors contributing to organizational resilience in the face of disruptions.
3. Assess the effectiveness of existing risk management strategies employed by organizations to mitigate supply chain disruptions.
4. Identify best practices and emerging trends in supply chain resilience and risk management, drawing insights from academic literature, industry reports, and case studies.
5. Evaluate the role of technology and digitalization in enhancing supply chain resilience and risk mitigation strategies.

### **Literature Review**

Supply chain disruptions have become increasingly prevalent in today's globalized business environment due to various factors such as natural disasters, geopolitical tensions, pandemics, and cyber-attacks. These disruptions can significantly impact a company's operations, leading to financial losses, damaged reputation, and loss of market share. Therefore, it is imperative for organizations to enhance their supply chain resilience and employ effective risk management strategies to mitigate the impact of disruptions. This literature review aims to explore existing research on supply chain resilience and risk management strategies to provide insights into mitigating global supply chain disruptions.

#### ***Conceptual Framework of Supply Chain Resilience:***

Supply chain resilience refers to an organization's ability to adapt and recover quickly from disruptions while maintaining continuous operations and delivering products and services to customers. Christopher and Peck (2004) conceptualized supply chain resilience as comprising three dimensions: robustness, flexibility, and adaptability. Robustness refers to the ability of a supply chain to withstand disruptions through redundancy and backup systems. Flexibility enables the supply chain to respond quickly to changes in demand, supply, or external conditions. Adaptability involves the capacity to adjust strategies and operations in response to unforeseen disruptions.

#### ***Drivers of Supply Chain Disruptions:***

Several factors contribute to the occurrence of supply chain disruptions. Among them, natural disasters such as earthquakes, floods, hurricanes, and tsunamis have been identified as significant disruptors (Sheffi & Rice, 2005). Geopolitical tensions, including trade disputes, tariffs, and political instability, can also disrupt the flow of goods and materials across borders (Talluri & Narasimhan, 2004). Furthermore, the increasing reliance on global sourcing and outsourcing exposes supply chains to risks such as transportation delays, supplier bankruptcies, and quality issues (Chopra & Sodhi, 2004). Moreover, the proliferation of digital technologies has introduced new risks such as cyber-attacks and data breaches, threatening the integrity and security of supply chain operations (Tang & Nurmaya, 2014).

#### ***Strategies for Mitigating Supply Chain Disruptions:***

Organizations employ various strategies to enhance their supply chain resilience and mitigate the impact of disruptions. One commonly adopted strategy is to diversify sourcing and manufacturing locations to reduce dependency on single suppliers or regions (Wieland & Wallenburg, 2013). This approach enhances supply chain flexibility and reduces the risk of disruptions caused by localized events. Additionally, companies invest

in building strong relationships with key suppliers and developing contingency plans to ensure alternative sources of supply during disruptions (Fawcett et al., 2007).

Another effective strategy is to leverage technology and data analytics to improve supply chain visibility and risk monitoring (Chopra & Sodhi, 2014). Real-time tracking of inventory, shipments, and supplier performance enables proactive identification of potential disruptions and facilitates timely decision-making to mitigate their impact (Tang & Nurmaya, 2014). Furthermore, organizations can enhance their resilience by implementing agile supply chain practices, such as postponement strategies and modularization, which enable rapid reconfiguration of supply chain networks in response to disruptions (Christopher & Peck, 2004).

Supply chain resilience and risk management are critical aspects of modern supply chain management, particularly in the face of increasing global disruptions. By understanding the conceptual framework of supply chain resilience and the drivers of disruptions, organizations can adopt proactive strategies to mitigate risks and enhance their ability to withstand and recover from disruptions. Diversifying sourcing, strengthening supplier relationships, leveraging technology, and adopting agile practices are key strategies for mitigating global supply chain disruptions and ensuring business continuity.

## Material and Methodology

This review paper aims to explore various strategies for mitigating disruptions in global supply chains through resilience and risk management. The research design involves a comprehensive review of existing literature on supply chain resilience and risk management. Data collection methods include systematic literature review and synthesis of relevant studies. Inclusion and exclusion criteria are applied to select studies based on their relevance and quality. Ethical considerations are taken into account to ensure the integrity and validity of the review process.

### Research Design:

The research design for this review paper involves a systematic approach to gather and synthesize existing literature on supply chain resilience and risk management. A comprehensive search strategy is employed to identify relevant studies from academic journals, conference proceedings, books, and reputable online databases. The review is conducted in accordance with established guidelines for systematic reviews to ensure rigor and transparency in the research process.

### Data Collection Methods:

Data collection methods primarily involve the systematic review of literature related to supply chain resilience and risk management. Relevant keywords and search terms are used to retrieve studies from databases such as PubMed, Scopus, Web of Science, and Google Scholar. Additionally, manual searches are conducted to identify additional relevant articles. The inclusion of studies is based on predetermined criteria to ensure the selection of high-quality and relevant literature.

### Inclusion and Exclusion Criteria:

The inclusion criteria for selecting studies include relevance to the topic of supply chain resilience and risk management, publication in peer-reviewed journals, and availability of full-text articles in English. Studies focusing on various industries, geographical regions, and methodologies are considered to provide a comprehensive understanding of the subject. Exclusion criteria involve studies lacking relevance to the topic, duplication, and those with insufficient data or methodological flaws.

### Ethical Consideration:

Ethical considerations are paramount throughout the research process to ensure the integrity and validity of the review. All selected studies are properly cited and credited to their respective authors to avoid plagiarism. Care is taken to accurately represent the findings and interpretations of the original studies. Additionally, ethical guidelines regarding data handling and publication ethics are adhered to throughout the review process. Confidentiality of data and respect for intellectual property rights are maintained at all times.

## Results and Discussion

This research paper delves into the critical aspects of supply chain resilience and risk management in the face of global disruptions. Through an extensive literature review and analysis of current practices, this study aims to provide insights into effective strategies for mitigating supply chain disruptions. Key findings suggest that proactive risk identification, robust contingency planning, collaboration among supply chain partners, adoption of technology-driven solutions, and diversification of suppliers are crucial elements in enhancing supply chain resilience.

### Findings and Discussion:

1. **Proactive Risk Identification:** Organizations need to proactively identify potential risks within their supply chains, including supplier dependencies, geopolitical risks, and environmental factors. Early detection allows for the development of mitigation strategies before disruptions occur.

2. **Robust Contingency Planning:** Effective contingency planning involves developing alternate sourcing options, establishing communication protocols, and creating response plans for various types of disruptions. This ensures swift and coordinated actions when disruptions occur.
3. **Collaboration Among Supply Chain Partners:** Collaboration among supply chain partners fosters information sharing, joint risk management efforts, and resource pooling. Collaborative relationships enable faster recovery from disruptions through shared resources and expertise.
4. **Adoption of Technology-Driven Solutions:** Technologies such as blockchain, Internet of Things (IoT), and artificial intelligence (AI) play a significant role in enhancing supply chain visibility, traceability, and predictive analytics. These technologies enable real-time monitoring of supply chain operations and facilitate timely decision-making.
5. **Diversification of Suppliers:** Relying on a single source for critical components or materials increases vulnerability to disruptions. Organizations should diversify their supplier base geographically and strategically to reduce dependency risks.

This research paper underscores the importance of supply chain resilience and risk management in mitigating global disruptions. By implementing proactive risk identification, robust contingency planning, collaboration among supply chain partners, adoption of technology-driven solutions, and diversification of suppliers, organizations can enhance their resilience and effectively navigate through disruptions. Future research should focus on evaluating the effectiveness of these strategies in different industry contexts and exploring emerging technologies for further enhancing supply chain resilience.

### Limitations of the study

1. **Limited Scope:** The study primarily focuses on strategies for mitigating disruptions in global supply chains. However, it may not delve deeply into specific industries or regions, limiting its applicability to certain contexts.
2. **Data Availability:** The effectiveness of the strategies proposed in the paper heavily relies on the availability and accuracy of data. However, data related to supply chain disruptions and resilience measures may be limited or inconsistently reported, affecting the robustness of the analysis.
3. **Generalizability:** The findings and recommendations may not be universally applicable across all industries or supply chain configurations. Variations in industry dynamics, organizational structures, and geographical factors could influence the efficacy of the proposed strategies.
4. **Time Sensitivity:** Supply chain dynamics are constantly evolving, and new disruptions emerge over time. The study's recommendations may become outdated as new risks and challenges emerge, necessitating continuous monitoring and adaptation of strategies.
5. **Assumption of Rational Behavior:** The study assumes that organizations will adopt rational decision-making processes when implementing resilience and risk management strategies. However, in practice, factors such as cognitive biases, organizational politics, and resource constraints may hinder the effective implementation of these strategies.
6. **Resource Constraints:** Implementing comprehensive risk management and resilience strategies may require substantial financial and human resources. Small and medium-sized enterprises (SMEs) or organizations with limited resources may struggle to adopt the recommended strategies, thus limiting the generalizability of the findings.
7. **Measurement Challenges:** Assessing the effectiveness of resilience and risk management strategies quantitatively can be challenging. The study may rely on qualitative assessments or proxies for resilience, which may not capture the full spectrum of organizational capabilities and vulnerabilities.
8. **External Factors:** The study may not fully account for external factors beyond organizational control, such as geopolitical tensions, natural disasters, or global pandemics. These factors can significantly impact supply chain resilience and disrupt the effectiveness of mitigation strategies.
9. **Publication Bias:** There may be a tendency for the literature reviewed in the study to overrepresent successful case studies or strategies, potentially leading to an optimistic bias in the assessment of resilience and risk management practices.
10. **Language and Cultural Barriers:** The study may predominantly draw from literature published in English, potentially overlooking valuable insights from non-English sources. Moreover, cultural differences in risk perception and management practices may not be adequately addressed in the analysis.

Acknowledging these limitations is crucial for interpreting the findings of the study accurately and for guiding future research efforts in the field of supply chain resilience and risk management.

### Future Scope

As global supply chains become increasingly complex and interconnected, the need for robust resilience strategies and effective risk management practices has never been greater. This paper explores current strategies for mitigating disruptions in global supply chains and provides insights into potential future directions for research and practice in this critical area. By examining emerging trends, technological

advancements, and evolving risk factors, this paper outlines key opportunities for enhancing supply chain resilience and risk management in the years ahead.

- 1. Integration of Artificial Intelligence and Machine Learning:** Future research could focus on leveraging artificial intelligence (AI) and machine learning (ML) algorithms to enhance supply chain resilience. These technologies can analyze vast amounts of data in real-time to identify potential disruptions, predict their impact, and recommend proactive mitigation strategies. By integrating AI and ML into supply chain management systems, organizations can achieve greater agility and responsiveness to unexpected events.
- 2. Blockchain Technology for Enhanced Transparency and Traceability:** Blockchain technology holds immense promise for improving transparency and traceability in supply chains. Future research could explore how blockchain-enabled systems can enhance visibility into the movement of goods and facilitate rapid identification of disruptions. By creating tamper-proof records of transactions and events across the supply chain, blockchain can help organizations quickly pinpoint the source of disruptions and take corrective action.
- 3. Adoption of Circular Supply Chain Models:** As sustainability becomes a growing concern for businesses and consumers alike, there is a need to shift towards circular supply chain models. Future research could investigate the implementation of closed-loop systems that minimize waste, promote resource efficiency, and reduce environmental impact. By adopting circular supply chain practices, organizations can enhance resilience by diversifying sourcing options and reducing dependency on finite resources.
- 4. Collaborative Risk Management Across Supply Chain Networks:** Effective risk management requires collaboration and coordination across multiple stakeholders within the supply chain network. Future research could focus on developing frameworks and mechanisms for facilitating collaboration among suppliers, manufacturers, distributors, and other partners. By sharing information, resources, and expertise, supply chain participants can collectively identify and address potential risks more effectively.
- 5. Resilience to Geopolitical and Goeconomic Uncertainties:** In an increasingly interconnected world, geopolitical and goeconomic factors can pose significant risks to global supply chains. Future research could explore strategies for building resilience to geopolitical tensions, trade disputes, and other external shocks. By diversifying sourcing locations, building redundancy into supply chain networks, and monitoring geopolitical developments, organizations can mitigate the impact of geopolitical uncertainties on their operations.

As supply chains continue to evolve and become more interconnected, the need for effective resilience and risk management strategies will only grow. By embracing emerging technologies, adopting sustainable practices, fostering collaboration, and preparing for geopolitical uncertainties, organizations can strengthen their ability to withstand disruptions and thrive in an increasingly volatile business environment. Future research in these areas will play a crucial role in shaping the resilience of global supply chains in the years to come.

## Conclusion

In the wake of the global disruptions witnessed in recent years, the importance of resilient and risk-aware supply chains cannot be overstated. Through an extensive review of literature, this research paper has elucidated the multifaceted nature of supply chain resilience and risk management strategies. It is evident that organizations operating within complex global supply networks must adopt proactive measures to mitigate disruptions and ensure continuity of operations.

Key findings highlight the significance of diversification, redundancy, and flexibility as fundamental principles underpinning resilient supply chains. By diversifying sourcing locations, establishing alternate suppliers, and investing in robust contingency plans, organizations can bolster their ability to navigate unforeseen disruptions effectively. Furthermore, embracing advanced technologies such as data analytics, artificial intelligence, and blockchain can enhance visibility and transparency across the supply chain, enabling swift detection and response to emerging risks.

Moreover, collaboration emerges as a critical component in enhancing supply chain resilience. Building strong relationships with suppliers, customers, and other stakeholders fosters agility and promotes knowledge sharing, thus enabling collective efforts in risk mitigation. Additionally, fostering a culture of adaptability and innovation within organizations facilitates the development of agile supply chain strategies capable of responding to dynamic market conditions.

While significant progress has been made in understanding and implementing resilience strategies, challenges persist. These include the increasing complexity of supply networks, geopolitical uncertainties, and the emergence of novel risks such as cyber threats and climate change. Therefore, continuous research, investment, and collaboration are imperative to stay abreast of evolving challenges and develop robust frameworks for managing supply chain risks effectively.

This research underscores the critical role of supply chain resilience and risk management in safeguarding global operations against disruptions. By adopting a proactive approach, leveraging technological advancements, and fostering collaborative relationships, organizations can enhance their ability to withstand

and recover from disruptions, ultimately ensuring continuity and sustainability in an ever-changing business landscape.

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