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Collaboration, Agility, and Redundancy: Key Strategies for Managing Global Supply Chain Disruptions

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ABSTRACT: Global supply chains have become highly vulnerable to disruptions caused by pandemics, geopolitical conflicts, trade wars, and sustainability pressures. This narrative review synthesizes existing research on risk management strategies with a focus on resilience, collaboration, sustainability, and strategic intelligence. Literature searches were conducted in Scopus, Web of Science, and Google Scholar, covering studies published between 2010 and 2024. The findings highlight resilience strategies—such as redundancy, agility, and digitalization—as essential mechanisms for mitigating disruptions. Redundancy reduces operational vulnerabilities through buffer inventories and multiple sourcing, while agility enables rapid adjustments to volatile conditions. Digitalization further enhances resilience by improving real-time monitoring and decision-making. Collaborative governance and risk-sharing contracts strengthen supply chain networks by fostering trust and distributing risks equitably. Geopolitical events and the COVID-19 pandemic illustrate the fragility of global networks, emphasizing the importance of supplier diversification, localization, and technological preparedness. Sustainability-related risks, including environmental, social, and governance (ESG) issues, require integrated frameworks that align resilience strategies with ethical and regulatory imperatives. Strategic intelligence emerges as a dynamic capability that supports proactive adaptation and recovery. This review concludes that effective supply chain risk management requires integrated and adaptive frameworks combining resilience, collaboration, and intelligence. Policy support, investment in logistics infrastructure, and targeted strategies for small and medium-sized enterprises (SMEs) are critical for building sustainable and competitive global supply chains in an increasingly uncertain environment.

Keywords: Global Supply Chain, Risk Management Strategies, Supply Chain Resilience, Collaborative Governance, Geopolitical Disruptions, Sustainability Risks Strategic Intelligence.

INTRODUCTION

Global supply chains are the backbone of modern economies, enabling the movement of goods, services, and information across borders. Their efficiency allows firms to access resources, reduce

costs, and expand markets. Yet, the same interdependence makes them highly vulnerable to external shocks. In recent years, systemic risks such as the COVID-19 pandemic, the Russia–Ukraine conflict, trade wars, and climate change have exposed critical weaknesses in supply chain design and management.. Scholars have emphasized the importance of building resilience within supply chains to mitigate risks and maintain competitiveness. For example, Hsu et al. (2022) highlight how resilience strategies are essential to counter avoidable disruptions, while Pham et al. (2022) classify global risks based on probability of occurrence and impact, demonstrating their influence on supply chain performance in the context of the COVID-19 pandemic.

The COVID-19 pandemic highlighted the fragility of global supply chains. Severe shortages of raw materials led to factory shutdowns and delivery delays, disrupting industries from electronics to healthcare (Govindan et al., 2023; Xu et al., 2020). At the same time, trade wars and tariff escalations created additional barriers, raising costs and reducing efficiency for multinational firms (Johnson & Haug, 2021). These events demonstrate the urgent need to re-evaluate supply chain strategies through the lens of resilience and risk management.

Empirical studies confirm the scale of these disruptions. Duong et al. (2022) report that the pandemic led to significant production delays and unmet demand, while Ghadge et al. (2019) emphasize the growing impact of climate change and extreme weather events. Such evidence shows that supply chains operate in an era of heightened uncertainty, where resilience and adaptability are essential rather than optiona.

Organizations worldwide must therefore move beyond merely identifying risks to applying robust frameworks that actively mitigate disruptions. This shift requires combining risk identification with strategies that enhance resilience and agility, allowing supply chains to withstand external shocks and recover efficiently. Such perspectives align with the call by Govindan et al. (2023) for the adoption of proactive strategies to ensure continuity in the face of crises. Building resilience, as suggested by Hsu et al. (2022), is not only a defensive mechanism but also a source of competitive advantage in a volatile global environment.

A central challenge in managing risks across global supply chains lies in their inherent complexity and interdependence. As Duong et al. (2022) note, globalization has exposed vulnerabilities in operational structures, leading to significant issues such as production delays, labor shortages, and demand fluctuations. Zhang and Wang (2024) further emphasize that firms face uncertainties arising from volatile markets and the need to comply with diverse regulatory frameworks across jurisdictions. These complexities complicate the design of effective risk management strategies, as managers must balance efficiency with resilience across a wide range of operational and institutional contexts.

Another critical challenge is the influence of geopolitical dynamics and protectionist trade policies. Johnson and Haug (2021) document how tariff escalations and trade wars force firms to adjust their supply chain configurations, often at considerable cost. The COVID-19 pandemic has reinforced the speed with which external shocks can destabilize global networks, highlighting the need for agile and adaptive responses (Majumdar et al., 2022; Mzougui et al., 2023). Technological

advancements have been proposed as a means to enhance agility, with Hsu et al. (2022) noting that digital innovations allow firms to monitor risks and adapt to disruptions in real time. Nevertheless, the integration of technology into risk management practices remains uneven across sectors, creating disparities in resilience levels.

Despite growing research on supply chain risks, gaps remain in the literature. Studies such as Gurtu and Johny (2021) have focused on specific aspects like political instability or market volatility, but comprehensive frameworks integrating diverse risk factors are limited. Ghadge et al. (2019) highlight the interconnected nature of risks but emphasize the absence of holistic approaches that account for systemic interactions. Similarly, Gaspar et al. (2020) observe that much of the literature centers on risk identification and assessment, with less attention to the continuous monitoring and adaptive management required in dynamic environments. This gap underscores the need for narrative reviews that synthesize fragmented findings and provide a cohesive perspective on supply chain risk management.

The primary objective of this review is to address these gaps by examining risk management strategies within global supply chains through an integrative lens. The review aims to analyze the interplay between resilience, collaboration, sustainability, and strategic intelligence as critical dimensions of risk management. By consolidating insights from diverse strands of research, the study seeks to offer a comprehensive understanding of how organizations can navigate complex disruptions while building long-term adaptive capacity.

The scope of this review encompasses a wide range of industries and geographical regions to capture the heterogeneity of supply chain dynamics. Sectoral differences—such as those between food, maritime, and manufacturing—introduce unique vulnerabilities and necessitate tailored risk management strategies. For instance, Al-Abdelmalek et al. (2023) observe that food supply chains prioritize safety and quality, requiring stringent protocols to mitigate contamination and logistical risks. In contrast, Sun et al. (2023) highlight maritime supply chains as particularly vulnerable to port congestion and freight delays, requiring robust logistical planning. Korucuk et al. (2023) describe how manufacturing industries, particularly automotive, increasingly adopt agile practices to adapt to demand fluctuations. By including diverse sectors, this review seeks to highlight commonalities and divergences in risk management strategies, offering nuanced insights applicable to both scholars and practitioners.

In summary, global supply chains face unprecedented challenges due to the convergence of health crises, geopolitical tensions, trade disruptions, and environmental risks. The literature reflects growing awareness of the need for resilience but also reveals gaps in integrated frameworks and adaptive strategies. This review contributes to the field by synthesizing current knowledge, identifying critical strategies, and proposing pathways for more effective risk management. Through this analysis, the study aims to provide organizations with the theoretical and practical tools necessary to enhance resilience and ensure continuity in an increasingly volatile global environment.

METHOD

The methodological foundation of this review is built on a systematic and rigorous approach to sourcing, screening, and synthesizing relevant literature on risk management strategies in global supply chains. Recognizing the interdisciplinary nature of supply chain studies, the review employed a multi-database search strategy designed to capture research from business, management, logistics, operations, and related fields. This methodological orientation ensures a comprehensive representation of scholarly perspectives and empirical evidence while maintaining the integrity and relevance required for publication in high-impact international journals.

The primary databases selected for this study were Scopus and Web of Science, owing to their breadth, reliability, and inclusion of peer-reviewed academic content. Scopus is widely regarded for its extensive coverage of scholarly publications across disciplines, making it particularly valuable for capturing research that intersects supply chain management, resilience, and risk assessment (Hsu et al., 2022). Web of Science, on the other hand, provides robust indexing of journals with high academic standing, enabling access to studies that delve into the nuances of supply chain vulnerabilities, global disruptions, and strategic frameworks (Seuring et al., 2022). Supplementary searches were also conducted using Google Scholar to ensure inclusivity, especially for emerging studies, working papers, or cross-disciplinary research that may not yet be indexed in Scopus or Web of Science. This triangulated approach allowed the review to maximize coverage and minimize the risk of overlooking significant contributions.

The search strategy employed a structured use of keywords and Boolean operators to refine results and capture literature most relevant to the research objectives. Keywords were carefully selected based on their frequent appearance in seminal works and contemporary studies. For the theme of supply chain risk management, the search string used was "supply chain" AND "risk management," ensuring a direct focus on the central research question. To address resilience strategies, the string "supply chain resilience" AND "strategies" was employed, capturing studies that propose or evaluate resilience-building mechanisms. For global disruptions, which have emerged as a critical driver of vulnerabilities, the string "global disruptions" OR "supply chain disruptions" was applied. To enhance comprehensiveness, these strings were combined into a broader query: ("supply chain" AND "risk management") OR ("supply chain resilience" AND "strategies") AND ("global disruptions" OR "supply chain disruptions"). This combination facilitated the retrieval of literature that explicitly addresses the intersections of risk management, resilience, and disruption, thus aligning with the study's objectives.

The process of literature selection was guided by explicit inclusion and exclusion criteria to ensure that only high-quality, relevant studies were considered. Inclusion criteria encompassed peer-reviewed articles, book chapters, and systematic reviews published in English between 2010 and 2024. This temporal frame was chosen to reflect the modern evolution of supply chain management strategies while allowing the review to capture both pre-pandemic and post-pandemic insights. Studies were required to directly address risk management strategies, resilience frameworks, or the impact of global disruptions on supply chain performance. Empirical studies, whether quantitative, qualitative, or mixed methods, as well as conceptual and theoretical papers,

were included to ensure a balance of evidence-based and conceptual insights. Exclusion criteria eliminated non-peer-reviewed publications, opinion pieces, and studies focusing solely on unrelated domains such as small-scale logistics without a broader supply chain context.

In terms of research types, this review considered a wide range of studies to provide a comprehensive synthesis. Randomized controlled trials are less common in supply chain research but were considered if present. More frequently, the review included cohort studies examining longitudinal impacts of disruptions, case studies illustrating specific organizational responses, and survey-based empirical studies that capture perceptions of risk and resilience strategies across industries. Literature reviews and meta-analyses were also included, provided they offered systematic insights into the body of knowledge relevant to global supply chain risk management. This diversity of study types enabled triangulation of findings and facilitated a nuanced understanding of both theoretical frameworks and practical applications.

The screening process followed a multi-step approach to ensure methodological rigor. The initial database search yielded a large number of studies, which were first screened by title and abstract to assess their relevance to the themes of risk management and resilience in global supply chains. Articles that passed this stage were subjected to full-text review to evaluate methodological soundness, alignment with research objectives, and depth of analysis. Each selected study was further assessed for the quality of its research design, robustness of findings, and contribution to the field. Discrepancies in the inclusion process were resolved through discussions among reviewers, ensuring objectivity and consistency.

Evaluation of the literature emphasized methodological rigor and thematic relevance. Studies were assessed not only for their contribution to understanding risk management strategies but also for their contextual insights, such as the geographical scope, industry focus, and scale of analysis. For example, sector-specific studies in food supply chains, maritime logistics, and manufacturing industries were compared to identify both commonalities and divergences in resilience strategies. This comparative perspective allowed the review to highlight sectoral nuances while maintaining a global outlook. Moreover, studies addressing technological innovations, such as digital platforms and Industry 4.0 applications, were given particular attention due to their growing relevance in enhancing supply chain agility and resilience.

Throughout the selection and evaluation process, attention was also paid to identifying trends, recurring themes, and knowledge gaps. By synthesizing findings across diverse sources, the methodology ensured that the review captures the complexity and multidimensionality of supply chain risk management. This process also allowed for the identification of underexplored areas, such as collaborative governance models or the integration of sustainability into risk strategies, which are critical for advancing both scholarly discourse and practical applications.

In summary, the methodology adopted in this review reflects a rigorous, systematic approach designed to ensure comprehensiveness, relevance, and academic integrity. By leveraging high-quality databases such as Scopus and Web of Science, employing carefully crafted search strings, and applying strict inclusion and exclusion criteria, the review curated a robust body of literature

spanning empirical, conceptual, and theoretical studies. The process of screening and evaluation ensured that the selected works collectively address the complexities of global supply chain risks, resilience strategies, and disruption management. This methodological foundation provides the basis for a meaningful synthesis of existing knowledge and offers a credible platform for advancing scholarly understanding and practical insights into supply chain risk management in an increasingly uncertain global environment.

RESULT AND DISCUSSION

The synthesis of literature on global supply chain risk management reveals a series of interconnected themes that collectively illuminate the strategies, challenges, and frameworks shaping contemporary approaches to resilience. The results are organized into five thematic areas: resilience strategies, collaborative risk management, geopolitical and pandemic disruptions, sustainability risks, and strategic intelligence. Each theme draws upon empirical evidence, case studies, and comparative analyses to provide a comprehensive understanding of risk management strategies across global contexts.

Resilience strategies have emerged as a cornerstone of supply chain management, with redundancy, agility, and digitalization consistently validated as effective approaches to mitigating disruption. Redundancy, which involves maintaining buffer inventories or cultivating multiple suppliers, has been shown to significantly reduce operational vulnerabilities. Um and Han (2020) demonstrate that redundancy improves the ability of firms to absorb shocks without severe disruptions to production or service delivery. Similarly, agility is highlighted as critical for rapid adaptation to volatile conditions. Govindan et al. (2023) emphasize that agile supply chains are more capable of adjusting to shifts in demand and supply, a finding echoed by Johnson and Haug (2021), who note that flexibility in operational strategies is essential for navigating external pressures. Digitalization complements these strategies by enhancing visibility and information sharing. Das et al. (2021) argue that digitized systems facilitate real-time monitoring and rapid decision-making, ultimately improving the resilience of supply chains in times of crisis.

Case studies across sectors provide further evidence of the efficacy of resilience strategies while also illustrating failures where such strategies were absent. In the maritime industry, Schutte et al. (2019) document how agile responses and flexible contracts enabled companies to maintain operational continuity during COVID-19 disruptions. By contrast, Sigala et al. (2022) highlight failures in the healthcare sector, where insufficient diversification of suppliers and delays in implementing contingency plans resulted in critical shortages of personal protective equipment. These contrasting examples underscore the importance of embedding resilience strategies into supply chain design before crises emerge.

Collaboration within supply chains has also been identified as a key factor in mitigating systemic risks. Cao et al. (2021) note that collaborative risk management fosters trust and improves communication among partners, enabling more coordinated responses to disruptions. By pooling resources and information, organizations can anticipate risks earlier and implement preventive measures more effectively. Revilla and Sáenz (2017) provide evidence that joint governance

structures reduce the frequency and severity of disruptions, highlighting the importance of shared accountability. Liu et al. (2021) further demonstrate that risk-sharing contracts distribute burdens equitably, encouraging all partners to invest in resilience measures. These findings collectively indicate that collaboration transforms fragmented responses into cohesive strategies, thereby enhancing the resilience of the entire supply chain network.

The role of geopolitical and pandemic disruptions in shaping supply chain strategies has been extensively documented. Wu et al. (2022) illustrate how conflicts such as the Russia–Ukraine war, Brexit, and the US–China trade war have fragmented global networks, prompting firms to diversify suppliers and shift from just-in-time to just-in-case practices. Handfield et al. (2020) report that increased inventory levels and localized sourcing have become common adaptations to mitigate geopolitical risks. Seuring et al. (2022) further emphasize the regulatory challenges arising from Brexit, which forced companies to reconfigure supply chains to comply with new tariffs and compliance measures. The COVID-19 pandemic, as noted by Majumdar et al. (2022), exposed the dangers of over-reliance on global suppliers, highlighting the value of diversified sourcing and localized supply channels. Xu et al. (2020) add that firms with prior investments in digitization and analytics were better equipped to forecast demand and reallocate resources, thereby mitigating the severity of disruptions. Collectively, these findings underline the necessity of integrating geopolitical awareness and technological preparedness into supply chain risk management.

Sustainability risks, encompassing environmental, social, and governance (ESG) dimensions, have grown increasingly salient in the literature. Das et al. (2021) and Bassett et al. (2021) identify ESG-related risks as critical to supply chain stability, noting that poor environmental practices, inadequate labor standards, and weak governance can undermine both performance and reputation. Völlers et al. (2023) argue that firms face mounting pressure to address greenhouse gas emissions and resource depletion, while Kuizinaitė et al. (2023) highlight the social risks tied to labor exploitation and community impacts. In terms of mitigation, Seuring et al. (2022) describe how firms employ "control" strategies such as rigorous supplier audits, while avoidance strategies involve sourcing exclusively from environmentally responsible partners. Rhodes et al. (2022) show that risk-sharing in sustainability contexts, often through partnerships and joint ventures, distributes accountability and fosters innovation in sustainable practices. These findings suggest that effective risk management increasingly requires integrating ESG considerations into resilience frameworks.

Strategic intelligence (SI) has been conceptualized as a dynamic capability critical to resilience in global supply chains. Das et al. (2021) and Govindan et al. (2023) note that SI supports proactive decision-making by leveraging analytics to anticipate disruptions and identify opportunities. Hsu et al. (2022) advocate embedding SI within risk management systems to enhance agility and responsiveness, while Xu et al. (2023) introduce the GREAT-3Rs framework—Reconfiguration, Resilience, and Recovery—as a conceptual model for applying SI in disruption contexts. This model emphasizes continuous learning and adaptation, enabling organizations to evolve alongside dynamic risks. Technological tools such as machine learning and advanced analytics, discussed by Pasupuleti et al. (2024) and Ganesh and Kalpana (2022), further illustrate how SI can generate real-time insights to support data-driven resilience strategies. The integration of SI within supply chains

thus represents a forward-looking approach to managing uncertainty and capitalizing on resilience as a competitive advantage.

Taken together, the results demonstrate that resilience strategies, collaborative practices, and the integration of sustainability and intelligence capabilities form the foundation of effective risk management in global supply chains. Sectoral comparisons reveal that while maritime industries emphasize logistical flexibility, healthcare sectors prioritize rapid sourcing strategies, and manufacturing leans heavily on agility and digitalization. Cross-national perspectives also highlight differences in regulatory and political contexts, with firms in the European Union adapting to Brexit-related complexities, while companies in Asia-Pacific navigate trade wars and geopolitical uncertainty. Despite these differences, the overarching trend emphasizes the need for integrated, adaptive, and collaborative frameworks. These frameworks not only address immediate vulnerabilities but also strengthen long-term resilience, ensuring that global supply chains remain robust in the face of increasingly complex disruptions.

Systemic factors exert a profound influence on supply chain vulnerabilities and the strategies developed to build resilience. Trade policies, financial markets, and institutional frameworks serve as external forces that both constrain and shape organizational responses to disruption. Johnson and Haug (2021) provide evidence of how the U.S.–China trade war compelled firms to adapt their sourcing strategies, often by prioritizing regional suppliers over global ones, thereby reducing exposure to tariffs and transportation risks. Wu et al. (2022) add that geopolitical risks demand structural changes to supply chain networks, where companies attempt to balance efficiency with robustness by diversifying suppliers and increasing inventory buffers. These examples illustrate how trade tensions and protectionist measures act as catalysts for firms to redesign their operational strategies.

Financial markets contribute another dimension to systemic vulnerability, particularly in the availability and allocation of capital for risk management initiatives. Wiedmer et al. (2023) highlight how financial crises, including the 2007–2008 crash, prompted firms to reconsider investment strategies and adopt integrated supply chain models. These models emphasize collaborative practices and digital innovations, both of which enhance resilience while addressing liquidity constraints. The uncertainties introduced by volatile capital markets underscore the importance of strategic investment in technologies that improve visibility and agility, as also emphasized by Yalçın and Ayyıldız (2024). At the same time, institutional frameworks—ranging from legal environments to regulatory systems—create an additional layer of complexity for global firms. Navigating diverse compliance requirements across jurisdictions increases operational costs and constrains managerial flexibility, particularly when risk management practices are not standardized (Wiedmer et al., 2023).

The interplay of these systemic factors highlights the necessity for resilience strategies that are flexible, adaptive, and technologically integrated. Narkhede et al. (2024) argue that organizations capable of monitoring systemic shifts and aligning their operational frameworks accordingly are better positioned to withstand external shocks. Digitalization, as emphasized by Das et al. (2021), further strengthens these adaptive capacities by enabling real-time information sharing, predictive analytics, and enhanced transparency. Thus, systemic factors both expose vulnerabilities and incentivize the development of more robust resilience frameworks.

Policy implications derived from the literature suggest that governments play a central role in supporting private sector resilience. Proactive trade policies that minimize tariffs and reduce trade barriers can alleviate geopolitical risks, granting firms greater flexibility in sourcing decisions (Govindan et al., 2023). Such policies facilitate supplier diversification and allow firms to mitigate risks associated with concentrated dependencies. Similarly, government investments in logistics infrastructure—such as modernized ports, efficient customs procedures, and reliable transportation networks—can significantly enhance the agility of supply chains by reducing delays and transaction costs. These infrastructural supports directly address vulnerabilities exacerbated during crises like COVID-19, when bottlenecks in logistics severely constrained supply flows (Majumdar et al., 2022).

Public-private partnerships are another critical policy instrument. By fostering risk-sharing arrangements and incentivizing collaborative innovation, governments can encourage firms to adopt resilience-enhancing practices. Govindan et al. (2023) stress that technological adoption, including advanced analytics and digital platforms, is often contingent upon external support in the form of subsidies, tax breaks, or regulatory facilitation. Such incentives are particularly vital for small and medium-sized enterprises (SMEs), which often lack the capital resources to invest independently in resilience technologies. Establishing adaptive regulatory environments that formalize resilience standards across industries can also create uniform benchmarks, ensuring that firms embed risk management into their operational models (Handfield et al., 2020; Johnson & Haug, 2021). By institutionalizing resilience, governments can help ensure that supply chains are not only responsive but also systematically equipped to withstand future disruptions.

Despite these advancements, limitations in the existing literature reveal areas requiring further scholarly attention. A significant shortcoming lies in the reliance on case study methodologies, which, while providing rich contextual insights, limit the generalizability of findings across diverse sectors and geographies (Madzík et al., 2024; Duong et al., 2022). Current research also tends to emphasize reactive strategies, such as redundancy and emergency sourcing, over proactive frameworks that cultivate resilience as a long-term organizational capability (Hasan et al., 2022). This focus on short-term mitigation neglects the structural and strategic shifts necessary for enduring resilience.

Future research should thus prioritize longitudinal studies that trace the effectiveness of resilience strategies over time and across industries. Such studies would capture how adaptive practices evolve in response to ongoing crises and systemic changes (Sim et al., 2024). Additionally, the development of integrative frameworks that explicitly incorporate systemic factors into supply chain risk management remains underexplored. Rasshyvalov et al. (2024) emphasize the importance of embedding geopolitical, financial, and institutional variables into resilience models to reflect the realities of globalized supply chains. Another promising area is the intersection of artificial intelligence and resilience. Rezaei-Arangdad and Godfrey (2024) argue that AI-driven tools enhance predictive capabilities and optimize resource allocation, thereby improving preparedness for disruptions. Similarly, Magableh and Mistarihi (2023) highlight the role of machine learning in identifying patterns of vulnerability, suggesting fertile ground for future empirical investigations.

Attention must also be directed towards SMEs, which constitute the majority of participants in global supply chains but often lack the financial and technological capacity to adopt comprehensive resilience measures. Narkhede et al. (2024) note that SMEs are disproportionately vulnerable to systemic shocks, underscoring the need for targeted research into scalable resilience strategies suitable for resource-constrained firms. By addressing these gaps, future scholarship can move beyond fragmented insights to develop holistic frameworks that reflect the multifaceted nature of global supply chain dynamics.

CONCLUSION

This review highlights the multifaceted challenges and evolving strategies within global supply chain risk management. The findings indicate that resilience strategies such as redundancy, agility, and digitalization are indispensable for mitigating disruptions and ensuring operational continuity. Case studies across industries further demonstrate both the successes and failures of these approaches, underscoring the necessity of embedding resilience into supply chain design before crises emerge. Collaboration among stakeholders, supported by joint governance frameworks and risk-sharing contracts, has proven to reduce systemic vulnerabilities while enhancing collective performance. Geopolitical tensions and the COVID-19 pandemic illustrate the fragility of global networks, reinforcing the importance of diversified sourcing, localized supply chains, and investments in digital technologies. Moreover, sustainability-related risks encompassing environmental, social, and governance dimensions demand integrated frameworks that align risk management with ethical and regulatory imperatives. The role of strategic intelligence emerges as a dynamic capability enabling organizations to anticipate, adapt, and recover from disruptions more effectively.

The urgency of these issues calls for greater engagement from both policymakers and industry leaders. Governments should establish supportive trade policies, invest in logistics infrastructure, and encourage public-private partnerships that facilitate technological adoption and resilience-building. Future research must address current limitations by developing longitudinal studies, integrative frameworks that embed systemic factors, and scalable strategies for small and medium-sized enterprises. By advancing these areas, scholarship and practice can converge to build supply chains that are not only efficient but also resilient, sustainable, and strategically intelligent, ensuring continuity and competitiveness in an increasingly volatile global landscape.

REFERENCE

Al-Abdelmalek, N., Küçükvar, M., Onat, N., Fares, E., Ayad, H., Bulak, M., … & Ertogral, K. (2023). Transforming challenges into opportunities for qatar's food industry: self-sufficiency, sustainability, and global food trade diversification. *Sustainability, 15*(7), 5755. https://doi.org/10.3390/su15075755

Bassett, H., Lau, J., Giordano, C., Suri, S., Advani, S., & Sharan, S. (2021). Preliminary lessons from covid-19 disruptions of small-scale fishery supply chains. *World Development, 143,* 105473. https://doi.org/10.1016/j.worlddev.2021.105473

Cao, S., Bryceson, K., & Hine, D. (2021). Collaborative risk management in decentralised multi-tier global food supply chains: an exploratory study. *The International Journal of Logistics Management, 32*(3), 1050-1067. https://doi.org/10.1108/ijlm-07-2020-0278

Das, D., Datta, A., Kumar, P., Kazançoğlu, Y., & Ram, M. (2021). Building supply chain resilience in the era of covid-19: an ahp-dematel approach. *Operations Management Research, 15*(1-2), 249-267. https://doi.org/10.1007/s12063-021-00200-4

Duong, A., Vo, V., Carvalho, M., Sampaio, P., & Quang, H. (2022). Risks and supply chain performance: globalization and covid-19 perspectives. *International Journal of Productivity and Performance Management, 72*(7), 1962-1986. https://doi.org/10.1108/ijppm-03-2021-0179

Ganesh, A. and Kalpana, P. (2022). Supply chain risk identification: a real-time data-mining approach. *Industrial Management & Data Systems, 122*(5), 1333-1354. https://doi.org/10.1108/imds-11-2021-0719

Gaspar, P., Ceryno, P., Ferrer, A., & Thomé, A. (2020). Phases and tools for supply chain risk management: a systematic literature review. *Gestão & Produção, 27*(3). https://doi.org/10.1590/0104-530x4227-20

Ghadge, A., Wurtmann, H., & Seuring, S. (2019). Managing climate change risks in global supply chains: a review and research agenda. *International Journal of Production Research, 58*(1), 44-64. https://doi.org/10.1080/00207543.2019.1629670

Govindan, K., Sethi, S., Cheng, T., & Lu, S. (2023). Designing supply chain strategies against epidemic outbreaks such as covid-19: review and future research directions. *Decision Sciences, 54*(4), 365-374. https://doi.org/10.1111/deci.12609

Gurtu, A. and Johny, J. (2021). Supply chain risk management: literature review. *Risks, 9*(1), 16. https://doi.org/10.3390/risks9010016

Handfield, R., Graham, G., & Burns, L. (2020). Coronavirus, tariffs, trade wars and supply chain evolutionary design. *International Journal of Operations & Production Management, 40*(10), 1649-1660. https://doi.org/10.1108/ijopm-03-2020-0171

Hasan, F., Islam, M., & Ishrat, F. (2022). Covid-19 pandemic impact on the supply chains of uk-based multinational manufacturing companies. *Business Ethics and Leadership, 6*(2), 44-67. https://doi.org/10.21272/bel.6(2).44-67.2022

Hsu, C., He, X., Zhang, T., Chang, A., Liu, W., & Lin, Z. (2022). Enhancing supply chain agility with industry 4.0 enablers to mitigate ripple effects based on integrated qfd-mcdm: an

empirical study of new energy materials manufacturers. *Mathematics, 10*(10), 1635. https://doi.org/10.3390/math10101635

Hsu, C., Li, M., Zhang, T., Chang, A., Shangguan, S., & Liu, W. (2022). Deploying big data enablers to strengthen supply chain resilience to mitigate sustainable risks based on integrated hoq-mcdm framework. *Mathematics, 10*(8), 1233. https://doi.org/10.3390/math10081233

Hsu, C., Zeng, J., Chang, A., & Cai, S. (2022). Deploying industry 4.0 enablers to strengthen supply chain resilience to mitigate ripple effects: an empirical study of top relay manufacturer in china. *IEEE Access, 10,* 114829-114855. https://doi.org/10.1109/access.2022.3215620

Johnson, J. and Haug, P. (2021). Modifications to global supply chain management strategies resulting from recent trade disruptions: an exploratory study. *Journal of Global Operations and Strategic Sourcing, 14*(4), 701-722. https://doi.org/10.1108/jgoss-12-2020-0074

Korucuk, S., Tırkolaee, E., Aytekin, A., Karabašević, D., & Karamaşa, Ç. (2023). Agile supply chain management based on critical success factors and most ideal risk reduction strategy in the era of industry 4.0: application to plastic industry. *Operations Management Research, 16*(4), 1698-1719. https://doi.org/10.1007/s12063-023-00360-5

Kuizinaitė, J., Morkūnas, M., & Volkov, A. (2023). Assessment of the most appropriate measures for mitigation of risks in the agri-food supply chain. *Sustainability, 15*(12), 9378. https://doi.org/10.3390/su15129378

Liu, D., Li, Z., He, C., & Wang, S. (2021). Risk-averse co-decision for lower-carbon product family configuration and resilient supplier selection. *Sustainability, 14*(1), 384. https://doi.org/10.3390/su14010384

Madzík, P., Falát, L., Copuš, L., & Čarnogurský, K. (2024). Resilience in supply chain risk management in disruptive world: rerouting research directions during and after pandemic. *Annals of Operations Research.* https://doi.org/10.1007/s10479-024-06126-x

Magableh, G. and Mistarihi, M. (2023). Global supply chain nervousness (gscn). *Sustainability, 15*(16), 12115. https://doi.org/10.3390/su151612115

Majumdar, A., Agrawal, R., Raut, R., & Narkhede, B. (2022). Two years of covid-19 pandemic: understanding the role of knowledge-based supply chains towards resilience through bibliometric and network analyses. *Operations Management Research, 16*(3), 1105-1121. https://doi.org/10.1007/s12063-022-00328-x

Mzougui, I., Carpitella, S., Certa, A., & Izquierdo, J. (2023). A strategic approach to safeguard global supply chains against covid-19 disruptions. *Mathematical Methods in the Applied Sciences, 48*(7), 7875-7889. https://doi.org/10.1002/mma.9373

Narkhede, G., Samuel, C., Mahajan, S., Verma, D., Sakhare, N., & Chaudhari, T. (2024). Beyond traditional supply chain management: addressing sociopolitical challenges in increasingly turbulent global trade landscape. *Business Strategy & Development, 7*(2). https://doi.org/10.1002/bsd2.397

Pasupuleti, V., Thuraka, B., Kodete, C., & Malisetty, S. (2024). Enhancing supply chain agility and sustainability through machine learning: optimization techniques for logistics and inventory management. *Logistics, 8*(3), 73. https://doi.org/10.3390/logistics8030073

Pham, H., Quang, H., Sampaio, P., Carvalho, M., Tran, D., Vo, V., … & Duong, A. (2022). The impact of global risks on supply chain performance: an empirical study on construction sector in the covid-19 pandemic. *International Journal of Quality & Reliability Management, 40*(4), 1009-1035. https://doi.org/10.1108/ijqrm-03-2022-0084

Rasshyvalov, D., Portnov, Y., Sigaieva, T., Alboshchii, O., & Rozumnyi, O. (2024). Navigating geopolitical risks: implications for global supply chain management. *Multidisciplinary Reviews, 7,* 2024spe017. https://doi.org/10.31893/multirev.2024spe017

Revilla, E. and Sáenz, M. (2017). The impact of risk management on the frequency of supply chain disruptions. *International Journal of Operations & Production Management, 37*(5), 557-576. https://doi.org/10.1108/ijopm-03-2016-0129

Rezaei-Arangdad, S. and Godfrey, A. (2024). Disruptions and adaptations: covid-19's impact on textile supply chain management. *Advances in Science and Technology, 146,* 67-75. https://doi.org/10.4028/p-lbud8y

Rhodes, O., Rostami, A., Khodadadyan, A., & Dunne, S. (2022). Response strategies of uk construction contractors to covid-19 in the consideration of new projects. *Buildings, 12*(7), 946. https://doi.org/10.3390/buildings12070946

Safari, A., Ismail, V., Parast, M., Gölgeci, İ., & Pokharel, S. (2023). Supply chain risk and resilience in startups, smes, and large enterprises: a systematic review and directions for research. *The International Journal of Logistics Management, 35*(2), 680-709. https://doi.org/10.1108/ijlm-10-2022-0422

Schutte, F., Niemann, W., & Kotzé, T. (2019). Post-shipment financial flows in supply chains: a study of small- to medium-sized enterprise importers. *Journal of Transport and Supply Chain Management, 13*. https://doi.org/10.4102/jtscm.v13i0.452

Seuring, S., Brandenburg, M., Sauer, P., Schünemann, D., Warasthe, R., Aman, S., … & Khalid, R. (2022). Comparing regions globally: impacts of covid-19 on supply chains – a delphi study. *International Journal of Operations & Production Management, 42*(8), 1077-1108. https://doi.org/10.1108/ijopm-10-2021-0675

Sigala, I., Sirenko, M., Comes, T., & Kovács, G. (2022). Mitigating personal protective equipment (ppe) supply chain disruptions in pandemics – a system dynamics approach. *International Journal of Operations & Production Management, 42*(13), 128-154. https://doi.org/10.1108/ijopm-09-2021-0608

Sim, M., Lee, J., Kim, Y., & Lee, C. (2024). Resilient responses to global supply chain disruptions: focusing on the stock price of global logistics companies. *Applied Sciences, 14*(23), 11256. https://doi.org/10.3390/app142311256

Sun, J., Wang, H., & Cui, Z. (2023). Alleviating the bauxite maritime supply chain risks through resilient strategies: qfd-mcdm with intuitionistic fuzzy decision approach. *Sustainability, 15*(10), 8244. https://doi.org/10.3390/su15108244

Um, J. and Han, N. (2020). Understanding the relationships between global supply chain risk and supply chain resilience: the role of mitigating strategies. *Supply Chain Management an International Journal, 26*(2), 240-255. https://doi.org/10.1108/scm-06-2020-0248

Völlers, P., Neise, T., Verfürth, P., Franz, M., Bücken, F., & Schumacher, K. (2023). Revisiting risk in the global production network approach 2.0 - towards a performative risk narrative perspective. *Environment and Planning A: Economy and Space, 55*(8), 1838-1858. https://doi.org/10.1177/0308518x231169288

Wiedmer, R., Polyviou, M., & Paraskevas, J. (2023). Does global supply chain integration payoff? the case of maritime shipping firms. *Journal of Business Logistics, 45*(1). https://doi.org/10.1111/jbl.12350

Wu, K., Yan, B., Ren, M., Tseng, M., Wáng, Q., & Chiu, A. (2022). Reconfiguring a hierarchical supply chain model under pandemic using text mining and social media analysis. *Industrial Management & Data Systems, 122*(3), 622-644. https://doi.org/10.1108/imds-06-2021-0358

Xu, X., Sethi, S., Chung, S., & Choi, T. (2023). Reforming global supply chain management under pandemics: the great-3rs framework. *Production and Operations Management, 32*(2), 524-546. https://doi.org/10.1111/poms.13885

Xu, Z., Elomri, A., Kerbache, L., & Omri, A. (2020). Impacts of covid-19 on global supply chains: facts and perspectives. *IEEE Engineering Management Review, 48*(3), 153-166. https://doi.org/10.1109/emr.2020.3018420

Yalçın, S. and Ayyıldız, E. (2024). Prioritizing vulnerability factors of global food supply chains by fermatean fuzzy analytical hierarchy process. *Foundations of Computing and Decision Sciences, 49*(3), 303-320. https://doi.org/10.2478/fcds-2024-0016