Article

Not peer-reviewed version

Adapting to Disruptions: A Qualitative Study on Strategies for Building Resilience in Global Supply Chains

Harry Johnson *

Posted Date: 2 January 2025

doi: 10.20944/preprints202501.0090.v1

Keywords: supply chain resilience; disruptions; diversification; technology adoption; risk management; collaboration; organizational culture

Article

Adapting to Disruptions: A Qualitative Study on Strategies for Building Resilience in Global Supply Chains

Harry Johnson

Independent Researcher; harryjohnson2555@outlook.com

Abstract: This study explores the strategies employed by organizations to build resilience in global supply chains amidst disruptions. As global supply chains face increasing volatility due to factors such as geopolitical instability, natural disasters, and regulatory changes, it is critical for organizations to adopt strategies that ensure continuity and minimize the impact of such disruptions. The research adopts a qualitative approach, utilizing in-depth interviews with 27 supply chain professionals from various industries to understand the key factors contributing to supply chain resilience. The study identifies several key strategies that organizations use, including diversification of suppliers and production locations, the adoption of advanced technologies such as artificial intelligence, machine learning, and real-time monitoring tools, and the importance of strong collaboration and communication with stakeholders. Additionally, the research highlights the role of organizational culture, leadership, and risk management practices in fostering a resilient supply chain. The findings suggest that companies that proactively manage risks, invest in technology, and establish strong collaborative relationships are better equipped to respond to disruptions and ensure operational continuity. Furthermore, the study emphasizes the importance of external factors such as regulatory changes and environmental disruptions in shaping supply chain resilience. The research concludes that building resilience is an ongoing process that requires continuous adaptation, proactive risk management, and strategic foresight to ensure that organizations can navigate the complexities and uncertainties of the global supply chain environment.

Keywords: supply chain resilience; disruptions; diversification; technology adoption; risk management; collaboration; organizational culture

1. Introduction

The concept of global supply chains (GSCs) has evolved over the past few decades, becoming an integral component of modern economies. These intricate systems of interconnected organizations, suppliers, and customers span multiple countries and industries, ensuring the efficient movement of goods, services, and information across borders. However, in recent years, the resilience of these global networks has been under intense scrutiny due to the increasing frequency and severity of disruptions. The term "disruption" refers to any event that disrupts the normal functioning of a supply chain, ranging from natural disasters, geopolitical tensions, economic shocks, and technological failures to pandemics such as the COVID-19 crisis (Zhang et al., 2021). The widespread effects of such disruptions have highlighted the vulnerability of the global supply chain, necessitating the development of more robust strategies to adapt and recover from these events (Ivanov & Dolgui, 2019). As the world becomes more interconnected, the potential for disruptions in one region to cascade across the global supply chain increases. The COVID-19 pandemic, for example, demonstrated the fragile nature of globalized production networks. Lockdowns, travel restrictions, labor shortages, and disruptions in transportation systems all contributed to severe delays in production and delivery timelines (Rashid et al., 2024). These disruptions had far-reaching consequences, impacting industries from automotive manufacturing to pharmaceuticals, electronics,

 doi:10.20944/preprints202501.0090.v1

and food supply chains. The pandemic exposed the challenges of balancing efficiency with resilience, as many companies had optimized their supply chains for cost reduction and just-in-time delivery, leaving little room for flexibility in the face of disruptions (Fischer-Preßler et al., 2020). In response to these challenges, organizations are increasingly looking for strategies to build supply chain resilience—strategies that will enable them to better withstand and recover from future disruptions (Durach, Glasen, & Sträube, 2017). One key strategy in building resilience is the concept of risk management. Risk management involves identifying, assessing, and mitigating potential risks that could disrupt the flow of goods and services (Zhao et al., 2023). A variety of approaches have been developed to understand and mitigate these risks, including the development of risk matrices, scenario planning, and stress testing. However, risk management in the context of global supply chains requires a more holistic approach that considers not only the risks within an organization's direct supply network but also those in the wider supply ecosystem (Nikookar et al., 2024). This has led to the development of frameworks that extend beyond the immediate suppliers and customers, incorporating geopolitical risks, environmental factors, and technological vulnerabilities into the risk management process (Ghobakhloo et al., 2023). While these frameworks are essential for identifying potential disruptions, they are not sufficient on their own. Companies must also focus on strategies that allow them to adapt in real-time when disruptions occur. One of the most critical elements in building resilience is the ability to adapt to unforeseen disruptions. Adaptation strategies involve the ability of organizations to quickly pivot, reconfigure supply chains, and find alternative solutions when disruptions occur (Altay & Pal, 2022). The ability to adapt depends heavily on the flexibility and agility of the supply chain network. This means that companies must have contingency plans in place, including alternative suppliers, transportation routes, and production processes. For example, companies can explore dual sourcing strategies, where they source key materials from two or more suppliers in different geographic locations. This diversification helps to reduce the risk of supply chain disruptions caused by events that impact one region or supplier (Kleindorfer & Saad, 2009). Additionally, companies can adopt technological innovations, such as artificial intelligence and machine learning, to predict and respond to disruptions more effectively (Wu et al., 2011). These technologies enable companies to analyze large amounts of data in real-time, identify emerging risks, and adjust their supply chain operations accordingly (Zheng et al., 2024). Another crucial strategy for building resilience is the focus on building strong relationships within the supply chain network. The success of a resilient supply chain is not solely dependent on the internal capabilities of a company; it also requires cooperation, communication, and trust among suppliers, manufacturers, and customers (Dey et al., 2023). Research has shown that organizations that maintain close relationships with their suppliers are better able to mitigate the effects of disruptions, as they can collaborate more effectively to find alternative solutions or adjust to changing circumstances (Manikas et al., 2022). These relationships help to ensure that information flows smoothly across the supply chain, enabling organizations to respond quickly and effectively to emerging threats. Furthermore, organizations that invest in long-term partnerships with suppliers are more likely to experience greater levels of trust and cooperation during periods of disruption (Hohenstein, 2022). Furthermore, the digitalization of supply chains has emerged as a key enabler of resilience. Digital technologies, such as the Internet of Things (IoT), blockchain, and cloud computing, allow for greater visibility and transparency across the entire supply chain (Emon & Khan, 2024). These technologies provide real-time data on inventory levels, shipments, and production schedules, allowing companies to respond quickly to disruptions and make informed decisions. For example, IoT sensors can be used to track the movement of goods in transit, providing early warnings if shipments are delayed or diverted. Blockchain technology, on the other hand, can enhance trust and accountability in the supply chain by providing an immutable record of transactions that can be accessed by all stakeholders (Zhao et al., 2023). By leveraging these digital tools, organizations can enhance their ability to monitor, assess, and respond to disruptions in real-time, reducing the time it takes to recover from disruptions and improving overall supply chain resilience (Dubey et al., 2023). Despite the numerous strategies that organizations can adopt to build resilience, it is important to recognize that there is no one-size-fits-all approach. The

 doi:10.20944/preprints202501.0090.v1

effectiveness of any strategy depends on the unique characteristics of each organization, including its size, industry, geographical location, and the specific risks it faces (Zhang et al., 2021). For instance, the strategies employed by a global electronics manufacturer may differ significantly from those used by a food retailer, as the risks and challenges they face are inherently different. While the electronics manufacturer may prioritize the development of flexible production capabilities and the diversification of suppliers, the food retailer may focus on ensuring the availability of perishable goods and minimizing disruptions to transportation networks (Ghasemzadeh et al., 2017). This highlights the need for organizations to adopt a customized approach to building resilience, taking into account their specific needs and vulnerabilities. Furthermore, it is crucial to emphasize that building resilience is not a one-time effort but an ongoing process. Organizations must continuously assess and refine their strategies in response to emerging risks and changing conditions. This requires a culture of continuous improvement, where organizations are constantly learning from past disruptions and incorporating lessons learned into their risk management and adaptation strategies (Jiang et al., 2023). Research has shown that organizations that are proactive in their efforts to build resilience are more likely to recover quickly and emerge stronger after disruptions (Hohenstein, 2022). As such, resilience should be viewed as a dynamic capability that evolves over time, rather than a static trait that can be achieved through a single intervention (Nnaji et al., 2024). The increasing frequency and severity of disruptions to global supply chains have underscored the need for organizations to develop robust strategies for building resilience. While many strategies have been proposed, such as risk management, adaptation, relationship building, and digitalization, the key to resilience lies in the ability to respond to disruptions in real-time, collaborate effectively with stakeholders, and continuously improve strategies over time. As organizations continue to face an increasingly complex and volatile business environment, the ability to build and maintain resilient supply chains will be a critical determinant of success. By adopting a holistic approach to resilience that incorporates both proactive risk management and flexible adaptation strategies, organizations can better navigate the challenges posed by disruptions and ensure the continuity of their operations in an uncertain world.

2. Literature Review

The study of resilience in global supply chains has gained increasing attention over the past few decades, driven by the need to adapt to a variety of challenges arising from disruptions. These disruptions, which can range from natural disasters, technological failures, to geopolitical uncertainties, have significant impacts on the continuity of supply chains, necessitating the development of strategies to manage and mitigate these risks. As the global supply chain landscape continues to evolve, scholars and practitioners have focused on developing frameworks, models, and strategies aimed at enhancing resilience. This literature review aims to synthesize recent research on resilience in supply chains, particularly focusing on how organizations are building resilience to adapt to disruptions and maintain their operations in volatile environments. The concept of supply chain resilience has been widely studied in the context of risk management. Early works in the field emphasized the need for risk management frameworks to identify and mitigate risks (Ivanov et al., 2014; Ponomarov & Holcomb, 2009). These frameworks focused primarily on identifying and quantifying risks, assessing their potential impacts on supply chain performance, and then developing mitigation strategies. However, in recent years, scholars have recognized that risk management is just one component of a broader approach to supply chain resilience. Ivanov and Dolgui (2020) emphasize that supply chain resilience is not solely about preventing risks but also about the ability to recover quickly and efficiently when disruptions do occur. This perspective has led to an increasing focus on the adaptability of supply chains, recognizing that no supply chain can be entirely risk-free, and that organizations must be capable of responding to unexpected challenges as they arise. The development of adaptive strategies for building resilience has become a central theme in recent research. Emon et al. (2025) note that one of the key characteristics of resilient supply chains is their ability to adapt to changing conditions. This adaptability is often linked to flexibility

 doi:10.20944/preprints202501.0090.v1

within the supply chain structure, such as the ability to rapidly switch suppliers or reconfigure production processes in response to disruptions. This view aligns with the work of Wieland et al. (2023), who argue that flexibility and agility are critical attributes of resilient supply chains, allowing organizations to respond to unforeseen events without significant loss of performance. Furthermore, Khan et al. (2025) argue that flexibility can be built through diversified sourcing strategies, which reduce dependence on single suppliers and mitigate the risks associated with disruptions. Diversification in both suppliers and geographical locations is seen as an effective strategy for building flexibility, as it reduces the vulnerability of the supply chain to localized disruptions (Belhadi et al., 2020). Technological innovations have also played a significant role in improving supply chain resilience. Khan et al. (2024) highlight the potential of digital technologies, such as artificial intelligence (AI), blockchain, and the Internet of Things (IoT), to enhance the resilience of supply chains. These technologies provide real-time data on the movement of goods, inventory levels, and potential risks, enabling organizations to make more informed decisions and react more quickly to disruptions. AI, for example, can be used to predict potential disruptions based on historical data and real-time analytics, allowing organizations to take preventive measures before a disruption occurs (Emon et al., 2024). Additionally, blockchain technology can improve transparency and traceability across the supply chain, ensuring that all stakeholders have access to the same information and can coordinate more effectively during times of disruption (Belhadi et al., 2021). These technologies are viewed as enablers of real-time decision-making and response, which are essential for minimizing the impacts of disruptions. The role of collaboration and relationships within the supply chain has also emerged as a critical factor in building resilience. Yuan et al. (2023) argue that close collaboration between supply chain partners is essential for sharing information, resources, and risks, which helps organizations respond more effectively to disruptions. By maintaining strong relationships with suppliers and customers, companies can coordinate better during times of crisis, ensuring that alternative solutions are quickly implemented to maintain the flow of goods and services. This perspective is supported by the findings of Gao (2024), who emphasizes that trust and cooperation among supply chain partners are critical for ensuring that information is shared promptly and that supply chains can continue to function despite external disruptions. Furthermore, as Asafo-Adjei et al. (2023) suggest, collaboration can extend beyond immediate supply chain partners to include governments and other stakeholders, particularly when disruptions are large-scale and affect entire industries or regions. This broader network of collaboration can help in coordinating responses and sharing resources, further enhancing supply chain resilience. Despite the many strategies proposed for building resilience, it is essential to recognize that no single approach works for all organizations. The need for tailored resilience strategies has been highlighted by researchers such as Alvarenga et al. (2023), who argue that the specific characteristics of an organization, such as its size, industry, and geographical location, significantly influence the type of resilience strategies that are most effective. For instance, organizations operating in industries with high levels of product complexity, such as the aerospace or automotive industries, may require more sophisticated strategies involving inventory management, production planning, and technology integration (Khan & Emon, 2024). In contrast, organizations in industries with less complex products, such as food retailing, may place greater emphasis on logistics and transportation networks to ensure that supply chains remain operational during disruptions (Tranvouez & Ferrarini, 2006). The dynamic nature of supply chain resilience is also an important consideration. Alvarenga et al. (2022) argue that resilience is not a static capability but a dynamic process that evolves over time. This perspective challenges the traditional view of resilience as a fixed trait that can be achieved through one-time interventions. Instead, organizations must continuously assess and adjust their resilience strategies based on changes in the external environment and lessons learned from past disruptions. This approach aligns with the findings of Belhadi et al. (2021), who suggest that organizations should engage in continuous learning and improvement to ensure that their resilience strategies remain effective in the face of new and emerging risks. Similarly, Chen et al. (2024) emphasize that organizations must build a culture of resilience, where employees at all levels understand the

 doi:10.20944/preprints202501.0090.v1

importance of adaptability and are trained to respond to disruptions as part of their day-to-day operations. Furthermore, the concept of resilience in supply chains extends beyond the immediate capabilities of individual organizations to the broader supply network. As Grossman et al. (2023) highlight, resilience is a collective characteristic of the entire supply chain ecosystem, involving all stakeholders, including suppliers, distributors, logistics providers, and customers. Therefore, efforts to build resilience must consider not only the internal capabilities of a company but also its relationships with other organizations within the supply chain. This view is supported by the work of Alvarenga et al. (2023), who argue that companies must collaborate with their supply chain partners to develop joint resilience strategies and share risks more equitably. One of the challenges associated with building resilience is balancing efficiency with flexibility. While efficient supply chains are critical for reducing costs and maintaining competitive advantage, they can also make organizations more vulnerable to disruptions. As Ivanov (2023) points out, many organizations have optimized their supply chains for efficiency, relying on just-in-time inventory systems and lean production practices. While these approaches can help reduce costs, they also leave little room for flexibility in the face of disruptions. Therefore, building resilience requires a shift in focus from mere efficiency to a more balanced approach that includes flexibility and adaptability as key components. This balance is also emphasized by Varriale et al. (2021), who argue that organizations must re-evaluate their supply chain strategies to ensure that they are not overly focused on cost reduction at the expense of resilience. Moreover, supply chain resilience is often linked to the ability to recover quickly after disruptions. According to Badakhshan & Ball (2022), recovery is an essential aspect of resilience, and organizations must have the capabilities in place to quickly restore normal operations after a disruption occurs. This includes having contingency plans, alternative suppliers, and backup systems that can be activated during times of crisis. Recovery efforts are also influenced by the speed and effectiveness of decision-making, which can be enhanced through the use of digital tools and technologies (Khan et al., 2025). In conclusion, the literature on supply chain resilience highlights a multifaceted approach that includes risk management, adaptability, collaboration, and the use of digital technologies. Resilience is not a static trait but a dynamic capability that must evolve in response to changing conditions. As disruptions become more frequent and complex, organizations must adopt flexible and adaptive strategies to maintain their operations. The future of supply chain resilience lies in the continuous improvement of these strategies, driven by both internal efforts and collaboration with external partners. By focusing on flexibility, technology, collaboration, and continuous learning, organizations can enhance their resilience and navigate the challenges posed by an increasingly volatile and unpredictable global environment.

3. Method

The research methodology for this study aimed to explore strategies for building resilience in global supply chains in the context of disruptions. A qualitative approach was employed to gain in-depth insights into the strategies used by organizations to manage and adapt to these challenges. A semi-structured interview technique was chosen as the primary data collection method, allowing the researchers to capture both standardized and rich, detailed responses from participants. The interviews were designed to explore participants' experiences, perceptions, and perspectives on how their organizations build resilience and adapt to various disruptions in the supply chain. The participants were selected through purposive sampling, ensuring that the sample consisted of individuals with relevant expertise and experience in supply chain management, risk management, and organizational resilience. A total of 27 participants were selected for the study, representing a diverse set of industries including manufacturing, retail, logistics, and technology. These participants included supply chain managers, operations directors, risk managers, and consultants, each of whom had significant experience working with global supply chains and managing disruptions. To ensure that the sample was representative of different perspectives and practices, participants were selected based on their roles, industries, and geographical locations. This allowed the researchers to capture a wide range of strategies and practices from organizations that operate in various contexts and

 doi:10.20944/preprints202501.0090.v1

environments. The participants were contacted via email, and their participation was voluntary. Informed consent was obtained from all participants before the interviews, with an assurance that their responses would remain confidential and used solely for the purposes of the study. The interviews were conducted either in person or through video conferencing platforms, depending on the availability and preferences of the participants. The duration of the interviews ranged from 45 minutes to 1.5 hours, with participants encouraged to elaborate on their experiences and provide examples of how their organizations had adapted to specific disruptions. The interviews were audio-recorded with the participants' consent, and detailed notes were taken during the interviews to supplement the recordings. The data collected from the interviews were transcribed verbatim, and thematic analysis was used to identify common themes, patterns, and insights across the responses. Thematic analysis allowed the researchers to systematically examine the data and identify recurring themes related to the strategies employed by organizations to build resilience, as well as the challenges and opportunities they face in adapting to disruptions. The analysis was conducted manually, with the researchers first familiarizing themselves with the transcripts, followed by the coding of the data into themes. After initial coding, the themes were refined through iterative analysis, and key findings were extracted that answered the research questions. To ensure the validity and reliability of the study, the researchers employed member checking, where a subset of participants was invited to review the findings and provide feedback on the accuracy and relevance of the identified themes. This process helped to ensure that the researchers' interpretations of the data aligned with the participants' experiences and perspectives. Additionally, the researchers maintained an audit trail by documenting the decisions made throughout the data collection and analysis process, allowing for transparency and consistency in the research process. Ethical considerations were carefully observed throughout the study, with an emphasis on participant confidentiality and voluntary participation. The findings from the qualitative data were subsequently used to develop insights into the strategies that organizations use to build resilience in their global supply chains, as well as the factors that influence their decision-making in times of disruption. The methodology used in this study was designed to provide a comprehensive understanding of the strategies employed by organizations to build resilience in the face of disruptions. By conducting in-depth interviews with a diverse sample of supply chain professionals and industry experts, the research was able to capture valuable insights that contribute to the growing body of knowledge on supply chain resilience. The qualitative approach allowed for a detailed exploration of the experiences and perceptions of the participants, providing a rich dataset from which meaningful themes and conclusions were drawn. The findings from this study offer valuable insights for both practitioners and researchers in the field of supply chain management.

4. Results

The results and findings of the study provide a comprehensive overview of the strategies used by organizations to build resilience in their global supply chains in response to disruptions. The analysis of the interview data revealed several key themes that emerged consistently across the 27 participants, reflecting a range of practices, challenges, and opportunities related to supply chain resilience. The findings demonstrate that organizations employ a variety of strategies to manage risks, adapt to disruptions, and ensure continuity in their supply chains. These strategies include diversification, technological adoption, collaboration, flexibility, risk management practices, and the development of organizational culture focused on resilience. The results also highlight the importance of dynamic adaptation and continuous improvement in supply chain resilience. One of the most prominent strategies identified by the participants was diversification. Many organizations have adopted a diversification strategy to reduce the risks associated with supply chain disruptions. This involves spreading operations across multiple suppliers, geographical regions, and logistics networks to minimize the impact of disruptions in one area. Participants emphasized that having a diversified supplier base allows organizations to shift production or sourcing to alternative suppliers when one source is compromised. This approach not only reduces the risk of relying on a single

 doi:10.20944/preprints202501.0090.v1

supplier or region but also provides a buffer against unexpected geopolitical, economic, or environmental disruptions. Some participants specifically highlighted the importance of geographic diversification, where organizations strategically locate their operations in different parts of the world to ensure continuity if one region faces a disruption. The ability to quickly switch suppliers or sources of raw materials based on changing circumstances was seen as a critical element of resilience. Another key theme that emerged from the findings was the role of technology in enhancing supply chain resilience. Many participants described how the adoption of digital technologies has improved their ability to monitor supply chain activities, detect potential disruptions, and respond proactively. Technologies such as artificial intelligence (AI), machine learning, the Internet of Things (IoT), and blockchain were frequently mentioned as tools that have transformed supply chain operations. AI and machine learning were particularly noted for their ability to predict potential disruptions by analyzing vast amounts of data from historical events, weather patterns, and geopolitical trends. This predictive capability allows organizations to take preemptive measures and make informed decisions regarding inventory management, transportation routes, and supplier selection. IoT devices were highlighted as essential for real-time tracking of goods and materials, enabling companies to have up-to-date information on inventory levels, shipment status, and potential delays. Blockchain technology was seen as a valuable tool for ensuring transparency and traceability throughout the supply chain, making it easier to track the flow of goods and verify the integrity of transactions. Collaboration and communication were also identified as crucial elements in building resilience. The findings revealed that organizations often rely on close relationships with their supply chain partners to share information, risks, and resources in times of disruption. Participants emphasized the importance of maintaining open lines of communication with suppliers, logistics providers, and customers, particularly during crises. In many cases, organizations were able to coordinate responses to disruptions more effectively because of established relationships built on trust and mutual support. Collaboration was not only confined to suppliers and customers but extended to other stakeholders such as governments and industry associations, especially when disruptions had broader regional or global impacts. By working together, organizations could ensure that critical resources and information were shared, helping to minimize the impact of disruptions. Additionally, some participants mentioned the value of collaborative risk-sharing arrangements, where supply chain partners agree to share the costs associated with disruptions, thereby reducing the financial burden on any single entity. Flexibility and agility were highlighted as fundamental qualities of resilient supply chains. The findings indicated that organizations that were able to quickly adjust their operations in response to disruptions were more likely to maintain continuity. Flexibility in production schedules, sourcing, and transportation was particularly important for organizations dealing with unexpected changes in demand or supply. Participants noted that the ability to shift production lines or alter delivery schedules on short notice helped mitigate the impact of disruptions and maintain customer satisfaction. Agility was also linked to the ability to innovate and adapt quickly to new circumstances. For instance, some organizations were able to pivot their operations to produce essential products during the COVID-19 pandemic, such as manufacturing personal protective equipment or ventilators, in response to a sudden increase in demand. Risk management practices were central to the resilience strategies discussed by participants. Many organizations had developed comprehensive risk management frameworks that allowed them to identify, assess, and mitigate potential disruptions before they occurred. These frameworks included detailed risk assessments, contingency plans, and mitigation strategies for various types of disruptions, such as natural disasters, economic shocks, and supply chain interruptions. Participants emphasized the importance of regularly updating risk assessments to reflect emerging risks and changing circumstances. Furthermore, organizations often conducted scenario planning exercises to explore potential future disruptions and develop strategies for responding to them. These exercises helped participants to better understand the range of possible risks and prepare for different scenarios, thereby enhancing their ability to respond quickly and effectively. The development of organizational culture focused on resilience was another theme that emerged strongly from the

 doi:10.20944/preprints202501.0090.v1

findings. Several participants emphasized the importance of fostering a culture where resilience is ingrained at all levels of the organization. This includes promoting a mindset of flexibility, adaptability, and continuous improvement among employees. Organizations that prioritized resilience were seen to have more engaged and empowered employees, who were able to make quick decisions and take action in the face of disruptions. Participants also highlighted the role of leadership in shaping organizational culture. Strong leaders were seen as essential in promoting resilience, providing clear guidance during times of crisis, and inspiring confidence among employees. Leadership support was also critical for ensuring that adequate resources were allocated to resilience-building initiatives, such as investing in technology, training, and supply chain diversification. The findings also revealed that building resilience is a dynamic process that requires continuous adaptation. Participants noted that organizations must be willing to learn from past disruptions and incorporate those lessons into their strategies. This includes evaluating the effectiveness of past responses to disruptions and making improvements where necessary. The ability to learn from both successes and failures was seen as an essential component of long-term resilience. Many participants emphasized the importance of regular reviews and updates to resilience strategies to ensure that they remain relevant in a rapidly changing global environment. This iterative process of improvement was viewed as a key factor in maintaining resilience over time. In addition to the internal strategies discussed by participants, the findings highlighted the influence of external factors on supply chain resilience. Many participants acknowledged that external forces, such as government policies, regulations, and global economic trends, play a significant role in shaping supply chain strategies. For example, changes in trade regulations, tariffs, and import/export restrictions were seen as major factors that could disrupt global supply chains. Some participants mentioned that they had to adapt their resilience strategies in response to changing regulations, such as adjusting their sourcing strategies or seeking alternative markets for their products. Geopolitical instability, natural disasters, and pandemics were also recognized as major external factors that could impact supply chain resilience. Participants noted that organizations must be prepared to respond not only to internal disruptions but also to broader global challenges that may affect the entire supply chain network. The study also uncovered some of the challenges that organizations face when trying to build resilience in their supply chains. One of the key challenges identified was the complexity of managing global supply chains. Participants noted that as supply chains become more globalized and interconnected, it becomes increasingly difficult to manage risks and disruptions effectively. The complexity of coordinating multiple suppliers, logistics providers, and other partners across different regions and time zones presents significant challenges for organizations. Furthermore, some participants highlighted the difficulty of balancing the trade-off between efficiency and resilience. Many organizations are under constant pressure to reduce costs and optimize their supply chains for maximum efficiency. However, this focus on efficiency can sometimes undermine resilience by reducing flexibility and increasing vulnerability to disruptions. The challenge, therefore, is to find a balance between optimizing supply chains for cost-effectiveness while maintaining the flexibility and agility needed to respond to disruptions. Finally, the findings revealed that organizations are increasingly recognizing the importance of building resilience as part of their long-term strategy. Participants noted that resilience is no longer seen as a reactive response to disruptions but as a proactive, strategic capability that can provide a competitive advantage. Many organizations are now embedding resilience into their corporate strategies, investing in technologies, processes, and human capital to build more resilient supply chains. This shift in mindset reflects a growing recognition that resilience is not just about surviving disruptions but also about thriving in an uncertain and volatile global environment. As a result, building resilience is increasingly viewed as a critical aspect of long-term sustainability and success in the global supply chain landscape.

 doi:10.20944/preprints202501.0090.v1

Table 1. Supply Chain Diversification Strategy.

Theme	Key Factors	Examples	Impact on Resilience
Diversification of Suppliers	Multiple suppliers, geographies	Sourcing from suppliers in multiple countries	Reduces dependency on a single source
Supplier Relationship Flexibility	Flexibility in supplier terms	Ability to shift suppliers during crises	Ensures continuity during disruptions
Product/Service Diversification	Offering alternative products	Shifting production lines to alternative goods	Ensures business continuity and market presence

The adoption of a diversification strategy emerged as a significant theme across the interviews. Organizations that diversified their suppliers, production sources, and geographical locations were better positioned to handle disruptions. This diversification allowed them to mitigate the risks of over-relying on any one supplier or region. In particular, shifting to alternative suppliers or product lines during supply chain interruptions was critical in maintaining operational continuity. Respondents consistently emphasized how diversifying their supply chain networks provided flexibility, allowing them to remain competitive and responsive to market demands despite external disruptions. By dispersing risks across multiple suppliers, both geographically and operationally, companies were able to better manage the volatility introduced by global disruptions.

Table 2. Technological Adoption for Resilience.

Theme	Key Technologies	Examples	Impact on Resilience
Predictive Analytics	AI, Machine Learning	Using AI for demand forecasting and risk assessment	Proactive identification of disruptions
Real-Time Monitoring	IoT, Blockchain	IoT-enabled sensors for shipment tracking	Improved response to supply chain interruptions
Automation and Robotics	Robotics, Process Automation	Automated warehouses and production lines	Enhanced efficiency and reduced human error

Technology played a pivotal role in strengthening the resilience of supply chains. Companies that adopted predictive analytics tools such as artificial intelligence (AI) and machine learning gained a competitive edge in forecasting potential disruptions and adjusting their strategies accordingly. Real-time monitoring technologies, such as the Internet of Things (IoT) and blockchain, enabled firms to track their goods and shipments continuously, ensuring a swift response to unexpected delays or disturbances. Automation in warehouses and production processes was also noted as a means to reduce human dependency, thereby maintaining efficiency during disruptions. As companies integrated these advanced technologies, they built an agile supply chain capable of quickly responding to unforeseen changes, enhancing both operational efficiency and risk management capabilities.

Table 3. Collaborative Networks in Supply Chain Resilience.

Theme	Collaborative Partners	Examples	Impact on Resilience
Supply Chain Partnerships	Suppliers, Distributors	Joint ventures with key suppliers	Strengthened risk-sharing mechanisms
Stakeholder Communication	Customers, Regulators	Regular updates and open communication channels	Enhanced visibility and crisis management
Industry Associations	Industry Peers, Competitors	Industry-wide collaborations during disruptions	Shared resources and collective problem-solving

 doi:10.20944/preprints202501.0090.v1

Collaboration and communication with key stakeholders were integral to the supply chains' resilience strategies. Respondents highlighted the importance of having established partnerships with suppliers, distributors, and even competitors. These collaborations fostered an environment of shared resources and risk mitigation, particularly when disruptions occurred. Regular communication with customers and regulatory bodies allowed firms to align on expectations and ensure that necessary adjustments were made in real time. Moreover, working with industry associations during global disruptions enabled organizations to pool resources and knowledge, addressing shared challenges more effectively. These collaborative efforts, underpinned by strong communication, allowed businesses to navigate through supply chain challenges more efficiently.

Table 4. Risk Management Practices.

Theme	Risk Mitigation Strategies	Examples	Impact on Resilience
Scenario Planning	Contingency planning, simulations	Simulating disruptions to evaluate responses	Preparedness for unexpected disruptions
Comprehensive Risk Assessment	Risk maps, SWOT analysis	Identifying vulnerable points in the supply chain	Early identification of potential disruptions
Financial Risk Management	Insurance, Hedging	Investing in supply chain insurance	Reduced financial impact of disruptions

Effective risk management practices were found to be critical to building resilient supply chains. Organizations that engaged in detailed scenario planning were better prepared for potential disruptions. By running simulations and assessing various disruption scenarios, they could predict possible outcomes and devise actionable plans. Additionally, a comprehensive risk assessment that involved mapping potential vulnerabilities and conducting SWOT (Strengths, Weaknesses, Opportunities, and Threats) analyses enabled companies to proactively address weaknesses in their supply chains. Many organizations also emphasized financial risk management strategies, such as investing in insurance or hedging, to protect themselves from the financial impact of disruptions. Collectively, these practices allowed organizations to stay ahead of risks, ensuring that they could adapt swiftly to changes while minimizing the impact on operations.

Table 5. Organizational Culture and Resilience.

Theme	Cultural Practices	Examples	Impact on Resilience
Flexibility in Decision-Making	Decentralized decision-making	Empowering employees to make quick decisions	Faster response times to disruptions
Resilience Training	Workshops, simulation exercises	Training employees in crisis management	Improved readiness for disruptive events
Leadership Support	Crisis leadership, strategic vision	Clear guidance from leadership during crises	Organizational confidence and direction

An organizational culture that promotes resilience was seen as a key driver in ensuring that supply chains remained robust during disruptions. Companies that encouraged flexibility in decision-making, particularly by decentralizing authority, enabled employees to make quick decisions during times of crisis. This speed in decision-making helped minimize delays and keep operations running smoothly. Resilience training programs were highlighted as essential in preparing employees for crises. By regularly participating in crisis management workshops and simulation exercises, staff members were able to familiarize themselves with potential disruptions and respond effectively. Additionally, leadership played a pivotal role in shaping the organizational mindset towards resilience. Leaders who provided clear guidance and strategic vision helped

 doi:10.20944/preprints202501.0090.v1

maintain organizational confidence and ensured that employees remained focused on overcoming challenges.

Table 6. Agility and Adaptability in Operations.

Theme	Operational Flexibility	Examples	Impact on Resilience
Production Flexibility	Adjustable production schedules	Shifting production lines during disruptions	Continued production without major delays
Supply Chain Flexibility	Multiple transportation routes	Diversifying logistics options to avoid blockages	Reducing delivery delays
Response to Market Shifts	Adjusting to changes in demand	Switching to manufacturing high-demand goods	Maintaining market position during crises

Agility and adaptability were fundamental to the resilience strategies of organizations. The ability to quickly alter production schedules and shift operations in response to disruptions enabled firms to keep their production lines running. For example, organizations that could adjust their production lines to accommodate alternative products during crises were able to maintain their manufacturing output without major interruptions. Similarly, having multiple transportation routes and diversifying logistics networks ensured that companies could continue moving goods despite disruptions in one part of the supply chain. This operational flexibility was also evident in how organizations responded to market shifts, such as adjusting production to meet the changing demands of consumers during unexpected events. These agile responses were crucial in sustaining operations and staying competitive during turbulent times.

Table 7. External Factors Affecting Supply Chain Resilience.

Theme	External Factors	Examples	Impact on Resilience
Regulatory Changes	Trade restrictions, tariffs	Adapting to new import/export restrictions	Required quick adjustments in sourcing and logistics
Environmental Disruptions	Natural disasters, climate change	Diversifying sources due to weather disruptions	Maintaining supply continuity despite climate events
Geopolitical Instability	Wars, political unrest	Shifting supply chain locations to stable regions	Reduced exposure to geopolitical risks

External factors significantly influence the resilience of global supply chains. Respondents noted that regulatory changes, such as new trade restrictions or tariffs, often required quick shifts in sourcing strategies and logistics operations to ensure continuity. Environmental disruptions, such as natural disasters and the effects of climate change, also posed challenges to supply chains. Companies responded by diversifying their supply sources or re-routing logistics to minimize delays during adverse weather events. Geopolitical instability, including wars or political unrest in specific regions, led organizations to reconsider their supply chain locations, often moving operations to more stable areas. These external factors highlighted the need for organizations to remain adaptable and responsive to changes in the global landscape, ensuring that supply chain resilience is not only internally driven but also externally aware.

The findings of the study highlight several key strategies and practices that organizations adopt to build resilience in their global supply chains in response to disruptions. A prominent theme that emerged was the importance of diversification, with companies spreading their operations across multiple suppliers, regions, and product lines to minimize the risks of dependency on a single source or location. Diversification provided a buffer against disruptions by allowing businesses to quickly shift their sourcing and production activities when one area faced challenges. Technological adoption was another crucial factor, with organizations leveraging advanced tools such as AI, machine

 doi:10.20944/preprints202501.0090.v1

learning, IoT, and blockchain to improve their ability to predict, monitor, and respond to disruptions in real time. These technologies helped organizations enhance efficiency, track goods across the supply chain, and make data-driven decisions, which were essential for maintaining operations during crises. Collaboration and communication emerged as vital elements of resilient supply chains. Firms that established strong relationships with suppliers, customers, and other stakeholders were able to share resources, risks, and information, enabling them to respond more effectively to disruptions. Regular communication and collaborative efforts during crises facilitated quicker adjustments and enhanced visibility into supply chain activities. Flexibility and adaptability were also integral to building resilience, with companies that could quickly alter production schedules, logistics routes, and business operations to accommodate changing circumstances proving more successful in managing disruptions. This agility allowed businesses to sustain operations even when facing unexpected challenges. Risk management practices were central to the resilience strategies of many organizations. Companies that conducted comprehensive risk assessments, engaged in scenario planning, and implemented contingency plans were better equipped to deal with potential disruptions. Financial risk management strategies, such as investing in insurance or hedging, were also identified as important for minimizing the financial impact of supply chain interruptions. The study found that fostering an organizational culture focused on resilience played a crucial role in ensuring that employees were empowered to respond to crises effectively. Leaders who provided clear guidance and support helped instill confidence throughout the organization, making it easier for businesses to navigate challenges. The external factors influencing supply chain resilience were also significant. Regulatory changes, environmental disruptions, and geopolitical instability were recognized as major challenges that companies needed to consider when building resilient supply chains. Firms that remained adaptable to external factors, such as shifting their operations to more stable regions or adjusting their sourcing strategies in response to regulatory changes, demonstrated greater resilience. Overall, the study found that organizations that employed a combination of diversification, technology, collaboration, risk management, and flexibility, while also considering external influences, were better equipped to navigate disruptions and maintain continuity in their global supply chains. These findings emphasize the dynamic nature of resilience and the need for continuous adaptation to evolving global challenges.

5. Discussion

The findings of this study reveal important insights into how organizations can effectively build resilience in their global supply chains. One of the key themes that emerged is the importance of diversification. Companies that diversified their supply base, geographical locations, and product offerings were better able to mitigate the risks associated with disruptions. By not relying on a single supplier, region, or product line, organizations were able to spread the risks across various sources, reducing the likelihood of significant operational interruptions. This strategy aligns with the growing recognition that global supply chains must be adaptable and flexible in the face of increasing uncertainty and volatility in the global market. Another critical factor that emerged from the study is the role of technology in enhancing supply chain resilience. The use of advanced technologies such as artificial intelligence, machine learning, Internet of Things (IoT), and blockchain proved instrumental in enabling organizations to predict potential disruptions, track shipments in real-time, and make data-driven decisions quickly. These technological tools provided businesses with the necessary visibility and control to respond to disruptions more effectively. They also allowed for proactive decision-making, ensuring that potential issues could be identified and addressed before they escalated into major problems. This technological empowerment has reshaped the way companies think about supply chain management, making it increasingly data-driven and responsive to real-time events. Collaboration and communication also emerged as essential components of a resilient supply chain. Organizations that maintained strong relationships with their suppliers, distributors, and customers were better equipped to weather disruptions. Through open communication channels and collaborative partnerships, these businesses were able to share

 doi:10.20944/preprints202501.0090.v1

resources, exchange critical information, and adapt their strategies quickly. This cooperation extended beyond individual companies, as firms within the same industry also collaborated to address common challenges. The importance of collaboration underscores the idea that resilience is not solely the responsibility of individual organizations but is often achieved through collective efforts. Working together, organizations can leverage each other's strengths to better respond to shared risks and disruptions. The study also highlighted the significance of organizational culture and leadership in fostering resilience. Companies that promoted a culture of flexibility and empowered their employees to make decisions in times of crisis were able to respond faster to disruptions. When leadership provided clear guidance and direction during challenging times, it helped maintain organizational focus and morale. Furthermore, organizations that invested in resilience training and crisis management preparedness were better able to handle unforeseen events. Employees who had been trained to think strategically in times of crisis demonstrated more confidence and effectiveness in managing disruptions. This emphasizes the importance of fostering a resilient mindset across all levels of the organization. Risk management practices were also identified as a key driver of resilience. Firms that proactively engaged in risk assessments and scenario planning were able to identify potential vulnerabilities in their supply chains and prepare for various types of disruptions. The use of financial risk management tools, such as insurance and hedging, helped organizations protect themselves from the financial consequences of disruptions. These practices ensured that businesses could maintain financial stability and avoid severe setbacks in the event of supply chain interruptions. The integration of risk management into the strategic planning process is now recognized as an essential part of building long-term supply chain resilience. Finally, external factors such as regulatory changes, environmental disruptions, and geopolitical instability were found to play a significant role in shaping the resilience of global supply chains. Companies that were able to anticipate and adapt to these external challenges were more likely to maintain operational continuity. Regulatory changes, such as new trade restrictions or tariffs, forced organizations to quickly alter their supply chains to comply with new rules. Environmental factors, including natural disasters and climate change, led businesses to diversify their suppliers and adjust their logistics networks to minimize disruptions. Geopolitical instability, such as political unrest or conflicts, prompted organizations to relocate or adjust their supply chain operations to more stable regions. The ability to navigate these external influences has become an essential part of maintaining supply chain resilience. In summary, the findings of this study illustrate that building a resilient global supply chain requires a multi-faceted approach. Organizations must adopt strategies that include diversification, technological innovation, collaboration, risk management, and an adaptable organizational culture. Furthermore, businesses must be prepared to respond to external factors that could impact their supply chains, such as regulatory changes, environmental disruptions, and geopolitical instability. By combining these elements, companies can develop supply chains that are not only robust in the face of disruptions but also capable of adapting to an ever-changing global environment. The dynamic nature of supply chain resilience means that companies must remain proactive, flexible, and responsive to the challenges and opportunities that arise in an increasingly complex and uncertain world.

6. Conclusion

This study has provided valuable insights into the strategies and practices that organizations utilize to build resilience in their global supply chains. The findings emphasize that a multifaceted approach is necessary for supply chains to remain robust in the face of disruptions. Diversification emerged as a key strategy, with companies spreading their risks across multiple suppliers, regions, and product lines to reduce dependency on any one source or location. This diversification, combined with the adoption of advanced technologies such as artificial intelligence, machine learning, and real-time monitoring tools, allows businesses to predict, track, and respond to disruptions more effectively. Furthermore, the importance of collaboration, both within organizations and across the broader supply chain ecosystem, was evident. Organizations that maintained strong communication

 doi:10.20944/preprints202501.0090.v1

with suppliers, distributors, and customers were better positioned to quickly adapt to changing circumstances and share resources and information when needed. The role of organizational culture and leadership also emerged as essential components of resilience. Companies that fostered a culture of flexibility, empowered their employees to make decisions, and invested in crisis management training were more agile and capable of responding to disruptions with confidence. Risk management practices, including scenario planning and financial risk mitigation, also proved vital in preparing organizations for unforeseen challenges. Additionally, external factors such as regulatory changes, environmental disruptions, and geopolitical instability were identified as significant influences on supply chain resilience, underscoring the need for organizations to remain adaptable to the changing global landscape. Ultimately, building resilience in global supply chains requires continuous adaptation and strategic foresight. The study highlights that organizations must remain proactive in diversifying their operations, integrating technology, fostering collaboration, and preparing for external shocks. As supply chains become increasingly complex and interconnected, the ability to respond quickly and efficiently to disruptions will be a critical determinant of organizational success. The findings underscore the importance of resilience as an ongoing process that requires constant evaluation, investment, and adaptation to ensure that supply chains can endure and thrive in the face of both anticipated and unforeseen challenges.

References

Durach, C. F., Glasen, P. C., & Sträube, F. (2017). Disruption causes and disruption management in supply chains with Chinese suppliers: Managing cultural differences. *International Journal of Physical Distribution & Logistics Management, 47*(9), 782-804. https://doi.org/10.1108/ijpdlm-07-2017-0228

Fischer-Preßler, D., Eismann, K., Pietrowski, R., Fischbach, K., & Schoder, D. (2020). Information technology and risk management in supply chains. *International Journal of Physical Distribution & Logistics Management, 50*(8), 775-794. https://doi.org/10.1108/ijpdlm-04-2019-0119

Zhang, Q., Fan, W.-Q., Lu, J., Wu, S., & Wang, X. (2021). Research on dynamic analysis and mitigation strategies of supply chains under different disruption risks. *Sustainability, 13*(5), 2462. https://doi.org/10.3390/su13052462

Nikookar, E., Stevenson, M., & Varsei, M. (2024). Building an antifragile supply chain: A capability blueprint for resilience and post-disruption growth. *Journal of Supply Chain Management, 60*(1), 54-72. https://doi.org/10.1111/jscm.12313

Ivanov, D., & Dolgui, A. (2019). Low-Certainty-Need (LCN) supply chains: A new perspective in managing disruption risks and resilience. *International Journal of Production Research, 57*(15-16), 5001-5022. https://doi.org/10.1080/00207543.2018.1521025

Rashid, A., Rasheed, R., Ngah, A., Jayaratne, M. D. R. P., Rahi, S., & Tunio, M. N. (2024). Role of information processing and digital supply chain in supply chain resilience through supply chain risk management. *Journal of Global Operations and Strategic Sourcing, 17*(2), 155-176. https://doi.org/10.1108/jgoss-12-2023-0106

Nnaji, U. O., Benjamin, L. B., Eyo-Udo, N. L., & Etukudoh, E. A. (2024). Strategies for enhancing global supply chain resilience to climate change. *International Journal of Management & Entrepreneurship Research, 6*(5), 1141-1155. https://doi.org/10.51594/ijmer.v6i5.1141

Emon, M. M. H., & Khan, T. (2024). Unlocking sustainability through supply chain visibility: Insights from the manufacturing sector of Bangladesh. *Brazilian Journal of Operations & Production Management, 21*(4), 2194. https://doi.org/10.14488/BJOPM.2194.2024

Ghobakhloo, M., Iranmanesh, M., Foroughi, B., Tseng, M.-L., Nikbin, D., & Khanfar, A. A. (2023). Industry 4.0 digital transformation and opportunities for supply chain resilience: A comprehensive review and a strategic roadmap. *Production Planning & Control, 34*(2), 125-145. https://doi.org/10.1080/09537287.2023.2252376

Zhao, G., Vazquez-Noguerol, M., Liu, S., & Prado Prado, J. C. (2023). Agri-food supply chain resilience strategies for preparing, responding, recovering, and adapting in relation to unexpected crisis: A cross-country comparative analysis from the COVID-19 pandemic. *Journal of Business Logistics, 44*(3), 253-274. https://doi.org/10.1111/jbl.12361

 doi:10.20944/preprints202501.0090.v1

Altay, N., & Pal, R. (2022). Coping in supply chains: A conceptual framework for disruption management. *The International Journal of Logistics Management, 33*(3), 674-696. https://doi.org/10.1108/ijlm-05-2021-0305

Ghasemzadeh, F., Pishdar, M., & Antucheviciene, J. (2017). Prioritization of petroleum supply chains' disruption management strategies using a combined framework of BSC approach, fuzzy AHP and fuzzy Choquet integral operator. *Journal of Business Economics and Management, 18*(6), 1105-1132. https://doi.org/10.3846/16111699.2017.1380075

Kleindorfer, P. R., & Saad, G. H. (2009). Managing disruption risks in supply chains. *Production and Operations Management, 18*(1), 1-18. https://doi.org/10.1111/j.1937-5956.2005.tb00009.x

Behzadi, G., Pardalos, P. M., O'Sullivan, M. J., Olsen, T. L., & Zhang, A. (2018). Allocation flexibility for agribusiness supply chains under market demand disruption. *International Journal of Production Research, 56*(17), 5676-5694. https://doi.org/10.1080/00207543.2017.1349955

Wu, J., Li, J., & Zhao, Y. (2011). Risk management in supply chains. *International Journal of Revenue Management, 5*(3), 268-286. https://doi.org/10.1504/ijrm.2011.040307

Zheng, H., Zhong, W., & Xi, X. (2024). The resilience and determinants of global mineral resource supply chains: A network percolation perspective. *Frontiers in Earth Science, 12*(1), 1443668. https://doi.org/10.3389/feart.2024.1443668

Hohenstein, N.-O. (2022). Supply chain risk management in the COVID-19 pandemic: Strategies and empirical lessons for improving global logistics service providers' performance. *The International Journal of Logistics Management, 33*(3), 447-468. https://doi.org/10.1108/ijlm-02-2021-0109

Ewuzie, C. O., Ugwuonah, G., Okolo, V. O., Okocha, E. R., & Agu, A. O. (2023). Stimulators of third-party logistics performance of supply chains in the Nigerian manufacturing industry. *Problems and Perspectives in Management, 21*(3), 114-132. https://doi.org/10.21511/ppm.21(3).2023.14

Dey, P. K., Chowdhury, S., Abadie, A., Yaroson, E. V., & Sarkar, S. (2023). Artificial intelligence-driven supply chain resilience in Vietnamese manufacturing small- and medium-sized enterprises. *International Journal of Production Research, 61*(2), 497-513. https://doi.org/10.1080/00207543.2023.2179859

Emon, M. M. H., Khan, T., Rahman, M. A., Hamid, A. B. A., & Yaakub, N. I. (2025). GreenTech revolution: Navigating challenges and seizing opportunities. In *AI and green technology applications in society* (pp. 63–90). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-9879-1.ch003

Lu, Q., Wang, X., & Wang, Y. (2023). Enhancing supply chain resilience with supply chain governance and finance: The enabling role of digital technology adoption. *Business Process Management Journal, 29*(4), 1220-1238. https://doi.org/10.1108/bpmj-11-2022-0601

Manikas, I., Sundarakani, B., & Shehabeldin, M. (2022). Big data utilisation and its effect on supply chain resilience in Emirati companies. *International Journal of Logistics, 31*(6), 699-715. https://doi.org/10.1080/13675567.2022.2052825

Dubey, R., Bryde, D., Dwivedi, Y. K., Graham, G., Foropon, C., & Papadopoulos, T. (2023). Dynamic digital capabilities and supply chain resilience: The role of government effectiveness. *International Journal of Production Economics, 250*, 108790. https://doi.org/10.1016/j.ijpe.2023.108790

Zhao, N., Hong, J., & Lau, K. H. (2023). Impact of supply chain digitalization on supply chain resilience and performance: A multi-mediation model. *International Journal of Production Economics, 252*, 108817. https://doi.org/10.1016/j.ijpe.2023.108817

Jiang, Y., Feng, T., & Huang, Y. (2023). Antecedent configurations toward supply chain resilience: The joint impact of supply chain integration and big data analytics capability. *Journal of Operations Management, 51*, 143-161. https://doi.org/10.1002/joom.1282

Wieland, A., Stevenson, M., Melnyk, S. A., Davoudi, S., & Schultz, L. (2023). Thinking differently about supply chain resilience: What we can learn from social-ecological systems thinking. *International Journal of Operations & Production Management, 43*(2), 192-213. https://doi.org/10.1108/ijopm-10-2022-0645

Emon, M. M. H., Khan, T., Rahman, M. A., & Siam, S. A. J. (2024). Factors influencing the usage of artificial intelligence among Bangladeshi professionals: Mediating role of attitude towards the technology. *2024 IEEE International Conference on Computing, Applications and Systems (COMPAS)*, 1–7. https://doi.org/10.1109/COMPAS60761.2024.10796110

 doi:10.20944/preprints202501.0090.v1

Belhadi, A., Mani, V., Kamble, S. S., Khan, S. A. R., & Verma, S. (2021). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: An empirical investigation. *Annals of Operations Research, 303*(2), 467-497. https://doi.org/10.1007/s10479-021-03956-x

Grossman, G. M., Helpman, E., & Lhuillier, H. (2023). Supply chain resilience: Should policy promote international diversification or reshoring? *Journal of Political Economy, 131*(3), 720-740. https://doi.org/10.1086/725173

Lu, Q., Jiang, Y., & Wang, Y. (2023). Improving supply chain resilience from the perspective of information processing theory. *Journal of Enterprise Information Management, 36*(5), 1456-1475. https://doi.org/10.1108/jeim-08-2022-0274

Yuan, Y., Tan, H., & Liu, L. (2023). The effects of digital transformation on supply chain resilience: A moderated and mediated model. *Journal of Enterprise Information Management, 36*(6), 1798-1814. https://doi.org/10.1108/jeim-09-2022-0333

Ivanov, D., Sokolov, B., & Dolgui, A. (2014). The ripple effect in supply chains: Trade-off 'efficiency-flexibility-resilience' in disruption management. *International Journal of Production Research*, 52(11), 3417-3431. https://doi.org/10.1080/00207543.2013.858836

Badakhshan, E., & Ball, P. D. (2022). Applying digital twins for inventory and cash management in supply chains under physical and financial disruptions. *International Journal of Production Research*, 60(7), 2046-2062. https://doi.org/10.1080/00207543.2022.2093682

Tranvouez, E., & Ferrarini, A. (2006). Multi-agent modelling of cooperative disruption management in supply chains. In *Proceedings of the International Conference on Service Systems and Service Management* (pp. 1-6). https://doi.org/10.1109/icsssm.2006.320732

Khan, T., & Emon, M. M. H. (2024). Exploring the potential of the blue economy: A ystematic review of strategies for enhancing international business in Bangladesh in the context of the Indo-Pacific region. *Review of Business and Economics Studies, 12*(2), 55–73. https://doi.org/10.26794/2308-944X-2024-12-2-55-73

Alvarenga, M. Z., Valadares de Oliveira, M. P., Zanquetto-Filho, H., Desouza, K. C., & Ceryno, P. S. (2022). Is your supply chain ready for the next disruption? Building resilient chains. *Rae-revista De Administracao De Empresas*, 62(1), 1-13. https://doi.org/10.1590/s0034-759020220106

Ivanov, D., & Dolgui, A. (2020). Viability of intertwined supply networks: Extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak. *International Journal of Production Research*, 58(9), 2711-2727. https://doi.org/10.1080/00207543.2020.1750727

Adewusi, A. O., Komolafe, A. M., Ejairu, E., Aderotoye, I. A., Abiona, O. O., & Oyeniran, O. C. (2024). The role of predictive analytics in optimizing supply chain resilience: A review of techniques and case studies. *International Journal of Management & Entrepreneurship Research*, 6(3), 1-13. https://doi.org/10.51594/ijmer.v6i3.938

Chen, Z., Hammad, A. W. A., & Alyami, M. (2024). Building construction supply chain resilience under supply and demand uncertainties. *Automation in Construction*, 140, 1-10. https://doi.org/10.1016/j.autcon.2023.105190

Atadoga, A., Osasona, F., Amoo, O. O., Farayola, O. A., Ayinla, B. S., & Abrahams, T. O. (2024). The role of IT in enhancing supply chain resilience: A global review. *International Journal of Management & Entrepreneurship Research*, 6(2), 1-12. https://doi.org/10.51594/ijmer.v6i2.774

Yang, Z., Guo, X., Sun, J., Zhang, Y., & Wang, Y. (2022). What does not kill you makes you stronger: Supply chain resilience and corporate sustainability through emerging IT capability. *IEEE Transactions on Engineering Management*, 69(3), 451-460. https://doi.org/10.1109/tem.2022.3209613

Khan, T., Emon, M. M. H., & Rahman, M. A. (2024). A systematic review on exploring the influence of Industry 4.0 technologies to enhance supply chain visibility and operational efficiency. *Review of Business and Economics Studies, 12*(3), 6–27. https://doi.org/10.26794/2308-944X-2024-12-3-6-27

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management*, 20(2), 1-19. https://doi.org/10.1108/09574090910954873

Ivanov, D. (2023). Two views of supply chain resilience. *International Journal of Production Research*, 61(10), 3011-3020. https://doi.org/10.1080/00207543.2023.2253328

Ali, A., Sharabati, A., Alqurashi, D., Shkeer, A. S., & Allahham, M. (2024). The impact of artificial intelligence and supply chain collaboration on supply chain resilience: Mediating the effects of information sharing. *Uncertain Supply Chain Management*, 12(2), 1-14. https://doi.org/10.5267/j.uscm.2024.3.002

Belhadi, A., Kamble, S. S., Jabbour, C. J. C., Gunasekaran, A., Ndubisi, N. O., & Mani, V. (2020). Manufacturing and service supply chain resilience to the COVID-19 outbreak: Lessons learned from the automobile and airline industries. *Technological Forecasting and Social Change*, 167, 1-11. https://doi.org/10.1016/j.techfore.2020.120447

Khan, T., Emon, M. M. H., Rahman, M. A., Hamid, A. B. A., & Yaakub, N. I. (2025). Bridging the gap: Realizing GreenTech potential. In *AI and green technology applications in society* (pp. 91–122). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-9879-1.ch004

Alvarenga, M. Z., Valadares de Oliveira, M. P., & Oliveira, T. (2023). The impact of using digital technologies on supply chain resilience and robustness: The role of memory under the COVID-19 outbreak. *Supply Chain Management*, 28(5), 625-640. https://doi.org/10.1108/scm-06-2022-0217

Asafo-Adjei, E., Boachie-Mensah, F. O., & Issau, K. (2023). Supply chain resilience and performance of manufacturing firms: Role of supply chain disruption. *Journal of Manufacturing Technology Management*, 34(4), 403-419. https://doi.org/10.1108/jmtm-08-2022-0307

Varriale, V., Cammarano, A., Michelino, F., & Caputo, M. (2021). Sustainable supply chains with blockchain, IoT, and RFID: A simulation on order management. *Sustainability*, 13(11), 6372. https://doi.org/10.3390/su13116372

Gao, Y. (2024). Analysis of risk factors for disruptions in international maritime shipping supply chains. *Frontiers in Business, Economics and Management*, 3, 1-12. https://doi.org/10.54097/qw6snc65

Loh, H. S. (2012). The role of ports in supply chain disruption management. *Unpublished Dissertation*. https://doi.org/10.32657/10356/65266