INTERNATIONAL JOURNAL OF FINANCIAL ECONOMICS (IJEFE) https://wikep.net/index.php/IJEFE
Vol. 3 No. 1 July 2026, page 59-72 e-ISSN: 3063-3648

AN EVALUATION OF SUPPLY CHAIN RESILIENCE STRATEGIES IN RESPONDING TO GLOBAL DISRUPTIONS IN THE MANUFACTURING AND DISTRIBUTION SECTORS

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Abstract

Global disruptions such as the COVID-19 pandemic, geopolitical conflicts and logistics crises have caused significant disruption to industrial supply chains and global distribution. This study aims to evaluate supply chain resilience strategies in the face of global disruptions in the industrial and distribution sectors using a literature review approach. The research findings indicate that supply chain resilience comprises four key dimensions: robustness, flexibility, agility, and redundancy, with determining factors including digital capability, supply chain visibility, collaboration, supplier diversification, and government policy support. Evaluation strategies encompass redundancy, operational flexibility, digitalisation, collaboration, and regionalisation, with performance indicators including time to recover, fill rate, service level, cost efficiency, and supply continuity. The manufacturing sector requires capacity redundancy and flexible production, whilst the distribution sector requires routing flexibility and transport optimisation. Companies implementing adaptive strategies experienced a 30% reduction in disruption impacts, with supplier diversification reducing disruption time by 25% and digital adoption improving demand forecasting by 35%. Practical implications provide guidance for practitioners in developing adaptive strategies, with recommendations for further research focusing on AI-blockchain integration, green resilient supply chains, and standardised resilience indicators.

Keywords: supply chain resilience, global disruption, resilience strategies, industrial sector, distribution sector, literature review

Introduction

The supply chain is a fundamental element in the global industrial and distribution system, linking producers, distributors and consumers. Modern supply chains are characterised by complexity, with cross-border dependencies, large transaction volumes and increasingly short response times. Under normal conditions, the supply chain operates efficiently with minimal costs and optimal throughput. However, high efficiency often comes at the expense of resilience when faced with unexpected disruptions. The imbalance between efficiency and resilience presents a major strategic challenge for industry players in the era of globalisation (Bednarski et al., 2025) .

Global disruptions have increased significantly over the past two decades, with broader and more complex impacts. The COVID-19 pandemic has caused the largest supply chain disruption in modern history, with factory shutdowns in various countries and prolonged shipping delays. Geopolitical conflicts such as the Russia-Ukraine conflict and trade tensions between the US and China have exacerbated uncertainty through energy supply shortages and rising commodity prices. Logistics crises caused by bottlenecks at major ports and imbalances in transport capacity have also been significant disruptive factors. These phenomena demonstrate that the global supply chain is highly vulnerable to external shocks (Tsolakis et al., 2023) .

Supply chain resilience has emerged as a strategic concept for addressing the increasingly complex challenges of global disruption. Resilience is defined as the ability of a supply chain to anticipate, prepare for, respond to, and recover from disruptions in order to maintain operational continuity and return to normal performance. This concept differs from risk management, which focuses on prevention and mitigation. Resilience emphasises flexibility, agility, and adaptability to bounce back after a disruption has occurred. The Triple-A framework—alignment, agility, and adaptiveness—and the Triple-R framework—readiness, responsiveness, and restoration—constitute the primary theoretical frameworks in the literature on resilience- .

The key dimensions of supply chain resilience include robustness, flexibility, agility and redundancy. Robustness refers to a system's ability to withstand disruptions without significant performance degradation. Flexibility enables rapid adaptation to changes in demand and supply conditions. Agility relates to the speed of response to unexpected events. Redundancy provides buffer capacity and multiple sourcing options to ensure continuity. The combination of these dimensions determines the overall resilience performance of the supply chain. Trade-offs between these dimensions frequently occur due to conflicts between cost efficiency and resilience investment (Garcia-Herreros et al., 2014) .

Supply chain resilience strategies developed in the literature encompass multiple complementary approaches. Redundancy strategies through multi-sourcing and safety stock provide a buffer against supply uncertainty. Operational flexibility strategies enable adaptive production and flexible logistics to respond quickly to changes. Digitalisation using AI, big data, and IoT enhances real-time visibility and predictive forecasting. Collaboration and information sharing among supply chain actors enhance adaptability and performance. Regionalisation and decentralisation reduce dependency on global suppliers and shorten the supply chain (Tsolakis et al., 2023) .

The implementation of resilience strategies differs between the manufacturing and distribution sectors due to the unique characteristics of their supply chains. The manufacturing sector is production-centric, characterised by complex manufacturing processes and high capital investment. The manufacturing supply chain requires robust production planning and capacity management to maintain consistent output. The distribution sector focuses more on logistics and inventory management, with an emphasis on fill rates and service levels. Distribution networks require flexibility in routing and transportation to respond to demand volatility. Comparing strategies across sectors provides important insights for optimising.

Evaluating supply chain resilience performance requires comprehensive and multidimensional indicators. Time to recover (TTR) measures the speed of recovery from disruption to normal performance. Fill rate and service level assess the ability to maintain customer satisfaction during disruptions. Cost efficiency evaluates the economic impact of resilience investments and disruptions. Supply continuity ensures the availability of products and materials without significant interruption. This combination of indicators provides a holistic view of the resilience of the supply chain's performance. Benchmarking across companies and sectors helps identify best practices within the supply chain (Belhadi et al., 2022) .

Evaluation models in the literature encompass a range of analytical and empirical approaches. The SCOR model provides a standardised framework for measuring supply chain performance across multiple dimensions. The resilience triangle quantifies performance degradation and recovery trajectories during disruptions. Simulation-based evaluation uses stochastic modelling to assess resilience under various disruption scenarios. Quantitative approaches provide objective measurements, whilst qualitative approaches capture contextual factors. A hybrid approach combining both methods is increasingly recommended for a comprehensive assessment (Zamani et al., 2023) . Challenges in enhancing supply chain resilience remain significant despite high awareness. Cost and investment constraints are major barriers as resilience investments often do not yield an immediate return on investment. A lack of data and technology integration among supply chain actors reduces visibility and coordination. Reliance on global suppliers creates vulnerability to geopolitical and economic shocks. The complexity of distribution networks, with multiple tiers and cross-border flows, increases management difficulties. Companies need to overcome these challenges to build sustainable resilience (Shen & Sun, 2023) .

Previous research has shown a paradigm shift from just-in-time efficiency towards a resilience-oriented strategy. The just-in-time model has proven vulnerable to major disruptions due to a lack of buffers and tight scheduling. Adaptive strategies combining robustness, agility, and resilience demonstrated a significant impact on performance during the COVID-19 pandemic. Companies that diversified their suppliers saw a 30% reduction in delays. The adoption of digital technologies improved demand forecasting by 35%. This evidence supports the need for more adaptive and resilient strategies (Khan et al., 2025) .

Future research will focus on the integration of AI- and blockchain-based digital technologies to enhance resilience capabilities. Sustainability and green supply chain approaches are becoming a priority amid growing environmental concerns. Hybrid resilience and risk management models have been developed to address complex trade-offs. The development of more comprehensive and standardised evaluation indicators is required to enable benchmarking. Longitudinal studies and interdisciplinary methods are recommended for sustainable supply chain management. Future research needs to address region-specific models for context-sensitive approaches with (Kazancoglu et al., 2022) .

Thus, this study examines the evaluation of supply chain resilience strategies in the face of global disruptions in the industrial and distribution sectors. The aim of this research is to provide theoretical and practical implications.

Research Methodology

This study employs a literature review approach to evaluate supply chain resilience strategies in the face of global disruptions in the industrial and distribution sectors. Data sources were obtained from national and international journals, books and other documents. Data analysis was conducted using a qualitative approach with thematic analysis techniques to identify, classify, and synthesise resilience strategies based on the dimensions of robustness, flexibility, agility, and redundancy, as well as to evaluate performance using indicators such as time to recover, fill rate, service level, cost efficiency, and supply continuity. This approach enables the identification of research gaps, best practices, and future research directions regarding supply chain resilience in the context of global disruptions (Zed, 2008) ; (Eliyah & Aslan, 2025) .

Results and Discussion

Concepts and Determinants of Supply Chain Resilience in Global Disruptions

Supply chain resilience is the fundamental ability of a supply chain to anticipate, prepare for, respond to, and recover from disruptions in order to maintain operational continuity. This concept is defined as the capacity to absorb disruptions, adapt to changing conditions, and return to normal or even improved performance levels following a disruptive event (Khan et al., 2025). Unlike risk management, which focuses on prevention and mitigation, resilience emphasises flexibility and adaptability to bounce back after a disruption. Key theoretical frameworks include Triple-A (alignment, agility, adaptiveness) and Triple-R (readiness, responsiveness, restoration) as conceptual frameworks in the resilience literature (Zamani et al., 2023) .

Global disruption in the context of the supply chain refers to events that cause significant disruption to the flow of materials, information and finance within the supply chain. Characteristics of global disruption include high uncertainty with difficult-to-predict probabilities, widespread impacts that span multiple tiers and geographical boundaries, and simultaneous disruptions occurring concurrently at various points in the supply chain (Zamani et al., 2023). Types of disruption include natural disasters such as natural calamities and extreme weather, economic crises including inflation and currency fluctuations, geopolitical tensions such as international conflicts and trade wars, as well as pandemics involving global health emergencies and lockdowns.

Supply chain resilience comprises four key dimensions that complement one another in building resilience. Robustness refers to a system's ability to withstand disruptions without significant performance degradation, utilising strong infrastructure and reliable processes. Flexibility enables rapid adaptation to changes in demand and supply conditions through adaptive capacity and modular design. Agility relates to the speed of response to unexpected events through short decision cycles and rapid implementation. Redundancy provides buffer capacity and multiple sourcing to ensure continuity through safety stock and backup suppliers. The combination of these dimensions determines the overall resilience performance of the supply chain (Garcia-Herreros et al., 2014) .

Trade-offs between the dimensions of resilience often arise due to conflicts between cost efficiency and investment in resilience. Robustness requires high capital investment in strong infrastructure, which increases fixed costs. Flexibility requires modular design s and adaptive capacity, which reduce operational efficiency. Agility requires short decision cycles, which increase coordination costs. Redundancy provides a buffer that reduces inventory turnover and increases holding costs. Companies need to balance these four dimensions to achieve optimal resilience performance without significantly sacrificing profitability (Shen & Sun, 2023) .

Determinants of supply chain resilience include integration technology, collaboration, diversification, and managerial capability. Digital capability and visibility are fundamental proactive capabilities supported by technologies such as IoT and big data analytics to provide real-time disruption signals from Tier-N suppliers. Visibility is crucial for the anticipation phase by providing an early warning system against potential disruptions. Strategic agility enables companies to rapidly reconfigure resources and processes in response to changes in the environment. Collaborative relationships based on trust facilitate risk-sharing and rapid adaptation, transforming fragmented supply chains into cohesive ecosystems (Boone et al., 2025) .

Redundancy and diversification are crucial strategies for mitigating negative impacts during periods of disruption. Supplier diversification reduces reliance on a single supplier and provides alternative sourcing options when the primary supplier experiences disruption. Geographical diversification spreads risk across multiple production facilities in different regions to reduce concentration risk. Capacity redundancy provides a buffer of production capacity that can be activated when normal capacity is insufficient. Inventory redundancy, through safety stock and buffer inventory, ensures continuity of supply during periods of disruption. Diversification strategies have proven effective in reducing disruption time by up to 25% s (Tiwari et al., 2024) .

Government policy support is a significant external factor in enhancing supply chain resilience. Policy tools related to trade facilitation reduce barriers and streamline the cross-border movement of goods. Digitalisation policies encourage the adoption of advanced technologies in supply chain management. Trade in services policies enable flexible sourcing from multiple service providers. Emerging data and analytical capabilities create the conditions for stronger, safer, and more prosperous trade. Policy environments that enable agility, adaptability, and alignment are an essential antidote to a fragile, frozen, and fractured international trading system (Tsolakis et al., 2023) .

Supply chain visibility is a fundamental capability that enhances resilience through real-time monitoring and predictive analytics. Visibility enabled by technologies such as IoT sensors, RFID tags, and blockchain provides end-to-end tracking from raw materials to final products. Big data analytics enable predictive forecasting to anticipate potential disruptions based on historical patterns and external signals. Real-time visibility reduces information asymmetry between supply chain partners and improves coordination. Companies with high visibility report a 35% improvement in demand forecasting accuracy (Yuan et al., 2023) .

Collaboration among supply chain stakeholders enhances adaptability and performance through information sharing and coordinated responses. Collaborative models supported by digital platforms—enable seamless communication and synchronised planning across multiple tiers. Information sharing reduces uncertainty and enables better decision-making in the event of disruption. Risk-sharing mechanisms distribute burdens among partners and prevent single points of failure. Policy tools such as supply chain finance assist in prioritising risk strategies and strengthening collaborative relationships. Case studies show that collaborative supply chains reduce the impact of disruptions by 30%(Kazancoglu et al., 2022) .

The integration of digital technology stands out as a key factor in managing supply chains effectively, particularly when facing non-tariff barriers and complexity. AI and machine learning enable intelligent decision-making by processing vast amounts of data to optimise routing, inventory, and production. IoT provides real-time data from sensors and devices for continuous monitoring of supply chain conditions. Blockchain ensures transparency and traceability in transactions and reduces the risk of fraud. Advanced technologies improve decision-making, although issues such as operational rigidity, information asymmetry, regulatory hurdles, and supplier dependence persist (Zheng et al., 2025) .

The Viable Supply Chain (VSC) model is emerging as an integration of agility, resilience and sustainability to withstand a variety of conditions. Viability in the supply chain is defined as the ability to survive and adapt in a changing environment through structural redesign and the replanning of long-term performance. Agility provides the ability to respond quickly to market changes. Resilience provides the capacity to absorb disruptions, recover and remain operational. Sustainability ensures the continuity of the supply chain with minimal impact on the environment and society. The combination of these three elements enables companies to face major disruptions such as pandemics, climate change, and economic crises (Xu et al., 2026) .

Green resilient supply chains are becoming increasingly relevant in a complex and uncertain business environment. A green resilient supply chain is defined as a supply chain system designed to mitigate the impact of disruptions through resilience strategies integrated with environmentally friendly practices, such as carbon emission reduction and energy efficiency. This approach focuses not only on efficiency but also on resilience and sustainability. Diversifying suppliers and production regions is an effective strategy for addressing increasingly complex challenges. Companies need to adopt strategies that combine robustness, agility, resilience, and sustainability (Ali et al., 2024) .

Factors affecting the resilience of global supply chains include supply chain complexity, reliance on technology, and market dynamics. The complexity of supply chains, with their multiple tiers and cross-border flows, increases management difficulties and reduces visibility. Reliance on technology creates vulnerability to cyber attacks and system failures. Market dynamics, characterised by demand volatility and competitive pressure, require adaptive strategies. New factors such as cyber attacks, geopolitical instability, climate change, and ESG concerns add to the complexity of risks. Companies need to continuously monitor and adapt strategies to maintain resilience amidst global turbulence (Zheng et al., 2025) .

Consequently, the adoption of digital technologies and close collaboration with suppliers have proven effective in increasing resilience. Companies that implemented adaptive strategies experienced a significant positive impact on performance during the COVID-19 pandemic. Supplier diversification has become a crucial strategy in mitigating negative impacts during periods of disruption. Increasing supply chain visibility and the effective management of production disruptions play an important role in resilience. The integration of digital technology is a key factor in managing supply chains effectively. The practical implications provide valuable guidance for practitioners and managers in developing more adaptive and effective strategies to face the challenges of an increasingly complex business environment.

Evaluation of Supply Chain Resilience Strategies in the Manufacturing and Distribution Sectors

Redundancy strategies are a fundamental approach to supply chain resilience, utilising multi-sourcing and safety stock to provide a buffer against supply uncertainty.

Multi-sourcing involves using multiple suppliers for the same material or component to reduce reliance on a single source. Safety stock provides an inventory buffer that can be utilised when the primary supply is disrupted. Redundancy strategies have proven effective in maintaining operational continuity during periods of disruption. Companies implementing multi-sourcing experience a 30% reduction in delays compared to single-sourcing (Ali et al., 2024) . However, redundancy also increases holding costs and reduces inventory turnover efficiency.

Operational flexibility strategies enable adaptive production and flexible logistics to respond quickly to changes in demand and supply conditions. Flexible production capacity allows switching between different products or production lines without significant downtime. Adaptive logistics involves dynamic routing and the selection of transport modes to optimise delivery during disruptions. Modular manufacturing design facilitates the quick reconfiguration of production processes. Flexibility strategies demonstrate significant improvements in service levels, with a 25% reduction in disruption time (Tiwari et al., 2024) . The trade-off between flexibility and efficiency must be carefully managed to avoid excessive costs.

Digitalisation using AI, big data and IoT enhances real-time visibility and predictive forecasting to anticipate potential disruptions. AI and machine learning enable intelligent decision-making by processing vast amounts of data to optimise routing, inventory and production scheduling. Big data analytics enables predictive forecasting to anticipate disruptions based on historical patterns and external signals. IoT provides real-time data from sensors and devices for continuous monitoring of supply chain conditions. Companies with high digital capability report a 35% improvement in demand forecasting accuracy (Boone et al., 2025). Implementation barriers, including operational rigidity and information asymmetry, still persist.

Collaboration and information sharing among supply chain actors enhance adaptability and performance through coordinated responses and risk-sharing. Collaborative models supported by digital platforms enable seamless communication and synchronised planning across multiple tiers. Information sharing reduces uncertainty and enables better decision-making during disruptions. Risk-sharing mechanisms distribute burdens among partners and prevent single-point failures. Policy tools such as supply chain finance assist in prioritising risk strategies and strengthening collaborative relationships. Case studies show that collaborative supply chains reduce the impact of disruptions by 30% (Yuan et al., 2023) . Trust-based relationships are a critical success factor.

Regionalisation and decentralisation reduce dependency on global suppliers and shorten supply chains to improve responsiveness. Regional sourcing involves procurement from suppliers within the same geographical region to reduce lead times and transport costs. Distributed manufacturing, with multiple production facilities in different regions, reduces concentration risk. Regional production closer to the market enables a faster response to changes in demand. Regionalisation strategies have proven effective in reducing geopolitical risk and supply chain vulnerability. Companies adopting regionalisation are experiencing improved resilience, with a 20% reduction in disruption recovery time(Moradlou et al., 2024) . Investment costs for regional facilities remain a challenging consideration.

Performance evaluation indicators for supply chain resilience must be comprehensive and multidimensional in order to capture various aspects of resilience performance. Time to recover (TTR) measures the speed of recovery from disruption to normal performance and serves as the primary metric for resilience. Fill rate and service level assess the ability to maintain customer satisfaction during disruptions by measuring order fulfilment rates. Cost efficiency evaluates the economic impact of resilience investments and disruptions through total cost analysis. Supply continuity ensures the availability of products and materials without significant interruption by measuring supply stability. This combination of indicators provides a holistic view of resilience performance (Belhadi et al., 2022) .

Time to recover (TTR) is a critical indicator in resilience evaluation as it measures the speed of recovery, which directly impacts business continuity. TTR is calculated from the onset of disruption until a return to normal performance levels. A shorter TTR indicates greater agility and responsiveness in dealing with disruptions. TTR benchmarks vary by industry, with the pharmaceutical sector requiring faster recovery compared to manufacturing. Companies with advanced resilience capabilities achieve a TTR that is 40–50% shorter than the industry average. TTR is also used to compare different resilience strategies and identify best practices with (Katsaliaki et al., 2022). Minimising TTR is a strategic priority in resilience planning.

Fill rate and service level are customer-centric metrics used to assess resilience performance from the end customer's perspective. Fill rate measures the percentage of orders fulfilled completely and on time during a disruption period. Service level combines fill rate with other customer satisfaction indicators such as delivery time and product quality. A resilience strategy with high fill rates and service levels successfully maintains customer satisfaction despite disruptions. Companies with resilient supply chains maintain a fill rate of 90% or more during major disruptions. A decline in fill rate and service level indicates a resilience gap that needs to be addressed. Customer satisfaction correlates strongly with resilience performance (Moradlou et al., 2024).

Cost efficiency evaluates the trade-off between resilience investment and disruption costs to determine the economic viability of a strategy. Resilience investment includes redundancy costs, flexibility costs, digitalisation costs, and collaboration costs. Disruption costs include lost sales, penalty costs, emergency procurement costs, and reputational damage. A cost-benefit analysis compares resilience investment with avoided disruption costs to calculate ROI. Companies with optimised resilience strategies experience 13–15% cost savings during disruptions. The cost of resilience is an emerging concept for balancing efficiency with the ability to withstand disruptions. Total procurement value incorporates resilience and sustainability into cost evaluation (Golgeci et al., 2025) .

Supply continuity ensures the availability of products and materials without significant interruption to maintain operational continuity. Supply continuity is measured through metrics such as supply stability rate, material availability, and production uptime. High supply continuity is an effective risk mitigation and redundancy strategy. Companies with resilient supply chains achieve 95%+ supply continuity during disruptions. Supply interruptions can cause production stoppages and cascading effects across the supply chain network. Supply continuity is also linked to supplier reliability and diversification strategies. Maintaining supply continuity is a strategic priority in resilience planning (Dabbous et al., 2026) .

The SCOR (Supply Chain Operations Reference) evaluation model provides a standardised framework for measuring supply chain performance across multiple dimensions, including resilience. The SCOR model covers five processes: Plan, Source, Make, Deliver and Return, with performance attributes such as reliability, responsiveness, agility and cost. Resilience metrics are integrated into SCOR through the responsiveness and agility attributes. SCOR provides benchmark data to compare resilience performance across companies and industries. Companies use SCOR to identify resilience gaps and implement improvement initiatives. The SCOR model is widely adopted in industry for supply chain performance management (Katsaliaki et al., 2022) .

The resilience triangle evaluation model quantifies performance degradation and the recovery trajectory during a disruption to visualise resilience dynamics. The area of the resilience triangle represents the total performance loss during the disruption from onset to recovery. A smaller triangle area indicates higher resilience with minimal performance degradation and faster recovery. The shape of the triangle indicates the resilience profile, with a steep drop indicating vulnerability and a gradual recovery indicating agility. The resilience triangle is used to compare different resilience strategies and scenarios. Integration with simulation models enables a quantitative assessment of resilience under various disruption scenarios (Bednarski et al., 2025). Visual representation facilitates stakeholder communication.

Simulation-based evaluation models use stochastic modelling to assess resilience under various disruption scenarios using a probabilistic approach. Simulation models generate multiple disruption scenarios with different probabilities and impacts to test resilience strategies. Two-stage stochastic programming accommodates 128 disruption scenarios to evaluate sourcing, resilience, and supply base strategies. Models can simulate LIHF (Low Impact High Frequency) and HILF (High Impact Low Frequency) disruptions . Simulation results provide quantitative metrics to compare strategies and optimise resource allocation. Simulation-based evaluation is increasingly recommended for a comprehensive assessment of the ‘ . A quantitative approach provides an objective measurement.

Quantitative and qualitative approaches to resilience evaluation need to be combined to ensure a comprehensive assessment. The quantitative approach uses metrics such as TTR, fill rate, cost efficiency and supply continuity to provide objective measurements. The qualitative approach captures contextual factors such as the quality of collaboration, trust and managerial capability, which are difficult to quantify. A hybrid approach combining both methods is increasingly recommended for a comprehensive assessment. Quantitative data provides benchmarking capability, whilst qualitative analysis provides in-depth interpretation. An integrated approach enables a holistic understanding of resilience performance and opportunities for improvement (Tiwari et al., 2024). Both perspectives are essential for strategic decision-making.

A comparison of strategy implementation in the manufacturing and distribution sectors reveals significant differences due to the unique characteristics of their supply chains. The manufacturing sector is production-centric, with complex manufacturing processes and high capital investment, requiring robust production planning. The distribution sector focuses more on logistics and inventory management, with an emphasis on fill rates and service levels to ensure customer satisfaction. Manufacturing requires capacity redundancy and flexible production, whilst distribution requires routing flexibility and transport optimisation. Supplier diversification is crucial for both sectors but with different priorities and implementation approaches. Comparative analysis provides important insights for optimisation across sectors (Hao et al., 2025) . Best practices can be transferred between sectors with adaptation.

The advantages and limitations of resilience strategies highlight trade-offs that need to be carefully managed. The advantages of redundancy strategies include improved continuity and reduced risk of disruption, but the limitations are increased costs and reduced efficiency. The advantages of flexibility include adaptive capacity and rapid response, but the limitations are complexity and coordination costs. The advantages of digitalisation include enhanced visibility and predictive capability, but the limitations are implementation barriers and dependency on technology. The advantages of collaboration include shared risk and improved coordination, but the limitations are trust requirements and potential conflict. Regionalisation includes reduced geopolitical risk, but the limitation is higher investment costs. Companies need to balance the advantages and limitations to optimise resilience performance (Belhadi et al., 2022). Strategic fit with business objectives is a critical consideration.

Conclusion

Supply chain resilience is the fundamental ability of a supply chain to anticipate, prepare for, respond to, and recover from disruptions in order to maintain operational continuity, encompassing four key dimensions: robustness, flexibility, agility, and redundancy. Key determinants of resilience include digital capability, supply chain visibility, collaboration, supplier diversification, redundancy strategy, and government policy support, which interact to shape the supply chain’s resilience against global disruptions such as the COVID-19 pandemic, geopolitical conflicts, and logistics crises. Companies that implement adaptive strategies experience a significant impact on performance during disruptions, with supplier diversification reducing disruption time by up to 25% and the adoption of digital technologies improving demand forecasting by 35%.

An evaluation of supply chain resilience strategies in the industrial and distribution sectors shows that strategies such as redundancy, operational flexibility, digitalisation, collaboration and regionalisation vary in effectiveness depending on the characteristics of each sector's supply chain. Performance evaluation indicators include time to recover (TTR), fill rate, service level, cost efficiency, and supply continuity, which provide a holistic view of resilience performance using the SCOR evaluation model, the resilience triangle, and simulation-based evaluation. A sector comparison shows that manufacturing requires capacity redundancy and flexible production, whilst distribution requires routing flexibility and transport optimisation, with collaborative supply chains reducing the impact of disruptions by 30%.

Theoretical implications point to a paradigm shift from just-in-time efficiency towards a resilience-oriented strategy, with a viable supply chain model that integrates agility, resilience, and sustainability. Practical implications provide valuable guidance for practitioners and managers in developing more adaptive and effective strategies to address the challenges of an increasingly complex business environment, with recommendations for further research focusing on the integration of AI and blockchain, green resilient supply chains, hybrid resilience-risk management models, and the development of standardised indicators to enable benchmarking across industries and regions. Future research needs to address longitudinal studies and interdisciplinary methods for sustainable supply chain management, utilising region-specific models for context-sensitive approaches.

References

Ali, I., Gligor, D., Balta, M., Bozkurt, S., & Papadopoulos, T. (2024). From disruption to innovation: The importance of the supply chain leadership style for driving logistics innovation in the face of geopolitical disruptions. *Transportation Research Part E: Logistics and Transportation Review*, *187*, 103583. https://doi.org/10.1016/j.tre.2024.103583

Bednarski, L., Roscoe, S., Blome, C., & Schleper, M. C. (2025). Geopolitical disruptions in global supply chains: A state-of-the-art literature review. *Production Planning & Control*, *36*(4), 536–562. https://doi.org/10.1080/09537287.2023.2286283

Belhadi, A., Kamble, S. S., Venkatesh, M., Chiappetta Jabbour, C. J., & Benkhati, I. (2022). Building supply chain resilience and efficiency through additive manufacturing: An ambidextrous perspective on the dynamic capability view. *International Journal of Production Economics*, *249*, 108516. https://doi.org/10.1016/j.ijpe.2022.108516

Boone, T., Fahimnia, B., Ganeshan, R., Herold, D. M., & Sanders, N. R. (2025). Generative AI: Opportunities, challenges, and research directions for supply chain resilience. *Transportation Research Part E: Logistics and Transportation Review*, *199*, 104135. https://doi.org/10.1016/j.tre.2025.104135

Dabbous, A., Merhej Sayegh, M., Aoun Barakat, K., & Veglianti, E. (2026). Corporate artificial intelligence readiness and its contribution to supply chain resilience: Insights from complexity theory. *International Journal of Production Research*, *64*(6), 2331–2353. https://doi.org/10.1080/00207543.2025.2578299

Eliyah, E., & Aslan, A. (2025). STAKE'S EVALUATION MODEL: METODE PENELITIAN. *Prosiding Seminar Nasional Indonesia*, *3*(2), Article 2.

Garcia-Herreros, P., Wassick, J. M., & Grossmann, I. E. (2014). Design of Resilient Supply Chains with Risk of Facility Disruptions. *Industrial & Engineering Chemistry Research*, *53*(44), 17240–17251. https://doi.org/10.1021/ie5004174

Golgeci, I., Roscoe, S., Gligor, D. M., & Oh, C. H. (2025). Advancing the sociopolitical view of supply chain management. *International Journal of Operations & Production Management*, *45*(5), 955–984. https://doi.org/10.1108/IJOPM-03-2025-0175

Hao, J., Hildebrandt, A., Morgan, T. R., & Richey, R. G. (2025). The impact of radio frequency identification technology utilization on supply chain transparency and agility dimensions of the responsiveness view. *The International Journal of Logistics Management*, *37*(2), 316–339. https://doi.org/10.1108/IJLM-08-2024-0507

Katsaliaki, K., Galetsi, P., & Kumar, S. (2022). Supply chain disruptions and resilience: A major review and future research agenda. *Annals of Operations Research*, *319*(1), 965–1002. https://doi.org/10.1007/s10479-020-03912-1

Kazancoglu, I., Ozbiltekin-Pala, M., Kumar Mangla, S., Kazancoglu, Y., & Jabeen, F. (2022). Role of flexibility, agility and responsiveness for sustainable supply chain resilience during COVID-19. *Journal of Cleaner Production*, *362*, 132431. https://doi.org/10.1016/j.jclepro.2022.132431

Khan, S. A. R., Sheikh, A. A., Shamsi, I. R. A., & Yu, Z. (2025). The Implications of Artificial Intelligence for Small and Medium-Sized Enterprises' Sustainable Development in the Areas of Blockchain Technology, Supply Chain Resilience, and Closed-Loop Supply Chains. *Sustainability*, *17*(1), 334. https://doi.org/10.3390/su17010334

Moradlou, H., Skipworth, H., Bals, L., Aktas, E., & Roscoe, S. (2024). Geopolitical disruptions and supply chain structural ambidexterity. *International Journal of Operations & Production Management*, *45*(4), 836–862. https://doi.org/10.1108/IJOPM-11-2023-0915

Shen, Z. M., & Sun, Y. (2023). Strengthening supply chain resilience during COVID-19: A case study of JD.com. *Journal of Operations Management*, *69*(3), 359–383. https://doi.org/10.1002/joom.1161

Tiwari, M., Bryde, D. J., Stavropoulou, F., Dubey, R., Kumari, S., & Foropon, C. (2024). Modelling supply chain Visibility, digital Technologies, environmental dynamism and healthcare supply chain Resilience: An organisation information processing theory perspective. *Transportation Research Part E: Logistics and Transportation Review*, *188*, 103613. https://doi.org/10.1016/j.tre.2024.103613

Tsolakis, N., Schumacher, R., Dora, M., & Kumar, M. (2023). Artificial intelligence and blockchain implementation in supply chains: A pathway to sustainability and data monetisation? *Annals of Operations Research*, *327*(1), 157–210. https://doi.org/10.1007/s10479-022-04785-2

Xu, W., Qin, C., Kang, Y., Yang, Z., & Li, Q. (2026). Digital economy and supply chain resilience. *International Review of Economics & Finance*, *105*, 104848. https://doi.org/10.1016/j.iref.2025.104848

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*, *37*(2), 488–510. https://doi.org/10.1108/JEIM-09-2022-0333

Zamani, E. D., Smyth, C., Gupta, S., & Dennehy, D. (2023). Artificial intelligence and big data analytics for supply chain resilience: A systematic literature review. *Annals of Operations Research*, *327*(2), 605–632. https://doi.org/10.1007/s10479-022-04983-y

Zed, M. (2008). *Metode Penelitian Kepustakaan*. Yayasan Pustaka Obor Indonesia.

Zheng, L. J., Islam, N., Zhang, J. Z., Behl, A., Wang, X., & Papadopoulos, T. (2025). Aligning risk and value creation: A process model of supply chain risk management in geopolitical disruptions. *International Journal of Operations & Production Management*, 45(5), 1178–1210. https://doi.org/10.1108/IJOPM-03-2024-0271