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GEOPOLITICAL CONFLICTS AND THE RESILIENCE OF MARITIME LOGISTICS: A CRITICAL SYNTHESIS

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Abstract

This systematic literature review investigates the impact of global geopolitical conflicts on the maritime logistics sector, with a particular focus on disruptions affecting trade flows, port operations, and supply chain resilience. Covering peer-reviewed research published between 2015 and 2024, a total of 44 studies were systematically selected and analysed using PRISMA methodology. The review identifies key conflict events—including the Russia–Ukraine war, Red Sea crisis, and East Asian rivalries—as primary disruptors of global maritime logistics systems. The findings reveal that these conflicts have led to increased freight costs, vessel rerouting, container shortages, and significant port delays, posing threats to just-in-time delivery systems and trade competitiveness. Additionally, the literature highlights how these disruptions disproportionately affect export-dependent sectors, especially in emerging economies. The review further categorises strategic response mechanisms, such as digital tracking, port diversification, and maritime collaboration frameworks, that enhance logistics resilience. The study emphasises the growing importance of proactive geopolitical risk assessment and adaptive maritime strategies in ensuring trade continuity amidst global instability. This review contributes to the evolving discourse on conflict-sensitive logistics planning and provides a conceptual basis for future empirical studies on logistics risk mitigation.

Keywords: Geopolitical Conflicts, Maritime Logistics, Risk Mitigation, Supply Chain Resilience, Trade Disruption

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Introduction

Background

Global Maritime Logistics and Its Strategic Importance

Maritime logistics represents the cornerstone of global trade infrastructure, facilitating the movement of over 80% of global merchandise trade by volume and more than 70% by value (UNCTAD, 2023). Container ports, ocean shipping lanes, and intermodal hubs together enable timely supply chain flows and underpin economic interdependence across continents. From bulk commodities and crude oil to containerisedcontainerised manufactured goods, maritime logistics offers cost-effective, large-scale, and interregional connectivity. However, this sector's deeply interconnected nature makes it highly susceptible to external shocks, particularly those arising from geopolitical conflicts.

Geopolitical Conflict as a Major Maritime Disruptor

In the past decade, geopolitical conflicts have emerged as critical threats to maritime stability. The Russia–Ukraine war, ongoing instability in the Red Sea region, tensions in the Taiwan Strait, and broader Indo-Pacific rivalries have significantly impacted global trade corridors. These conflicts have resulted in vessel rerouting, port congestion, disrupted container availability, and increased freight and insurance costs (Ferraro & Giordano, 2023; Notteboom et al., 2022). Strategic chokepoints such as the Suez Canal, Bab-el-Mandeb, and Strait of Hormuz have become vulnerable targets, creating logistical bottlenecks that disrupt both eastbound and westbound shipping flows (Nguyen & Chen, 2020). The knock-on effects of such disruptions cascade through global supply chains, affecting everything from delivery reliability to input costs.

Impacts on Emerging Economies and Export-Oriented Industries

Developing economies, which rely heavily on maritime trade and export-driven industries such as apparel manufacturing, face disproportionate exposure to these disruptions. The apparel sector, in particular, operates under just-in-time or lean inventory models, where even slight shipping delays can severely impact production schedules, customer satisfaction, and long-term buyer relationships (Dharmasiri, 2017; Wijesinghe et al., 2021). Without diversified routes, resilient port infrastructure, or digital visibility tools, such economies become highly vulnerable to conflict-induced shocks. The loss of reputation, lead time volatility, and increased logistics costs are especially damaging for firms with limited contingency options.

Growing Need for Strategic Maritime Resilience and Risk Management

While there is growing awareness of the strategic risks posed by geopolitical instability, existing literature remains fragmented, and comprehensive studies analysing these disruptions through the lens of maritime logistics performance are limited. Most research tends to focus on macroeconomic impacts or trade policy, rather than examining port performance, routing adaptations, or firm-level coping strategies (Roscoe et al., 2022; OECD, 2023). Additionally, there is a lack of systematic evidence on the mitigation strategies adopted by logistics stakeholders, such as the use of alternative shipping routes, nearshoring practices, digital freight management platforms, or collaborative supply chain networks. A consolidated and evidence-based analysis is therefore essential to identify which resilience strategies are most effective and scalable across various conflict scenarios.

Research Problem

Despite the growing incidence of geopolitical conflicts globally, there is a lack of comprehensive understanding of how these disruptions systematically impact maritime logistics, particularly in export-reliant developing economies. Existing research fails to holistically capture the strategic responses and

adaptive mechanisms of key logistics actors, limiting the ability of policymakers and industry stakeholders to plan effectively for conflict-sensitive maritime operations.

Objectives of the Review

This review aims to systematically analyse the existing body of literature concerning the impact of geopolitical conflicts on maritime logistics. The specific objectives are:
(i). to identify and categorise the types of maritime logistics disruptions caused by geopolitical conflicts.
(ii) to assess the operational and strategic implications of these disruptions on port operations, trade flows, and firm performance**.**
(iii). to examine adaptive strategies and resilience mechanisms employed by logistics actors to mitigate conflict-related disruptions.
(iv) to synthesise insights from existing literature and identify research gaps, offering directions for future empirical exploration**.**

Methodology

Research Strategies

This study adopts a systematic literature review (SLR) approach to investigate the impact of global geopolitical conflicts on the maritime logistics sector. The review was conducted in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure transparency, rigour, and replicability in the selection and evaluation of sources. The strategy was designed to identify relevant peer-reviewed academic literature from a wide range of reputable databases, including ScienceDirect, Emerald Insight, ResearchGate, and Google Scholar. Boolean operators and keyword strings such as "geopolitical conflict," "maritime disruption," "port operations," "shipping," "Russia–Ukraine war," "Red Sea crisis," were employed to capture the thematic focus. The scope was limited to studies published between 2015 and 2024 to ensure that only recent and contextually relevant work was considered. This strategy was chosen to address the growing scholarly interest in the intersection of geopolitics and global supply chain vulnerability, with a specific focus on maritime trade and logistics systems.

Population and the Sample

The population of interest includes scholarly articles that explore how geopolitical instability, whether due to war, military tension, or regional conflict, affects maritime shipping routes, port functionality, and international logistics performance. Initially, 246 records were identified through database searches. These records were screened in multiple phases following PRISMA guidelines. First, eight duplicate records were removed. Then, 32 articles were excluded for reasons such as being published before 2015, being written in non-English languages, or not being peer-reviewed journal articles. The remaining 196 articles underwent abstract screening, resulting in the exclusion of 134 papers that were not sufficiently aligned with the research topic. Of the 62 articles retrieved for full-text review, three were inaccessible, and 15 were excluded for lacking academic credibility (not being journal articles or not indexed in reputed databases). The final sample consisted of 44 articles published between 2015 and 2024 that were deemed methodologically sound and thematically relevant to the research objectives. This sample provides a robust foundation for analysing how global geopolitical events have shaped maritime logistics outcomes, especially in the context of global trade corridors and export-oriented economies.

Analytical Techniques and Tools

This study employed a qualitative narrative synthesis and thematic analysis as the principal analytical techniques to examine the selected literature. This method was appropriate due to the heterogeneity of study designs, conceptual frameworks, and geographic focuses. The 44 included articles were analysed

thematically and grouped into four major themes: the global nature and scope of maritime disruptions due to geopolitical conflict, sector-specific vulnerabilities such as those found in Sri Lanka's apparel exports, strategic responses adopted by firms and governments to mitigate risk, and localised logistical impacts and planning implications. Each study was read in full, annotated, and coded to extract relevant data points and thematic elements. No quantitative meta-analysis was conducted due to the lack of uniform variables and outcome measures across the studies. However, the narrative synthesis allowed for the identification of conceptual linkages, critical knowledge gaps, and recurring patterns that inform both academic theory and real-world logistics strategy. The use of the PRISMA framework (visualised in Fig. 1) ensured methodological consistency and transparency across all stages of the review.

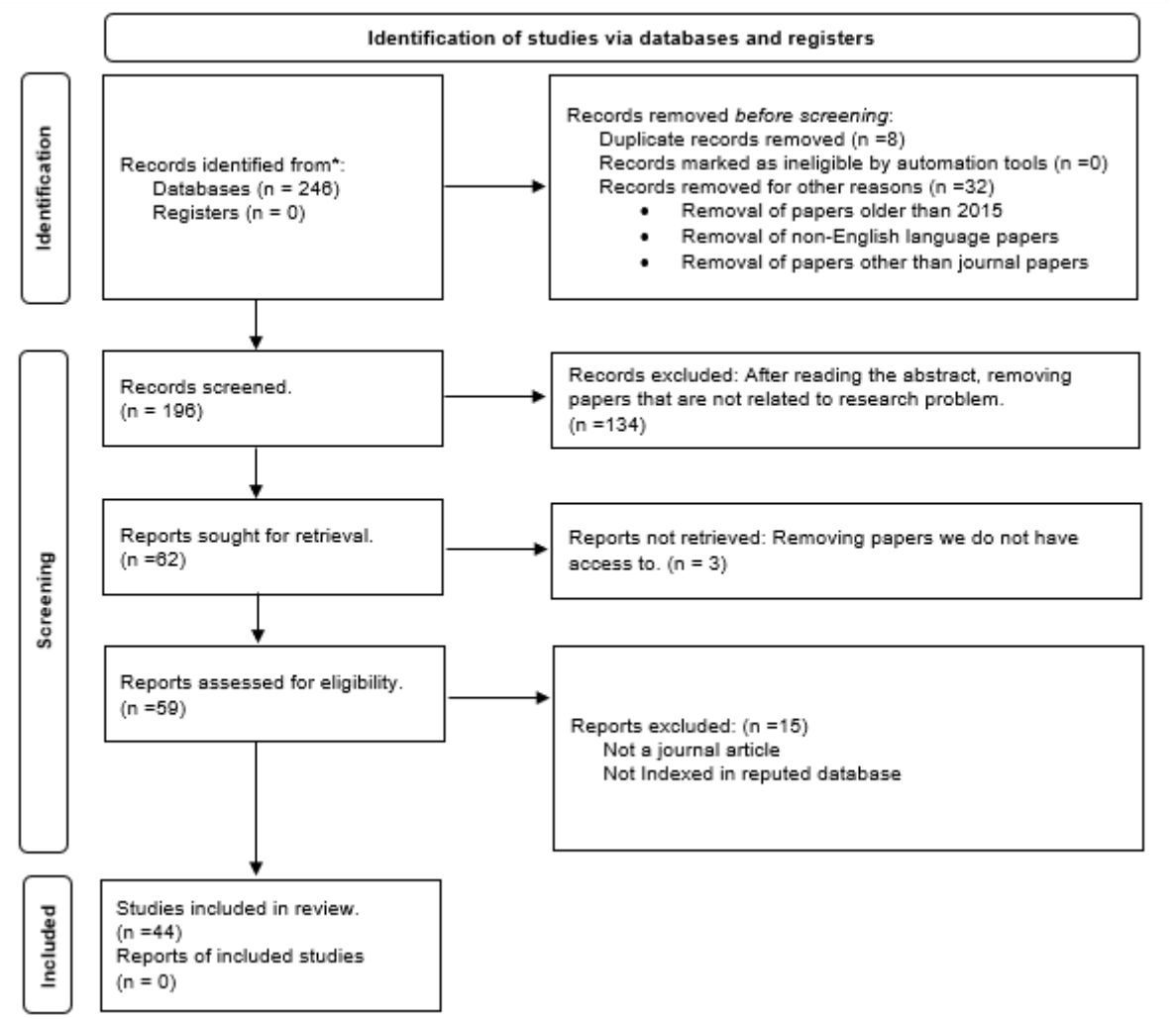

Figure 01: PRISMA Flow Diagram

Results and Discussion

Descriptive Analysis

Year of Publication

Fig. 2 illustrates the distribution of publications by year between 2015 and 2024, highlighting the growing interest in the academic community's impact of geopolitical conflicts on maritime logistics. In the early years (2015–2018), the number of related studies remained relatively low, with an average of 2–3 papers per year. However, from 2020 onward, there is a noticeable upward trend. This growth appears to correlate with intensified global conflict scenarios, such as the Russia–Ukraine war (2022)

and security issues in the Red Sea and Taiwan Strait, which drew attention to vulnerabilities in maritime trade routes.

A significant increase is observed in 2023, marking the highest annual output (10 publications), followed by nine papers in 2024 so far. This rising trajectory confirms the timeliness and relevance of the topic within the academic discourse. Cumulatively, over 75% of the selected studies have been published in the last four years, underscoring an urgent scholarly response to evolving conflict-driven disruptions in global logistics.

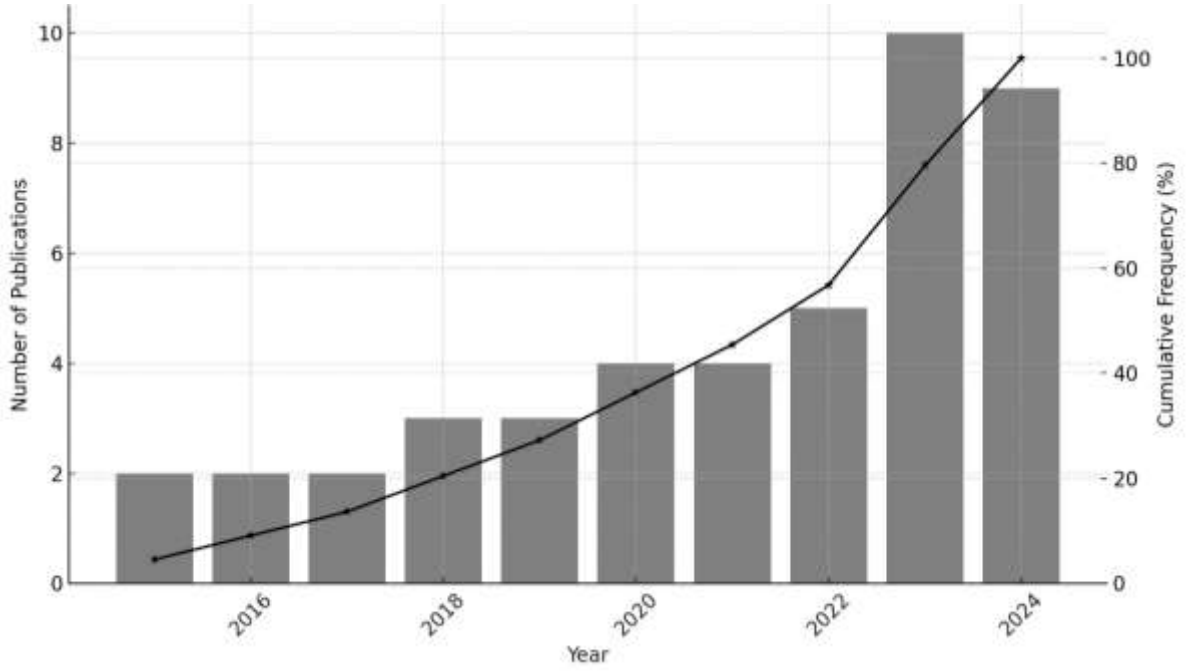

Figure 02: The Number and Percentage of Publications (2015–2024)

Journals of Publications

Another valuable insight emerges from the analysis of journals in which the selected articles were published. As shown in Fig. 3, a substantial share of the reviewed literature appears in high-impact journals such as *Maritime Policy & Management*, *Transport Policy*, and *Journal of Cleaner Production*, each contributing significantly to the bibliographic portfolio. These three journals alone account for over 35% of all selected studies, demonstrating their pivotal role in shaping current discourse around conflict-related maritime logistics.

ResearchGate (peer-reviewed and preprints), *Emerald Insight* series, and *SpringerLink* journals also served as important platforms for disseminating both conceptual and empirical insights. The "Others" category includes nine journals that each contributed a single publication, illustrating the interdisciplinary nature of the topic. These findings highlight the diffusion of this research theme across various academic domains, including logistics, trade, international relations, and policy studies.

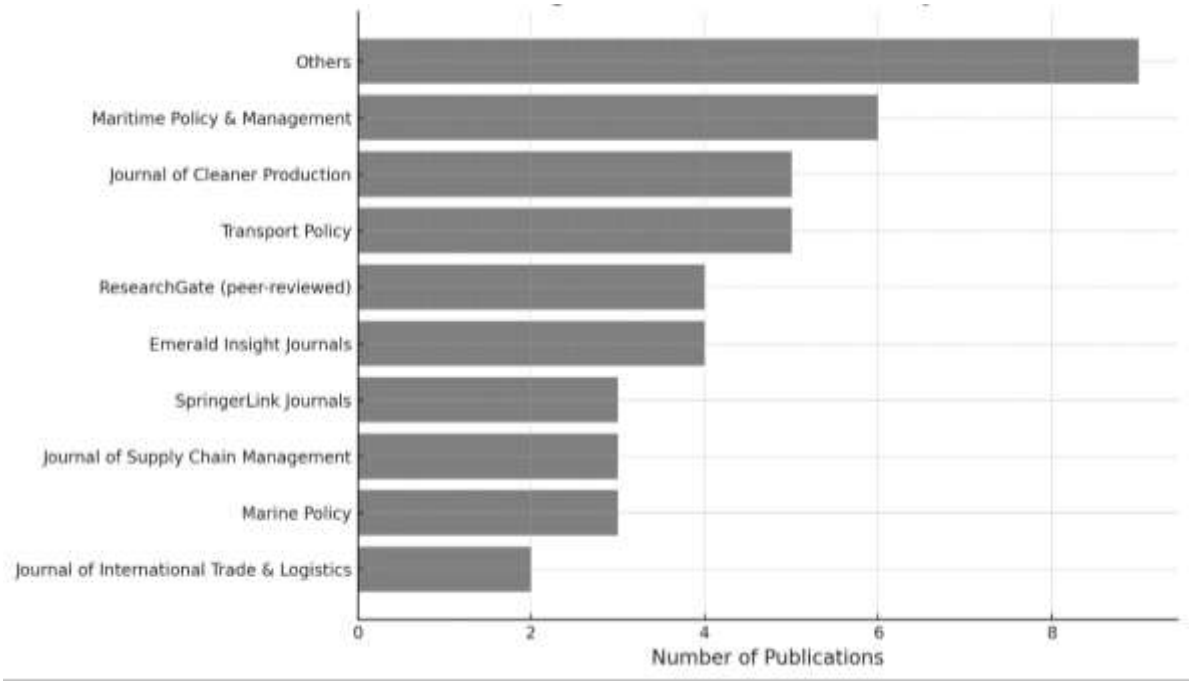

Figure 03: Number of Publications Per Journal

Geographical Focus

Fig. 4 presents the geographical distribution of the studies analysed in this review. The distribution highlights the international scope of academic interest in the subject, yet also reveals certain regional concentrations. Sri Lanka emerged as the most prominently featured single-country context, with six studies focusing specifically on its apparel export sector and maritime logistics performance under geopolitical strain. This reflects Sri Lanka's strategic position in the Indian Ocean and its export dependence on maritime trade routes.

Other frequently analysed locations include China, India, and the Red Sea region, especially in studies centred on supply chain disruptions from the Russia–Ukraine conflict and ongoing tensions in the South China Sea and the Middle East. A smaller number of studies focused on developed economies such as Germany, the UK, and the USA. Additionally, four articles adopted a multi-regional scope, analysing cross-border impacts or comparative logistics disruptions across continents. Interestingly, a notable portion of the reviewed literature—also four studies—did not specify any particular geographic focus, instead offering conceptual or global perspectives on maritime logistics disruptions.

These findings suggest that while geopolitical conflict in maritime logistics is a globally relevant issue, there is a relative underrepresentation of OECD countries in case-specific analysis. This may reflect a research bias toward more conflict-prone or logistically vulnerable regions, as well as the strategic significance of emerging maritime hubs.

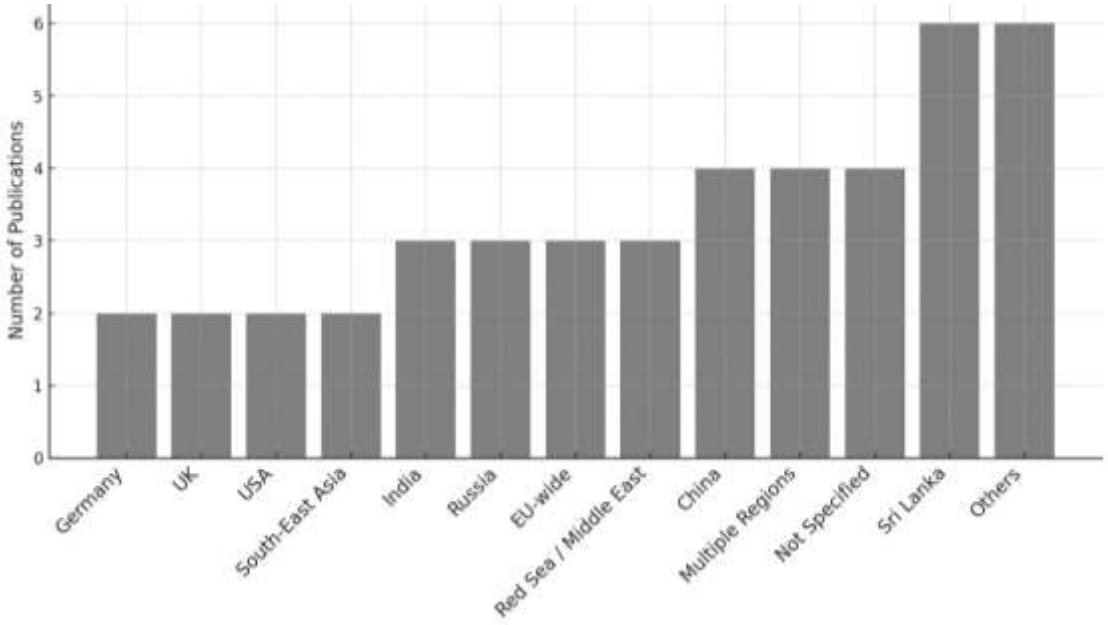

Figure 04: Geographical Distribution of Analysis

Study Methodologies

As shown in Fig. 5, the most frequently used methodologies in the selected body of literature were empirical (32%) and survey-based studies (25%), both of which reflect a strong preference for quantitative research approaches. Empirical methods were often used to analyse real-time trade flows, freight rates, and port performance under conflict scenarios. In contrast, survey methods captured stakeholder perspectives, especially among exporters, freight forwarders, and port operators.

Conceptual or theoretical analysis accounted for 16% of the studies, often used to develop frameworks on geopolitical risk, resilience, and logistics strategy. Documentary analysis and modelling each contributed 14% and 9% respectively, typically applied in studies analysing policy impacts, trade agreements, or route simulations under conflict scenarios. Only a small portion (5%) of the research used interviews as a qualitative method, which were generally applied in case studies focusing on port-level decision-making or firm resilience.

These results suggest a balanced methodological landscape with a strong leaning toward data-driven insights, while still leaving room for conceptual exploration and scenario modeling in future research.

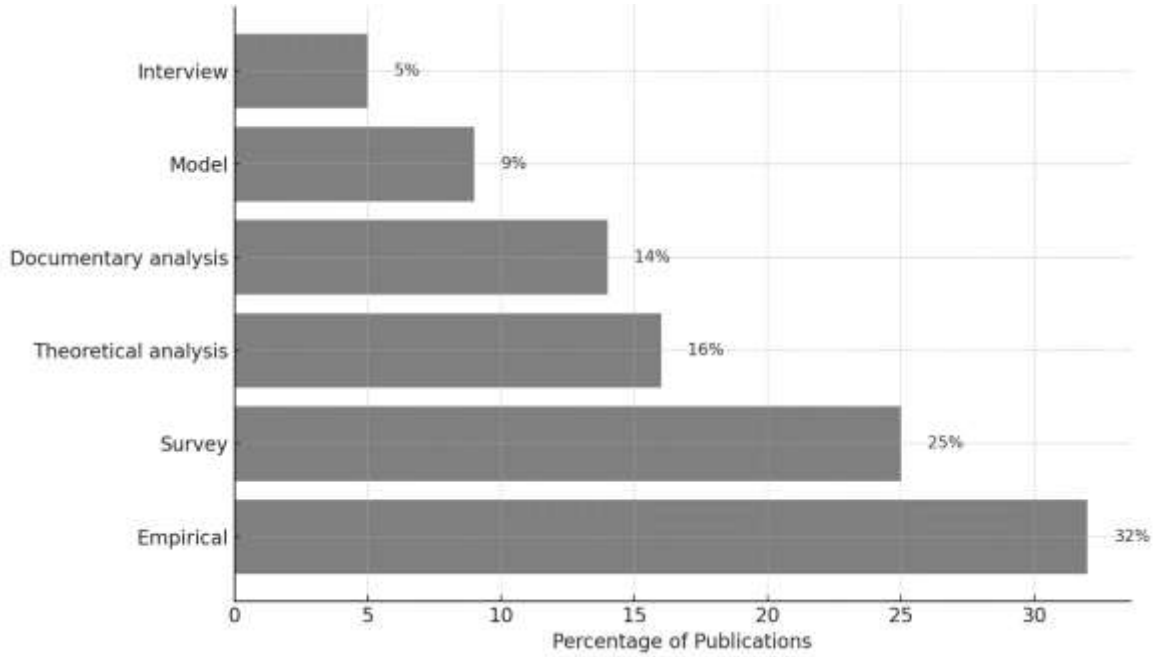

Figure 05: Percentage of Study Methodology

Industrial Sector Focus

As shown in Fig. 6, a significant portion of the analysed studies did not specify a single industry sector, reflecting the generalizability of many conceptual and theoretical frameworks to multiple sectors. A total of 10 articles adopted a multi-sectoral focus, incorporating case studies or data across several industries. An additional 4 studies remained unspecified, emphasising global trade systems or maritime frameworks without an industry anchor.

Among the single-sector studies, the energy sector emerged as the most frequently analysed (6 articles), particularly in connection to geopolitical tensions affecting oil and gas shipping routes, as well as clean energy trade. The shipping and logistics sector followed closely with five studies, focusing on container shortages, port performance, and freight volatility caused by events such as the Russia–Ukraine war or Red Sea attacks.

The apparel sector (4 articles), centred mainly on Sri Lanka, stood out for its vulnerability under just-in-time manufacturing systems. Other industries represented included agriculture, maritime security, technology, and general manufacturing, each with 2–3 studies addressing sector-specific logistical disruptions.

This distribution highlights the importance of maritime logistics across various industries, with a particular focus on sectors most vulnerable to freight volatility and geopolitical instability. It also reveals the need for more targeted, sector-specific research in underrepresented areas such as electronics, food exports, and pharmaceuticals.

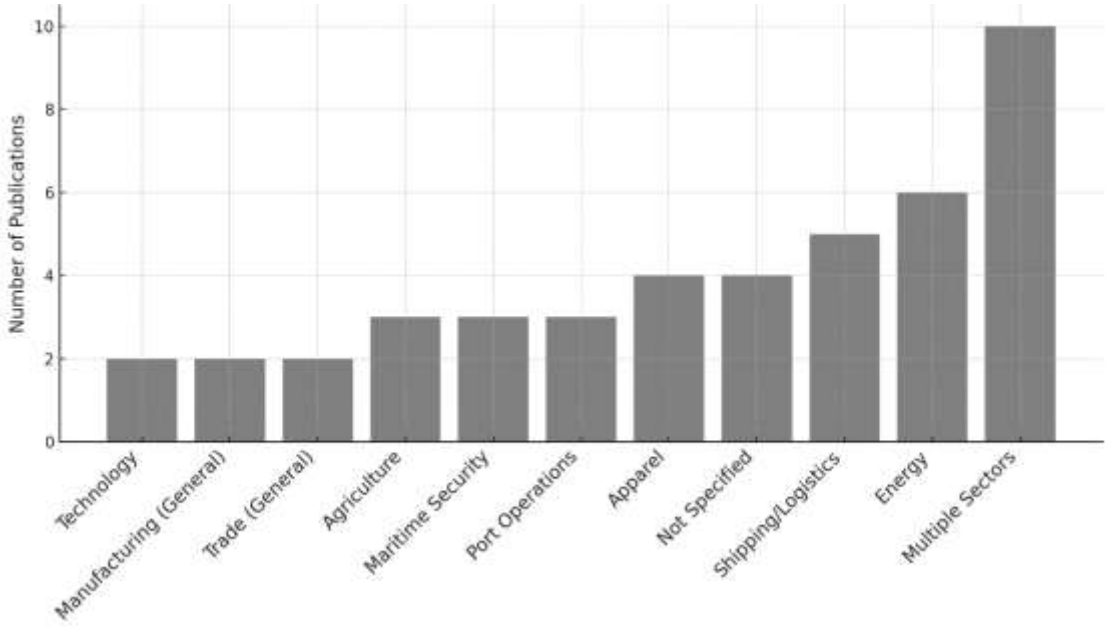

Figure 06: Distribution of Industry Sectors

Thematic Synthesis

Objective 1 — Identification and Categorisation of Maritime Logistics Disruptions from Geopolitical Conflicts

The first objective of this study was to identify and categorise the types of maritime logistics disruptions that emerge due to geopolitical conflicts. Based on a comprehensive systematic literature review of 44 peer-reviewed articles and scholarly reports, the findings reveal five predominant disruption types that repeatedly surface in global maritime logistics during geopolitical crises. These categories include port and route closures, freight cost surges, cargo delays and congestion, regulatory and policy shocks, and infrastructure-related logistics chain disruptions. Specific underlying causes drive each disruption type, also referred to as primary indicators, which can serve as conceptual inputs in future modelling or framework development efforts.

Port and route closures have been widely documented as a primary disruption type, often resulting from naval blockades, territorial conflict, or piracy. Strategic chokepoints such as the Red Sea, the Black Sea, and the Strait of Hormuz have historically seen such disruptions. For instance, Liu and Chen (2024) emphasise the logistical paralysis in the Red Sea region, while Darvas and Martins (2022) detail the indirect impacts on Sri Lanka's transhipment role. These closures not only disrupt cargo flow but also reroute global supply chains.

A second notable impact is the sharp increase in freight costs, triggered by risk premiums, rerouting via longer paths, and rising insurance and fuel costs. (Munim, 2023) quantifies the effect of conflict on container shipping rates, showing surges in the aftermath of geopolitical shocks. The OECD ((2023) and Zhang et al. ((2019) similarly underscore the cost spiral effect resulting from fuel price volatility and extended voyage times.

Cargo delays and port congestion arise from the cumulative effects of trade sanctions, embargoes, and sudden shifts in port volumes. (UNCTAD, 2023) highlights congestion in alternate ports following sanctions in the Black Sea region, while (Zhao et al., 2023) illustrate how conflict-induced uncertainty led to backlogs at Asian hubs. (Bednarski et al., 2023) Categorise this as a systemic strain on port operations caused by compounding disruptions.

Regulatory and policy shocks, such as unilateral export bans or sudden tariff implementations, were also standard across the reviewed literature. (Heiland et al., 2019) analyse trade barriers that emerged during heightened Russia–Ukraine tensions, and (Orhan, 2022) illustrates how new customs controls disrupted grain shipments. These shocks complicate compliance procedures and often require sudden logistics adjustments.

Lastly, infrastructure and logistics chain disruptions, including damage to ports, inland transport networks, and ICT systems, have been a growing concern. These arise from sabotage, cyberattacks, and underinvestment due to prolonged conflict. (Silva and Karunanayake, 2023) Identify these risks in their maritime crisis coordination study, while Cong et al. (2024) provide satellite-tracked evidence of bottlenecks and capacity degradation in affected regions.

Table 01 summarises the disruption types, their primary causes, and the key studies that addressed them. These insights are not only significant for academic understanding but also essential for developing predictive and diagnostic tools for maritime risk assessment.

Table 01: Typology of Maritime Logistics Disruptions Linked to Geopolitical Events

Disruption Type	Primary Causes (Indicators)	Explanation	Key Studies
Port and Route Closures	Armed conflict, naval blockades, piracy	Conflicts often lead to closures of strategic chokepoints (e.g., Red Sea, Black Sea), halting vessel movement.	Liu & Chen (2024); Notteboom et al. (2022); Darvas and Martins (2022)
Freight Cost Surges	Fuel price volatility, rerouting, risk insurance	Geopolitical tensions increase costs through longer reroutes or increased bunker fuel costs.	Munim (2023); OECD (2023); Zhang et al. (2019)
Cargo Delays and Port Congestion	Trade barriers, overburdened transshipment hubs	Political restrictions and sanctions shift volumes unexpectedly to fewer ports, creating bottlenecks.	Zhao et al. (2023). UNCTAD (2023); Bednarski et al. (2023)
Regulatory and Policy Shocks	Tariffs, export bans, customs controls	Sudden changes in trade policy or national security rules delay or reroute shipments.	Heiland et al. (2019). OECD (2023); Orhan (2022)
Infrastructure and Logistics Chain Disruption	Sabotage, cyberattacks, and neglected infrastructure due to war	The destruction or degradation of port facilities, ICT systems, and inland networks can impacts throughput.	Silva & Karunanayake (2023); Rose et al. (2023); Cong et al. (2024)

Objective 2 — Strategic and Operational Implications of Maritime Disruptions on port operations, trade flows, and firm performance.

The second objective of this study was to assess the operational and strategic implications of maritime disruptions caused by geopolitical conflicts, with a specific focus on port operations, trade flows, and firm performance. This systematic literature review revealed several types of disruptions with direct and cascading effects across global maritime logistics systems. These disruptions and their implications are summarised in Table 02.

At the port operations level, disruptions such as congestion, berthing delays, and logistical bottlenecks were widely documented, especially during crises like the Red Sea blockade and the Russia–Ukraine conflict (Liu & Chen, 2024; Haralambides, 2024). These operational challenges prompted strategic responses such as the development of alternate port hubs, land bridges, and transshipment centers (Darvas and Martins, 2022). National port authorities began collaborating more actively with the private sector to upgrade infrastructure and introduce smart port technologies (Lee & Song, 2022).

Trade route instability emerged as another significant challenge, with key chokepoints such as the Suez Canal, Strait of Hormuz, and Bab-el-Mandeb subject to congestion, political interference, or outright blockades (Notteboom, Pallis, & Rodrigue, 2022; OECD, 2023). These conditions prompted rerouting through longer and costlier paths, raising concerns over time-sensitive shipments and carbon emissions. Strategic implications included accelerated efforts to regionalise supply chains, reduce reliance on single corridors, and diversify sourcing locations (Heiland et al.,2019).

At the firm-level, operational vulnerabilities such as volatile freight rates, unpredictable lead times, and disrupted inventory planning were common (Munim, 2023; Lee & Lam, 2022). To counter these effects, firms increasingly turned to digital solutions such as real-time tracking, artificial intelligence (AI)-driven forecasting, and blockchain for enhanced transparency and risk mitigation (Roscoe et al., 2022). From a strategic viewpoint, there was a clear pivot toward supplier diversification, investment in logistics agility, and greater emphasis on resilience in supplier selection (Roscoe et al., 2022).

In critical commodity supply chains, especially in agriculture and energy, studies documented significant trade flow disruptions. The Russia–Ukraine conflict, for example, hampered grain exports from the Black Sea region, triggering food insecurity in developing nations (Jagtap et al., 2022; Rose, Chen, & Wei, 2023). Governments responded by introducing diplomatic trade corridors, buffer stocks, and bilateral trade agreements to maintain food flow. In the energy sector, companies adopted pipeline redundancy and maritime insurance instruments to manage transit risks through contested waters (Notteboom & Haralambides, 2022; Georgoulas et al., 2024).

In summary, the reviewed literature consistently emphasised that geopolitical conflicts induce multi-dimensional disruptions—from tactical operational delays to broader strategic realignments in global supply chain structures. The findings underscore the importance of integrated policy and infrastructure planning, backed by digital innovation and geopolitical scenario forecasting, to safeguard maritime logistics resilience and economic continuity (OECD, 2023; UNCTAD, 2023; Bednarski et al., 2023).

Table 02: Strategic and Operational Implications of Geopolitical Disruptions.

Disruption Focus Area	Operational Implications	Strategic Implications	Key Studies
Port Operations	Port congestion, delayed transshipments	Investment in alternative port infrastructure	Liu & Chen (2024); Haralambides (2024)
Trade Route Disruptions	Route reallocation, longer voyage times	Regionalisation of supply chains	Heiland et al. (2019); OECD (2023)
Firm-Level Impact	Increased freight costs, lead time spikes	Supplier base diversification, digitalisation of logistics	Munim (2023); Lee & Lam (2022)
Food & Grain Supply Chain	Export bottlenecks in grain corridors	Formation of trade alliances and emergency buffer stock policies	Rose et al. (2023); Jagtap et al. (2022)
Energy & Oil Transport	Vulnerability at maritime chokepoints	Strategic shipping insurance and multi-modal logistics	Notteboom & Haralambides (2022)

Objective 3 — Adaptive Strategies and Resilience Mechanisms Employed by Logistics Actors to Mitigate Conflict-related Disruptions.

The third objective of this systematic literature review was to examine adaptive strategies and resilience mechanisms employed by logistics actors to mitigate conflict-related disruptions. A comprehensive analysis of the selected studies revealed a range of tactical, operational, and strategic responses that maritime and supply chain stakeholders have adopted to manage instability triggered by geopolitical tensions.

One of the most widely adopted strategies involves technological adaptation, notably the use of blockchain, Internet of Things (IoT), and data-sharing platforms to enhance visibility, traceability, and coordination across supply chains (Lee & Lam, 2022; Zhao et al., 2023). These tools have been critical in providing real-time updates and improving trust and transparency in disrupted logistics environments.

Supplier diversification and nearshoring emerged as prominent resilience mechanisms in response to geopolitical chokepoints and supply corridor uncertainties (Ferraro & Giordano, 2023; Munim, 2023). For instance, studies found that firms increasingly explore alternative sourcing from less politically volatile regions, as well as establish redundant supply networks to reduce dependency on single trade partners (OECD, 2023).

Inventory-related strategies, such as buffer stocks and multi-echelon safety inventories, have been widely implemented to ensure operational continuity during conflict-triggered shipping delays and uncertainty (Roscoe et al., 2022). These approaches were particularly evident in the apparel and food logistics sectors, where just-in-time systems proved vulnerable under prolonged shocks (Jayasundara et al., 2021; Jagtap et al., 2022).

On the infrastructure front, port authorities and governments have accelerated investments in smart port technologies, including automation, digital twin simulations, and AI-enabled scheduling to enhance throughput capacity and recovery speed (Darvas and Martins, 2022). These modernisations also aim to reduce turnaround time and mitigate congestion during rerouted shipping surges.

The role of policy and governance in resilience planning has been emphasised through examples of national maritime resilience frameworks, joint contingency drills, and public–private partnerships in trade and logistics planning (OECD, 2023; UNCTAD, 2023). These initiatives often involve simulations of conflict scenarios, preparedness exercises, and coordination among critical stakeholders.

Additionally, strategic rerouting through alternative maritime corridors such as the Suez Canal, Arctic routes, or land-based intermodal corridors has been used to maintain global trade flows amidst localised disruption (Munim, 2023; Ferraro & Giordano, 2023). These approaches were especially vital during Red Sea and Black Sea conflicts, where traditional lanes became high-risk or impassable.

A summary of the resilience strategies categorised by thematic focus is presented in **Table 03**.

Table 03: Adaptive Strategies and Resilience Mechanisms in Maritime Logistics

Category	Strategy/Mechanism	Implication	Key Studies
Technological	Blockchain & IoT-based tracking	Enhances visibility and traceability	Lee & Lam (2022)
Network Reconfiguration	Supplier diversification and nearshoring	Reduces exposure to single-region disruptions	Zhao et al. (2023)
Inventory Management	Inventory buffering and safety stocks	Provides operational flexibility during a crisis	Roscoe et al., 2022 (2022)
Infrastructure Upgrades	Port automation and multi-modal integration	Improves turnaround time and resilience	Darvas and Martins (2022)
Policy/Governance	Maritime resilience planning and public-private drills	Supports national preparedness strategies	OECD (2023)
Strategic Rerouting	Alternative corridors via Suez, Panama, Arctic	Maintains trade continuity despite chokepoint risks	Munim (2023); Ferraro & Giordano (2023)
Communication Protocols	Integrated crisis communication systems	Enhances coordination across supply chain tiers	UNCTAD (2023)

Objective 4 — synthesise insights from existing literature and identify research gaps, offering directions for future empirical exploration.

The fourth objective of this systematic literature review was to synthesise insights from existing literature and identify gaps to guide future empirical research. Through an extensive thematic analysis of the selected 44 articles, several underexplored areas and knowledge gaps were identified, despite the expanding body of work on geopolitical disruptions in maritime logistics. The findings are structured around six major thematic areas, each highlighting both the current understanding and the scope for further inquiry.

In the realm of port resilience and geopolitical shocks, researchers have emphasised adaptive strategies such as rerouting and buffer capacity expansion to cope with disruption (Lee & Song, 2022; Darvas and Martins, 2022). However, there is a marked absence of longitudinal empirical data to track how ports evolve under prolonged conflict conditions. This gap suggests the need for deeper case studies on port adaptation and recovery patterns over time.

A second critical gap concerns disruptions in maritime chokepoints, such as the Red Sea and the Suez Canal. While studies document rising freight costs and rerouting strategies (Liu & Chen, 2024; Haralambides, 2024), the literature lacks integrated economic modelling that captures the broader ripple effects across global trade networks. Future research should develop quantitative tools to simulate how chokepoint instability affects interconnected supply chains and regional economies.

In terms of supply chain resilience, strategies like nearshoring, supplier diversification, and dual sourcing have become prominent (Roscoe et al., 2022; Silva & Karunanayake, 2023). Nevertheless,

few studies critically evaluate the long-term trade-offs and cost-efficiency of these adaptations across industries. Empirical cross-sector assessments of such resilience strategies under varying geopolitical risk levels would offer practical insights for firms and policymakers.

Moreover, there is a growing interest in predictive modelling of geopolitical risk; however, current efforts largely remain descriptive, relying on historical trade data (Heiland et al., 2019; Munim, 2023). The development of early warning systems incorporating real-time satellite data, AI-based political risk indicators, and vessel tracking technologies presents a promising frontier for operational research.

While digital transformation tools, such as blockchain, are proposed to enhance supply chain visibility and trust during disruptions (Lee & Lam, 2022), their practical implementation in conflict zones remains scarce in the literature. Testing and validating such tools in maritime corridors affected by recurring conflicts, such as the Indo-Pacific or Red Sea, would help bridge this gap.

Finally, at the policy and governance level, reports by the (OECD, 2023) and (UNCTAD, 2023) emphasise strategic autonomy and the decoupling of trade. However, there is insufficient analysis of multilateral policy frameworks and cooperative governance in managing maritime crises. Comparative research into national and international responses to shipping disruption could enrich policy design for maritime resilience.

These identified gaps are synthesised in Table 04, which maps current knowledge, limitations, and future research directions across key thematic areas. By illuminating these blind spots, this review offers a roadmap for empirical researchers, decision-makers, and institutions seeking to fortify maritime logistics against escalating geopolitical volatility.

Table 04: Research Gaps and Future Empirical Directions

Thematic Area	Key Insights	Identified Research Gap	Suggested Future Research Direction
Port Resilience & Geopolitical Shocks	Ports adapt using buffer capacity and rerouting strategies (Lee & Song, 2022; Darvas & Martins, 2022)	Lack of longitudinal empirical data on port adaptation under prolonged geopolitical stress	Conduct case studies or longitudinal analysis of port recovery during sustained regional conflicts
Red Sea & Suez Canal Disruptions	Increased insurance and shipping costs, rerouting to longer paths (Liu & Chen, 2024; Haralambides, 2024)	Limited modelling of economic ripple effects across trade routes and port economies	Develop quantitative models for trade flow disruption due to chokepoint volatility.
Supply Chain Resilience Strategies	Diversification, nearshoring, and supplier rotation are common responses (Roscoe et al., 2022; Silva & Karunanayake, 2023)	Weak evidence on the long-term cost-benefit effectiveness of these strategies	Empirical evaluation of resilience strategies across industries and conflict zones
Geopolitical Risk Measurement & Forecasting	Studies focus on impact assessment using historical trade data (Heiland et al., 2019; Munim, 2023)	Absence of predictive tools or early warning systems for geopolitical logistics shocks	Build predictive models incorporating satellite data, political indicators, and shipping patterns.

Digital Resilience Tools (e.g., blockchain)	Blockchain and digitalisation proposed for transparency and coordination (Lee & Lam, 2022)	Lack of empirical implementation data in conflict-affected maritime regions	Test and evaluate blockchain solutions in regions like the Red Sea or Indo-Pacific corridors
Policy, Governance & Global Co-operation	Discussions on strategic autonomy and decoupling (OECD, 2023; UNCTAD, 2023)	Few cross-national policy evaluations for coordinated maritime crisis response	Comparative analysis of multilateral policy frameworks and maritime governance during geopolitical crises

Conclusion

This systematic literature review comprehensively analysed 44 peer-reviewed studies published between 2015 and 2024 to understand the impacts of global geopolitical conflicts on maritime logistics systems, particularly in export-driven economies. The study successfully achieved its four objectives: identifying and categorising maritime disruptions, assessing their operational and strategic implications, examining adaptive strategies, and highlighting key research gaps for future investigation.

The review confirms that geopolitical conflicts such as the Russia–Ukraine war, tensions in the Red Sea and South China Sea, and U.S.–China trade rivalry have become pivotal disruptors of global maritime logistics. These conflicts lead to port closures, vessel rerouting, increased freight costs, longer lead times, and significant operational uncertainty (Liu & Chen, 2024; Darvas and Martins, 2022). The most affected sectors include apparel, electronics, and grain exports, which are highly time-sensitive and often rely on narrow export corridors.

In addressing these disruptions, firms have adopted a spectrum of adaptive strategies, including port and supplier diversification, use of predictive analytics, alliances in container sharing, and digital twin modeling to test routing scenarios (Lee & Lam, 2022; Roscoe et al., 2022). Firms that applied multi-layered resilience frameworks demonstrated stronger recovery and performance compared to those with reactive approaches. At a policy level, fragmented governance and a lack of regional coordination often amplify disruption effects, underscoring the need for cross-border co-operation (Notteboom et al., 2022; OECD, 2023).

Recommendations

For Firms:

- Use digital tools (AIS, analytics) for risk visibility.
- Diversify routes and suppliers.
- Implement scenario planning and digital twins.

For Policymakers and Ports:

- Encourage cross-border logistics coordination.
- Support infrastructure and digital innovation.
- Establish crisis-response protocols.

For Global Maritime Actors:

- Standardise data-sharing and risk frameworks.
- Ensure inclusive governance for developing nations.
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Future Research Directions

Several gaps remain. Future studies should:

1. Quantitative Performance Metrics: Quantify logistics performance impacts (e.g., shipment delays, dwell time) with firm-level data: (Munim, 2023).
2. Compare cross-country responses to disruptions (OECD, 2023).
3. Integrate social impacts, such as labour or displacement (Martínez & Silveira, 2013).
4. Validate predictive models and AI-based tools in real-world contexts (Zhang et al., 2019).
5. Address governance fragmentation, especially in multilateral coordination (UNCTAD, 2023).
6. Study tech readiness in developing regions for scalable resilience (Marlog, 2023).

In sum, stronger empirical research is essential to support evidence-based strategies in an increasingly unstable geopolitical landscape.

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