

SUPPLY CHAIN RESILIENCE IN THE ERA OF THE VULNERABLE CONTEMPORARY ECONOMY

Elida-Tomița TODĂRIȚĂ

“Nicolae Bălcescu” Land Forces Academy, Sibiu, Romania
elida_todarita@yahoo.com

Abstract: *One of the main functions of the supply chain involves monitoring the flow of goods and data from raw materials all the way to the customer, using human resources, processes, and new technologies, with the aim of minimizing costs, improving logistics services, and ensuring resilience. Resilience is built, maintained, and implemented. Unpredictable situations and periods of fluctuation (ups and downs) can occur at any point in the supply chain, and the entire operation is affected by them. Thus, market volatility in the supply chain is influenced by unpredictable and rapid fluctuations in demand, supply, or prices, caused in part by increasingly frequent economic changes, shifting customer preferences, disruptive events, and armed conflicts between major powers. All of these factors combined create uncertainty and increase both operational risk and the difficulty of effectively planning the flow of goods. This paper consists of a study that uses both a theoretical and analytical framework to examine the development and resilience of supply chains under pressure from current economic conditions, as well as their vulnerability in the current economic climate. The research method is based on a descriptive and analytical analysis.*

Keywords: supply chain, economy, vulnerabilities, changes

1. Introduction

The research methodology adopted in this study is based on a qualitative and exploratory approach, aimed at understanding the multidimensional nature of resilience within global supply chains. The study relies on a systematic literature review of academic articles, policy reports, and industry publications, with a particular focus on recent contributions addressing supply chain disruptions, risk management, and resilience-building strategies. The selected literature was analyzed through thematic content analysis, allowing the identification of recurring patterns, key risk drivers, and resilience capabilities across economic, geopolitical, and environmental dimensions. Additionally, a comparative analysis approach was employed to examine how different studies conceptualize resilience in relation to contemporary global

shocks, such as pandemics, climate change, and geopolitical tensions. This methodology enables a comprehensive understanding of how supply chain systems adapt, absorb, and recover from disruptions in an increasingly uncertain global economy.

The concept of the supply chain was introduced relatively recently into management vocabulary (in the 1980s). The term “supply chain” was coined and developed by Keith Oliver and Michael Webber, British consultants, with the aim of describing an emerging management discipline. They defined the supply chain as the process of planning, implementing, and controlling the flow of materials, information, and finished products from the source to the consumer, with the aim of efficiently meeting customer requirements. The goal of their “innovation” stemmed from the need to “break down functional

silos” - specifically, the barriers between departments such as production, marketing, distribution, sales, and finance within companies - in order to reduce inventory and increase efficiency. Initially, the term used for the supply chain was "Integrated Inventory Management" (I2M), but it failed to resonate with customers and was quickly replaced by "supply chain management" (SCM) [1].

Subsequently, the applicability of SCM has been extensively studied and explored in various fields, with a number of definitions proposed in the literature.

On the other hand, confusion regarding the meaning of this concept has inevitably arisen due to the fact that some authors define SCM in operational terms, with implications for the flow of raw materials, components, and finished products. Other specialists view it as a management philosophy, while still others have interpreted it in terms of process management or even as an integrated system [2].

Practitioners' interest in supply chain management has grown steadily, especially since organizations in the field realized that they can no longer operate efficiently if they remain isolated from their distributors or other entities in the supply chain. Moreover, the benefits of collaborative relationships both within and outside the organization have been recognized.

With the development of new technologies and their implementation in logistics, operations—including transportation—often face certain constraints; therefore, they require constant rigor and organization, which in turn yield consistent gains.

Choosing the best logistics strategies directly influences a company's performance, primarily in terms of costs but also in terms of asset utilization. Equally important are decisions regarding pricing, defining compensation systems for the sales

team.

Furthermore, promotional initiatives, ancillary business conditions, and distributional approaches are contingent upon a supply structure that may encompass a greater or lesser number of supplier. With the aim of ensuring the widest possible market reach for the product.

Outsourcing services based on an analysis of existing knowledge and skills can also be included in the pricing category.

The key configuration elements - production, allocation, externalization, client service, and resource management strategies - serve as the core components of SCM strategy. Achieving strategic goals and maintaining a competitive advantage require that these elements, together with the decisions derived from them, be consistently aligned with the organization's overall strategy, the needs of its customers, and its position within the market. Such alignment is particularly important in light of the dynamic nature of the business environment, where competitive advantage tends to be short-lived [3].

Table 1 highlights the supply chain's contribution to the development of the organization's strategy, based on four main strategies (innovation, cost, service, and quality), the sources of competitive advantage for each, the strategic focus, and the elements of the logistics chain designed to support each individual strategy. The future of work and outsourcing is increasingly influenced by technological progress, globalization, and the transformation of labor models.

Developments such as automation, artificial intelligence, and the expansion of remote work are shifting outsourcing from a primarily cost-driven practice toward strategic partnerships focused on innovation and adaptability.

Table 1 The role of the supply chain in developing the organization's strategy
Source: https://www.researchgate.net/publication/23544775_ELABORAREA_STRATEGIILOR_LOGISTICE,
p. 36, accessed 24.04.2026

<i>Main strategy</i>	<i>Source of advantage</i>	<i>Strategic axis</i>	<i>The main elements of the logistics chain that contribute to the strategy</i>
Innovation	Unique brand and technology	Attractive and innovative products	The time it takes to reach the market and create the required production volume
Cost	Cost-reduced operations	Minimum cost within the product assortment	Effective and low-cost infrastructure
Services	Distinctive or difficult-to-replicate services	A service tailored to address the specific requirements of the client	Services designed specifically for the customer
Quality	The safest and most reliable products	Safe products	Reliability of supply chain processes and quality control

At the same time, the rise of the gig economy and access to global talent pools are reshaping traditional employment structures, while issues related to data protection, labor ethics, and workforce development remain significant challenges. By adopting flexible work arrangements, fostering continuous learning, and integrating sustainable practices, organizations can use outsourcing as a means to enhance competitiveness and resilience in a rapidly changing global environment [4].

Modern supply chain management incorporates multiple key dimensions, including resilience, sustainability, and digital transformation, which together shape its performance and adaptability in a rapidly evolving global environment. Competitiveness is being reconfigured by the increasingly stringent requirements of global consumers and regulators for sustainability, resilience and ethical compliance in supply processes in the supply chain [5].

Supply chain resilience (SCR) can be compared with related concepts such as supply chain risk management and robustness. While supply chain risk management focuses primarily on

identifying and mitigating known risks, resilience extends this perspective by encompassing the capability of a supply chain to anticipate, respond to, and recover from unforeseen disruptions, as well as to prepare for potential future shocks [6].

2. Global and national logistics in the era of the vulnerable economy – statistical data

The economic impact of the disruptions is reflected on several levels that can have direct, indirect and secondary effects. The direct effects are manifested on human resource capital, stock levels and logistics infrastructure. Then, the indirect effects derive from the dysfunctions that occur in the flows of goods, the secondary effects are felt at the level of macroeconomic indicators [7].

In the last 10 years, the logistics industry both globally and nationally has faced continuous disruptions influenced by economic changes and transformations (from the economic crises that also affected Romania, to the COVID-19 pandemic, to geopolitical tensions, to the shortage of raw materials, to fierce competition, bottlenecks in the transport sector, to the increase in logistics chain tariffs, etc.).

All these factors have led to the highlighting of major vulnerabilities, revenue losses, production stoppages and higher costs, including in the field of transport.

For these reasons, cost differences in logistics activity constitute a competitive advantage. Thus, organizations were forced to look for various ways of differentiating products, through innovative ones and through strategies to combat competing markets taking into account the specificity of each one, the ultimate goal being to create interest for the consumer.

According to a McKinsey & Company report from January 2025 (in the World Economic Forum), supply chain disruptions could cost organizations up to 45% of a year's profits over the course of a decade. Companies that fail to build supply chain resilience face not only financial losses, but also damaged reputation, regulatory risks, and operational instability [8].

The report aimed at an analysis of the year 2025, with 100 companies in the logistics field being respondents. The main topic was the influence of the impact of tariff increases on the world's most important trade flows as a result of ongoing economic changes around the world.

Among the respondents, 82% reported that their SCM are impacted by the new tariffs, with between 20% and 40% of their SCM operations being affected in various ways. (Figure 1).

The impact of the tariff increases mentioned in Figure 1 were gradually felt across all supply chain activities, with 39% of the organisations surveyed also mentioning increases in supplier costs and associated material costs. 30% of them mentioned the discounts offered to customer demand.

Within the consumer goods industry, the greatest impact was observed, with tariffs impacting 43% of supply chain functions. [8]. In general, organizations maintain the same resilience measures when disruptions to logistics activity occur.

So, as can be seen in Figure 2, following the study also carried out by McKinsey & Company (in the World Economic Forum), the majority of respondents (36%) have initial actions in progress, 29% have developed strategies or response plans, 17% have already implemented actions of this kind, 15% have not identified any impact to prepare in this regard, and 3% did not take any action.

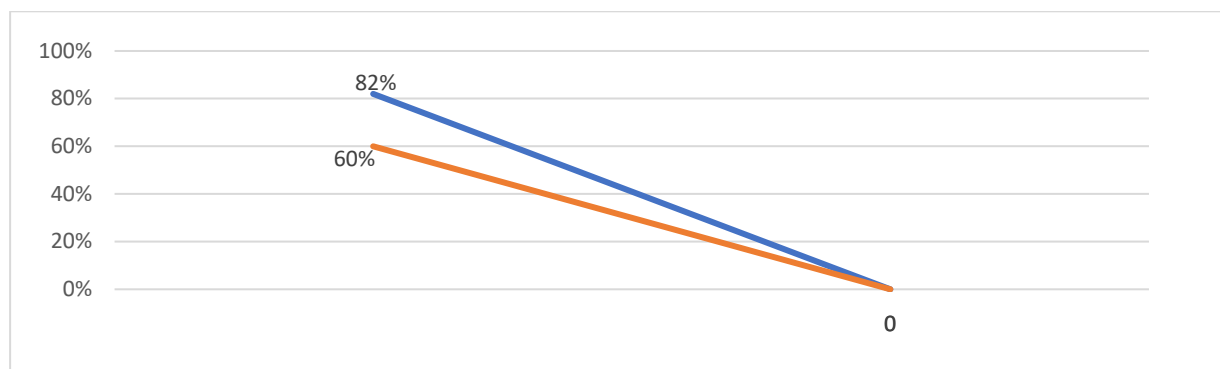


Figure 1: The impact of tariffs on the most important trade flows in the world

Source: Tacy Foster. Supply chain risk pulse 2025: Tariffs reshuffle global trade priorities.

The defining issue for global supply chains is now tariffs, testing resilience and leading companies to delay digital transformation in favor of fast, tactical moves. December 2, 2025.

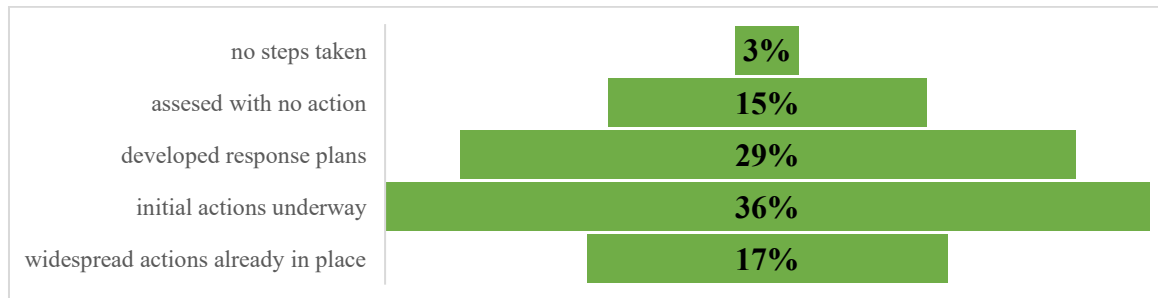


Figure 2: Actions taken to reduce tariff impact on the supply chain

Source: Foster Tacy. *Supply chain risk pulse 2025: Tariffs reshuffle global trade priorities. The defining issue for global supply chains is now tariffs, testing resilience and leading*, <https://www.mckinsey.com/capabilities/operations/our-insights/supply-chain-risk-survey>, accessed on 27.04.2026

A comparison can be made with 2024 in terms of resilience. In a report also by the World Economic Forum (*The Global Risks Report 2024*), the distribution of risks in this field of activity can also be analysed from the perspective of the concept of resilience, defined as the ability of social, economic and institutional systems to anticipate, absorb and adapt to shocks. The predominance of risks such as extreme weather events, disinformation or social polarization suggest that current challenges are no longer isolated, but interconnected, simultaneously affecting several dimensions of society. In this context, resilience becomes an essential element, as it requires not only crisis response, but also the ability to adapt and transform in the face of complex and unpredictable risks. The intensification of climate phenomena requires the development of robust infrastructures and adaptation policies, while informational and social risks require strengthening institutional trust and social cohesion. Figure 3 reflects not only the hierarchy of perceived risks but also the need for an integrated approach to resilience at the global level. The percentages reported by the World Economic Forum in *The Global Risks Report 2024* indicate significant pressures on global supply chains. Extreme weather events (66%) suggest a high exposure of logistics infrastructure and critical supply chain management situations to climate

shocks, with a direct impact on operational continuity (Figure 3).

Therefore, the comparison between 2024 and 2025 highlights an evolution in the global risk profile, from predominantly climate- and economy-related vulnerabilities toward a context characterized by the interdependence of climatic, geopolitical, and informational risks. This transformation underlines the need for an integrated approach to resilience, based on anticipation, adaptation, and international cooperation, in order to reduce the impact of complex and interconnected crises.

For 2025, the data highlights a significant shift in the perception of global risks, with the focus moving from predominantly economic and logistical risks toward geopolitical, informational, and social risks. Although extreme weather events continue to represent one of the main global threats (14%), the emergence and consolidation of risks such as interstate armed conflicts (23%), geoeconomic confrontations (8%), as well as misinformation and societal polarization (7% and 6%, respectively), indicate an increasing level of systemic instability at the international level.

From the perspective of resilience, the distribution of risks in 2025 suggests that global systems are exposed to multiple and simultaneous pressures that go beyond the strictly economic dimension. While in 2024

the dominant risks were associated with critical infrastructure, supply chains, and climate-related shocks, in 2025 there is a visible increase in vulnerabilities generated by geopolitical tensions and social fragmentation. This demonstrates that resilience can no longer be addressed exclusively through technical or economic measures, but requires stronger international cooperation, institutional capacity, and social cohesion.

Interstate conflicts and geoeconomic confrontations can directly affect international trade, energy security, and the

stability of global markets, increasing the risk of disruptions in trade flows and access to strategic resources. At the same time, the persistence of misinformation and social polarization reduces trust in institutions and complicates the implementation of public policies necessary for crisis management. These trends show that global resilience depends not only on the ability to respond to external shocks, but also on the capacity of societies to maintain internal stability and adapt governance mechanisms to an increasingly volatile international environment.

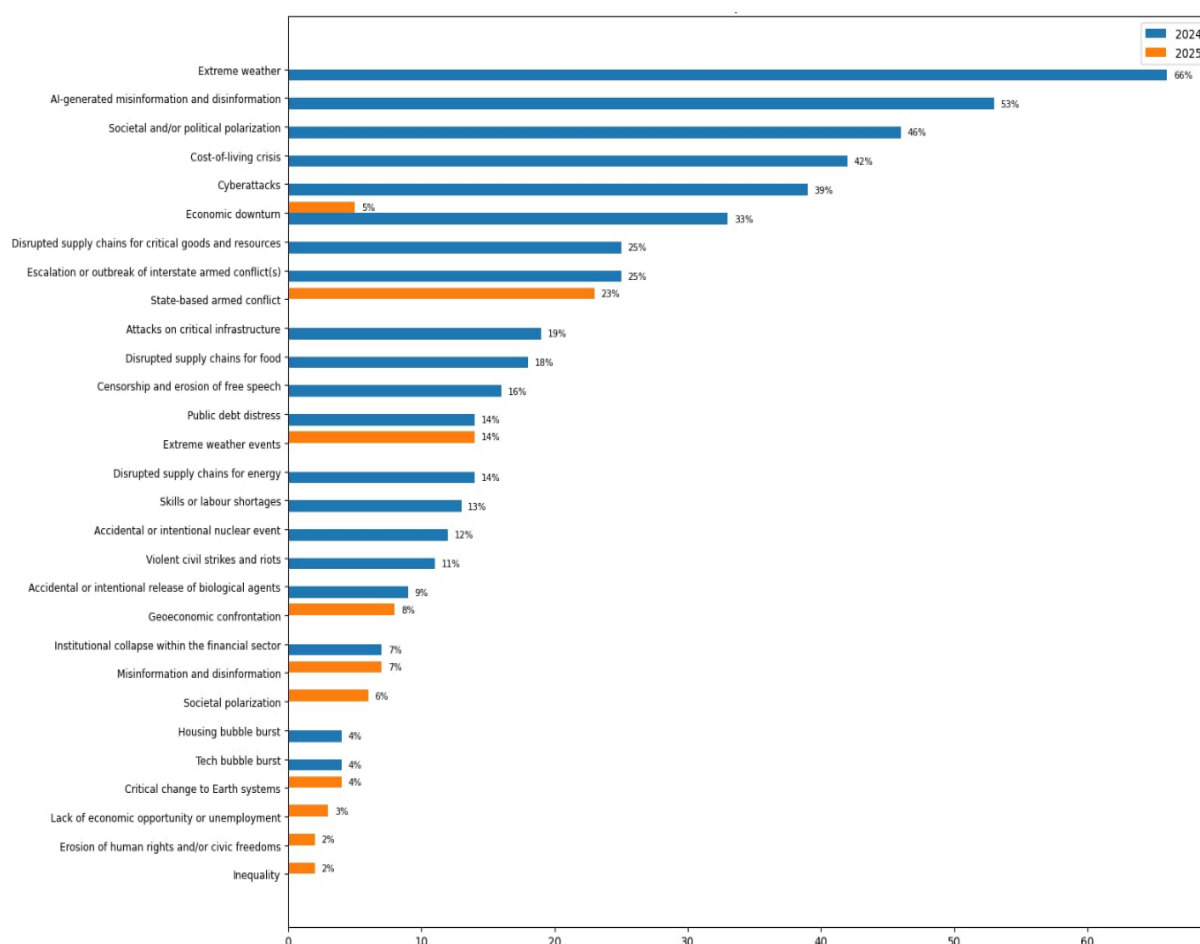


Figure 3: Global risks comparison 2024-2025

Source: World Economic Forum Global Risks Perception Survey, The Global Risks Report 2024 and 2025, World Economic Forum, 2024, p. 13 and 2025 p. 13, available at: https://www3.weforum.org/docs/WEF_The_Global_Risks_Report_2024.pdf, https://reports.weforum.org/docs/WEF_Global_Risks_Report_2025.pdf, accessed on 20.05.2026

At the same time, disinformation and risks associated with artificial intelligence (53%) highlight vulnerabilities in the digital component of the supply chain affecting data integrity, traceability and interconnected decision-making processes. Social risks, such as polarization (46%) and the cost of living crisis (42%), can generate indirect disruptions by affecting labor and demand, while economic decline (33%) influences the reconfiguration of global trade flows. Overall, the structure of these percentages reflects the transition to a risk environment dominated by systemic factors, which reinforces the need for supply chains oriented towards resilience and adaptability. Figure 4 highlights the interconnection and mutual influence among the major global risks identified by the World Economic Forum, demonstrating that contemporary vulnerabilities no longer operate in isolation, but rather form a complex and interdependent system of economic, social, geopolitical, technological, and environmental risks. The size of the nodes reflects the degree of influence of each risk, while the intensity of the connections indicates the level of interdependence between them. In this context, the figure suggests that the effects of a crisis can rapidly spread across different sectors and regions, amplifying global instability.

A central aspect of the analysis is the dominant position of social and economic risks, such as inequality, decline in health and well-being, societal polarization, and economic downturn. These risks appear as major nodes within the network, with strong links to inflation, public debt, lack of economic opportunities, and social tensions. Their interdependence highlights how economic difficulties can generate social instability, while social fragmentation can reduce the capacity of institutions to effectively manage global crises.

The critical importance of global supply chains in global risk dynamics is also noted. The node “Disruptions to a systemically

important supply chain” is directly connected to economic, climate-related, and geopolitical risks, demonstrating that logistical disruptions are both consequences of global crises and factors capable of amplifying systemic instability. Its links with economic downturn, inflation, natural resource shortages, and geoeconomic confrontations indicate that supply chain vulnerabilities affect industrial production, goods distribution, and access to strategic resources. At the same time, the connections between supply chains and extreme weather events suggest that global logistics infrastructures are increasingly exposed to the effects of climate change and natural disasters, which may lead to operational disruptions and significant increases in costs.

Technological risks also occupy an important position within the network, particularly through misinformation, cyber warfare, and the adverse outcomes of artificial intelligence technologies. Misinformation and disinformation represent one of the most influential nodes, being strongly connected with societal polarization, censorship, armed conflict, and the erosion of human rights and civic freedoms. These relationships indicate that the information environment has become a strategic element capable of affecting social cohesion, political stability, and the functioning of democratic institutions. At the same time, cyber espionage and warfare highlight the vulnerability of digital infrastructures and the impact cyberattacks may have on economic activity and international security.

Environmental risks are deeply integrated into this structure of interdependencies. Extreme weather events, biodiversity loss, pollution, and natural resource shortages are closely linked to involuntary migration, public health challenges, and disruptions in supply chains. These relationships demonstrate that climate change produces not only environmental consequences, but

also major economic and social effects, influencing food, energy, and industrial security on a global scale.

From a geopolitical perspective, interstate armed conflict and geoeconomic confrontation are associated with economic, logistical, social, and technological risks. Geopolitical tensions may restrict access to strategic resources, advanced technologies, and international markets, thereby increasing economic fragmentation and the vulnerability of global supply chains. In addition, the relationship between conflict, migration, and the erosion of civil rights highlights the human and institutional consequences of geopolitical instability.

Overall, the figure illustrates that global risks function as an interconnected system in which disruptions in one area can trigger cascading effects across the global economy and society. From the perspective of resilience, the analysis underlines the need for an integrated and multidimensional approach based on international cooperation, institutional strengthening, and the enhancement of supply chain resilience. In this context, the development of flexible and diversified supply chains, investments in resilient infrastructure, and the strengthening of adaptive capacity to multiple shocks become essential elements for maintaining global economic and social stability.

In this context, the resilience of supply chains must be understood as an emerging property of the system that depends on its ability to absorb multiple and interdependent risks, to adapt quickly to disruptions and to maintain its critical functions, thus becoming resilient in the face of all vulnerabilities.

A resilient supply chain requires a balance between inventory levels and fluctuations in demand. Holding excess inventory can lead to higher costs, but on the other hand, too low a level can lead to shortages.

The logistics market in Romania must also be resilient because it is constantly facing the vulnerabilities registered on the market and

the risks to which the global economic state is subjected. According to statistical data recorded in the first quarter of 2026, the rental demand for logistics spaces decreased by 56% in Q1, compared to Q1 of 2025, with approximately 80,000 square meters leased. A significant portion of transactions in early 2026 have been driven by renegotiations and space optimization rather than new large-scale expansions [9].

Although the logistics evolution in Romania in 2025 is remarkable, it remains quite below the level of neighboring countries in terms of logistics spaces in relation to the number of inhabitants (420 sqm/1,000 inhabitants), while in Hungary it is 617 sqm/1,000 inhabitants, in Poland 973 sqm/1,000 inhabitants, and the Czech Republic (which registers as a regional leader) with 1,165 sqm/1,000 inhabitants [10]. In order to reach European standards in terms of modern storage spaces (currently there are only 8 million sqm), Romania needs to double its logistics activity.

Romania's logistical potential is also supported by energy developments, such as offshore wind projects in the Black Sea or the expansion of automotive and electronic production capacities. Looking at the whole, they are a viable projection for the future because they can generate new transport and storage flows, which means a diversification of demand.

The supply chain system in Romania is expanding, although there are significant structural imbalances due to various causes: high geographical concentration, volatility of logistics investments, exposure to climate risks, etc. All these vulnerabilities indicate a moderate level of resilience. These characteristics highlight the need to strengthen the adaptive capacity of supply chains through diversification.

Increasing resilience in this context involves not only expanding logistics capacities, but also structurally reconfiguring supply networks through diversification.

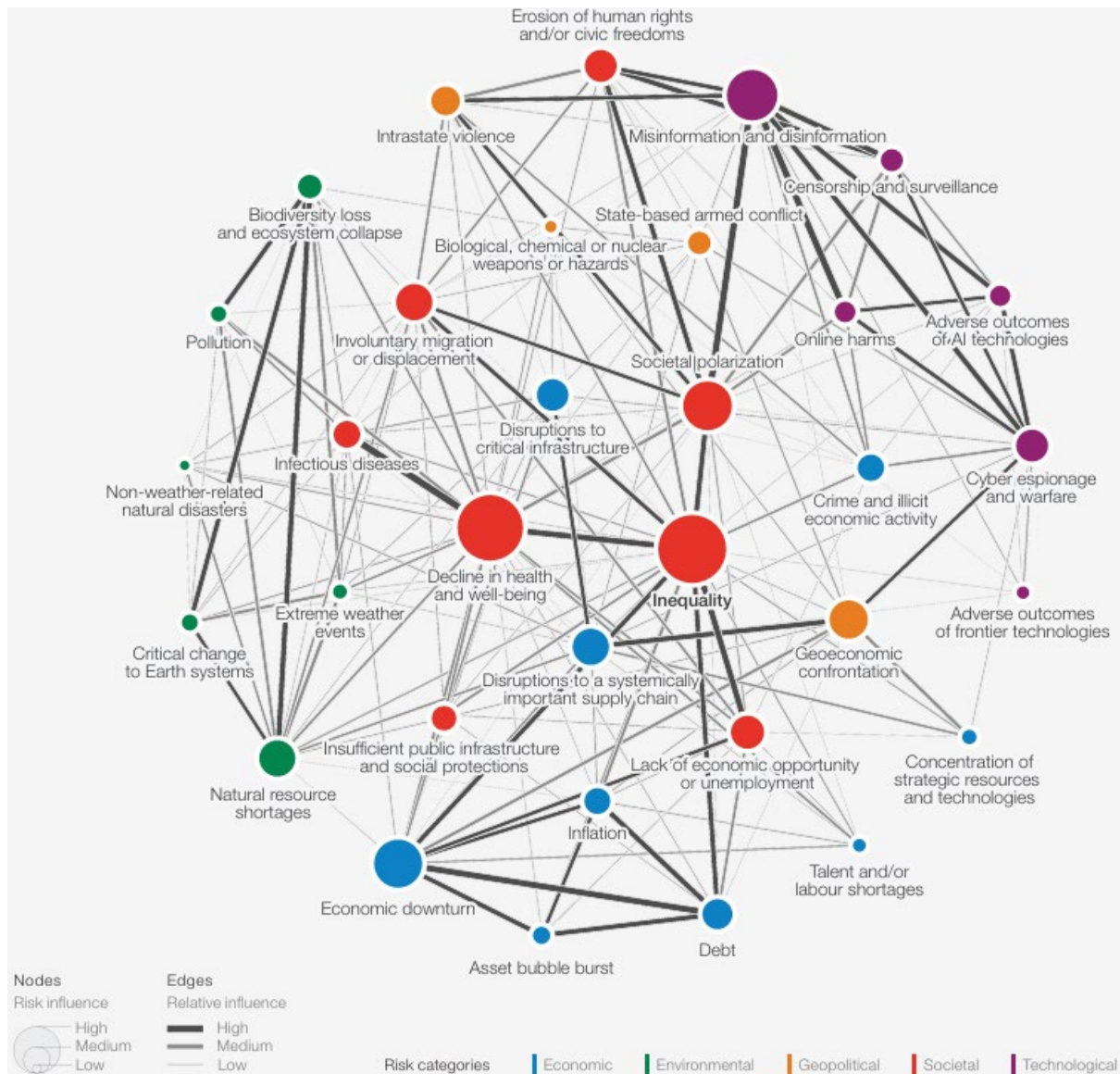


Figure 4: Global Risk Interdependencies and Systemic Resilience

Source: World Economic Forum Global Risks Perception Survey, The Global Risks Report 2025, World Economic Forum, 2025, p. 18, available at:

https://reports.weforum.org/docs/WEF_Global_Risks_Report_2025.pdf, accessed on 20.05.2026

3. Conclusions

The results of the study indicate that supply chain resilience is a key factor in ensuring operational stability in the context of global uncertainty. The analysis highlights that the most significant disruptions arise from the interaction of geopolitical, economic, and climate-related risks, which generate cascading effects across supply networks. The findings also show that organizations adopting proactive risk management and digital technologies demonstrate higher adaptability and continuity. Overall, supply

chain resilience emerges as a strategic capability essential for maintaining competitiveness in an increasingly volatile global environment.

Resilient SCM enables companies to reduce risks linked to supply chain disruptions, including geopolitical tensions, natural catastrophes, and supplier insolvencies. Through the adoption of risk mitigation strategies and the development of supply chain resilience, organizations can limit the effects of such disruptions on operational performance and profitability.

Supply chain resilience remains a continuous process of logistics activity, not a one-size-fits-all solution. Organizations must be resilient at all times, which means that they must be constantly prepared for challenges. Resilience in the supply chain can be improved by creating a risk management culture in the organization.

In the current national and global environment, supply chain resilience is a competitive advantage, all the more so as the economic situation is not favorable, with multiple causes. So, building and maintaining a resilient supply chain requires an ongoing organizational strategy.

A relevant area of research in this context is how economic volatility and disruptive events influence the resilience of supply chains. Of interest is the identification of strategies through which organizations reduce their vulnerability and ensure their operational continuity in conditions of uncertainty. At the same time, the analysis of the role of digitalization in optimizing logistics flows and anticipating risks offers an important direction of study. In conclusion, deepening these issues can contribute to the development of more efficient models for managing supply chains in unstable economic contexts.

The research has certain limitations that are mainly determined by the theoretical-analytical character and the preponderant use

of secondary sources, which can also limit both the results and their timeliness in the light of the constantly changing economic environment. In this context, there are permanent future research directions depending on the dynamics of the economic and geopolitical context, the diversity of the sectors of activity, the resilience and sustainability of logistics chains.

This study highlights several directions for further research, emphasizing the need to deepen the analysis of supply chain resilience in the context of increasingly complex and interconnected global disruptions. Future studies could expand the current conceptual framework by incorporating empirical data and real-world case studies in order to better capture how organizations implement resilience strategies in practice. In addition, the integration of quantitative approaches and industry-specific analyses would provide a more detailed understanding of how different sectors respond to economic, geopolitical, and environmental shocks. Further research is also encouraged on the role of digital transformation and advanced technologies in strengthening predictive capabilities and enhancing supply chain adaptability. These directions would contribute to a more comprehensive and applied understanding of supply chain resilience in an evolving global economy.

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