

Supplier Collaboration Relationship: Essential Role in Building Global Supply Chain Resilience

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Abstract

The collaboration relationship with suppliers is essential for managing supply chain risks strategically. By closely collaborating with suppliers, strategic procurement can enhance global supply chain resilience and adaptability to potential disruptions. Combining risk management with supplier development, the collaboration relationships yield positive results through visibility within a multi-tier supply chain for mitigating risks. For this research, a systematic literature review was conducted to identify the key factors for the successful implementation of the supplier collaboration relationship strategy. The findings emphasize the significant resilience impact triggered by communication, digitalization, risk categorization, flexibility and regionalization. As a result of the supply chain resilience and in correlation with supplier collaboration relationships are: risk awareness, transparency within the supply chain, early supplier involvement in product development and knowledge sharing, forecast and inventory and supplier development procurement.

Keywords: *Global supply chain, Risk awareness, Strategic Procurement, Supplier collaboration relationship, Supply chain resilience*

JEL classification: F23, F60, L26, M16

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1. Introduction

Several studies have highlighted the importance of supplier collaboration relationships to mitigate potential risks within the supply chain (Christopher and Peck, 2004; Wieland and Wallenburg, 2013). The post-pandemic crisis and current geopolitical turmoil have exposed the vulnerabilities in global supply chains and the geopolitical tensions have further complicated the situation (Frederico, 2021). In the current landscape strategic procurement professionals have to focus on supply chain resilience (Christopher and Peck, 2004). The pandemic represents only one kind of risk among numerous others capable of undermining the operations of supply chains. According to the article (Gutierrez et al., 2020), titled “Taking supplier collaboration to the next level”, valuable insights are highlighted into the importance of supplier collaboration relationships. Emerging technologies will enable partners to collaboratively reshape the business and its supply chain and according to Wieland and Wallenburg (2013) the suppliers are not only a source of cost savings but also a source of resilience (Koberg and Longoni, 2019) through their provision of critical components, services and manufacturing.

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They serve as a vital resource for gaining a competitive edge and assisting businesses in offering quality products, innovation and sustainability as highlighted by (Gutierrez et al. (2020) and Negri and Cagno et al. (2021). Building resilient supply chains involved diversifying sourcing strategies by developing backup suppliers and regionalization (Nagao and Ijuin et al., 2021). Numerous studies showcased that global organizations are facing difficulties in handling unforeseeable disruptions due to several reasons mostly that the supply-base transparency is not easy to achieve (K Galahitiyawe and Patabandige, 2021; Silva and Ruel, 2022). In global multi-tier supply chains, several supplier-tiers may contribute to the fabrication of complex components being involved in the process from raw-material sources to the final assembled systems and this monitoring can demand a significant effort. The primary objective of procurement professionals is to optimize these activities to ensure the efficient and effective delivery of products and services while minimizing costs, maintaining quality and reducing lead times (Chenini, Iqbal et al., 2020; Silva and Ruel, 2022). In conclusion, understanding supply chain risks is an important mission for strategic procurement. The complex procurement strategies encompassing the supplier collaboration relationship are not enough extensively researched due to various existing gaps. Therefore, the objective of this research is to highlight the important areas of impact within supply chain resilience and the role of the supplier collaboration relationship in its achievement. To provide an answer this research considered a qualitative analysis and an in-depth review of specialized literature.

2. Literature review

The capacity to encounter adverse effects and rapidly bounce back from disruptions is known as resilience (Jüttner and Maklan, 2011). According to the studies of the authors Chenini, Iqbal et al. (2020) and Koberg and Longoni (2019), strategic procurement professionals are struggling to increase the level of resilience across their supply chains and are building strategies based on the lessons learned from the pandemic (Ivanov et al., 2020). The companies which are unable to monitor and mitigate risk throughout their supply chain, remain vulnerable to threats and disruption (Sopa and Saenchaiyathon, 2020). The moderating role of the risk-mitigation strategy is to enhance supply chain resilience capability in uncertain environments (Um and Han, 2020; Negri and Cagno et al., 2021) and consider each supply chain's unique characteristics. In their studies Um and Han (2020) also emphasize the need for collaboration and coordination among supply chain partners to effectively implement these strategies.

The advance of computation and big data analysis created the frame of “a new Supply chain 4.0” as a management system for the post-pandemic period (Frederico, 2021). This transformational strategic orientation to be considered is data-driven and able to create knowledge to improve decision-making based on lessons learned and best practices (Wieland, Wallenburg et al., 2013; Frederico, 2021).

The global supply chain of complex industries such as the energy sector, automotive and electronics (Rajagopal and Ravi, 2015) are organized as multi-tiers, in this system, each tier represents a different level of the supply chain. The companies are aiming to get multi-tier visibility as an important risk mitigation aspect. This multi-tiered structure allows for greater efficiency, cost-effectiveness and flexibility in the overall supply chain management process, but can also create challenges in terms of visibility and coordination (Silva and Ruel, 2022; Mohammed, Govindan et al., 2023). According to Lu and Tomlin (2023) the transparency of the lower tiers enables companies to detect critical situations, including lack of quality or hidden bottlenecks. In an optimal scenario, companies would gain visibility through their entire network of suppliers (Imran and Shukran, 2016). The study of Baah and Acquah et al. (2022) confirmed that supply chain collaboration as a significant and positive influence on supply chain visibility, stakeholder trust and financial performances thereby projecting win-win scenarios for companies that engage in collaborative supply chain practices.

Procurement and supply chain professionals can react faster to events based on the implemented proactive risk categorization (Imran and Shukran, 2016; Negri and Cagno et al., 2021). However, warning signs for financial issues within the supply chain partners include price increases, or product-safety problems in the supplier base (Baah, Acquah et al., 2022). For shortage avoidance and its consequent impacts (Nagao and Ijuin et al., 2021) and as part of supply chain risk management, there are to be considered the correct supply planning and forecasting and the accurate internal inventory system (Kamalahmadi et al., 2016). Additionally, Koberg and Longoni (2019) state that a technology-based solution makes visibility easy and simplifies assessment in favor of resilience. Dual sourcing and contingent sourcing are important risk-mitigation strategies to manage supply chain risks (Lu and Tomlin et al., 2023). According to the authors Lu and Tomlin et al. (2023) to avoid unreliable contingency, strategic procurement professionals must consider building additional capacity and resources. Other authors Chenini and Iqbal et al. (2020) and Fu and Rahman et al. (2022) highlight the impact of resilient supply chain management and its network design as positive overall company performance.

To ensure sustainable cost savings it is necessary intelligence in negotiations, active supplier involvement and cross-functional approaches (Fozia, 2022). To improve resilience in their supply chains, procurement professionals have to be more risk-aware and employ regional sourcing (Imran and Shukran, 2016); Frederico, 2021). With a more holistic approach, they not only avoid costs, but also benefit from greater financial stability (Baah, Acquah et al., 2022) and confident sustainability (Fozia, 2022). In addition, they will review how well their company collaborates with other supply chain members for example logistics companies, and third-party vendors to support a strong network (Ghadge et al., 2013; Silva and Ruel, 2022). This may include having multiple suppliers for critical components (Lu and Tomlin et al., 2023), maintaining extra inventory, utilizing diverse transportation routes or investing in backup production facilities (Nagao and Ijuin et al., 2021). The researchers' articles (Busse, Schleper et al., 2016; Nagao and Ijuin et al., 2021)

explore contextual barriers to supplier development for sustainability in global supply chains and risk categorization remedies (Imran and Shukran, 2016) and regionalization (Lu and Tomlin et al., 2023) to mitigate such challenges. Product standardization and early involvement in the supply chain are two strategies that can help companies optimize their supply chain management and reduce costs or potential delays.

More studies contribute with detailed specific capabilities that are to be consistently developed to achieve flexibility ((Imran and Shukran, 2016; Nagao and Ijuin et al., 2021) and articles are bringing forward the need to implement the supply chain risk awareness processes in relation to generative artificial intelligence Koberg and Longoni (2019) and also Spieske et al. (2023). Artificial intelligence-powered generative techniques combined with supplier collaboration can play a significant role in enhancing the efficiency and competitiveness of global supply chains. By leveraging advanced machine learning algorithms and large datasets, artificial intelligence generative models can optimize various aspects of supply chain management, such as demand forecasting and inventory management, supplier selection and risk assessment. Companies need data-driven procurement processes to empower effective results (Ali and Ahmed et al., 2021; Frederico, 2021) and combined with risk categorization (Imran and Shukran, 2016), adaptability and regionalization (Nagao and Ijuin et al., 2021). Several studies have proposed models for supply chain information collaboration empowered with machine learning techniques (Hosseini and Ivanov, 2020; Ali and Ahmed et al., 2021). These advanced technologies can help companies stay competitive in an increasingly complex and dynamic global market (Frederico, 2021; Huang and Wang et al., 2023). Also, it can help by presenting it in a way that allows to procurement professionals to assess their options very quickly and make data-based decisions before the risk event occurs (Farias et al., 2022; Huang and Wang et al., 2023).

Comprehensive analytical approaches and multi-criteria decision-making techniques help strategic procurement to be more proactive on how to change and improve their sourcing strategies and supplier relationship management as emphasized by the studies of Choudhary and Singh et al. (2022) and Frederico (2021). To achieve greater resilience through tier-2 suppliers and below (Lu and Tomlin et al., 2023), global companies increasingly want to extend collaboration throughout their entire supply network. Engaging with suppliers and manufacturers, at the early stages of product development, can help companies identify potential opportunities related to valuable expertise and knowledge (Nagao and Ijuin et al., 2021; Silva and Ruel, 2022), which can impact positively their product development and reduce the innovation efforts. High customer awareness has a positive impact on supplier performance through the dissemination of sustainable (Negri and Cagno et al., 2021) best practices according to Gongga and Gaob et al., (2019) and Chenini and Iqbal et al. (2020). The study of Mwesiumo et al. (2021) shows that collaborative risk identification and overall focus on mitigating disruptive risks have a significant direct effect on collaborative supply risk mitigation. The same study identifies that risk awareness is associated with the level of collaborative supply risk mitigation,

meanwhile supplier performance is not associated with collaborative supply risk mitigation (Mwesiumo et al., 2021).

3. Research Methodology

In the attempt to validate the important role of supplier collaboration relationships over global supply chain risk resilience, the investigated literature review revealed several areas of impact which have been further structured.

The focused areas with the main impact had been grouped for further deductive and logical approach into 5 groups: 1. R= Risk awareness and mitigation, 2. V= Visibility throughout the multi-level supply chain, 3. K= willingness for Knowledge sharing (by best practices and lessons learned), 4. SD= Supplier development, 5. I= Inventory system by planning and forecasting.

Numerous empirical studies have been identified in international databases by using keywords such as: “supplier collaboration relationship”, “supply chain resilience”, “multi-tier visibility”, “risk awareness”, “supplier development”, “risk mitigation”, “source redundancy”, “inventory system”, “regional sourcing”. A number of 24 studies from all those referenced articles had been considered as the most suitable based on the following criteria: publications in peer-reviewed journals and presentations of empirical data.

Further, the qualitative analysis had been structured in Table 1. to correlate the supplier collaboration relationship focused areas with the main factors of the supply chain resilience (flexibility, digitalization and data analytics, risk categorization, communication).

Supplier collaboration relationship research study with impact on global supply chain resilience (Risk awareness/ Visibility/ Knowledge sharing/Supplier development/ Planning and Forecasting)

Table 1

Article Research	Supplier collaboration	Impacts on R= Risk awareness V= Visibility K= Knowledge sharing SD = Supplier develop. I – Inventory system	Main Factors of Supply Chain Resilience
Ali and Ahmed et al., 2021	■	R, K, SD	Flexibility, Digitalization and data analytics
Baah and Acquah et al., 2022	■	R, SD, I	Flexibility, Digitalization and data analytics
Busse and Schleper et al., 2016	■	K, SD	Flexibility, Communication
Chenini and Iqbal et al., 2020	■	K, SD, I	Flexibility, Communication, Digitalization and data analytics
Christopher and Peck, 2004	■	R, K, SD	Flexibility, Communication

Article Research	Supplier collaboration	Impacts on R= Risk awareness V= Visibility K= Knowledge sharing SD = Supplier develop. I – Inventory system	Main Factors of Supply Chain Resilience
Imran and Shukran, 2016	■	R, V, K, SD	Flexibility, Risk categorization, Regionalization
Frederico, 2021	■	R	Digitalization and data analytics
Gebhardt and Spieske et al., 2022	■	R, V, SD	Flexibility, Risk categorization
Gonga and Gaob et al., 2019	■	K, SD	Flexibility, Communication
Hosseini and Ivanov, 2020	■	R	Risk categorization
Koberg and Longoni, 2019	■	R	Risk categorization
K Galahitiyawe and Patabandige, 2021	■	R, V	Flexibility, Risk categorization
Lu and Tomlin, 2023	■	SD	Flexibility, Regionalization
Mahmud and Paul, et al., 2023	■	SD	Communication
Mwesiumo et al., 2021	■	R, V	Flexibility, Communication
Nagao and Ijuin et al., 2021	■	R	Regionalization, Risk categorization
Negri and Cagno et al., 2021	■	R	Risk categorization
Silva and Ruel, 2022	■	R	Flexibility
Sopa and Saenchaiyathon, 2020	■	K, SD	Flexibility, Communication
Spieske et al., 2023	■	R, SD	Digitalization and data analytics
Um and Han, 2020	■	SD	Flexibility, Communication
Wieland and Wallenburg, 2013	■	K, SD	Flexibility, Communication

4. Research Results

The supplier collaboration relationship is a very complex process with limited research due to its intricate and overlapping aspects. The existing studies consider a positive approach however senior procurement consultants and global organizations are not clear to declare it as a strategic target with measurable key performance indicators. Therefore, to build specific strategies and recognize the levels of the relationship this analysis concludes the logical trajectory of it starting with risk awareness and forecasting and planning, then supply chain in return has to offer more visibility and most important supplier development and mutual knowledge sharing (technical, commercial, logistics, others) Figure 1.

Key aspect of the supplier collaboration relationship is the communication and mutual trust (Nyaga and Whipple et al., 2010; Baah, Acquah et al., 2022)

because those are the double-lane road of change of relevant information. The forecasting and other input know-how information or supportive tools are relevant for the supply chain partners. In return the early alerts of potential deviations (bottlenecks and delays raw material shortages) are essential information for the procurement as soon as possible, also cost value and innovation ideas, technological limitations reflected in the early involvement program, other shared lesson learned (Frederico, 2021) or best practices with other clients.

These areas of impact described by Figure 1 are major factors to enhance resilience through adaptability or flexibility, improve risk management by risk categorization and regionalization (Nagao and Ijuin et al., 2021) and all the data and information have to be cross-checked by data analytics monitored through digitalized systems. The findings of this research highlight the significant resilience impact triggered by communication, digitalization, risk categorization, flexibility and regionalization.

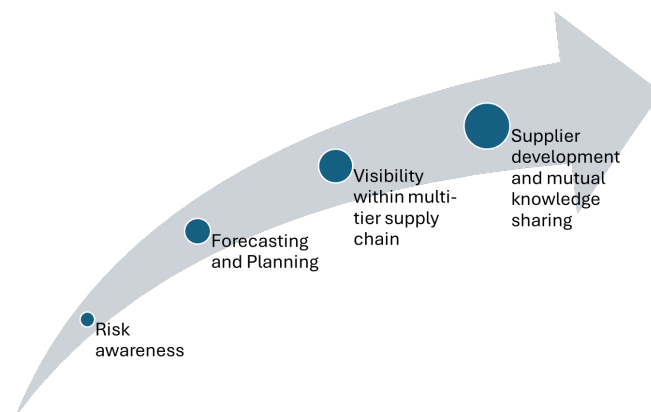


Figure 1. Supplier collaboration relationship and focused impact areas.

Source: Author's own design

Conclusions

Supplier collaboration relationship is a time-consuming process and involves significant management effort upfront for the value created or the long-lasting results (Mahmud and Paul et al., 2023). However by considering a new approach for the supplier collaboration relationship, the companies can unlock significant value and gain a competitive advantage in the market (Gutierrez et al., 2020). This process is an ongoing journey. With implemented risk management combined with supplier collaboration global organizations can move from a fire-fighting mode to a forward-looking mode according to the study of Um and Han (2020). Collaboration necessitates a shift in the mindset of both strategic procurement and suppliers who might be accustomed to more transactional or even antagonistic roles.

Proximity to business and suppliers is crucial for strategic procurement to collaborate with the key partners and mitigate risks in an integrated way across the business and with the stakeholders (Gebhardt and Spieske et al., 2022). Several authors and consultants have also pinpointed that there are particular factors that make supplier collaboration challenging up to barriers to collaboration (Busse and Schleper et al., 2016). Supplier development and open book policy are other important key aspects contributing to a sustainable and resilient supply chain (Baah, Acquah et al., 2022). As a result of the supply chain resilience and in correlation with supplier collaboration relationships are risk awareness, transparency within the supply chain, early supplier involvement in product development and knowledge sharing, forecast and inventory and supplier development procurement. This collaborative approach enables proactive risk management, reducing the impact of disruptions and enhancing the overall resilience of the global supply chain.

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