A systematic literature review for improving supply chain resilience

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Abstract:

This study evaluates supply chain risk management (SCRM) literature by examining SCRM characteristics and their links to resilience, robustness, disruption, and crisis management. It also lists SCRM's most major critiques. The study used 350 relevant Web of Science publications. Themes and results were extracted using thematic analysis. The study illuminated SCRM's adaptability, reactivity, cooperation, redundancy, and transparency. These elements stabilize and strengthen the supply chain. This research emphasizes the importance of crisis management in SCRM, especially in the face of unplanned disruptions and crises, but further research is needed on other SCRM predecessors including transparency, cooperation, coordination, and competence. The study identified data, communication, resource, and supply chain partner coordination issues. The findings suggest that developing a culture of risk awareness and collaboration within the organization and among supply chain partners and establishing effective risk assessment and mitigation methods can solve these issues.

Keywords: Improving Resilience, Robustness, Disruption Mitigation Techniques, and Supply Chain Risk Management

1. INTRODUCTION.

Supply chain managers must balance consumer demand and operational disturbances (Christopher and Towill 2001). Globalization connects and broadens supply chains, increasing

unpredictability (Manuj and Mentzer 2008). Disruptions must be controlled to ensure supply chain sustainability (Stauffer, 2003). Supply chain disruptions fascinate academics and professionals (Ivanov et al. 2017). Systems theory illuminates supply chain risk management (Defee et al., 2010). Supply chain risk management may divide academics. Humans can't handle many supply chains (Sterman 1989). Risk management is less effective in complicated supply chains (Craighead et al. 2007). Due to supply chain connections, it may be hard to link an event to a choice (Sterman, 2000). Complexity hinders standard risk management (Wu 2006). Resilience and robustness have been studied recently (Kamalahmadi and Parast 2016) (Ho et al., 2015). Supply chain managers should prioritize system interruption response to increase mitigation and continuity through robustness and resilience. Risk analysis and risk management publications have debated these terminology (Santos et al. 2014), and some academics believe their definitions are incorrect (Aven and Zio 2014). Robustness is often associated with resilience (Durach et al., 2015). Most supply chain resilience and robustness research is uncertain. Proactive or reactive judgments and redundancy or flexibility determine these groups. The first section recommends contingency measures and buffer space for unavoidable hazards (Sheffi and Rice 2005). (Ivanov et al. 2017).

Before the concept of supply chain management (SCM) existed, the supply chain was subject to disruption. Supply chain disruptions owing to ecosystem shifts, business model transformation, and cyberattacks from developing technology are just a few examples of how disruptions have changed over the centuries. Disruption threats, which threaten the stability and security of society, are increasing, putting a strain on global supply networks. The global spread of COVID-19, for instance, has disrupted international trade and transportation. Delivery delays and product shortages have resulted from the resultant interruptions in the supply chain. At the same time, there has been an enormous uptick in the demand for certain things used in epidemic management, and it has become increasingly difficult to predict demand patterns for numerous consumer goods. Supply chain interruptions caused by efforts to contain the virus have left many businesses struggling to get back up and running. While there are many potential causes of supply chain disruptions, The Stuxnet computer worm, for instance, was alleged to have taken external control

of the controllers at Iran's Natanz nuclear enrichment complex in November 2010 (chen et al., 2011).

To study the dimensions of SCRM and their linkages to other factors including resilience, robustness, disruption, and crisis management; and to identify the important difficulties and challenges associated to SCRM as highlighted in the literature. To examine the present literature on SCRM in depth in order to spot any holes we may have in our knowledge of research strategies, theoretical frameworks, or empirical studies.

2. LITERATURE REVIEW.

Systematic reviews of SCRM literature exist. (Ali et al., 2017) employed an SLR technique to evaluate SCRM inside a concept mapping framework to seek conceptual clarity, focusing on the definition, key elements, and management practices. Based on their findings, SCRM has three components: resilience phases, resilience procedures, and resilience capacities. Hohenstein et al. (2015) reviewed 67 papers on SCRM's four stages: preparation, response, recovery, and development. Most scientific definitions of SCRM emphasized response and recovery from unexpected disruptions rather than preparedness and expansion. The literature most mentioned SCRM's adaptability, redundancy, cooperation, and supply chain agility. (Weiland et al., 2015) study of 94 studies supports supply chain resilience as part of SCRM. Risk management, visibility, and network complexity can predict supply chain resilience, they found. This study examines how SCRM drivers—flexibility, agility, collaboration, and redundancy—reduce demand, supply, process, control, and environmental supply chain disruptions. This study examined resilience's definition, components, and capacities (Hohenstein et al., 2015).

Supply chain risk.

The literature suggests several supply chain risk buckets, including corporate governance, financial risk, and multi-level complex systems. Numerous scholars (Samvedi, Jain, and Chan, 2013) have established that there is no universal approach to define or describe supply chain hazards. This research includes these five supply chain risks with expanded definitions. Control risk is an institution's assumptions, regulations, policies, and actions. Order volumes, batch sizes, safety stock constraints, and asset and transit management raise this risk. If the client's direct

competition wants the arrangement ended, a tightly integrated supplier may face similar risks (Chopra and Sodhi 2004). Asymmetric power dynamics, poor planning, forecasting, and supply management visibility are other network risk issues. SCRM identifies organizational features that improve supply chain disruption response (Behzadi et al. 2018).

The resilience of the supply chain.

A resilient supply chain can withstand disturbances, recover, and improve. The "four Rs"—robustness, resourcefulness, recovery, and review—define resilience. Supply chain risk management has been improved by adaptability, rapid response, cooperation, and redundancy. Several organizational skills are needed to handle supply chain interruptions. Christopher and Peck (2004) recommended resource redundancy, agility, supplier flexibility, and collaborative planning for SCRM success. (Tukamuhabwa et al., 2015) found that increasing adaptability, agility, cooperative linkages, and redundancy promoted SCRM the most. Shekarian et al. (2019) showed how manufacturing, strategic, and supplier flexibility can improve supply chain agility, building on Stevenson and Spring (2007)'s twenty-one characteristics of supply chain flexibility. Different techniques can increase supply chain agility and flexibility.

Supply Chain Robustness.

Supply chain risk management (SCRM) is essential for competing in the modern global economy. In response to the challenges and complexity of global supply chains, the significance of effective SCRM processes has been recognized more and more (Chopra & Sodhi, 2004; Manuj & Mentzer, 2008). Threats to supply chains include things like terrorist attacks, natural disasters, supplier bankruptcy, and political unrest (Tang & Musa, 2011). These risks represent a significant hazard since they may result in breaks in the supply chain, increased costs, and tarnished reputations (Cox & Thompson, 2000; Christopher & Peck, 2004). Supply chain robustness, also referred to as a system's ability to withstand and recover from disruptions, is a key concept in supply chain risk management (SCRM) (Browning, et al., 2014). One definition of resilience, which is connected to the idea of robustness, is the capacity to recover quickly from setbacks (Ponomarov & Holcomb, 2009).

The significance of SCRM and robustness in several industries, including manufacturing, retail, and healthcare, has been the subject of numerous research. For instance, studies have looked at how SCRM affects supply chain efficiency in the industrial sector (Liu et al., 2013). They discovered that by lowering risks and increasing responsiveness, good SCRM techniques can greatly improve the performance of the supply chain. Researchers have looked at how resilience affects supply chain performance in the retail sector (Soni et al., 2019). They discovered that a more reliable supply chain can boost delivery efficiency and lower the likelihood of stockouts. Researchers have looked into the effects of SCRM on patient safety in the healthcare sector (Mello et al., 2018). They discovered that by lowering the risk of supply chain disruptions and ensuring the availability of essential supplies, effective SCRM practices can improve patient safety.

The SCRM and robustness can be enhanced in a number of ways. One approach entails developing risk management strategies that are specific to the threats and challenges faced by a particular supply chain (Liu, et al., 2013). Technology can also improve the visibility and responsiveness of the supply chain (Soni et al., 2019). For example, real-time inventory tracking made possible by RFID technology can improve supply chain coordination. Collaboration between supply chain partners can considerably improve supply chain relationship management (SCRM) and resilience (Mello et al., 2018). Because of this, it's crucial to collaborate closely with suppliers, sharing information and resources while jointly developing risk management strategies. In the current global marketplace, businesses must prioritize SCRM and resilience. Complex global supply chains require effective SCRM procedures to be able to withstand disruptive events and recover from them. Research have shown that supply chain efficiency and patient safety can both be significantly increased with the use of suitable SCRM protocols and resilience. A number of initiatives, including the development of risk management plans, the adoption of technical advancements, and the collaboration of supply chain partners, have been suggested to enhance SCRM and resilience. Thus, firms should prioritize SCRM and resilience if they want to continue to succeed in a global market. Studies on the use of AI and ML for supply chain risk management have increased recently. (SCRM) have the potential to significantly enhance SCRM and resilience through the capacity to deploy proactive risk management techniques and gain real-time insights into supply chain risks (Yu, et al., 2021). Artificial intelligence-driven predictive analytics, for

example, can identify coming disruptions in advance and give businesses time to adapt (Kumar et al., 2021). Supply chains may use this data to make better decisions and improve performance, much to how ML systems can comb through enormous amounts of data to uncover patterns and trends (Zhang et al., 2022). Sustainability and its significance in SCRM and robustness are still active research areas. As pressure grows on businesses to act responsibly and minimise their environmental impact, the need for sustainable SCRM practices is becoming more generally accepted (Li et al., 2022). Examples of how sustainable SCRM practices integrate environmental and social issues into risk management strategies include lowering carbon emissions, ensuring ethical material procurement, and promoting ethical labor practices (Liu & Seuring, 2018). Cooperation between supply chain partners continues to be essential to robustness and effective SCRM. Building cooperative connections with suppliers and other stakeholders is crucial for enhancing supply chain resilience, according to recent study (Wang & Chan, 2022). Building trust amongst supply chain partners, sharing information and resources, and co-creating risk management plans are all part of this (Saghafian & Atefi, 2022). More transparency and visibility throughout supply networks are also being increasingly recognized, especially in the wake of the COVID-19 outbreak, which exposed the risks of opaque supply systems (Bozarth & Handfield, 2021).

Disruption in the supply chain

Current business concerns include supply chain risk management (SCRM) and interruption, especially in light of recent international occurrences like the COVID-19 pandemic, natural disasters, and geopolitical tensions. Effective SCRM processes are essential because disruptions can have a major influence on supply chain performance, resulting in higher prices, delayed deliveries, and reputational harm. A wide range of hazards, such as erratic demand, supplier bankruptcy, halted shipping, natural disasters, and cyberattacks, can affect supply chains. Recent studies have identified a number of new hazards, such as pandemics, climate change, and geopolitical conflicts, emphasizing the necessity for enterprises to take a comprehensive and proactive approach to SCRM (Eriksson et al., 2020; Grimm et al., 2020). In particular, the COVID-19 pandemic has brought to light the necessity for organizations to be flexible and adaptable in the face of unforeseen interruptions. To reduce risks, several businesses have

implemented contingency plans and diversified their supply networks (Sodhi and Tang, 2021). Businesses use a variety of techniques and instruments to manage supply chain risks, including risk assessment, emergency planning, supply chain visibility, and cooperation with supply chain partners. In order to assess supply chain risk, threats must be identified and their likelihood and potential impact quantified. In the event of unforeseen events, contingency planning aims to lessen disruption severity and maintain supply (Hajiagha and Khosrojerdi, 2020). Real-time monitoring and surveillance of supply chain activity to spot potential disruptions enables proactive risk management (Altay et al., 2018). Effective supply chain collaboration is characterized by close relationships and trust with suppliers and other stakeholders, an open exchange of information and resources, and the creation of shared risk management techniques (Goh et al., 2019).

Disruptions can significantly affect the performance of the supply chain, resulting in higher costs, delays, and reputational harm. Several studies have emphasized the value of supply chain resilience and agility in reducing the effects of disruptions. While resilience involves the capacity to bounce back from setbacks and acclimatize to new circumstances, agility involves the ability to respond quickly to changing circumstances (Ivanov, 2020). Companies are better equipped to lessen the effects of disruptions and preserve supply chain performance in the face of unforeseen catastrophes when they place a high priority on supply chain agility and resilience. SCRM and disruption are still major concerns for companies today, especially considering recent international events like the COVID-19 epidemic. Companies must take a comprehensive and proactive approach to SCRM because they confront a wide range of risks, including erratic demand, supplier bankruptcy, disruptions in the transportation network, natural disasters, and cyberattacks. Businesses employ a variety of techniques and instruments to manage supply chain risks, including risk assessment, emergency preparedness, supply chain visibility, and cooperation with supply chain partners. Supply chain agility and resilience are crucial for minimizing the effects of interruptions and preserving supply chain performance since disturbances can have a major influence on supply chain performance. Businesses are better positioned to win in today's quickly changing market if they prioritize SCRM and disruption management.

3. METHODOLOGY.

The purpose of this research was to utilize a systematic literature review (SLR) approach to provide a thorough comprehension of SCRM. SLR method used in this research includes five major review procedures meant to bolster the reliability of the SLR results. Formulation of the question entails articulating the research question and the aims of the SLR. Article identification is the next step, and it entails a search of applicable literature via internet databases, academic journals, and other sources. The third step, article selection and evaluation, entails vetting the found articles against a set of inclusion and exclusion criteria. Article analysis and synthesis, the fourth step, include performing a qualitative analysis to extract important data from the chosen articles and then synthesizing the findings. Reporting and implementation of results is the fifth step, and it entails providing a thorough and open presentation of the SLR findings and sharing those findings with those who need to know about them. The use of a systematic and rigorous methodology. The SLR approach guarantees that the review is open, auditable, and repeatable, which boosts confidence in the results. In short, by summarizing the existing literature and identifying critical research gaps and potential for future research, this study contributes significantly to the field of SCRM.

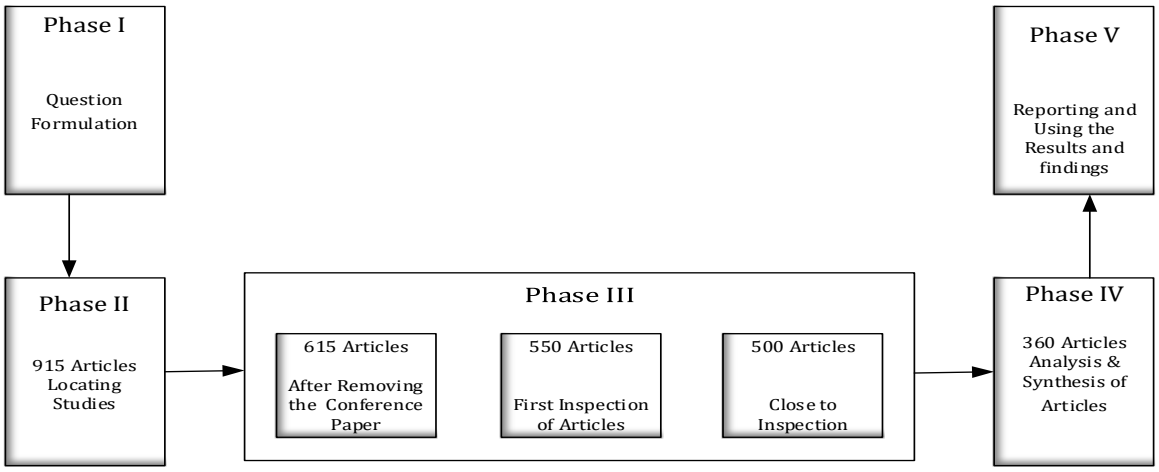

Figure 1. Study Selection and Evaluation

Phase 1: Formulating questions

In an SLR, the first step is to formulate the review question such that its scope is clear and any potential confusion is eliminated (Booth et al. 2012; Ali et all., 2017). The following are the questions that will be investigated in this project:

1. How does SCRM relate to factors like resilience, robustness, disruption, and crisis management? What are the dimensions of SCRM and the interactions between them? What are the primary concerns and challenges related to SCRM?

2. What are the present gaps in the literature on SCRM, and what areas need to be further studied in terms of research techniques, theoretical frameworks, and empirical studies?

3. how can supply chains be made more robust, resilient, and resistant to disruptions?

Phase 2: Locating articles

The next stage is to compile a list of all the major contributions that answer the research topic. This research used the Web of Science (WoS) database as (Kamalahmadi and Parast , 2016b). The scope of this research also extends to General Management (GM). According to (Tukamuhabwa et al. 2015) the WoS database is widely used in supply chain research because it is the largest business and management database available (2017). In this investigation, we employed a set of four keywords to help us find the right articles. Boolean operators (e.g., OR, AND) were utilized to create search strings that combined the terms "Supply chain," "Disruption," "Risk," or "Resilience," and "Robustness*" with search fields in article titles, abstracts, and keywords. Articles published between the years 2000 and 2023 were included for this analysis. This study uses a very specific search strategy in an effort to reduce the possibility of bias and guarantee the reliability of the data used. The SLR's five review processes (question formulation, article identification, article selection and assessment, article analysis and synthesis, reporting, and implementation of remainder) are in line with this approach as well.

Phase 3: Selecting and evaluating articles

Articles were chosen after their titles, keywords, and abstracts were evaluated in accordance with a set of inclusion criteria (Table 1). (Ali, Mahfouz, and Arisha 2017). In this stage, 915 papers were found. (Kamalahmadi and Parast 2016b): To begin, a comprehensive cross-check was

performed on all publications to filter out database retrieval results from conference papers. While there were originally 915 articles, only 615 remain. The articles were then vetted to ensure they met the inclusion requirements. To do this, I first checked the publications' titles, abstracts, and found keywords. The papers on supply chain risk management were obtained at this stage. As a result, we went from 615 items to 550. Third, the publications that examined the impact of various SCRM strategies on mitigating various sources of disruption risk were retrieved by reading their introductions, conclusions, and implications. To determine whatever SCRM plan has been proposed for reducing supply chain disruptions from various causes, this step is essential. The proposed framework and its related definitions were used to precisely identify each potential source of disruption risk. As a result, there are now 500 articles rather than 550. In the end, after going through each of the 500 articles to examine the references, we were left with only 360 publications. Consequently, the systematic literature review reported here is based on these 360 high-quality research publications. Figure 2 depicts the testing and judging procedure.

Table 1. Inclusion and rational.

Inclusion Criteria	**Rational**
Research articles in research journals. Articles published between 2004 and 2023 The dimensions and causes of SCRM should be made explicit in the summary. Articles must be written in English, and they can cover a wide range of topics and research methods (including, but not limited to, theory and concept development, simulation, case study, and survey).	Quality is assumed to be higher in higher-ranked journals. Since the idea of resilience, specifically SCRM, was not widely discussed before to the year 2004, that year is chosen as the baseline (Kamalahmadi and Parast 2016b). The study's overarching goal is to learn how different SCRM precursors influence the effectiveness of mitigation strategies against supply chain disruptions. In the academic world of supply chain management, English is the language of choice.

Phase 4: Analyzing articles and synthesizing findings

This study uses a systematic literature review (SLR) to reorganize the results of several investigations, as suggested by (Tranfield et al. 2003). In this phase study narrows down the articles to 360. The information gathered contains definitions and impacts of SCRM enhancers on key disruption risk drivers in the supply chain, as well as numerous potential ways to improve supply chain resilience. Finding commonalities among the different studies allowed for the synthesis to be completed. Using a five-step procedure consisting of (1) data extraction, (2) data analysis, (3) data synthesis, (4) quality assessment, and (5) data presentation, the selected papers were analyzed and synthesized (Denyer and Tranfield 2009). Relevant information, such as author, publication year, research technique, study design, and major findings, was extracted from each of the 360 papers. The next step in the data analysis process was to look for commonalities among the articles that had been chosen. This made it possible for the researchers to sort the publications based on their objectives, methods, and results.

The articles were then categorized into overarching themes and more specific subthemes as part of the data synthesis phase. The themes included the significance of organizational culture and the influence of disruptive events on supply chain resilience, as well as techniques for strengthening supply chain resilience such flexibility, agility, collaboration, and redundancy. To complete the synthesis, each of the chosen publications was assessed for its level of methodological rigor and contextual applicability. This required evaluating aspects including the study's methodology, sample size, data gathering strategies, and analysis procedures. Each article was evaluated for its relevance to the study issue, and those that did not make the cut were omitted. Finally, the data presentation entailed providing a summary of the SLR's findings. The. When used to synthesize the results of many studies and provide a holistic perspective of the present state of research on SCRM, the SLR methodology was found to be an effective strategy. The findings were solid and trustworthy because of the methodical and rigorous approach taken, and the primary themes and subthemes were presented clearly to aid in knowledge transfer to both academics and practitioners.

4. SUMMARY OF RESULTS.

Characteristics of publications

The overall findings of the SLR done in this study yielded 360 articles related to SCRM, and their distribution is depicted in Figure 2 below. The results show that the earliest SCRM-related articles appeared in the literature around 2004–2005 when the discipline was still developing. Earlier research by (Ali et al., 2017). The chart also reveals that the total number of publications on SCRM was steady until 2011, when it began an abrupt and sustained upward trend. In addition, the data shows that the bulk of SCRM articles were published between 2013 and 2021, which is indicative of the rising prominence of SCRM in the realm of scientific study. Figure 2 shows an increase in SCRM publications around 2017, which is interesting given that this analysis was undertaken at the start of 2023. Consistent with earlier research' findings, which also noted a sharp rise in SCRM articles in recent years, this pattern appears to be continuing (Ali, Mahfouz, and Arisha 2017). Managing supply chain risks is becoming increasingly important in today's complex and volatile business environment, which has sparked a surge in interest in SCRM studies.

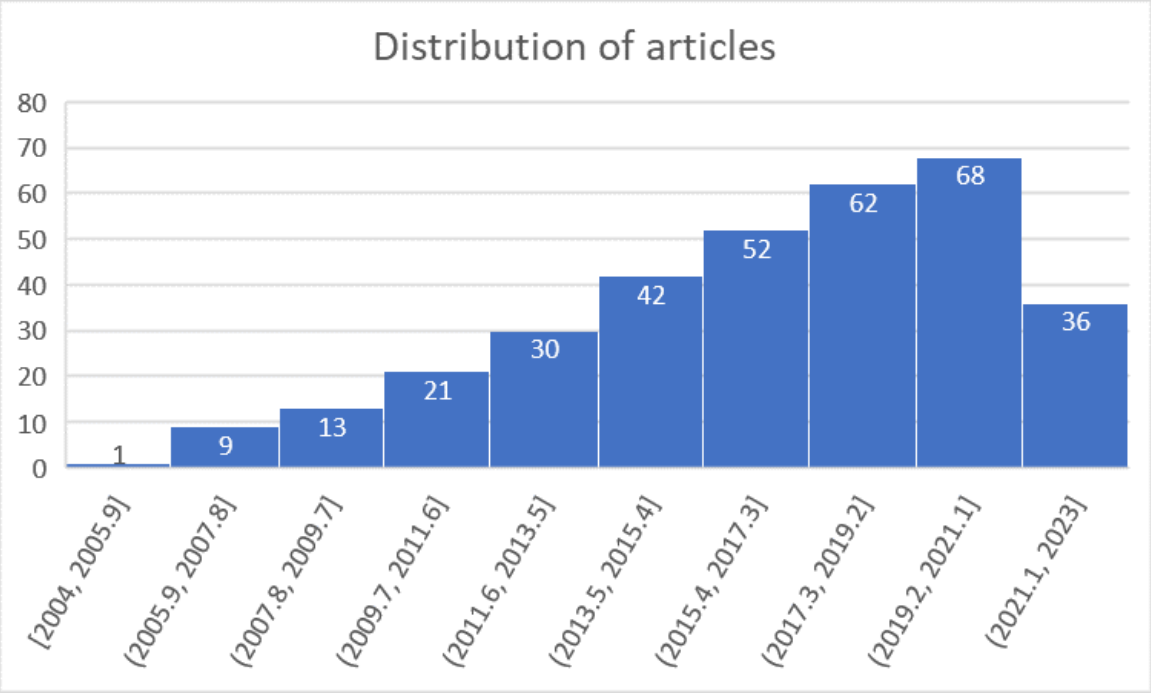

Figure 2. Distribution of Article.

To make the SLR process easier, Provalis Research's QDA Miner was employed as a text mining platform. Exposure to environmental (including man-made and natural) disruptions is more generally referred to as "disruption," whereas "risk" is more commonly used to describe threats

to an organization or network. Figure 3 shows a keyword cloud, where larger clouds represent more significant words or phrases in the field of study. The use of these previously unrecognized search strings was bolstered by text mining's discovery of relevant keywords and phrases.

Figure 3. Keyword cloud

The data was synthesized using a set of predetermined criteria for the new set of categories. Several facets of SCRM were used to determine predetermined criteria. Using a dendrogram, a text-mining tool, we double-checked our preliminary concept mapping for categorization. A "dendrogram" displays these connections and divisions into groups in a tree-like structure. The data correlation can be seen in the dendrogram. The length of the branches in a dendrogram shows the degree to which different groups share common functional characteristics. Word similarity index example shown in Figure 4.

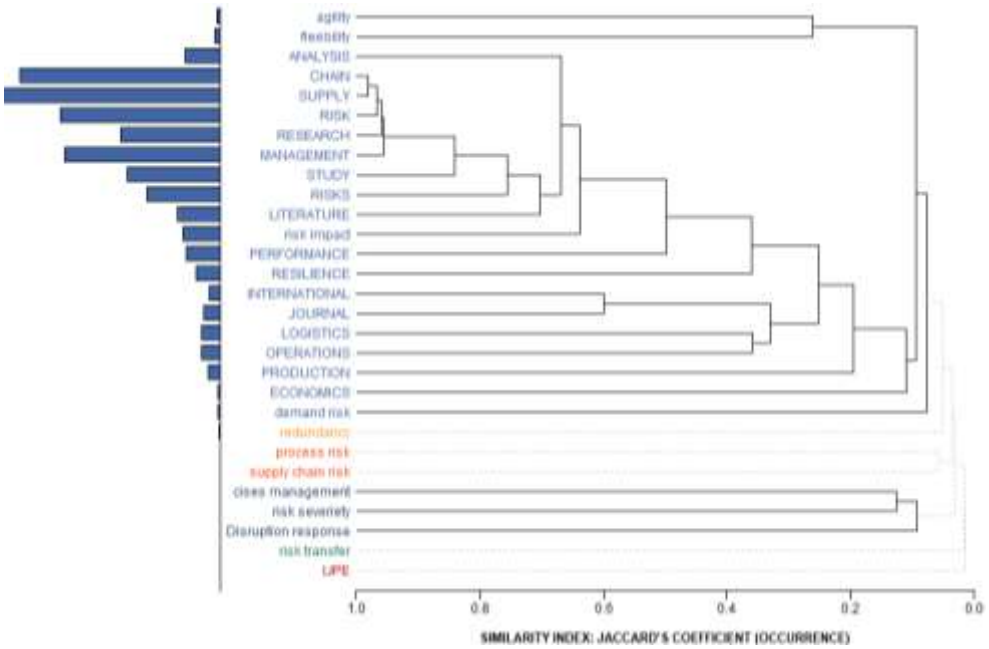

Figure 4. Word similarity index example

5. DATA ANALYSIS.

Thematic Analysis.

In qualitative research, thematic analysis is a frequent method of data analysis. The process entails searching for and examining recurring structures within the data. The data collected from the research articles will be analyzed using theme analysis in this study. In their 2006 article, Braun and Clarke argue that thematic analysis is a versatile method of data analysis that can be used with a wide variety of research questions and data formats. A similar method to statistical analysis, thematic analysis seeks out underlying themes and patterns in data that could otherwise go unnoticed. One must become acquainted with the data, create initial codes, search for themes, review and refine the themes, define and name the themes, and finally present the findings of the analysis (Braun & Clarke, 2006). Initial coding and familiarization with the data is accomplished through multiple readings of the material. Afterwards, the codes are combined to establish overarching categories. Then, we define and name the topics after conducting a thorough review of them.

Because it allows researchers to recognize and examine recurring patterns and themes in the data, thematic analysis is a popular method of data analysis in qualitative research (Nowell et al., 2017). It is possible to modify the analysis to the specific research topic and data set through the use of the thematic analysis' adaptability and flexibility (Braun & Clarke, 2006). To describe the phenomenon's qualitative complexity, this approach entails picking out recurrent themes (Fereday & Muir-Cochrane, 2006). The information is said to have a theme if there is a consistent thread running through it that defines what kinds of observations are possible, how to interpret various aspects of the phenomenon, and how to categorize the results (Vaismoradi et al., 2013). The complete spectrum of themes' explicit meaning was derived using an inductive method, and subsequent themes were extracted directly from the text data (Braun & Clarke, 2006). This method of text coding eliminates the need for a predetermined a priori coding template and was utilized because it was deemed suitable for this investigation (Hsieh & Shannon, 2005) The findings can be trusted because they were derived using a rigorous and methodical method called thematic analysis (Nowell et al., 2017).

. The evidence reveals the relevant topics and sheds light on the connections between them. To ensure that all possible themes and subthemes had been identified, an iterative procedure was used. Because of this, we can say that the process has theoretically reached saturation (Brooks et al., 2015). To confirm the criteria of internal homogeneity and exterior heterogeneity,

Risk Classification.

Organizational, network, and other risks, including those posed by Mother Nature and humans, were classified as SC hazards. We classified them into categories according to their similarities and the relationships between them.

Inventory risk, process/operational risk, quality risk, and management risk are typical types of organizational hazards. Buffer or excess inventories pose a threat due to the opportunity cost and handling fee they incur (Yang et all., 2021). Cash-to-cash cycle reduction and better forecasting methods could help reduce inventory risk (Zepeda et al., 2016). Risks that originate from operational incidents that impede the smooth flow of resources or data inside SC are known as process or operational risks. The literature on this topic is extensive (Ali et al., 2020). Plant

malfunctions or supply chain breakdowns might pose a threat to product quality. (Chevaz et al., 2012) all point to outsourcing activity as the root cause of product quality risk, however this may have more to do with network risk than with organizational risk. Poor management's inability to foresee and respond to changes in the market is a source of management risk. Management risk is not adequately recognized as a key threat to a company's performance in the SCRM literature.

As one of the drivers of supply chain risk, this study first looks into how the precursors of SCRM can help reduce the impact of demand interruption. Actual demand may differ from projections, or there may be disruptions in the flow of goods and data either inside the network or between the focus enterprises and the market, all of which constitute this type of risk (Stum et all., 2022) These are the most mentioned forms of supply chain flexibility advocated in this study to cushion the blow of demand surprises. Production adaptability (Doetze et al., 2021), storage adaptability (Li et al. 2015; Finch, 2004), and procedure adaptability (Wagner et al, 2017;) adaptability of the process (Mizgier et al., 2017). adaptability of products (Blos et al., 2018) flexibility in both sourcing (Harnandz et al., 2018; Namdar et al., 2018; Kumar et al., 2018) and resourcing (2018;) (Olson et all, 2018; Liu et all, 2014; Koeing et all, 2016). Furthermore, it has been demonstrated (Rehman et al., 2022) that a company's ability to be flexible in its manufacturing processes is positively associated to volume flexibility, mix flexibility, and customer happiness. Following the same vein as (Ellinger et al., 2018; Shenoi et al., 2018; Saglam et al., 2021).

According to this study, the two most frequently mentioned types of supply chain agility for mitigating demand disruption risk are process agility (Lavaster et al., 2014) and supplier base agility (Tan et al 2019; Yang et all, 2010). In addition, a company's agility can increase through the promotion of information-sharing, creativity, teamwork, and rapid response (Saglam et all, 2020; Riley et all, 2016; Collicchia et all, 2019). This study reviews the literature on supply chain collaboration and finds that sharing information and working together with customers are the most important factors in reducing the likelihood of demand interruptions (Kwak et al., 2018; Fan et al., 2018; Durach et al., 2018; Teri et al., 2020). Collaborative planning, forecasting, and restocking for a supply chain was found by Chow et al. (2016) to be the optimal frequency response for managing operational and interruption risks simultaneously. Cooperation with customers has been emphasized by (Li et al., 2015) and others to reduce demand risk and improve

efficiency (freeman et al., 2018). These findings are consistent with those of a prior study (Canter et al., 2014), and (Noorei et al, 2015). The role of supply chain redundancy in reducing the risk of demand interruption was investigated in a recent literature review (Tan et al., 2019). They developed a combined model of supply chain configuration and new-product diffusion to show how demand dynamics throughout a diffusion process affect the best way to distribute goods. In addition to improving its bargaining position, a business that uses many suppliers establishes a safety net in the case of unexpectedly high demand or a manufacturing hiccup related to the introduction of a new product.

Potential delays, defects, or interruptions in the flow of products and information from inside the network, upstream of the target firms, are examples of this sort of risk. Role of supply risk as a source of disruption hazards (Kem et al., 2012; Collichia et al., 2011; Ramesh et al., 2021; Fischl et al., 2014) flexibility in the supply chain was recognized as the most useful tactic for dealing with the disruption, followed by collaboration, redundancy, and agility. Based on a literature assessment, this study identified these as the most crucial forms of supply chain flexibility for mitigating supply interruption risks. vendor adaptability (Huma et al., 2020; Jindal et all, 2022; Zimon et all, 2019; Silva et all, 2021; Revella et all, 2017; Kohl et al., 2022) adaptability in logistics (Moslemi et all, 2016; Vikoloy et all., 2014; Kwak et all., 2018) and adaptability in supply (Bso et all, 2019; cassedy et all,2022),

The importance of supply chain agility in risk management was explored by behzadi et al. (2017). They found that enhancing a company's supply chain agility can aid it in adapting to the erratic demands of its customers. Therefore, agility methods should be used in a highly unpredictable situation. Ivanov et al. (2017) discovered that the usage of agility might lessen the negative link between environmental unpredictability and supply chain adaptability. Agility was included together with the other four categories of flexibility by (Bo et al., 2023) while addressing how to manage with supply interruption. According to Bier et al., an agile supply chain strategy involves a captive source of supply, flexible suppliers, and modest cost competitiveness (2020). Several studies have concluded that strong buyer-supplier relationships are the single most critical factor in reducing supply disruption risk in collaborative supply chains (Schmit et al., 2012; Parasat et al., 2021; Shan et al., 2023). Supplier involvement has been found to be successful in reducing

the risk of supply interruption (Sawk, 2018), therefore better collaboration with suppliers is crucial (Sawk, 2015; Habermann et al., 2015). Ivanov et al (2019)'s literature review, which is in line with other research, concluded that supply chain collaboration is an effective technique for mitigating the effects of demand and supply fluctuations. Supply chain redundancy strategies that have been found to be most successful at lowering the risk of supply disruption include using several suppliers and pre-positioning inventories (Alora et al., 2015; Sansi et al., 2022; Shekarian et al., 2021). Using SCRM with redundancy has been found to lessen the impact of disruptions on the supply market. The usage of emergency stockpiles, supplier redundancy, and other forms of supply chain redundancy are all encouraged for the sake of security and reliability. Pre-positioning stocks, backup suppliers, and shielded suppliers are the three redundancy techniques recommended by Friday et al. (2018) to mitigate supply disruption risk.

This research investigated how the precursors to SCRM can help reduce process disruptions, as process risk is the fourth source of disruption risk. Production quality and quantity may not be as planned, which is a form of process risk. Quality, timeliness, and capacity hazards linked with incoming and outgoing logistical and internal operations fall under this category (Bloom et all. 2011; Tommula et al, 2011; El baz et all, 2021).

According to Yang et al. (2010), businesses who can balance supply chain adaptability with unpredictability earn better results. Similarly, Sreedevi and Saranga (2017) demonstrated that supply and process risk is mitigated when a company's supply and manufacturing flexibility are aligned with uncertainty. Environmental uncertainty, technical complexity, and mutual understanding all contribute to supply chain flexibility (Hou et al., 2021).

This study investigated the role of SCRM precursors in controlling the fifth type of risk: control risk. A company's ability to exercise control over its operations is subject to the assumptions, rules, systems, and procedures that make up its network. Similar dangers can also arise when a customer's connection with a vertically integrated provider is abruptly severed by the company's direct competitor (Yan et al., 2019; Wels et al., 2010) The research demonstrated that supply contract models can help evaluate competing supply proposals with varying quantity minimumsnd penalty terms. This method is useful for weeding out inefficient vendors and negotiating favorable terms with the remaining suppliers. The two most important features of

supply chain collaboration in handling supply network disruptions are open lines of communication and information exchange among supply chain participants. Scholars' conceptions of supply chain collaboration include things like shared information, shared goals, shared decisions, shared resources, collaborative communication, and shared knowledge generation (Bak, 2018). Researchers also stressed the importance of cooperation amongst all participants in the supply chain, from manufacturers to shoppers, in order to reap the benefits of this strategy.

All of these ideas revolve around the same central tenet: that the advantages of supply chain collaboration can be fully realized only when all participants in the supply chain work together. The success of a supply chain relies on everyone involved working together smoothly. This calls for a dedication to open lines of communication and the sharing of relevant data, as well as an acceptance of novel approaches to the management of supply chain risks. A more efficient and robust supply chain that can better weather disturbances and give value to customers may be built when producers, suppliers, and consumers work together.

Risk mitigation.

Researchers classified risk management and control strategies as proactive or reactive. Risk management requires agility, adaptability, and preparedness (Jia et al., 2010). Table 2 lists the most effective risk-reduction strategies from the literature. Contingency planning and risk-sharing outsourcing are key to strategic risk reduction. A supplier alliance network, lead time reduction, and recovery planning system can be employed to mitigate situational interruptions (Chang et al., 2015).

Table 2. Most effective risk-reduction strategies from the literature

Proactive strategy	**Reactive strategy**
Supply chain contracts include VMI/buffer stock, incentive contracts, and mix/volume flexibility contracts for risk mutual benefits. . Product/process management: delaying, designing, and delivering a wide range of products Relationship with the Supplier: Confidence-Building, Cultural Adaptation, and Constant Coordination	Strategic event management plan and increased flexibility in options as part of contingency planning Disaster management involves robust recovery, supply chain reconstruction, resource utilization and management, and interruption scenario planning. Demand management encompasses customer fluctuation, dynamic pricing, and operational rerouting.

Risk mitigation through collaboration contracts

During the investigation, it became clear that SC networks' under-examination of management, quality, and supplier default risks. Supply chain performance can be enhanced by risk sharing and contract arrangements that can be made possible through collaboration and outsourcing (Singh et al., 2019; Yoon et al., 2018). To secure long-term profitability and craft a thorough strategy for mitigating risks, it is increasingly vital to form alliances and strategic relationships with suppliers. Several businesses and supply chains require unique approaches to contingency planning and recovery (Micheli et al., 2014). Long-term contracts for controlling disruptions are still uncommon in the literature on supply chain contracts, which has mostly concentrated on coping with price and demand changes (Gao et al., 2019). Yet, in the future, risk sharing contracts may be developed as a method of addressing supply chain hazards. Risk management, contract arrangements, and other types of collaboration and outsourcing must all work together for supply chain networks to function optimally. There are various alternatives to contracts when it comes to supply chain collaboration. Alliances and partnerships with suppliers, for instance, can provide advantages including cheaper entry into new markets, higher rates of innovation, and lower overall costs due to the pooling of resources (Ambulkar et al., 2016). When markets are unpredictable or unclear, and supply chain partners need to coordinate to mitigate risks and

address disruptions, these perks can be invaluable. Sharing relevant information is essential for productive supply chain collaboration. Partners in the supply chain can more effectively coordinate their efforts and adapt to shifting market conditions if they have access to up-to-date information on demand estimates, manufacturing plans, and inventory levels (Yoon et al., 2018). Concerns regarding data security and confidentiality, along with trust and power asymmetries among supply chain participants, can make efficient information sharing difficult to achieve.

Visibility and traceability

If information is accessible, timely, and accurate, risk reduction (proactive management or reactive risk response) can be significantly enhanced. Upcoming developments in information and communication technology are anticipated to have a significant effect on how visible the SC is. For the management of SC risks, current technologies like RFID, ERP, and GPRS will be crucial informational tools (Vilko et al., 2019).

Risk propagation and recovery planning

Disruption propagation, effects, and SC dangers are understudied (Sawk, 2019; Chaudhry et al., 2016). Risk profile modeling and risk propagation modeling using risk drivers including cost, length, and service will improve risk management. Understanding risk potential beyond the dyad across the chain and network helps predict risk spread. The Japanese tsunami caused this in the car industry. Understanding risk propagation can lead to proactive risk management. Disaster recovery requires global planning (Doetzer et al., 2021). Due to SC environment uncertainty and several recognized risks, the only way to recover is quickly. The optimal risk recovery models require proactive preparation, knowledge, and human connection.

Industry impact

This research has implications for both academic and business practices in the area of supply chain risk management (SCRM). Despite apparent differences over the ideal approach, or whether quantitative or qualitative work offers better insight and theory, the authors stress that their study should directly influence industrial practices. Some researchers have called for improved SCRM risk management. The use of quantitative tools such as simulation models and mathematical programming models, the analytical/network hierarchy process, complexity and graph theory, and

the development of well-grounded models that consider other interdisciplinary research approaches have all been proposed as ways to advance SCRM research. It has been suggested that SCRM studies would benefit from a more empirical approach (Diehl et al., 2013). Researchers can learn more about the intricacies and difficulties of SCRM by collecting data and performing studies based on real-world experiences. Using quantitative tools like simulation models and mathematical programming models is another technique to advance SCRM study (Rao and Goldsby, 2009). Researchers can use these instruments to better recognize threats and compare various countermeasures. It has also been suggested that SCRM studies benefit from the analytical/network hierarchy method (Diabal et al., 2012). Methods for mitigating supply chain risks are identified by dissecting the chain into its constituent elements and conducting in-depth analyses of each. Some researchers have proposed using complexity theory and graph theory into SCRM studies (Nakatani et al., 2018). Researchers can benefit from these methods by learning how to better protect the supply chain's most vital links. Some SCRM researchers have advocated for the creation of thorough models which incorporate findings from other fields of study (Sina et al., 2021). Researchers can create more thorough models of SCRM that account for the intricate interactions between diverse stakeholders in the supply chain by drawing on ideas from other domains such as economics, psychology, and sociology. Despite the fact that the authors of this study concentrate mostly on academic research on SCRM, they stress the importance of that research having an immediate impact on industrial practices. The use of quantitative tools, the analytical/network hierarchy process, complexity and graph theory, and the creation of well-grounded models that account for interdisciplinary research approaches are just some of the methods that have been proposed by proponents of SCRM to improve the quality of this field.

Supply chain approach to risk management.

This study found that a large percentage of papers examined the effect of demand disruption risks on SCRM, with supply disruption risks coming in second with a medium number of papers, followed by environmental disruption risks with a small number of papers, process disruption risks with a small number of papers, and control disruption risks with a small number of papers. Most research has focused on analyzing the impact of demand disruption risks on SCRM, while less emphasis has been paid to the impact of processing and controlling disruption risks. We are

aware of only a few studies that have examined the simultaneous impact of two or three different categories of supply chain disruption risks on SCRM, such as Bandaly et al. (2016), Charpin and Remi (2022), and Norrman et al. (2020). We also discuss how supply chain risk management affects theory and practices, and these consequences are as follows.

Implications for theory and practice

The primary objectives of this research are (1) to define the various types of disruption risk (such as those related to demand, supply, process, control, and the environment); and (2) to create a classification system based on these definitions for identifying and differentiating among these various types of disruption risk. Using the criteria and categories established by Lavaster et al. (2014) and Swafford, Ghagh et al. (2015), this research establishes a link between

This article proposes a paradigm for analyzing supply chain risk management (SCRM) and its effect on reducing disruptions, based on a systematic literature review (SLR). The primary result of this study is a concept-mapping framework that fills in many gaps in our knowledge of SCRM and the hazards associated with supply chain disruptions. The SLR first determined which elements of the SCRM enhancers (demand, supply, process, control, and environment) would have the greatest beneficial effect on organizational performance in the face of various disruption risk sources. The results shed light on the complex interplay between various supply chain disruptions and resilience boosters like adaptability, responsiveness, coordination, and redundancy. Further information about the relative significance of various supply chain resilience enhancers in minimizing supply chain disruptions would be useful for decision-makers. In addition, the study suggests that companies with more vulnerability to supply chain disruptions may gain from using these strategies. When a supply chain is at danger of disruption, the essay emphasizes the need of managers having a better grasp of these antecedents. Managers gain a clearer picture of their specific functions within a supply chain network through an examination of the meanings, consequences, and effects of supply chain flexibility, agility, cooperation, and redundancy. With the help of the created concept-mapping framework, managers will be able to better recognize threats and create preventative SCRM plans to minimize interruptions. The research also highlights the importance of viewing SCRM as a process that needs to be constantly monitored, evaluated, and adapted to the evolving nature of business.

Limitations and recommendations for future research

There are several caveats that point to potential future research directions, but overall, this study has contributed greatly to our understanding of SCRM. Outside the study's focus on resilience, robustness, and disruption, additional SCRM antecedents could be investigated in subsequent research. Visibility, integration, structure, and knowledge are all potential precursors that could benefit from further investigation. Supply chain risks not included here could be explored in future studies (Doetze et al., 2021). This kind of study would help shed light on the complex interplay between SCRM's myriad causes and risk categories.

6. CONCLUSION.

Many critical questions about SCRM and SC resilience were investigated in this work (SCRES). To begin, the study surveyed the state of the art on SCRES by evaluating previously published works. The study initially defined the many types of SC disruption risks, such as those related to demand, supply, process, control, and the environment. Afterwards, the research uncovered a number of crucial SCRES improvements. It stressed the significance of SCRES enhancers, such as adaptability, responsiveness, interoperability, and resiliency, in the effective management of disruption risks. This study's literature review differed from others in its approach, scope, methods, and overall contribution. For this work, we used a systematic review (SLR) of 360 previously published scholarly articles and papers covering a time span of 19 years (from 2004 to 2023). According to the SLR findings, adaptability is the best defense against disruptions in demand, supply, processes, and environments. The literature identifies collaboration as the most effective method for addressing control disruption concerns. The study's findings informed the development of a schedule and framework for SCRM meant to identify the most important SCRM strategy for addressing each type of supply chain interruption risks. The results of this study have a significant bearing on the study and practice of supply chain risk management. This research helped by characterizing each potential disruption and offering a classification scheme based on these descriptions. Many forms of supply chain disruption hazards not previously discussed in the literature were also associated to organizational competences in this study. The study's suggestions can aid decision-makers in honing their organizational abilities in preparation for dealing with a variety of disruptions and limiting their effects on productivity.

7. REFERENCES

Ali, A., Mahfouz, A., & Arisha, A. (2017). Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review. Supply Chain Management: An International Journal.

Ali, I., & Gurd, B. (2020). Managing operational risks through knowledge sharing in food supply chains. Knowledge and Process Management, 27(4), 322-331.

Alora, A., & Barua, M. K. (2019). An integrated structural modelling and MICMAC analysis for supply chain disruption risk classification and prioritisation in India. International Journal of Value Chain Management, 10(1), 1-25.

Ambulkar, S., Blackhurst, J. V., & Cantor, D. E. (2016). Supply chain risk mitigation competency: an individual-level knowledge-based perspective. International Journal of Production Research, 54(5), 1398-1411.

Aven, T., & Zio, E. (2014). Foundational issues in risk assessment and risk management. Risk analysis, 34(7), 1164-1172.

Bak, O. (2018). Supply chain risk management research agenda: from a literature review to a call for future research directions. Business Process Management Journal.

Bandaly, D., Satir, A., & Shanker, L. (2016). Impact of lead time variability in supply chain risk management. International Journal of Production Economics, 180, 88-100.

Behzadi, G., O'Sullivan, M. J., Olsen, T. L., & Zhang, A. (2018). Agribusiness supply chain risk management: A review of quantitative decision models. Omega, 79, 21-42.

Bier, T., Lange, A., & Glock, C. H. (2020). Methods for mitigating disruptions in complex supply chain structures: a systematic literature review. International Journal of Production Research, 58(6), 1835-1856.

Blos, M. F., da Silva, R. M., & Wee, H. M. (2018). A framework for designing supply chain disruptions management considering productive systems and carrier viewpoints. International Journal of Production Research, 56(15), 5045-5061.

Bozarth, C. C., & Handfield, R. B. (2021). Introduction to operations and supply chain management (5th ed.). Pearson.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Brooks, J., McCluskey, S., Turley, E., & King, N. (2015). The utility of template analysis in qualitative psychology research. Qualitative research in psychology, 12(2), 202-222.

Chang, W., Ellinger, A. E., & Blackhurst, J. (2015). A contextual approach to supply chain risk mitigation. The International Journal of Logistics Management.

Charpin, R. (2022). The resurgence of nationalism and its implications for supply chain risk management. International Journal of Physical Distribution & Logistics Management, 52(1), 4-28.

Chen, J., Sohal, A. S., &Prajogo, D. I. (2013). Supply chain operational risk mitigation: a collaborative approach. International Journal of Production Research, 51(7), 2186-2199.

Chen, T. M., & Abu-Nimeh, S. (2011). Lessons from stuxnet. Computer, 44(4), 91-93.

Chopra, S., & Sodhi, M. S. (2004). Managing risk to avoid supply-chain breakdown. MIT Sloan management review.

Chow, P. S., Choi, T. M., Shen, B., & Zheng, J. (2014). Supply contracting with risk-sensitive retailers under information asymmetry: an exploratory behavioral study. Systems Research and Behavioral Science, 31(4), 554-564.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. Industrial marketing management, 29(1), 37-44.

Christopher, M., & Peck, H. (2004). Building the resilient supply chain.

Christopher, Martin, Carlos Mena, Omera Khan, and Oznur Yurt. "Approaches to managing global sourcing risk." Supply chain management: An international journal 16, no. 2 (2011): 67-81.

Denyer, D., &Tranfield, D. (2009). Producing a systematic review.

Diehl, D., & Spinler, S. (2013). Defining a common ground for supply chain risk management–A case study in the fast-moving consumer goods industry. International Journal of Logistics Research and Applications, 16(4), 311-327.

Doetzer, M., & Pflaum, A. (2021). The role of digitalized information sharing for flexibility capability utilization: lessons from Germany and Japan. International Journal of Physical Distribution & Logistics Management.

Durach, C. F., & Machuca, J. A. (2018). A matter of perspective–the role of interpersonal relationships in supply chain risk management. International Journal of Operations & Production Management.

Durach, C. F., Wieland, A., & Machuca, J. A. (2015). Antecedents and dimensions of supply chain robustness: a systematic literature review. International Journal of Physical Distribution & Logistics Management.

El Baz, J., & Ruel, S. (2021). Can supply chain risk management practices mitigate the disruption impacts on supply chains' resilience and robustness? Evidence from an empirical survey in a COVID-19 outbreak era. International Journal of Production Economics, 233, 107972.

Ellinger, A. E., Chen, H., Tian, Y., & Armstrong, C. (2015). Learning orientation, integration, and supply chain risk management in Chinese manufacturing firms. International Journal of Logistics Research and Applications, 18(6), 476-493.

Eriksson, D., Rudberg, M., &Styhre, A. (2020). Risk management in the supply chain: A real options perspective. International Journal of Production Economics, 226, 107849.

Fan, H., Cheng, T. C. E., Li, G., & Lee, P. K. (2016). The effectiveness of supply chain risk information processing capability: an information processing perspective. IEEE Transactions on Engineering Management, 63(4), 414-425.

Fan, H., Li, G., Sun, H., & Cheng, T. C. E. (2017). An information processing perspective on supply chain risk management: Antecedents, mechanism, and consequences. International Journal of Production Economics, 185, 63-75.

Fan, Y., & Stevenson, M. (2018). Reading on and between the lines: risk identification in collaborative and adversarial buyer–supplier relationships. Supply Chain Management: An International Journal.

Finch, P. (2004). Supply chain risk management. Supply chain management: an International Journal, 9(2), 183-196.

Fischl, M., Scherrer-Rathje, M., & Friedli, T. (2014). Digging deeper into supply risk: a systematic literature review on price risks. Supply Chain Management: An International Journal.

Freeman, N., Mittenthal, J., Keskin, B., &Melouk, S. (2018). Sourcing strategies for a capacitated firm subject to supply and demand uncertainty. Omega, 77, 127-142.

Friday, D., Ryan, S., Sridharan, R., & Collins, D. (2018). Collaborative risk management: a systematic literature review. International Journal of Physical Distribution & Logistics Management.

Gao, S. Y., Simchi-Levi, D., Teo, C. P., & Yan, Z. (2019). Disruption risk mitigation in supply chains: The risk exposure index revisited. Operations Research, 67(3), 831-852.

Grimm, C. M., Hofstetter, J. S., Sarkis, J., & Wallenburg, C. M. (2020). Enhancing supply chain resilience through corporate social responsibility initiatives: A contingency theory perspective. Journal of Business Research, 121, 288-299.

Habermann, M., Blackhurst, J., & Metcalf, A. Y. (2015). Keep your friends close? Supply chain design and disruption risk. Decision Sciences, 46(3), 491-526.

Hajiagha, S. H. R., &Khosrojerdi, A. (2020). A review of supply chain risk management: Definition, theory, and research agenda. Journal of Purchasing and Supply Management, 26(2).

Hohenstein, N. O., Feisel, E., Hartmann, E., &Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: a systematic review and paths for further investigation. International Journal of Physical Distribution & Logistics Management, 45(1/2), 90-117.

Hou, J., & Zhao, X. (2021). Toward a supply chain risk identification and filtering framework using systems theory. Asia Pacific Journal of Marketing and Logistics, 33(6), 1482-1497.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. Qualitative health research, 15(9), 1277-1288.

Hu, Y., Wang, D., Pang, K., Xu, G., & Guo, J. (2015). The effect of emotion and time pressure on risk decision-making. Journal of Risk Research, 18(5), 637-650.

Huma, S., Ahmed, W., & Najmi, A. (2020). Understanding the impact of supply-side decisions and practices on supply risk management. Benchmarking: An International Journal, 27(5), 1769-1792.

Ivanov, D., &Dolgui, A. (2019). Low-Certainty-Need (LCN) supply chains: a new perspective in managing disruption risks and resilience. International Journal of Production Research, 57(15-16), 5119-5136.

Ivanov, D., Dolgui, A., Sokolov, B., & Ivanova, M. (2017). Literature review on disruption recovery in the supply chain. International Journal of Production Research, 55(20), 6158-6174.

Ivanov, V. V. (1986). Review of Dictionary of the Nostratic Languages, Vol. I, by Vladislav M. Illic-Svityc (Traduction anglaise de la version russe de 1974, Etimologija 1972: 182–184). Typology, Relationship and Time: A collection of papers on language change and relationship by Russian scholars, 51-56.

Jia, F., & Rutherford, C. (2010). Mitigation of supply chain relational risk caused by cultural differences between China and the West. The International Journal of Logistics Management.

Jindal, A., Sharma, S. K., &Routroy, S. (2022). Bayesian Belief Network Approach for Supply Risk Modelling. International Journal of Information Systems and Supply Chain Management (IJISSCM), 15(1), 1-17.

Kamalahmadi, M., &Parast, M. M. (2016). A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research. International journal of production economics, 171, 116-133.

Khan, O., Christopher, M., & Burnes, B. (2008). The impact of product design on supply chain risk: a case study. International Journal of Physical Distribution & Logistics Management.

Kohl, M., Habl, A., Kallali, K., Puff, J., Fottner, J., Oger, R., ... & Li, J. (2022). Managing supply chains during the Covid-19 crisis: synthesis of academic and practitioner visions and recommendations for the future. The International Journal of Logistics Management, (ahead-of-print).

Kumar, M., Basu, P., & Avittathur, B. (2018). Pricing and sourcing strategies for competing retailers in supply chains under disruption risk. European Journal of Operational Research, 265(2), 533-543.

Kwak, D. W., Seo, Y. J., & Mason, R. (2018). Investigating the relationship between supply chain innovation, risk management capabilities and competitive advantage in global supply chains. International Journal of Operations & Production Management.

Li, G., Fan, H., Lee, P. K., & Cheng, T. C. E. (2015). Joint supply chain risk management: An agency and collaboration perspective. International Journal of Production Economics, 164, 83-94.kwak

Li, G., Li, L., & Sun, J. (2019). Pricing and service effort strategy in a dual-channel supply chain with showrooming effect. Transportation Research Part E: Logistics and Transportation Review, 126, 32-48.

Li, M., Wang, X., & Qiu, J. (2022). Sustainable supply chain risk management: A systematic literature review. Journal of Cleaner Production, 332, 127079.

Liu, F., Wang, J. J., Chen, H., & Yang, D. L. (2014). Machine scheduling with outsourcing: coping with supply chain uncertainty with a second supplying source. The International Journal of Logistics Management, 25(1), 133-159.

Liu, H., & Wei, S. (2022). Leveraging supply chain disruption orientation for resilience: the roles of supply chain risk management practices and analytics capability. International Journal of Physical Distribution & Logistics Management, (ahead-of-print).

Liu, M., &Seuring, S. (2018). Developing sustainable and resilient supply chains in China: A case study of Huawei Technologies. Journal of Cleaner Production, 172, 2510-2520.

Liu, Y., Huang, Z., & Liu, Y. (2013). Research on supply chain risk management and its implementation based on SCOR model. Journal of Software Engineering and Applications, 6(9), 449-456.

Mello, J. A., Keisler, J. M., & Craighead, C. W. (2018). Supply chain resilience: Definition, review, and theoretical foundations for further study. Journal of Business Logistics, 39(1), 1-14.

Micheli, G. J., Mogre, R., & Perego, A. (2014). How to choose mitigation measures for supply chain risks. International Journal of Production Research, 52(1), 117-129.

Mizgier, K. J., Pasia, J. M., & Talluri, S. (2017). Multiobjective capital allocation for supplier development under risk. International Journal of Production Research, 55(18), 5243-5258.

Moslemi, A., Hilmola, O. P., & Vilko, J. (2016). Risks in emerging markets: logistics services in the Mediterranean region. Maritime Business Review.

Nakatani, J., Tahara, K., Nakajima, K., Daigo, I., Kurishima, H., Kudoh, Y., ... & Moriguchi, Y. (2018). A graph theory-based methodology for vulnerability assessment of supply chains using the life cycle inventory database. Omega, 75, 165-181.

Namdar, J., Li, X., Sawhney, R., & Pradhan, N. (2018). Supply chain resilience for single and multiple sourcing in the presence of disruption risks. International Journal of Production Research, 56(6), 2339-2360.

Norrman, A., & Wieland, A. (2020). The development of supply chain risk management over time: revisiting Ericsson. International Journal of Physical Distribution & Logistics Management, 50(6), 641-666.

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. International journal of qualitative methods, 16(1), 1-13.

Olson, D. L., & Wu, D. (2011). Risk management models for supply chain: a scenario analysis of outsourcing to China. Supply Chain Management: An International Journal, 16(6), 401-408.

Parasat, M. M., & Subramanian, N. (2021). An examination of the effect of supply chain disruption risk drivers on organizational performance: evidence from Chinese supply chains. Supply Chain Management: An International Journal, 26(4), 548-562.

Riley, J. M., Klein, R., Miller, J., & Sridharan, V. (2016). How internal integration, information sharing, and training affect supply chain risk management capabilities. International Journal of Physical Distribution & Logistics Management, 46(10), 953-980.

Saghafian, S., &Atefi, A. (2022). Building supply chain resilience through collaboration and information sharing. International Journal of Production Economics, 243, 108633.

Samvedi, A., Jain, V., & Chan, F. T. (2013). Quantifying risks in a supply chain through integration of fuzzy AHP and fuzzy TOPSIS. International Journal of Production Research, 51(8), 2433-2442.

Sansi, E., Daskin, M. S., Hong, Y. C., Roesch, S., & Zhang, D. (2022). Mitigation strategies against supply disruption risk: a case study at the Ford Motor Company. International Journal of Production Research, 60(19), 5956-5976.

Shan, X., Xiong, S., & Zhang, C. (2023). Mitigating supply disruption risks by diversifying competing suppliers and using sales effort. International Journal of Production Economics, 255, 108637.

Sheffi, Y., & Rice Jr, J. B. (2005). A supply chain view of the resilient enterprise. MIT Sloan management review.

Shekarian, M., &MellatParast, M. (2021). An Integrative approach to supply chain disruption risk and resilience management: a literature review. International Journal of Logistics Research and Applications, 24(5), 427-455.

Shekarian, M., Nooraie, S. V. R., &Parast, M. M. (2020). An examination of the impact of flexibility and agility on mitigating supply chain disruptions. International Journal of Production Economics, 220, 107438.

Shenoi, V. V., Dath, T. S., Rajendran, C., &Shahabudeen, P. (2018). Strategic action grids: a study on supply chain risk management in manufacturing industries in India. Benchmarking: An International Journal, 25(8), 3045-3061.

Silva, L. M. F., de Oliveira, A. C. R., Leite, M. S. A., & Marins, F. A. (2021). Risk assessment model using conditional probability and simulation: case study in a piped gas supply chain in Brazil. International Journal of Production Research, 59(10), 2960-2976.

Singh, N. P., & Singh, S. (2019). Building supply chain risk resilience: Role of big data analytics in supply chain disruption mitigation. Benchmarking: An International Journal.

Sodhi, M. S., & Tang, C. S. (2009). Modeling supply-chain planning under demand uncertainty using stochastic programming: A survey motivated by asset–liability management. International Journal of Production Economics, 121(2), 728-738.

Sodhi, M. S., Son, B. G., & Tang, C. S. (2012). Researchers' perspectives on supply chain risk management. Production and operations management, 21(1), 1-13.

Soni, U., Agarwal, A., & Sharma, R. R. (2019). Developing a framework for resilient retail supply chain. Journal of Modelling in Management, 14(3), 563-588.

Sreedevi, R., & Saranga, H. (2017). Uncertainty and supply chain risk: The moderating role of supply chain flexibility in risk mitigation. International Journal of Production Economics, 193, 332-342.

Stauffer, D. (2003). Risk: The weak link in your supply chain. Harvard Management Update, 8(3), 3-5.

Sterman, John D. 2000. Business Dynamics: Systems Thinking and Modeling for a Complex World. Boston: Irwin/ McGraw-Hill.

Stevenson, M., & Spring, M. (2007). Flexibility from a supply chain perspective: definition and review. International journal of operations & production management, 27(7), 685-713.

Tan, W. J., Zhang, A. N., & Cai, W. (2019). A graph-based model to measure structural redundancy for supply chain resilience. International Journal of Production Research, 57(20), 6385-6404.

Tang, O., & Musa, S. N. (2011). Identifying risk issues and research advancements in supply chain risk management. International journal of production economics, 133(1), 25-34.

Rehman, A., Jajja, M. S. S., & Farooq, S. (2022). Manufacturing planning and control driven supply chain risk management: A dynamic capability perspective. Transportation Research Part E: Logistics and Transportation Review, 167, 102933.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. Nursing & health sciences, 15(3), 398-405.

Vilko, J., Ritala, P., & Hallikas, J. (2019). Risk management abilities in multimodal maritime supply chains: Visibility and control perspectives. Accident Analysis & Prevention, 123, 469-481.

Wagner, S. M., Mizgier, K. J., & Papageorgiou, S. (2017). Operational disruptions and business cycles. International journal of production economics, 183, 66-78.

Wang, D., & Chan, F. T. (2022). Building a sustainable supply chain network: The role of green innovation, cooperation and information sharing. Journal of Cleaner Production, 317, 128386.

Wels, A., & Buscher, U. (2010). Cost optimal planning of order quantities for risk control at the supply chain risk management. BETRIEBSWIRTSCHAFTLICHE FORSCHUNG UND PRAXIS, 62(1), 20-37.

Wu, Y. (2006). Robust optimization applied to uncertain production loading problems with import quota limits under the global supply chain management environment. International Journal of Production Research, 44(5), 849-882.

Yang, B., & Fernandes, K. J. (2010). Global supply chain risk management: a socio-technical perspective. International Journal of Business Environment, 3(2), 240-249.

Yang, J., Xie, H., Yu, G., & Liu, M. (2021). Antecedents and consequences of supply chain risk management capabilities: An investigation in the post-coronavirus crisis. International Journal of Production Research, 59(5), 1573-1585.

Yang, Y., Pan, S., & Ballot, E. (2017). Mitigating supply chain disruptions through interconnected logistics services in the Physical Internet. International Journal of Production Research, 55(14), 3970-3983.

Yoon, J., Talluri, S., Yildiz, H., & Ho, W. (2018). Models for supplier selection and risk mitigation: a holistic approach. International Journal of Production Research, 56(10), 3636-3661.

Yu, M., Shi, Y., & Zhang, J. (2021). Supply chain risk management using artificial intelligence and machine learning. Journal of Manufacturing Systems, 60, 155-171.

Zepeda, E. D., Nyaga, G. N., & Young, G. J. (2016). Supply chain risk management and hospital inventory: Effects of system affiliation. Journal of Operations Management, 44, 30-47.

Zhang, S., Tan, Y., & Dai, X. (2022). Applying machine learning to supply chain management: A systematic literature review. Computers & Industrial Engineering, 163, 107908.

Zimon, D., &Madzík, P. (2020). Standardized management systems and risk management in the supply chain. International Journal of Quality & Reliability Management, 37(2), 305-327.