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The Influence of Multiple Sourcing Supplier Strategy, Supply Chain Risk Management and Technology Adoption on Supply Chain Resilience (SCRe); Mediating Role of Supply Chain Flexibility (SCF) in Indonesia

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Abstract

Purpose: The complexity and dependence of the supply chain (SC) on international suppliers make Indonesian manufacturing vulnerable to disruption and less resilient. The aim of this investigation is to discuss supply chain resilience (SCRe) and to identify and propose the variables that improve (SCRe).

Design/methodology/approach: to identify the variables of SCRe, articles from several scientific journals are compiled. Reviewing of the literature and conducting content analysis to determine the variables of company resources and capabilities can improve SCRe.

Findings: From reviewing and conducting content analysis eight variables found as company resource/independent variables, one variable as company capability/mediator variable and one moderator variable

Research limitations/implications: the study limited view from the RBV and the contingency theory in the developing the framework, the articles collection year from 2019-2024 and the study limited to the supply perspective.

Practical implications: This provides a detailed explanation of how the company's resources and capabilities influence competitive advantage in an uncertain environment from a supply perspective and it adds tremendously to literature. This study will help SC practitioners or business representatives to find the right strategy to improve SCRe in an uncertain environment from supply perspective.

Originality/value: This study present factors affecting SCRe from supply perspective and the RBV and contingency theory that can give practitioners and academicians a new perspective on the effect of vulnerability from supply perspective.

Keywords: supply chain resilience; disruption; multiple sourcing strategy; resource base view; contingency theory.

Classification: Conceptual paper

Introduction

Disruption in the SC have historically led to increased uncertainty in supply and demand. Events like Covid-19 have increased supply and demand volatility, an uncertain demand shock for oil due to lockdown in many countries is reducing demand for crude oil and leading to war trading between traders (Rusia and Saudi Arabia) and affecting price volatility (Bourghelle et al., 2021). Other commodity such as metal and agriculture have an impact on the volatility of supply, demand and price (Ezeaku et al., 2021). Price volatility is also impacting automotive manufacturing around the world, with supply shortages due to semiconductor shortages as most of the industry had to work from home back in 2020 (Morgan, 2023). In addition, blockage of the Suez Canal in March 2021 was an unexpected event, since 12% of world trade relies on it and goods worth $ 9 Billion flow through this canal every day. The blockage affects production stoppage due to no parts to be assembled, increase shipping cost because of rerouting resulting late supply and empty store inventory (Stevens, 2021). These factors potentially pose significant risk to the SC, from delivery and production disruptions to logistical delays.

Geographically, southeast Asia is the diversity strategy for manufacturing companies whose main production base in Asia is China, and Indonesia is the most attractive country for diverse manufacturing companies, such as Foxconn as a manufacture of Apple, Samsung, Toyota and Tata Motor has chosen Indonesia for production and sales location (Selko, 2014). The high population and low salary country makes Indonesia as the targeted market with high demand and good manufacturing operation base simultaneously.

The quick development of the manufacturing sector in Indonesia still faces a challenge. Due to the variety of manufacturers, the connection to the network has not yet been established. Therefore,

the manufacturer's dependence on the global supplier is essential to ensure the company's competitiveness and advantages. However, dependence on global suppliers will increase sSC complexity. Although a number of alternative tools appear to reduce the uncertainty effect, the disruption caused by uncertainty in any SC network impacts the company's business itself. Attention and early identification of potential risk exposures represent a resource for improving the company's competitive advantages. Therefore, the employment of a multiple sourcing strategy, digital technology adoption and a SCRM approach in the SC, improve the flexibility capability of the SC and increases the SCRe.

The problem identified in this study is related to Indonesian manufacturing's dependence on international suppliers, theoretical gaps and limited research on firm level practices that strengthen SCRe to respond appropriately to SC disruptions and limited research identified the SCRe from supply perspective (Kurniawan et al., 2017; Widiyanesti & Fernando, 2019) .

The complexity and dependence of the SC on international suppliers make Indonesian manufacturing vulnerable to disruption and less resilient. Using a Toyota manufacturer case during the Covid-19 pandemic as an example, it can be shown that the chip shortage from its international suppliers lead to disruptions in their production line in Indonesia, resulting the company's inability to meet market demand. While in Indonesia, economic growth was driven by the manufacturing sector. Data statistics shows that the contribution to GDP is over 20% from 1994 to 2022. (https://stat.unido.org/, 2023).

BCI reported that the SC disruptions caused to raising labor cost (84%), lost revenue (77.6%), lost productivity (76.4%) and resulted in organizational reputational damage due to customer complaints (73.8%) and concern of shareholders (73.7%) (Elliott, 2023). The argument strengthened during Covid-19, Europe loss 112.7 billion euro to GDP (Choudhury et al., 2022). Even though disruptions are not common, the impact on business continuity is still severe and the same event may be occurred in the future.

SCRe is the emerging topic in SC discipline that allow the condition returns back to normal or even better after disruption (Al Naimi et al., 2022). In SCRe subject, there appears to be limited information in the literature to study it in the specific manufacturing sectors whose impact to vulnerable and from supply perspective which usually vulnerable to disruption in Indonesia (Kurniawan et al., 2017; Widiyanesti & Fernando, 2019). Vulnerability in context of supply and demand context is board aspect to study in the supply in SC network. Pettit et al. (2019) suggest to study the supplier and customer resilience separately to understand their effect to overall SC. While Kurniawan et al. (2017) has studied SCRe and vulnerable of SCRe in Indonesia from demand perspective, and determine the factors effect to vulnerable. Even though the study has successfully to accomplish the research objective in vulnerable, however the study was too broad in multiple manufacturing, the similar argument reinforced by Pettit et al. (2019) that factor affecting SCRe in the specific industry is required to develop.

The aim of this paper is: (1) to identify and propose the variables that improve SCRe, (2) to develop a conceptual framework that improve chain resilience, (3) to find the research gap for future research investigations can be carried out. Therefore, from a theoretical and practical perspective,

the result can serve as a reference and guide to remain resilient and sustainable in the SC and operations.

Literature Review

Supply Chain Resilience (SCRe)

SCRe represent the direct and indirect impact of SC resources through SC capability. The capability required to improve the company's competitive advantage (Hosseini & Sheikhi, 2012). SCRe indicates how well the company can remain competitive in the age of disruption.

Since the early 2000s, SCRe topics have attracted the interest of researchers. The concept was first introduced by Christopher and Lee (2004) in their paper; However, after the COVID-19 pandemic, companies began to pay close attention to the concept of SCRe. The volatility of the global economic environment is a key element that motivates companies to prioritize SCRe (Pettit et al., 2019). There is lack of understanding or no consensus in the literature on defining specific elements and a holistic approached on SCRe definition. The SCRe definition comes from focus event, performance, speed and adaptive framing (Ribeiro & Barbosa-Povoa, 2018). From the level of performance that can focus on competitive advantage, SCRe is defined as the ability to prepare for the disruption, recover from the disruption and maintain a consistently positive operating within an acceptable cost and time-frame (Ribeiro & Barbosa-Povoa, 2018). It is important to raise awareness of SCRe because, although the probability its occurrence is low, the impact is serious for the company (Ribeiro & Barbosa-Povoa, 2018). The vulnerability and uncertainty of the SC network in all aspects will impact business collapse. Therefore, the SCRe must be a key area to be consider in the business process. SCRe defined as adaptive capability to prevent unanticipated conditions, react to disruptions, and rebound from the situation by keeping the operations continuity at the ideal level of connectivity and governance of structure and function (Ponomarov & Holcomb, 2009). Despite the fact that SCRe was defined by numerous researchers, there is no concreate definition that provides a complete understanding of the concept.

Multiple Sourcing Strategy and Supply Chain Resilience (SCRe)

The multiple sourcing supplier strategy plays an important role in improving SCRe through direct relationships or through SCF (Shekarian & Mellat Parast, 2021).

The studies multiple sourcing strategy examined its effect on improving SCRe (An et al., 2024; Heese, 2015; Ni-na & Bao-wen, 2010; Remko, 2020; Wu et al., 2019; Xu et al., 2024). The most common approaches found in the literature are simulation method and case studies, but limited empirical methodological studies are still conducted (An et al., 2024; Rajesh, 2021; Xu et al., 2024).

Multiple sourcing suppliers is considered as a unique and inimitable resource of the company and it is a key factor in determining the company's strategy. Researchers have examined the direct effects of a multiple sourcing supplier strategy on SCRe using mathematical simulation methods and interviews (Heese, 2015; Ni-na & Bao-wen, 2010; Remko, 2020; Wu et al., 2019) and empirically (Delbufalo, 2022; Liu, 2020; Pratono, 2023; Xu et al., 2024).

The multiple sourcing strategy as the company's redundancy resource, has improved the SCRe, and the multiple sourcing strategy has met the high demand during disruption (Liu, 2020). Pratono (2023) suggests that the multiple sourcing strategy increases the company's competitive advantage during market turbulence. However, Delbufalo (2022) contradictorily found that supply base diversity has a negative impact on SCRe. The dependence of manufacturing companies in Indonesia on international suppliers may vary to improve SCRe. Therefore, in order to improve SCRe in the global network, the introduction of this strategy was necessary. From above explanation, the hypothesis shown in fig.1.

Supply Chain Risk Management (SCRM) and Supply Chain Resilience (SCRe)

SCRM has been thoroughly examined in the literature review, as shown in the literature review by (Bier et al., 2020; Hoffmann et al., 2013; Pournader et al., 2020). Al Naimi et al. (2021) discussed that SCRM creates awareness of disruption towards SCRe. Hoffmann et al. (2013) suggested that uncertainty leads to more of transaction cost, the ability to manage the SC risk would lowering it down and improve company competitive advantage.

Although SCRM has matured in the literature, over the past two decades, there is still a gap in cultural differences in practices (Pournader et al., 2020). The SCRM practice is divided into a few parts: risk identification, risk assessment, risk mitigation and risk control (DuHadway et al., 2019; El Baz & Ruel, 2021)

Risk identification is the initial process and foundation in SCRM (El Baz & Ruel, 2021; Wiedenmann & Größler, 2021). The company must use risk identification to accurately identify the source of SC risk early on, as the level of disruption determines the likelihood of detection. Due to the complexity of the SC and limited sources during the disruption, the company need to gather information from its processes and partners. Therefore, risk identification plays an essential role and significantly influence the results of the next steps in SCRM to improve the SCRe (El Baz & Ruel, 2021).

Risk assessment is the evaluation the identified risk found in the process to reduce the severity of the risk. There are three levels of risk: high risk, moderate risk and low risk. The risk assessment is required as a strategy to improve the SCRe. Scholars have identified the connection risk assessment influence the SCRe (Shishodia et al., 2023)

Risk mitigation is the strategy derived from the result of the risk assessment to reduce the risk during the disruption or via the contingency plan. Postponement mitigation is an effective strategy for improving the SCRe during demand uncertainty and pandemic disruptions (Dohale et al., 2023), while supplier diversity and inventory management have been viewed as a strategy for mitigating SC risk during disruption (Tarei et al., 2020). The risk mitigation has effect to improve SCRe (Um & Han, 2021). Al Naimi et al. (2021) argued that SCRM practice creates awareness of disruption towards SCRe.

Risk control is considered an important dimension for hedging the risk in the event of disruptions. Previous studies have examined the significant effect of risk control on SCRe (El Baz & Ruel, 2021; Gupta et al., 2022). Risk control i.e: company preparedness and company risk intelligence

have a significant impact on SCRe (Gupta et al., 2022). Risk control has a positive impact on SCRe (El Baz & Ruel, 2021). SCRM practice has significant positive on SCRe (Al-Ayed & Al-Tit, 2023). From above explanation, the hypothesis shown in fig.1

Digital Technology Adoption and Supply Chain Resilience (SCRe)

Artificial Intelligent (AI)

AI has been extensively studied by many scholars as resource capability to improve SCRe (Ivanov et al., 2021; Kothari, 2018; Modgil et al., 2022; Xu et al., 2024). AI is a resource capable of developing agent-based systems, genetic processes and expert method to facilitate demand planning, order fulfilment, network design and inventory planning in combination with supplier systems (Muniz et al., 2020).

As an advance technology, AI has a significant impact on SCRe by providing valuable insights, optimizing processes and responding to disruptions (Belhadi et al., 2024; Modgil et al., 2021). AI allows companies to simulate different scenario and develop a resilience plan for potential disruption (Belhadi et al., 2022). Through simulation, the company can test the effectiveness of its contingency plan and identify opportunities for improvement. AI makes it easier to monitor and analyze supplier performance, enabling companies to build stronger and more resilient supplier relationships (Gupta et al., 2021). Early identification of potential problems with suppliers helps mitigate risks associated with SC disruption (Nayal et al., 2022).

Big Data Analysist (BDA)

Big Data Analysist (BDA) can be defined as organizational resource as a technology and technique used by an organization to analyze enormous data and complex datasets, improve the organizational performance and create insight for action taken form big data (Mikalef et al., 2018).

Now days, the use of the Enterprise Resource Planning (ERP) can generate huge amount of data. Companies use the ERP system to track, alert and monitor the SC network and operation for inventory updates, demand and shipping alerts (Pettit et al., 2019). However, using ERPs in organization to inform the SC manager about the past and present, by linking with BDA, provides future information that can improve the SCRe.

BDA allows companies to analyze historical data and identify patterns, trends and potential risks in the SC (Hung et al., 2020; Kara et al., 2020). Predict source of disruptions, such as natural disasters, geopolitical events, or supplier failures (Nagy & Foltin, 2022), so companies can proactive measures. BDA enable real-time monitoring of the entire SC, providing visibility into various stages of production, transportation, and distribution. Real-time data helps identify issues arise, enabling faster responses and minimizing the impact of disruptions (Talwar et al., 2021). Analyzing data on supplier performance, financial stability, and geopolitical factors helps assess and manage supplier risks. BDA can be used to create supplier risk profiles and create contingency plans for potential disruptions. By analyzing performance metrics and feedback data, companies can continually improve their SC processes (Gu et al., 2021; Xu et al., 2024). Continuous improvement helps build a more resilient SC over time by learning from past disruptions and adapting strategies accordingly.

Internet of Things (IoT)

IoT in SC can be detected through the use of wire sensors, global positioning system (GPS), smart devices, and RFID chips, that can monitor, report and exchange data through an intelligent interface that is seamlessly integrated into the information network (Katsaliaki et al., 2021).

The advance information technology such as IoT has been widely studied to improve SCRe. A previous study was conducted by (Al-Ayed & Al-Tit, 2023; Ben-Daya et al., 2019), found that the implementation of IoT in information practice can assist the company in early detection of situations with on demanded solution, and improve visibility, agility and representation of the real-time situation in order to make quick decisions. SC visibility can improve flexibility during disruptions and make the SC more resilient.

IoT devices, such as RFID tags and sensors, enable real-time monitoring of goods throughout the SC (Ben-Daya et al., 2019; Mwesiumo et al., 2021). This ensures that stakeholders have instant visibility into the location, condition, and status of products. The data collected by IoT devices can be analyzed to recognize patterns, detect anomalies, and predict potential disruptions (Katsaliaki et al., 2021). This proactive approach allows for quick responses to emerging issues (Ben-Daya et al., 2019). IoT-generated data provides valuable insights that can be used for informed decision-making. This data-driven approach allows SC managers to optimize processes, identify potential risks, and implement preventive measures (Al-Talib et al., 2020). Advance digital technology has been embraced to mitigate business risk during and post covid-19 disruption. The technology's job is to warn of potential risks so that the company can take action to mitigate the risk with new procedures (Fernando et al., 2023). Advance digital technology adoption is a significant positive to improve the SCRe (Zouari et al., 2020). The integration of IoT technologies into the SC improves resilience by providing real-time visibility, predictive capabilities, automation, and improved communication across the entire SC ecosystem. This enables companies to respond more effectively to disruptions and uncertainties, ultimately ensuring a more SCRe.

The literature has confirmed that technologies adoption such as AI, BDA and IoT are the most popular advance technologies used during SC disruptions (Kamboj & Rana, 2023; Katsaliaki et al., 2021). From above explanation, the hypothesis shown in fig.1.

Multiple Sourcing Strategy and Supply Chain Flexibility (SCF)

Multiple sourcing suppliers were investigated to improve SCF. Researchers have explored many ways to study the multiple sourcing strategy for SCF using mathematical approaches (Gan et al., 2022) and empirical approaches (Pratono, 2023; Rajesh, 2021).

Gan et al. (2022) found that multiple sourcing strategy is the right strategy to improve SCF on concurrent product on SC design architecture on modularity. The strategy would improve price stability among suppliers. The finding inline with Pratono (2023) that found the multiple sourcing strategy make company have flexibility option during turbulence environment. The more suppliers there are, the higher the responsiveness. Companies that rely on a large number of suppliers benefit from flexibility sourcing. Supply base diversity has a positive and significant impact on SC agility (Delbufalo, 2022). Single supplier is often used in the electronic manufacturing. However, the era of disruption, it has been shown using multiple sourcing suppliers can improve SCF (Rajesh,

2021). The strategy for improving SCF through a multiple sourcing supplier strategy may vary by country. From above explanation, the hypothesis shown in fig.1

Supply Chain Risk Management (SCRM) practice and Supply Chain Flexibility

SCRM practice consist of risk identification, risk assessment, risk mitigation and risk control (El Baz & Ruel, 2021). The groups of companies that adopted preventive SCRM practices have higher degree of flexibility (Rajesh, 2021). SCRM helps companies design more flexible SC during disruption, to give indication for managers for prioritize action for contingency plan and mitigation to low-down high likelihood event especially from supply side through balancing process, inventory, capacity (Katsaliaki et al., 2021). SCRM practice have significant positive on operational performance such as operational efficiency and operational flexibility (Bhatti et al., 2022; Shou et al., 2018). From above explanation, the hypothesis shown in fig.1

Digital Technology Adoption and Supply Chain Flexibility

AI algorithms can analyze historical data and predict future demand patterns. This allows companies to anticipate changes in demand and adapt their SC accordingly. This predictive capability improves flexibility by enabling proactive adjustments to inventory levels and production schedules (Khan et al., 2020).

AI-driven automation, including robotics and autonomous vehicles, can increase flexibility by improving efficiency and responsiveness in the logistics and the manufacturing processes. Automated systems can quickly adapt to changes in demand, reducing lead times and enabling a more agile SC (Modgil et al., 2022). AI can help analyze and manage relationships with suppliers. By monitoring supplier performance, assessing risks, and identifying alternative sources, companies can proactively address potential disruptions, thereby increasing the resilience of their SC (Riahi et al., 2021). AI algorithms can optimize transport routes, taking into account real-time factors such as traffic, weather, and unexpected events. This dynamic routing capability improves the flexibility of logistics operations and ensures timely and efficient deliveries (Soori et al., 2023). AI can improve manufacturing processes by enabling adaptive manufacturing systems. These systems can quickly reconfigure production lines to adapt to changes in product specifications or demand, providing greater flexibility in responding to market dynamics (Javaid et al., 2022; Kinkel et al., 2022). Integrating AI technologies into SC management improves flexibility by providing better insights, real-time visibility, and automation capabilities. This enables companies to quickly adapt to changes, mitigate risks, and optimize their SC operations in a dynamic business environment (Modgil et al., 2022).

BDA enable companies to process and analyze massive amounts of data in real time. This allows them to quickly identify trends, demand fluctuations, and potential disruptions in the SC and make informed decisions in timely manner (Seyedan & Mafakheri, 2020). BDA helps identify, assess and mitigates risks by analyzing patterns and trends that could indicate potential disruptions. This proactive approach to risk management increases the flexibility of the SC by preparing it to respond effectively to various risks, such as supplier failures, natural disasters, or geopolitical tensions (Park & Singh, 2023; Seyedan & Mafakheri, 2020). BDA enables better collaboration with suppliers and partners by sharing insights and forecasts, leading to a more synchronized and flexible SC (Chen, 2024). BDA supports SCF by enabling more customized and personalized

products and services. By understanding customer preferences and behaviors in depth, companies can adapt their SCs to offer more tailored options, enhancing customer satisfaction and competitive advantage (Anshari et al., 2019). The insights gained from BDA enable faster and more informed decision-making. This agility is critical to SCF as it allows companies to quickly adapt their strategies and operations to new information or changes in the market environment (Wang et al., 2022). Fernando et al. (2018) examined the relationships between BDA, data security, SC innovation capabilities and service SC performance and showed that data security and BDA have a positive influence on service SC innovation capabilities. BDA also positively impacts three service SC performance: flexibility, reliability and customer service. While Bahrami et al. (2022) examined the big data analysis has no significant relationship with SC performance, whereas SC performance measurement includes new product flexibility, supply flexibility, mix flexibility and volume flexibility

IoT devices enable real-time tracking of goods throughout the SC. This visibility helps companies monitor the location, condition, and progress of goods as they move from supplier to customers (Ben-Daya et al., 2019). This real-time data can be used to make more informed decisions and adjustments, increasing flexibility. By analyzing the vast amounts of data generated by IoT devices, companies can better predict demand and adjust their SCs accordingly (El Jaouhari et al., 2022). This predictive ability enables more efficient inventory management, reduces overstocks and stockouts, and allows for a more flexible response to market changes. IoT devices can automate inventory tracking and management, reducing manual errors and increasing efficiency (Jarašūnienė et al., 2023). This automation allows companies to more easily adapt their inventory levels to changing demands, improving SCF. IoT enables improved communication and sharing between various stakeholders in the SC, including suppliers, manufacturers, logistics service providers, and retailers (Pal, 2021). This improved collaboration can lead to more efficient and flexible SC operations, as all parties can quickly adapt to changes or disruptions. IoT can help identify potential risks and disruptions in the SC by monitoring various factors such as weather conditions, traffic patterns, and geopolitical events (Xu et al., 2020) This proactive approach allows companies to implement contingency plans and make adjustments to maintain SCF in the face of unforeseen challenges. IoT enables a more detailed understanding of customer preferences and behaviors, which can lead to more customized and personalized product offerings (Caro & Sadr, 2019). This capability requires a SC that is flexible and responsive enough to adapt to these personalized demands. IoT can help optimize routes and reduce energy consumption, leading to more sustainable and efficient SC operations (Hossein Motlagh et al., 2020). These efficiencies can contribute to flexibility by freeing up resources that can be used to adapt to other changes or innovations within the SC. Integrating IoT technologies into the SC chain increases its flexibility by providing real-time data, improving risk management, automating and optimizing operations, and facilitating better collaboration between stakeholders. This increased flexibility is critical for companies to be able to quickly adapt to market changes, customer demands, and any disruptions that may arise. IoT redesign the SC which in turn reinforces SCF (Al-Talib et al., 2020). With the above explanation, the hypothesis shown in fig.1

Supply Chain Flexibility (SFC) and Supply Chain Resilience (SCRe)

SCF as feature of SCRe determine the company ability in responding and adapting to environment change in the market (Hosseini et al., 2019). A review of studies undertaken by Hosseini et al.

(2019) found that SCF is the key factor in enhancing SCRe. The argument was strengthened by the systematic review by Shekarian and Mellat Parast (2021) who examined a number of studies exploring the SCF as an important capability for improving SCRe. Numerous of research has found that SCF is the most important strategy for improving SCRe under supply, demand, process and environmental uncertainties.

In a disruptive environment, SCF allows the company to instantly adjust and adapt to supply and demand. (Piprani et al., 2022). Scholars have examined whether SCF improves SCRe (Brusset & Teller, 2017; Piprani et al., 2022; Rajesh, 2021; Siagian et al., 2021). The multi-dimensional SCF i.e. flexibility of product development, production, logistics, supply base and supplier flexibility have significant influence SCRe. This allows the company to continue operate in the high risk SC environment (Piprani et al., 2022). The company's capability to respond to sudden changes improves SCRe. The flexibility in product development and the flexibility to change quantities in response to uncertain changes in customer demand (Siagian et al., 2021). The flexible business strategy in terms of supply, process and demand can improve SCRe. The company can adopt them to as corporate capabilities to improve the SCRe (Rajesh, 2021). With the above explanation, the hypothesis shown in fig.1

Supply Chain Flexibility (SCF) as Mediating Role

The RBV theory suggests that to achieve competitive advantage, the firm must have resources and that capabilities must have value, rarity, imperfect imitability, and substitutability (Barney, 1991). Multiple sourcing strategy, risk management practices and digital technology adoption are considered a strategic practice to achieve competitive advantage. However, these strategic practices do not continually improve SCRe. The study found that strategic practices such as multiples sourcing strategy (Delbufalo, 2022), digital technology adoption (Belhadi et al., 2022) and risk management practice (Al Naimi et al., 2022) are still not confidence resource for successful strategy to improve directly of SCRe. Therefore, the SCF is considered as SC capability in bridging to improve SCRe. There are capabilities is considered to increase the SCRe according to Pettit et al. (2010), such as flexibility, capacity, efficiency, visibility, adaptability, anticipation, recovery, dispersion, collaboration, organization, market position, security and financial strength, however, flexibility is consider as the biggest capability to increase the SCRe

SCF has been studied by many scholars as a mediating role in improving competitive advantages (SC performance and SCRe) (Khanuja & Jain, 2021; Kumar et al., 2020; Liao, 2020; Rajesh, 2021; Tsai & Lasminar, 2021; Yang et al., 2022).

SCF is the company's value. SCF (logistic network flexibility and supply network flexibility) improves the delivery, volume and mix flexibility and leads to an increase in customer value (Liao, 2020). SCF (sourcing flexibility, manufacturing flexibility and logistic flexibility) has been shown to be effective as a mediate of SC integration and SC performance (Khanuja & Jain, 2021). To improve SCRe in the face of SC complexity, SCF is required. Rajesh (2021) found that SCF significant positive on mediating multiple sourcing strategy and SCRe. SCF significant positive mediates the SC risk and SCRe (Chikazhe et al., 2023). The resilience capabilities of the SC has a substantial mediating influence on the risks associated with sourcing, manufacturing, and delivery, hence enhancing the overall resilience of the SC (Um & Han, 2021). In the health sector

operational flexibility successfully mediates information technology on SCRe (Alolayyan et al., 2022). SCF has a significant positive mediate digital transformation and SC performance in unpredictable environment (Enrique et al., 2022). Base on the above explanation, the hypotheses shown in Fig.1.

Environmental Uncertainty as Moderating Role

Contingency theory suggests that an organization's strategy and practices must fit with environment (Szilagyi et al., 1980). This research focuses on the externality of the environment known as environmental uncertainty. A high level of uncertain environment can effect the company's resource strategy and capability to strengthen or weaken them to improve its competitive advantages (Koç et al., 2022; Mishra & Yadav, 2021).

Environmental uncertainties in the SC area have been extensively studied in the literature (Al-Hakimi et al., 2022; Kalyar et al., 2020; Laguir et al., 2023; Wong et al., 2011; Wu et al., 2023). Most companies strive to manage the disruption and recover from the situation as quickly as possible in order to reduce the costs and losses caused by the disruption. Definition of environmental change as a situation affected by a phase uncertain state with influenced instability. Due to environmental uncertainty, companies must respond flexibly to address the situation and remain resilient

Environmental uncertainty as a moderating effect in the SC area have been extensively studied in the literature (Al-Hakimi et al., 2022; Bstieler, 2005; Kalyar et al., 2020; Laguir et al., 2023; Pratono, 2023; Wong et al., 2011; Wu et al., 2023; Yazdani, 2022).

The moderating effect of environmental uncertainty effects performance (Yazdani, 2022). Low environmental uncertainty has been tested with significant effect as a moderator of the supplier relationship on SCRe in the SMEs context (Al-Hakimi et al., 2022). However, the impact and extent of environmental uncertainty may vary across industries and countries (Bstieler, 2005).

In a dynamic company, the impact of an uncertain environment cannot be ignored, in the high level of environmental uncertainty, a multiple sourcing strategy may affective in improving supply chain resilience and flexibility than when environmental uncertainty is low (Al-Hakimi et al., 2022; Pratono, 2023). The adoption technology in stable environment may focus on the efficiency rather than flexibility and adaptability in detecting the disruption. In addition, the SCRM practice may differ in the high level of environment uncertainty rather than in the stable environment.

The effect of environmental uncertainty as a moderator helps to understand how the respective resource affects the SCF and SCRe. Different environmental uncertainties require different SC responses. The moderator helps types of flexibility or other capabilities in specific environmental condition that require different responses and adaptations from the SC. By above explanation, the hypotheses shown in the fig.1

Method

To identify the variables of SCRe, articles from several scientific journals are compiled. Reviewing of the literature and conducting content analysis to determine the variables of company resources and capabilities can improve SCRe.
The collection article approach of relevant articles using keywords, i.e, Supply Chain Resilience, Resource Base View, Contingency View, Supply Chain Disruption from various publishers indexed by Scopus Q1 and Australian Business Deans Council (ABDC) Rank A. During the first search, 200 articles are collected and checked for relevance. After screening 40 articles will be selected for further analysis.

A literature review and content analysis was implemented in order to reveal variables influencing SCRe (Senna et al., 2021). This approach is beneficial to understand the trend and key important variables influenced by resource and capability on SCRe.

The duration of the article collection ranges from 2019 to 2024. After data collection, the data is refined based on the variables described by different authors. The variables are analyzed and then the SCRe framework is formulated.

Findings and Discussion

The literature review method has been proven to be gold standard technique for developing frameworks and identifying variables affecting SCRe. the distribution of articles publish shown from 2019 to 2024 there are 40 literature that variables develop framework below shown in fig. 1.

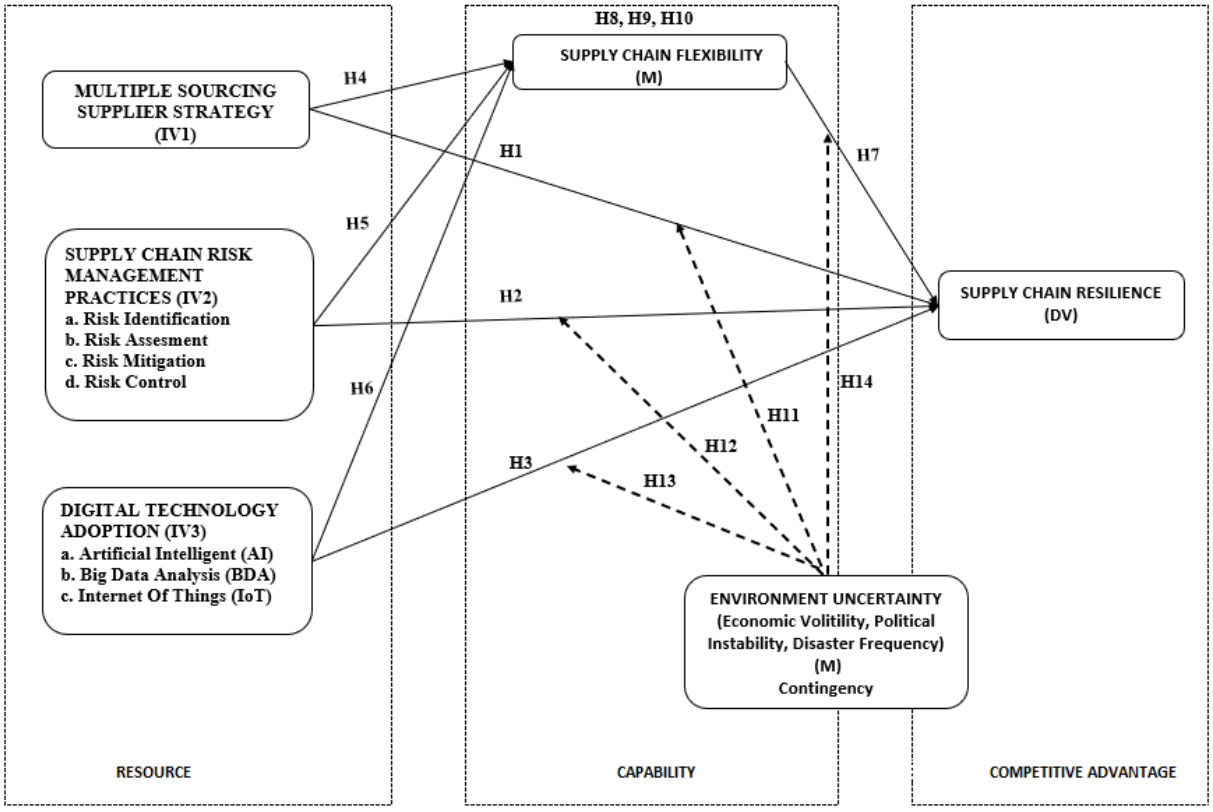

Figure 1: SCRe Framework

SCRe framework develop from the resource base view (Barney, 1991) and contingency theory (Szilagyi et al., 1980)

The Resource-based View (RBV) theory developed by Barney (1991) suggest in its original work that sustainable competitive advantages in the company result from the resource. The resources identified the trait as rare, valuable, non-substitutable and difficult to imitate.

A multiple sourcing strategy is viewed as a resource that can improve SCRe through business flexibility in the SC (Rajesh, 2021). A review article by Pournader et al. (2020) suggested that SCRM practice is viewed as a resource for enhancing capability of SCRe. Furthermore, Mikalef and Gupta (2021) argued that RBV is an appropriate theoretical lens for turbulence and uncertain environments where technology adoption such as artificial intelligence is the specific resource.

From the above explanation, it is clear from RBV that the multiple sourcing strategy, SCRM and technology adoption are considered as resources in the organization through SCF as the company's capability to provide the resilience supply chain as competitive advantage for the company.

The second supported foundation that contingency theory is industrial organization theory which argue, there is no best way to manage firm business, instead the best contingent on internal and external environment (Woodward, 1965). Contingency theory is the most suitable approach for organization studies because it is the analytical economy of perspective dealing with a finite but flexible variable such as environment (Clegg et al., 1999). Environmental uncertainty has been tested by researchers to determine its impact on performance. Souder et al. (1998) tested environmental uncertainty from a market and technical perspective to determine how the moderator affects new development of a product.

In order to fit with the environment, in the SCRe context, SC management must adapt to respond to change the external environment by building the SCF and the SCRe.

Theoretical and practical contribution

This study proposes a research framework to analyze the company's resources such as multiple sourcing strategies, SC management practices, technology adoption and company capability such as SCF to improve SCRe in uncertain environments. their impact from a supply perspective has not been comprehensively studied from supply perspective. This study makes several contributions to the literature.

This study considers the resources and capabilities of firms in an uncertain environment from a supply perspective. The combination of Resource-Base View (RBV) and contingency theories to illustrate the direct and indirect effects in an uncertain environment on SCRe. This provides a detailed explanation of how the firm's resources and capabilities influence competitive advantage in an uncertain environment from supply perspective and it adds tremendously to literature. This study will help SC practitioners or business representatives to find the right strategy to improve

SCRe in an uncertain environment from supply perspective. Finally, this study will help the government to find the right strategy to build policies to protect the investment in case of disruption or uncertain environment from supply perspective.

Conclusion

This study concludes that SCRe has wide scope of application in SC management. The analysist of literature shows that SCRe was considered from three parts, the first supply side, the process side and the demand side. The supply side will be the first to be affected across SC network. This study outcomes to reveal the variables affected the SCRe from the supply side. By using RBV theory resource and capabilities variables can determined, Multiple sourcing suppliers strategy, SCRM practices and digital technology adoption are resource variables that directly influence SCRe and through the mediator SCF as company capability. Contingency theory determined the variables that fit to the environment through the moderating effect of environment uncertainty.
This study has its own limitation particularly with regard to the quantitative number of samples drawn from the literature. It cannot generalize the study. Future studies should reveal unexplored variables affected SCRe from supply side. Future research should focus on empirical research in Indonesia to enrich the literature in SCRe from supply perspective.

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