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Building Resilience in the Wake of Major Disruptions:

How Procurement Strategies Changed During the COVID-19 Disruption.

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Title: Building Resilience in the Wake of Major Disruptions: How Procurement Strategies Changed During the COVID-19 Disruption.

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Key terms: Procurement, Resilience, Disruptions, Supply Chain Management, Strategy, Sourcing, Purchasing.

Background: The pandemic disruption caused by COVID-19, which began at the end of 2019, has had an impact on economies across the globe. A profound impact has been noticed in the Procurement function, which has suffered from supply disruptions. The importance of the procurement function in disruption management is stressed through its role as the window to the supplier base. Supply chain disruptions force firms to evaluate and create capabilities to mitigate the effect of risk sources and improve resilience. By building resilience into supply networks, companies are better prepared for disruptions and can thus bounce back easier and quicker.

Purpose: The purpose of this research was to explore how procurement strategies have changed under the COVID-19 disruption to become more resilient. We focus on which changes firms have implemented to make their procurement more resilient, and why. To draw conclusions, proactive strategies the companies had in place, as well as reactive strategies that they implemented after the disruption, are explored.

Method: This research was conducted through a qualitative case study design of 8 firms which were affected by disruptions emanating from the COVID-19 pandemic. Insights and facts on the purpose were obtained through interviews with 10 procurement professionals working in these case companies. The findings were analysed with the Supply Chain Resilience (SCRES) literature and theory. A cross-case analysis ultimately led to the final conclusions.

Conclusion: All informants noted an improvement in their situation after implementing reactive strategy changes. The sample seemed to indicate a short-term perspective on the crisis, two years into the pandemic. Long-term thinking or strategies are a rarity. The disruptions caused by the pandemic have improved risk-management and disruption-thinking. However, in most of our sample, this has hardly materialized into the development of mitigation strategies for future disruptions. The resilience-

focused changes to procurement strategies are therefore mostly only improving SCRES in the short-term.

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1. Introduction

The first chapter will set the foundation for this research. Background into the current state of affairs is presented first. The Research Problem, i.e., reasons for why this topic deserves research attention, is discussed next. Lastly, the final purpose and research questions are provided.

1.1. Background

The pandemic disruption produced by SARS-CoV-2, which began at the end of 2019, has had an impact on economies across the globe (Kauzya & Niland, 2020). Millions of people have been ill because of the epidemic, and hundreds of thousands have died as a result. In addition to serious health consequences, the pandemic has impacted practically every area of social life (Kauzya & Niland, 2020). The coronavirus (COVID-19) outbreak demonstrates that pandemics and epidemics may impact negatively on global supply chains (SC) (Queiroz et al., 2020). For instance, the impact of viral confinement efforts on industrial production in China, which fell by 13.5% in January and February relative to the earlier year (World Economic Forum, 2020). Initially, the virus appeared in December 2019 in Wuhan, China. This was later was known as one of the modern-day pandemics in humankind with over 153 million cases and 2.230.537 million deaths worldwide by the time this study's background was written (WHO, 2022). One odd feature has been the impact of countrywide lockdowns on the supply of commodities. Several high-demand commodities that were accessible before the disruption, such as medical safety equipment, have encountered serious constraints, a bottleneck situation (Meyer et al., 2021).

A significant effect on the supply chains is on industrial plants that must shut down if their personnel is ill or confined under quarantine regime. Such incidents have had an impact not just on individual factories and production lines, but also on whole industries. Following that, indirect repercussions were felt across the supply chain, particularly if alternative suppliers could not be discovered, or worse, were disrupted concurrently. Additional indirect impacts came rapidly on the horizon because of a combination of export and travel prohibitions, and subsequently because of widespread unemployment caused by a fall in consumption. Simultaneously, the pandemic has stimulated a wide range of increased purchase behaviour, from panic buying to price speculation, leading to the bullwhip effect.

Ultimately, COVID-19 has caused supply and demand instabilities as well as capacity changes, resulting in shortages and disruptions in global supply chains (Ivanov, 2020; Queiroz et al., 2020; Kovacs & Sigala, 2021).

Supply chains rely on their supply base, which is a set of vendors from whom a corporation buys goods and services (Torabi, Baghersad, and Mansouri 2015). The identification of the optimal supplier base for procurement is critical to the performance of supply chains in global marketplaces. Procurement plans are among the most important variables in a company's performance and success (Merzifonluoglu 2015). In complicated global supply chains, nevertheless, a supplier or set of suppliers may be disrupted with little or no notice. Nissan, for instance, had significant difficulties following the 2011 Japan earthquake because it obtained 12 percent of its engines from a manufacturer near the disaster zone (Merzifonluoglu 2015). In 2000, Ericsson suffered a 400-million-euro loss after a fire broke out at their supplier's semiconductor factory in New Mexico (Chopra and Sodhi 2004; Bhattacharya et al. 2013; Merzifonluoglu 2015; Torabi, Baghersad, and Mansouri 2015). To reduce supply shortages in such instances, organizations must adopt efficient sourcing methods. According to a report released on March 28 by the Chartered Institute of Procurement and Supply, the COVID-19 pandemic has influenced 86 percent of supply chains, and the Institute for Supply Management discovered that among early March and late March 2020, the majority of enterprises undergoing supply chain impact increased from 80 to 95 percent (Supply Chain Movement Digital Magazine, 2022). As a result, the popular management press has called for the establishment of more robust supply chains (Linton and Vakil, 2020, p. I), as well as the creation of supply chain recovering scenarios and techniques (Simchi-Levi, 2020).

1.2. Research problem

Procurement strategies are the strategies that facilitate, and are aimed at obtaining the services, materials and products required to support the firm’s operations. They are in line with, and support, the firm’s high-level competitive strategy. These strategies, in turn, influence the decisions made on the tactical and operational levels (Preez & Folinas, 2019; Virolainen, 1998). The importance of the procurement function in disruption management is stressed through its role as the company’s window to the supplier base. One supplier affected by a disruption can cause ripple effects across the entire

supply chain (Kleindorfer & Saad, 2005). Frederico et al. (2021) observe the importance of certain aspects of procurement, such as strategic sourcing, in maintaining supply chain continuity under major disruptions like the COVID-19 pandemic. Kaur and Singh (2020) affirm that and find that, as the procurement function manages the uninterrupted supply for the firm, it must have the ability to be both proactive and reactive in its disaster management. This implies that firms must be prepared for disruptions in their supply chain, but that it must also be able to react and recover in novel conditions. This importance of uninterrupted supply makes Sheffi and Rice (2005) argue for supply chains being made resilient as a strategic initiative.

Supply chain disruptions force firms to evaluate and create capabilities to mitigate the effect of risk sources (Ambulkar et al., 2015), and improve resilience during and after the COVID-19 disruption (Sharma, 2020; Paul et al., 2021). By building resilience into supply networks, companies are better prepared for disruptions, and can thus bounce back easier and quicker to normal conditions (Sheffi & Rice, 2005). Van Hoek and Dobrzykowski (2021) found that companies impacted in the wake of the COVID-19 pandemic started to adapt by making minor short-term adjustments to their procurement and risk strategies, while others are contemplating or planning complex and long-term changes, such as reshoring. In general, however, extant studies on how companies improve resilience to supply chain disruptions is limited (Ambulkar et al., 2015).

The interplay between epidemics and pandemics in the field of humanitarian logistics have been widely covered in its literature, as demonstrated by (Dasaklis et al., 2012) in their literature review. However, how commercial supply chains fare in pandemics has not been sufficiently studied (Ivanov, 2020; Queiroz et al., 2020).The same authors have also identified a gap in literature concerning the effects of novel and severe disruptions on supply chains. The interplay between the procurement function and supply chain resilience has not been extensively studied either. Pereira et al. (2014) have researched the role of procurement in achieving supply chain resilience, through a systematic literature review. They proposed future research to be more empirical in nature and focus on specific disruptions. Chowdhury et al. (2021) also noticed, in their systematic literature review of COVID-19 and supply chain research, that most articles lack an empirical focus and theory. Other research papers focus on the role of specific aspects of procurement under disruptions. For example, the role of sourcing strategies in achieving supply chain resilience has been covered by Namdar et al. (2018) and Frederico et al. (2021). These studies do not take a holistic angle in studying the procurement function, which

we will aim to do. Thus, there is a lack of empirical research concerning the effects of the COVID-19 pandemic on how firms change their procurement strategies to become more resilient. It is very likely that firms will increasingly have to deal with various supply chain disruptions. These can stem from climate, political and financial crises etc (Kovacs & Sigala, 2021). To understand how firms evolve during a disruption can create new insights for theory development in this field.

1.3. Purpose

The aims of this research follow from the literature gaps, calls for future research and relevance of the topic showcased above. Therefore, the purpose of this research is to explore how procurement strategies have changed under the COVID-19 disruption to become more resilient. We focus on which changes firms have implemented to make their procurement more resilient, and why. This will not be a snapshot, rather, the evolution from the pre-disruption to the post-disruption phase is studied. Following from this purpose is our main Research Question:

RQ 1: "How have procurement strategies changed in the wake of COVID-19 disruption to become more resilient, and why?"

This Research Question is divided into two sub-questions to better capture the evolution of procurement strategies under disruptions. These are:

RQ 1.1. "What procurement strategies did companies have in place, if any, to limit the impact of the COVID-19 disruption?"

RQ 1.2. "What reactive changes to their procurement strategies have companies implemented and are companies planning to implement, and why?"

Besides its academic relevance, studying the impact of a major disruption, like the COVID-19 pandemic, on procurement strategies also harbours societal and practical relevance. This targeted and empirical research will enable businesses to learn valuable lessons pertaining to their supply chain risks, preparing them for future disruptions in an increasingly volatile world (Hoek, 2020).

1.4. Definitions / abbreviations / acronyms

SCRES – Supply Chain Resilience

SC – Supply Chain

PSM – Purchasing and Supply Management

SCDO - Supply Chain Disruption Orientation

HUMLOG – Humanitarian Logistics

SR - Systematic Literature Review

2. Literature Review

The theoretical foundation of this thesis is presented in this chapter, which is roughly divided into four parts. First, theory on disruptions is discussed. Second, literature in strategy and resilience. Thirdly, theory and literature on the Procurement function are provided. Finally, our chosen theoretical model, based on the literature review, is presented.

2.1. Supply Chain Disruptions

Oliver and Weber (2012), who outlined the linkage of logistics with other operational activities, popularized supply chain management (SCM) as a concept in the 1980s (Khojasteh, 2018) This notion has grown in prominence as globalization has resulted in increasingly complicated supply chain arrangements. Furthermore, time and performance rivalry encouraged businesses to better organize the movement of goods in and out of the organization (Mentzer et al., 2001; Pires Ribeiro & Barbosa-Povoa, 2018) SCM is defined as the management of the movement of goods, information, currency, and demand from the first supplier in the supply chain to the final client (Coyle, 2017). While conventional purchasing was primarily concerned with cutting costs, the procurement function has exceeded this role. It is no longer just a function responsible for purchasing decisions, but also contains supplier and resource management. The procurement function's role as the company's dialog box to its supplier base emphasizes the function's significance in disruption management (Kleindorfer & Saad, 2005)

2.1.1. What are disruptions?

Risks within supply chains are plentiful, but can be classified in two main groups, operational and disruption risks. Operational risks are high-frequency, low-impact events, such as everyday fluctuations in lead-times or demand. On the other hand, disruptions are low-frequency, high-impact risks. Examples include the 2011 earthquake and tsunami in Japan, which crippled global supply chains (Craighead et al., 2007; Ivanov, 2020). Supply chain disruptions are unanticipated and unexpected events that disturb the normal flow of services, materials and goods in a supply network (Ambulkar et al., 2015; Craighead et al., 2007; Kleindorfer & Saad, 2005). These disruptions have immediate effects

on supply chain operations, as links of transportation, supply and distribution are disturbed (Ivanov, 2020). This impacts the operational, financial and market performance of companies (Ambulkar et al., 2015; Butt, 2021; Craighead et al., 2007). The intensity of disruptions can vary (Butt, 2021). Craighead et al. (2007) explored this and researched how and why supply chain disruptions differ in severity. They characterized the severity of supply chain disruptions by the number of nodes in a supply network that are hampered in their normal flow of goods and materials. Wider and more financially devastating impacts can therefore be expected for a supply network during more severe disruptions.

2.1.2. Epidemic disruptions

Existing literature on epidemics and its impact on commercial supply chains was scarce up until the early stages of the COVID-19 pandemic. Belhadi et al., (2021)'s analysis, based on the Supply Chain resilience hypothesis, sheds light on the impact of the COVID-19 epidemic on the automotive and aviation supply chains. In three discrete phases, the two supply chains' immediate and long-term reaction plans are analysed using a mixed - method approach methodologies. Chen et al., (2021) proposed a recovery approach for supply chain disruptions with the motive of modifying the original product type in order to successfully tackle those. Patrucco & Kähkönen, (2021) examined the "PSM (Purchasing and Supply Management) lessons from the pandemic: changing for better crisis response". Van Hoek & Dobrzykowski, (2021) investigated if the pandemic is encouraging reshoring choices and whether the pandemic will definitely contribute to firms reshoring segments of their supply chain. Frederico et al., (2021) researched the influence of the strategic sourcing process on the supply chain's responsiveness to COVID-19. The article provides experts' viewpoints on the impact of strategic sourcing approaches on supply chain reactivity. Jerome et al., (2021)'s research recommends incorporating Industry 4.0 principles into a company's procurement processes to make it more robust and competitive.

The aforementioned literature is a handful of the needed gap filling literature about commercial supply chains disruptions. Disruptions emanating from pandemics or epidemics are distinct from other disruptions through their long-term existence, ripple effect (propagations) and high uncertainty. Epidemics scale fast and spread widely over many regions, in the case of COVID-19, over the world (Ivanov, 2020). The current COVID-19 pandemic is unique in its disruption. Comparing it to previous epidemics, such as the SARS epidemic in 2003, it has impacted demand, supply, and logistics

concurrently and more severely (Chowdhury et al., 2021). The combination of the big and long-term impact makes this disruption especially interesting to study.

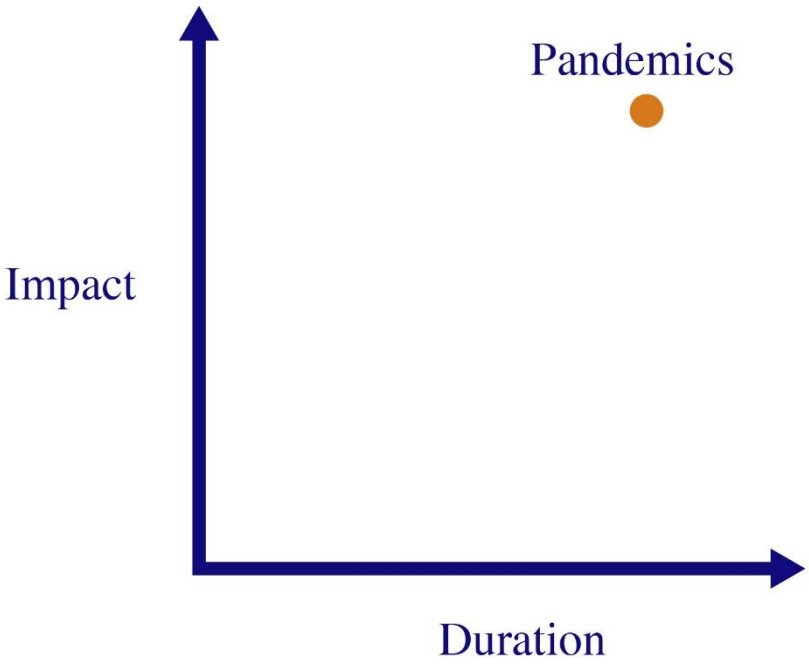

FIGURE 1 - PANDEMIC DISRUPTION CHARACTERISTICS, ACCORDING TO LITERATURE

2.1.3. Supply Chain Disruption Orientation

A firm's realization and acknowledgement of possible impending disruptions, and its ability and willingness to learn from past disruptions is known in the field as Supply Chain Disruption Orientation (SCDO) (Ambulkar et al., 2015; Bode et al., 2011a; Yu et al., 2019). The more pronounced a company's SCDO is, the more it cares about supply chain disruptions. In turn, this influences its motivation to act in response to these disruptions. (Bode et al., 2011a) .Yu et al. (2019) find that supply chain resilience is positively impacted by SCDO. Despite its importance in building resilience, SCDO alone is not enough according to Ambulkar et al. (2015). This is especially the case in high-impact disruptions, where SCDO does not have a direct impact on a firm's supply (Kleindorfer & Saad, 2005) chain resilience. The COVID-19 pandemic has proven to be one of these high-impact disruptions.

2.2. Strategy & Resilience Literature

Resilience as a concept did not originate from the domain of SCM. The first definitions and conceptualizations of resilience in SCM, now known as Supply Chain Resilience (SCRES), appeared in the early 2000s. in 2003, it was defined by Rice & Caniato (2003) as "the ability to restore normal operations after an unexpected disruption", caused by e.g., a natural disaster or terrorist attack. In 2005, Rice developed this further and described SCRES as a function of the responsiveness of a supply chain and the competitiveness of the focal firm. This continued until 2009, when Ponomarov and Holcomb provided a more theoretically grounded definition of SCRES. This definition includes the adaptive capabilities of supply chains in case of unexpected events and disruptions, and the ability to recover through operational continuity (Ponomarov & Holcomb, 2009). In the following decade, the field did not develop a widely accepted definition. Definitions were obtained through theory building or were slightly altered from previous work (Hohenstein et al., 2015). Blackhurst et al. (2011), following Rice (2003) and Sheffi & Rice (2005), defined SCRES as a company's ability to recover from disruptions, which allows their supply base to return to normal conditions. Ambulkar et al. (2015) consider SCRES to consist of a company's alertness and adaptiveness, and being able to respond to disruptions in a timely manner.

2.2.1. Elements of SCRES

In the literature, many different SCRES measures are proposed. These measures can be, and are categorized into different higher-level strategies or elements. Christopher & Peck (2004) consider four main elements of SCRES, namely **supply chain (re-)engineering, supply chain collaboration, agility and supply chain risk management culture**. Within these elements they provide different methods and capabilities. For example, within supply chain engineering, strategies relating to the supply base, such as supplier development are included. Within agility, the two main methods are visibility and velocity, while collaborative planning is one of two proposed methods of supply chain collaboration. Ponomarov & Holcomb (2009) propose three resilience phases of readiness, response and control. The logistical capabilities needed within these is grouped into three categories, namely, control, coherence and connectedness. For example, control in the readiness phase can comprise of the creation of back-up systems, while information sharing is a capability within connectedness in the response phase. In their highly influential work on SCRES, Sheffi & Rice (2005) find that redundancy

and flexibility are the two main elements in achieving resilient supply chains. Redundancy aims to keep resources in reserve for use during emergencies, such as safety stock or multiple-sourcing strategies. Redundancy in normal day-to-day operations represents a cost with hardly any benefits. These benefits are only reaped in case of disruptive events. Flexibility on the other hand, represent an organic capability that allows for fast identification of threats and subsequent response. Besides improved resilience, flexibility also support the firm's competitiveness. Whereas other authors consider the right company culture a key high-level element of resilience, Sheffi and Rice consider culture to be a tenet of the flexibility capability. Another key tenet of flexibility that they have identified, control systems, is very similar to the resilience element of visibility, that other authors propose. **We can therefore see that despite different conceptualizations, there are many similarities between different works of research.**

As noted above, different words are used to capture these elements or capabilities of resilience. Jüttner & Maklan (2011) conclude that the four capabilities/categories that are most often mentioned and do a good job in capturing the core of most interpretations, are flexibility, velocity, visibility and collaboration. Flexibility is a firm's capability to face, resolve and possibly exploit disruptions. Jüttner and Maklan note that redundancy is described by some authors as a separate resilience capability. They follow Rice & Caniato (2003)'s interpretation that the duplication of capacity rather is one form of flexibility. Velocity revolves around the speed of disruptions and subsequent adaptations. How fast risk events are discovered and how long it takes for a supply chain to recover from such disruptions are important aspects in terms of resilience. Supply chain visibility pertains to timely information on entities (i.e., products/goods) and events throughout the supply chain and in the external environment. Visibility tackles the problems associated with the bullwhip effect, making it play a key role not only in disruption readiness, but also in response and recovery. The three capabilities elaborated above, flexibility, velocity and visibility, are sometimes collectively referred to as agility (Chopra & Sodhi, 2004; Christopher & Peck, 2004; Tomlin, 2006). Lastly, collaboration along the supply chain relates to issues such as risk and information sharing, in all phases of disruptions. Pettit et al. (2013) propose various capability categories, which are fractured and detailed, but can largely be fitted under the categories proposed by Jüttner & Maklan (2011) above, as they imply the same. Similar findings are reported by more contemporary influential work, such as Hosseini et al. (2019). They find that the key elements of resilience, or conceptual drivers as they call them, are agility, visibility, flexibility, collaboration and information sharing. They acknowledge that some of these terms are used

interchangeably in the literature. Information sharing, e.g., is considered to be a part of collaboration by different works discussed above (Jüttner & Maklan, 2011; Ponomarov & Holcomb, 2009).

An interesting finding is that while flexibility as a core category/element of resilience is a general pattern in the literature, Christopher & Peck (2004) have not included this element in their highly influential framework. They do, however, state that flexibility is implied with their definition. We can therefore consider that, even to their interpretations, flexibility is a key aspect of resilience. We stick to this same view throughout the research.

2.2.2. Trajectory of SCRES

Hohenstein et al. (2015) provided us with a literature review on SCRES, its definitions and interpretations. Despite the lack of a widely accepted definition, a general description of SCRES can be given. Most definitions in the literature imply that companies have to respond to, cope with, or adapt to disruptions. They have identified four phases of SCRES, namely: readiness, response, recovery and growth. Not all phases are as emphasized as the others. Returning to normal conditions, or recovery, is widely emphasized as central to SCRES. The first phase, readiness, is under-highlighted in the literature. Moving to a new and improved state, or growth, has not been a key focus of many studies.

This focus on either returning to previous conditions or evolving to an improved state is a clear dichotomy in the field. There is non-consensus in the resilience literature on whether firms return to their pre-disruption state, or if they evolve to a new and better state to achieve resilience. Dickens et al. (2021) examined 60 research articles that defined resilience. The definition in 37 of these articles implied a return to pre-disruption state, while 24 articles included the evolving of the supply chain to a new and improved state. The rest were non-directional, or implied that both directions are a part of resilience strategy. Their empirical analysis supported this majority view, but they posit that firms evolve to an improved state after the external environment has stabilized. Sheffi & Rice (2005) provide a timeline of a typical disruption (response) consisting of eight stages, from preparation to long-term impact, in which flexibility and redundancy have different uses throughout the stages. Through a literature review, (Ali et al., 2017) identified three phases of SCRES. These are the pre-, during- and post-disruption phases. In the literature, different themes are used to describe these phases. In the pre-

disruption phase, these are themes like resist, avoid, prepare. In the during-disruption phase, respond, adapt and cope are used. Survive, restore, recover and return imply a post-disruption phase.

The concept of "bouncing back" from misfortune while maintaining activities and prospering is appealing but developing SCRES capabilities is not inexpensive. The trade-off considerations between SCRES development and cost should be examined further (Jüttner & Maklan, 2011; Pereira et al., 2014). These considerations may entail deciding whether to invest in spare capacity to grow adaptive skills. To create balanced resilience, capacity and vulnerability in terms of supply chain capabilities solutions is desired (Pettit et al., 2013).

2.2.3. Proactive and Reactive Strategies

The approach used to plan for, react to and rebound from supply chain disruptions is defined in much of the SCRES publications. These tactics may be divided into three types: proactive, concurrent, and reactive (Pariès & Wreathall, 2017). Proactive strategies are competences required in the pre-disruption period; major themes in definitions include plan, foresee alert, and prepare (Ponomarov & Holcomb, 2009; Ambulkar et al., 2015). Concurrent methods, on the other hand, refer to rapid reactive thinking and first-response ability to deal with interruptions during the disruptions period (Sheffi & Rice, 2005; Pariès & Wreathall, 2017). Coping with change, adapting to and responding to unforeseen circumstances are just a few of the topics covered. (Knemeyer et al., 2009; (Carvalho et al., 2011; (Wu et al., 2013). Lastly, reactive strategies relate to what is necessary in the post-disruption phase to recover. Common topics include bounce back from disruptive events and revert to the old or ideal condition (Schmitt & Singh, 2012; Brandon-Jones et al., 2014).

Other authors limit this to two types, namely proactive or reactive strategies for disruptions. We hold the same view throughout this research. The concurrent strategies are, in these interpretations, part of the reactive strategy. (Ponomarov & Holcomb, 2009; Välikangas & Sevón, 2010; Wieland & Wallenburg, 2013; Durach et al., 2015). A proactive aspect of supply chain resilience is a system's capacity to function in the face of internal or external disruptions. A proactive plan provides for the continuation of operations in the face of interruption (Kitano, 2004; Stonebraker et al., 2009). A reactive strategy is the capacity to respond swiftly to unforeseen market developments in an uncertain competitive environment (Wieland & Wallenburg, 2013; Durach et al., 2015).

Given the prospect of greater disruption, production organizations must be able to depend on both proactive and reactive methods for a supply chain to be effective (Wieland & Wallenburg, 2013; Golgeci & Y. Ponomarov, 2013). Appropriate proactive and reactive supply network resilience results in significant utilization and exploration to assure the present and future sustainability of a supply chain (Levinthal & March, 1993). Firms frequently require that their partners, including subcontractors and suppliers, employ standard practices to ensure supply chain resilience in order to strengthen their comparative benefit and consumer value.

2.2.4. Mitigation & Contingency

Optimal contingency (reactive) and mitigation (proactive) strategies during disruptions is heavily dependent on characteristics of the focal firm, its suppliers, and the disruption (Tomlin, 2006).The relationship between disruption mitigation and the characteristics of specific supply chains has been investigated by Shao (2013). A positive relationship between disruption mitigation capabilities on one hand, and supply chain integration, agility, and communication & information-sharing on the other hand was found. The geographic dispersion of a supply network negatively impacts the same mitigation capabilities. Habermann et al. (2015) concur and find that co-location of suppliers mitigates and shortens the length of disruptions. However great mitigation strategies may be in reducing a certain type of risk, the same strategy may increase another type of risk (Chopra & Sodhi, 2004). In terms of mitigation, lessons can also be learned from humanitarian logistics. Amongst other things, Kovacs & Sigala (2021) draw these lessons from HUMLOG's strategies in collaboration, standardization and preparedness.

To reap the benefits of greater supply chain resilience, it is essential to comprehend the elements that influence partners activity in this domain. Previous research has concentrated on modelling the predecessors of supply chain resilience or independent variables from the viewpoints of connection exchange and uncertainty. Researchers studying inter-organizational supply chain resilience, for instance, have looked at learning functionality, sharing of risks, interconnectivity (Ponomarov & Holcomb, 2009), risk management and exposure (Jüttner & Maklan, 2011), relational competencies (Wieland & Wallenburg, 2013), and visibility, interoperability, and intelligence gathering (Brandon-Jones et al., 2014).

2.3. Procurement Literature

Procurement strategies are the processes and decisions that are aimed at obtaining the services, materials and products required to support the firm's operations. These strategies are in line with, and support, the firm's high-level competitive strategy (Virolainen, 1998). While traditional purchasing was primarily focused on reducing costs, the procurement function has outgrown this position. It is no longer a simple function responsible for purchase decisions, but further includes the management of suppliers and resources. The importance of the procurement function in disruption management is stressed through its role as the company's window to the supplier base. (Kleindorfer & Saad, 2005). Procurement, purchasing and sourcing are sometimes used as interchangeable terms in both literature and practice. (Pereira et al., 2014). How these terms are used can be very specific to industries, such as the public sector that mainly uses the term procurement. In general, procurement is considered to be more strategic and inclusive than purchasing, which is transactional in nature. These three terms can also be grouped together for practical purposes, such as in the work of Miemczyk et al. (2012) on reviewing definitions and measures in sustainable supply management. As noted above, procurement is more inclusive. According to Lysons & Farrington (2020), purchasing and sourcing/supplier management are integral part of the umbrella-function of procurement. Sourcing is concerned with the supplier base, from selecting, coordinating, checking, and collaborating with suppliers. Purchasing is more operational, focusing on transactional tasks such as placing orders and handling payments. Therefore, the procurement function and processes deal with the uninterrupted supply for the firm, from beginning to end, and in strategic and operational matters. This is also the view of procurement held throughout this research.

2.3.1. Procurement and Resilience

The literature review above has dealt with the concepts of procurement and resilience. The table below summarizes procurement measures that contribute to resilient supply chains, as proposed in the literature.

SCRES Element	Proposed measures	References
Supply Chain (re-) engineering	Resilience-oriented Supplier selection	(Costa et al., 2018) ; (Cavalcante et al., 2019) ; (Mari et al., 2019) ;(Shin & Park, 2020) (Sureeyatanapas et al., 2020) ; (Rajesh, 2020) ; (Hoek, 2020)
	Diversification/Dual Sourcing	(Saghafian & Van Oyen, 2012) ; (Lücker & Seifert, 2017) ; (Zhu et al., 2020) ; (Queiroz et al., 2020)
	Sourcing localization/regionalization	(Kochan & Nowicki, 2018)
Agility	Enhance Supply Chain Visibility	(Brandon-Jones et al., 2014) ; (Ruiz-Benítez et al., 2018) ; (Rajesh, 2020) ; (Yang et al., 2021) ; (Zhu et al., 2020) ; (Um & Han, 2021)
	Business continuity plans	(Hernantes et al., 2017)
	Risk Hedging	(Rajesh, 2020)
Collaboration	Collaborative planning	(Ruiz-Benítez et al., 2018) ; (Rajesh, 2020) ; (Polyviou et al., 2019) ;
	Information sharing	(Hoek, 2020; Rajesh, 2020; Zhu et al., 2020)
Supply Chain Risk Management Culture	Factor risk considerations into decision making	(Rajesh, 2020) ; (Can Saglam et al., 2021)

TABLE 1 - PROCUREMENT STRATEGIES FOR RESILIENCE, AS PROPOSED IN LITERATURE

2.4. Theoretical model

This sub-chapter establishes the theoretical background of this thesis. The decisions made for our model follow from our Literature Review above. The study builds upon a framework of a comprehensive model of procurement strategies and disruptions. A framework is a useful tool for organizing and representing information about a topic (Whitehead, 2003), as well as identifying essential components in order to grasp the theory, concepts, and links among them (Rowley & Slack, 2004).

The Model

As mentioned, this theoretical mode is built around three aspects, namely the stages of disruption, SCRES and procurement strategies. **The three phases of disruption** cover the moments of pre-disruptions, during-disruption and post-disruptions (Ali et al., 2017; Hohenstein et al., 2015; Sheffi & Rice, 2005). From the **SCRES** literature, we identified two main types of strategy, proactive and reactive, where reactive strategies are both short and long-term (Ponomarov & Holcomb, 2009; Välikangas & Sevón, 2010; Wieland & Wallenburg, 2013; Durach et al., 2015). Lastly, in terms of the **procurement strategies**, we build upon the framework of Christopher & Peck (2004), who detailed four main elements of resilient supply chain strategies, namely supply chain (re-)engineering, agility, collaboration and supply chain risk management culture. These three aspects are visualized in the figure below. The Methodology in chapter three further details how these three aspects are used.

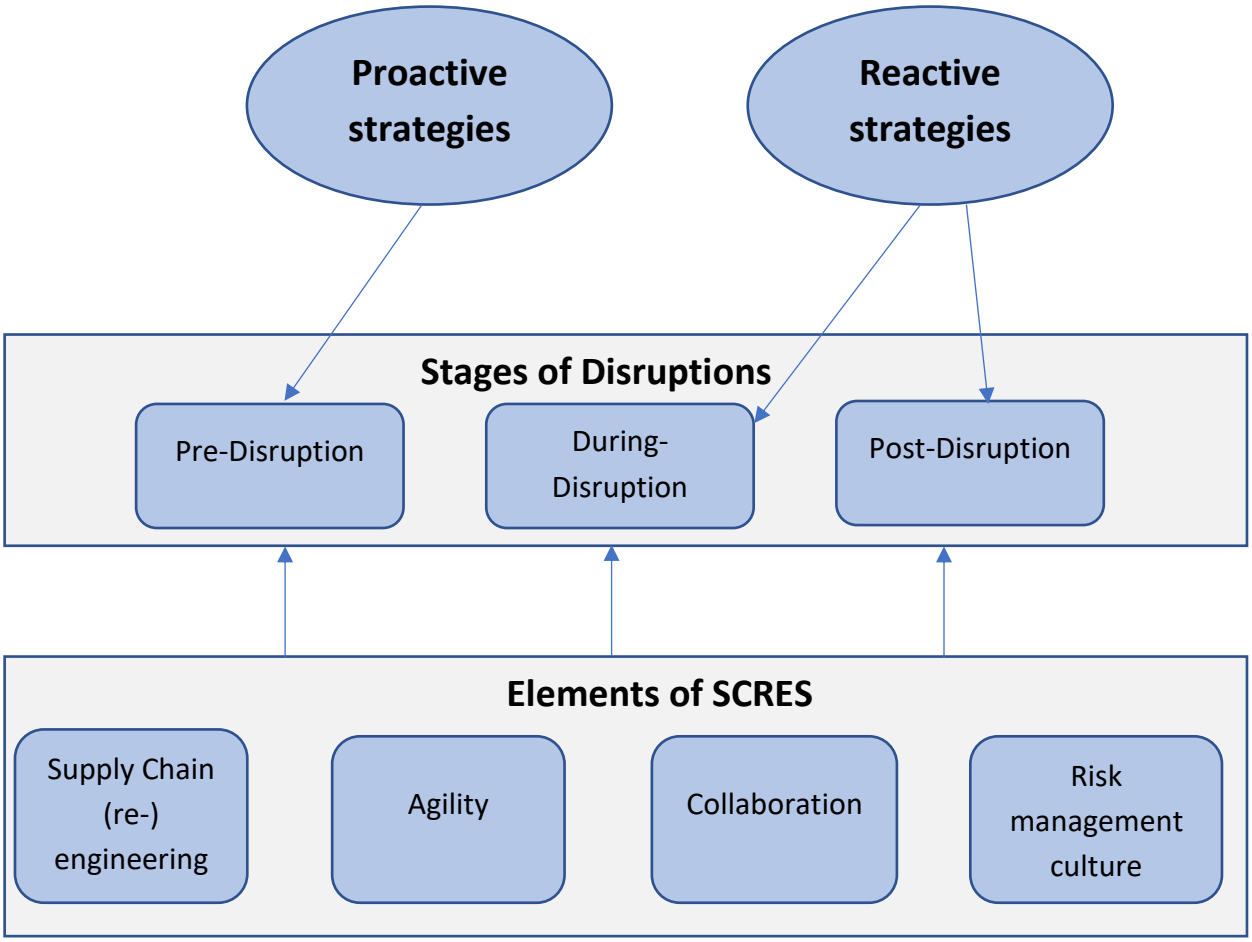

FIGURE 2 - THEORETICAL MODEL (ADAPTED FROM MULTIPLE SOURCES)

3. Methodology & Method

This chapter provides the methodological background of this study. Research philosophy and theories, as well as tangible methods that were employed to gather and process data are discussed.

Following the Four-ring Model by Easterby-Smith et al. 2018) and the Research Onion by Saunders et al. (2019), the figure below visualizes this research's methodology and methods. It provides a keyword summary of the matters elaborated on in this chapter.

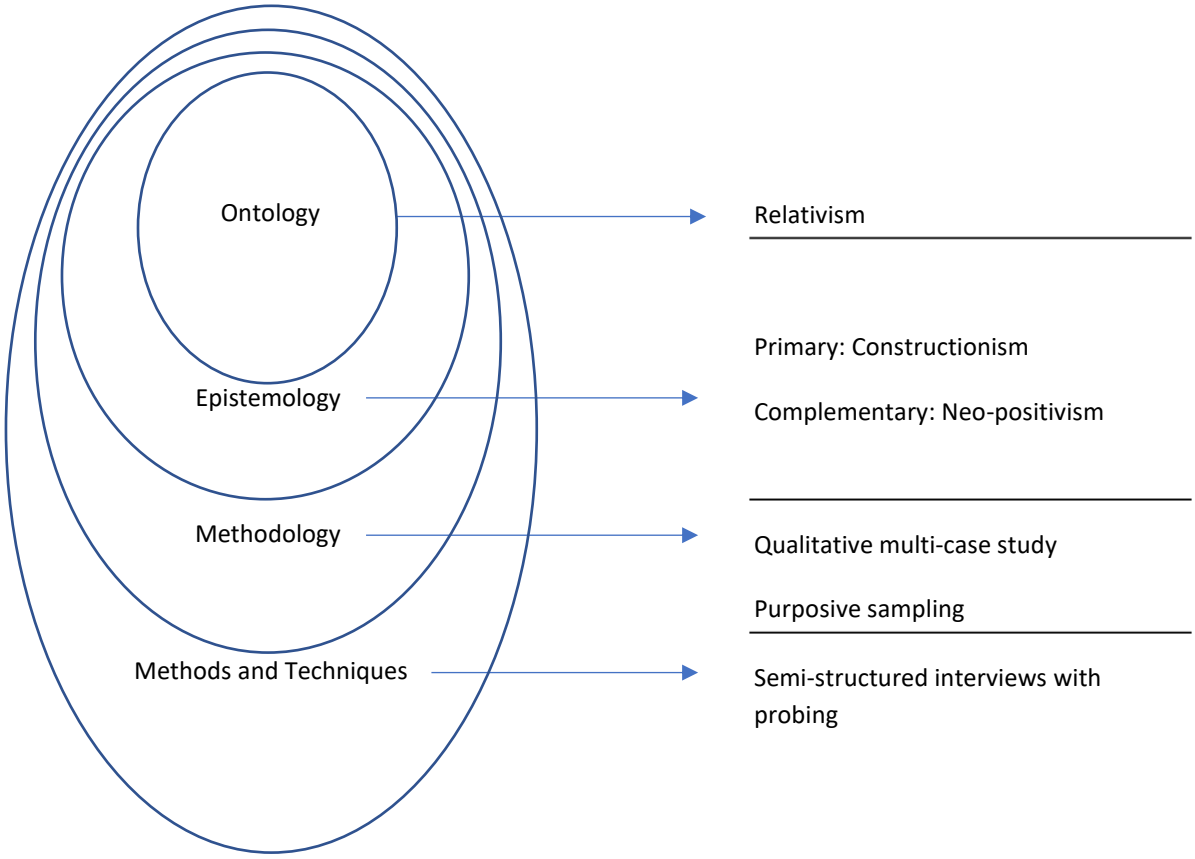

FIGURE 3 - RESEARCH DESIGN - BASED ON THE FOUR-RING MODEL AND RESEARCH ONION (EASTERBY-SMITH AND SAUNDERS)

3.1. Research philosophy

The first methodological consideration is ontology. In ontology, we theorize about the nature of reality, and indicate our assumptions about this reality (Bell et al., 2019). Along the continuum of ontological positions, researchers can hold many different stances. Easterby-Smith et al. (2018) have introduced four ontological positions along this continuum, namely realism, internal realism, relativism, and nominalism. In both types of realism, it is assumed that only one reality exists, but the way in which we have access to this reality, or perceive it, differs. These stances do not fit our research, as the main cause of the disruption might be the same (COVID-19), this has created different realities for different industries, geographies etc. In nominalism, more emphasis is placed on how language and communication shape our realities. Albeit that language, communication, discourse etc. play an important role in disruptions, the reality behind that communication is as important for companies dealing with disruptions.

This study uses relativist ontology, as it fits best with the purpose of this research. In relativism, rather than a single reality, there exists different perspectives on a phenomenon. Context matters, so there is no objective reality or truth to be unearthed across cases. The background, context and perception of the person shape their own version of reality (Easterby-Smith et al., 2018). In our study we have a procurement-perspective on disruptions. This perspective on the effects of major disruptions, and the subsequent changes needed, will yield different results than a marketing-perspective. Within the procurement-perspective, a further wide variety of different perspectives exist, based on each case's own unique context.

In line with the chosen ontological position, is the epistemological stance we take. Epistemologies are assumptions on how we can gain knowledge about phenomena or realities. How we conduct the research, and what we deem to be acceptable forms of knowledge to fulfil the research purpose, follow from this epistemological stance (Bell et al., 2019; Saunders et al., 2019).

Within management research, two main strokes of epistemology are proposed: positivism and constructionism. Positivism argues that social reality exists externally and should be measured objectively. In constructionism, reality is determined by people, so their sensemaking of phenomena is important (Easterby-Smith et al., 2018). Arbnor & Bjerke (2009) suggest three distinct paradigms.

Analytical view as positivism, actor view as constructionism, and system approach as neo-positivism, an intermediate position.

Often, researcher hold one specific view and approach to their epistemology. Other authors have proposed the use of multiple paradigms (Arbnor & Bjerke, 2009; Gioia & Pitre, 1990; Schultz & Hatch, 1996). Arbnor & Bjerke (2009) propose the methodology of complementarity. In this approach, two methods are reconciled to perform better research. They posit that it is desirable, in certain circumstances, to use different views under the principle of complementarity. It is not about combining different viewpoints or methods, as this ought to create complications. Instead, material gained from methods of the secondary paradigm should be reshaped or transformed into the primary paradigm. There are thus not two independent epistemologies. In our case, that would mean using the facts surrounding the disruptions as context to create a deeper understanding of behaviours, actions and conceptions. Schultz & Hatch (1996) developed a novel approach to using multiple paradigms, labelled interplay. In this, the similarities and differences between paradigms are simultaneously recognized. They are also of the view that methods of different paradigms should not just be selected and matched. They mention four strategies to using multiple paradigms, namely: sequential, parallel, bridging and interplay. This thesis makes use of the bridging strategy, which posits that transition zones between paradigms exist. A bigger emphasis is placed on similarities, rather than differences (Gioia & Pitre, 1990; Schultz & Hatch, 1996).

We have adopted the constructionist epistemology as a primary paradigm for this research. We explore a certain phenomenon through qualitative data to understand the behaviour of people and entities. In this, we do not use statistical data, which would allow us to generalize our findings to the population. Rather, we generalize from a small sample to theory, i.e., analytical generalization (Saunders et al., 2019). Through this primary paradigm, a deep understanding can be reached of the procurement function under disruptions, as experienced by companies and professionals. Thus, the "why" aspect of our research question can also be well uncovered. This is done by exploring the conceptions and understandings of our cases in relation to procurement, resilience, and disruptions. Constructionism is the primary paradigm, as the aim of the research was to explore and understand, more so than to explain phenomena and behaviour with set rules.

The secondary, or complementary paradigm, is neo-positivism. This was (consciously) added later, as it became apparent that the facts surrounding the behaviours of our cases was important. The more

objective view on reality in neo-positivism is useful in this regard. Through this paradigm, and e.g., its influence on the data collection, we can paint a better picture of what has happened for our case companies in practice. The facts surrounding the disruptions, such as severity, length, impacts etc., are all important factual context to the resulting actions, behaviour and conceptions of our sample. This information will thus be at the basis of deeper probing to increase understanding, thereby transforming it into material more suited for the primary paradigm.

The research follows a more inductive mode of inference. This is in line with our constructionist epistemology. We use multiple informants, to generalize from data to theory (KETOKIVI & MANTERE, 2010). Theory plays a role insofar as it provides a framework for some aspects of the research. We try to refrain from theory-bias in our data collection through neutral and open interview questions, as well as probing. The theory will be important in the analysis and results, but we will not be limited to it. It has guided us in developing the theoretical model, which will support us in part of our analysis. We do not aim to prove or disprove prior theory, meaning that identifying interesting phenomena, interpretations, strategies etc. is a core tenet of this study.

3.2. Research design

Due to the social aspects of the procurement function, involving many different people, suppliers, buyers, cultures and countries, procurement is a complex social phenomenon, which is very fitting for case-method research (Yin, 2018). The case method approach has a focus on a number of organizations or respondents, generally over time. It has a focus on increasing understanding of the different facets and dynamics of a phenomenon. This can be done for various goals, such as giving descriptions or building theory (Eisenhardt, 1989). It is important for researchers in case studies to refrain from biases, both in the data collection and analysis phases. Eisenhardt posits that the key to counter bias and perform good cross-case analyses is to view the data from different perspectives. This can be done, for example, by selecting a set of dimensions or categories, within which similarities and differences across cases are identified. These dimensions can flow from the problem, literature, or the researcher's own choosing. In our case, we have found, it is useful to use the different elements of resilience, as identified in literature, to structure the findings and cross-case analysis with. This use of structured and diverse perspectives on data improves accuracy and reliability, and will also ease the finding of

surprising or novel data. Central to later stages of case-method research is the iterating comparison between data and theory. This includes comparing the data and emerging concepts with extant literature on its similarities and differences (Eisenhardt, 1989).

This method does not allow for generalizations to population. However, with a constructionist view, external validity, also known as generalizability, is not of great concern in case methods. It is more about creating insights into behaviour, for example. The longitudinal aspect of case studies is a cherished one. In our research, however, we lack the time to conduct a truly longitudinal study. The more cases are included in the sample, the less constructionistic, and the more positivistic it becomes. Using a single case to study our topic would bring about worries of that case's uniqueness. Doing a multiple-case study would, in most cases, provide stronger results and deeper understanding of phenomena (Yin, 2018). It is uncommon for research to be fully constructionistic or positivistic, with the same applying to ours (Easterby-Smith et al., 2018). Eisenhardt & Graebner (2007) for example, developed an intermediate position, which allowed for the use of more cases and more between-case-analyses. As mentioned before, we primarily hold a constructionist epistemology, but acknowledge that we are not fully or wholly constructionistic, using neo-positivism as our complementary paradigm (Easterby-Smith et al., 2018).

Our multiple-case study design is visualized in the figure below.

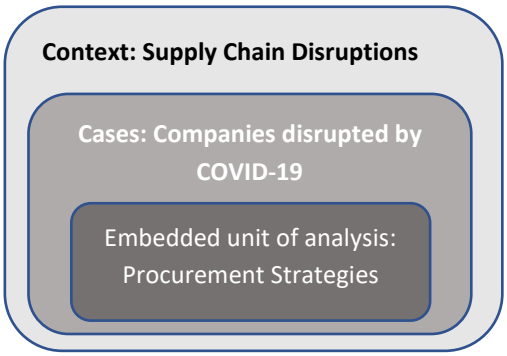

FIGURE 4 - CASE STUDY DESIGN

3.3. Data collection

3.3.1. Primary data

We analysed the research philosophy, strategy, and design before deciding to conduct semi-structured qualitative interviews. Interviews, according to (Tracy, 2010), are a technique to promote "mutual discovery, understanding, reflection, and explanation" in order to learn about the informant's lived experiences and viewpoints. The goal is to learn about the informant's points of view and why they hold them (Easterby-Smith et al., 2018, p 278). The interview guide assisted us to avoid asking a set of questions and instead construct follow-up questions during the interview to pursue our exploratory approach and acquire more in-depth material on the themes that the study follows. In a way, this had characteristics of a dialogue, as a deeper understanding was explored and we refrained from biased questioning (Arbnor & Bjerke, 2009). We tried to be frank about our accumulated knowledge, built through the literature review, and voice the intention of not trying to look for this literature in the primary data collection. This was hard in the beginning, but we managed to significantly improve the interview style and guide to suit this need for unbiasedness.

The dialogue was kept as open as possible, building upon the answers of the informants. As a result, the inquiries were similarly open-ended and thus cannot be immediately answered affirmatively or negatively in short (Easterby-Smith et al., 2018). Furthermore, the semi-structured subject guidelines provide for greater freedom in the emphasis of the interviews. As noted, context and facts are important to the research. These matters were best explored through the semi-structured interview with probing. It allowed us to consider behaviours and answers in their bigger picture.

Prior to the interviews we supplied the informants with basic data regarding the study's context, namely the fact that it is part of our master’s thesis at Jönköping International Business School. We, nevertheless, actively avoid providing too much theoretical concepts. Unfortunately, the linguistic obstacle was a limiter on the way the informants could communicate their emotions and individual perspectives easier in their own native language, which is Swedish. We felt that the extra details in their native language would be even more fruitful.

Lastly, we intended to conduct the interviews face to face in order to collect more information regarding the surroundings and the informant's behaviour. Sadly, because to the ongoing pandemic

and company safety measures, it would have been difficult. Consequently, we also switch to remote options using Microsoft Teams, Zoom, or WebEx, relying on the informant's inclination, to decrease the possibility endangering anyone's health. The digital interviews, on the other hand, enabled us to be more adaptable. It made it possible to acquire information with people from different places while being adjustable with the timetable.

Sampling Strategy

The collection of qualitative data necessitates the use of a suitable sampling approach. We used the term "purposeful sampling" because it is appropriate for qualitative research (Emmel, 2013; Maylor et al., 2017). Furthermore, it enables the identification of examples for situations based on established characteristics (Emmel, 2013; Easterby-Smith et al., 2018).

Purposive sampling was utilized to discover organizations with supply networks that were convincing examples of the target group of organizations that have had their supply chains disrupted by COVID-19, while also affording research opportunity (Whitehead, 2003). A total of 30 organizations were contacted, with a focus on Sweden, resulting in 15 potential informants replying based on their interest in procurement strategies under disruptions, risk management and resilience. Following a final assessment of organizations based on the project purpose, eight firms covering a wide sector assessment were chosen (Yin, 2018). Each organization was asked to assign "key informants". In this case, the purchaser or procurement officer of the organization based on the enterprise view of supply chain resilience specifically: procurement strategies, risk management and disruptions.

These firms had in common the fact that their procurement function was disrupted by the COVID-19 pandemic. They did differ in other aspects, such as industry, size, and supply locations. This might be considered a weakness, as any results of the research would not be specific to a more delineated sample. This diversity of cases would, on the other hand, provide us with greater ability to identify patterns typical to procurement, across case characteristics. Due to the lack of time and access for MSc. thesis students to cooperating case companies, having a broader delineation provided us with a bigger selection.

3.3.2. Literature Review

We completed an extensive literature review by dividing the search criteria into keyword categories from the themes of the literature involved. Brainstorming regarding the keywords took place in a way that covers all aspects of the themes of the literature review we needed. Crisis literature, Risk Management and Procurement literature comprised of the thematic pillars of this study, in order to create the basis knowledge schematics of this study and promote the explorative nature of it.

To explore the current body of knowledge we decided to conduct a systematic literature review. Systematic literature reviews (SRs) are a method of synthesizing scientific data to address a specific research question in a clear and repeatable manner, whilst attempting to include all existing information on the issue and assessing its value (Easterby-Smith et al., 2018). Thus, we initiated the search with keywords that we strongly believed will lead to the desired results from the existing body of knowledge that existed in procurement, strategies, and crisis literature as well as SCRES literature.

As a result, an EXCEL spreadsheet was formed to divide the work, with keywords assigned to each of us to explore what are the literature connections to the study. The use of an informative yet scientifically proof database was important as the keyword search was done in Web of Science database and Google Scholar. The keywords were divided into three distinct categories “Pandemic”, “Supply Chain” and “Strategy”. Under the pandemic category the keywords used were: COVID-19, Corona, Pandemic, Disruption, Crisis, Risk. Under the Supply Chain category which was used by both of us to incorporate the results yielded by the combination of the keywords: Supply Chain, Procurement, Purchasing, Sourcing. Lastly, on the category of Strategy: Strategic Responses, Resilience, Risk Management, Mitigation/Preparedness and Contingency. After a careful keyword search in the databases the search yielded 97 scientific articles which was the basis for this study’s literature review.

3.4. Data analysis

We started the analysis of the primary data, i.e., the interviews, by transcribing them. This has been done using the software Otter.ai. This provided us with a first draft of the interview transcripts. The outputs of these software systems were then manually checked for accuracy.

As showcased in the theoretical model, we first looked at the data through the four identified elements of SCRES. Through a content analysis, we aimed to empirically identify the use of measures within these elements. Content analyses are a research approach that draws inferences from qualitative data and pre-defined concepts, theory, and ideas (Kippendorff, 2004). It is a qualitative and interpretative method, used mainly on textual data. The first step of a content analysis is the selection of several factors or concepts which will guide the analysis. This has been done in our theoretical model, and comprises of the four SCRES elements (Easterby-Smith et al., 2018). This pre-defined theory guided us to identify measures, strategies, ideas etc., in the data. These measures and strategies would fall in one of the four elements, or not. Since this is a qualitative study, findings are not quantified. The number of occurrences of measures or elements, for example, are not important.

After having done the content analysis, an even more inductive approach to the data was used. In the case of identified measures and strategies not falling under one of the elements, they were grouped with others to possibly form new SCRES elements. These elements or strategies were thus empirically derived from the data. We therefore contribute to this theory by identifying implemented measures and strategies that fall outside of these four elements, and therewith potentially craft new elements of SCRES. Unexpected findings in the context of resilience under disruptions are the most valuable findings, which will be identified and discussed in the analysis.

3.5. Research quality

We are proactive and upfront with the methodological approach in order to perform a reliable and thorough study (Easterby-Smith et al., 2018, p.401). As a result, we explore Tracy's (2010) eight criteria for successful qualitative studies in this section. First, the topic is worthy, because the COVID-19 outbreak created unparalleled disruption in global supply systems, our research is exciting, contemporary, and current. Consecutively, numerous researchers advocated for a thorough analysis of the pandemic.

The requirement, "rich rigour," is met by grounding our research on a thorough evaluation of the bibliography on SCRES. Furthermore, to obtain more viewpoints on the issue, we used a holistic approach paired with purposive sampling. We performed the interviews digitally in the context of

COVID-19. As a result, there is no change in the importance and volume of the data gathering during the interviews. Nonetheless, we were limited by time, which prevented us from acquiring further study participants.

We reviewed every phase of our study in advance to establish a systematic technique of carrying out the research, and we examined our performance on a regular basis to identify flaws and clarify discrepancies to assure honesty, fulfilling that way the requirement of “sincerity” and “credibility”. Furthermore, we were self-reflective inside the research's framework to guarantee that readers of their work could trace their actions. To enhance the integrity of our work, we had a detailed research procedure so that readers could comprehend our processes and our discoveries. During the interviews, we urged the informants for clarifications or more elaboration if their comments were confusing.

We believe the findings of our study may be applied to comparable situations, such as another outbreak as well as other widespread disturbances involving recurrence, fulfilling the requirement of “resonance”. Nevertheless, since qualitative research is distinctive and internally generally applicable, they are not completely transferable (Easterby-Smith et al., 2018, p. 405). Furthermore, we attempted to write the research in scholarly and creative style to maintain the reader's interest and make our research more engaging. Lastly, in order to achieve substantial consistency, we linked our ontological, epistemological, and research approaches. With our research, we provided a substantial addition to the field of SCRES in the scenario of a pandemic, fulfilling that way the requirements of “Significant contribution” “Ethical” and “Meaningful coherence”.

3.6. Ethical considerations

We notified prospective informants regarding interview data analysis and ensured their confidentiality. In addition, we emailed them their written consent (Table Consent Form) to confirm that we have their authorization for the informant's data. Yet, several informants needed more information about the issues addressed before agreeing to participate in the interviews, something we granted.

4. Findings

In this section, interesting quotes from the interviews will be gathered and elaborated on in the context of our research goals. First, the context of our cases will be presented, after which the content analysis and other unexpected findings are detailed.

4.1. Case Descriptions

Case A

Case A is active in the Wood industry, supplying various types of wood products to their customers for further processing or assembly. It employs between 100 and 500 people. Our informant works in the procurement department as a purchaser and has been doing so for the last two and a half years. The COVID-19 pandemic had initially caused an up soar in demand, contrary to their own expectations. The effect of the pandemic on manpower availability led, partially, to a bad harvest, which created their initial supply problems. Since then, supply has continued to be disrupted, causing backlogs. In their own words, "*Everything is lagging behind."* The disruptions are not over for Case A and have been exacerbated by the renewed invasion of Ukraine in February 2022. "*There hasn't really been an after-COVID for us yet*."

Case B

Case B is a large player in the consumer durables market, with between 10 and 25.000 people. This company provided 2 informants for our research. One is a Global Commodity Manager & Group Sourcing Network Leader, while the other is an Operational Buyer. The company experienced a surge in demand shortly into the pandemic, which was reflected in the demand of our informants' commodities. Within their respective areas of responsibility, they have been mainly affected by travel and contact restrictions. This increased the difficulties related to the execution of their work. The disruptions emanating from the pandemic have largely subsided towards the end of the second pandemic year.

Case C

Case C is a large actor in the mining industry, providing entire mining solutions and projects. They employ between 25-50.000 people. Two informants within this company were interviewed, a Sourcing Manager and a Project Manager. The pandemic has caused massive supply shortages and price increases, both in components and raw materials. "*Before the pandemic we were able to get some components in 2,3,4 days, maybe a week. Now we're talking 5, 10, 15 weeks delivery time for the same components".* They are still facing disruptions caused by the pandemic. These have been exacerbated by the war in Ukraine: *"The disruption is not over for us yet - it has all increased now. I would say if we hadn't had that conflict in Ukraine, the situation of the pandemic should be up and running again around this summer."*

Case D

Case D operates in the window coverings market with their own brand. They employ between 500-1000 people. Our informant is a purchaser, and responsible for obtaining components and materials, which are assembled into final products. The COVID-19 pandemic has caused supply problems, price increases and drastic lead time increases. "*I have had trouble with really long lead times, and it can shift from one day to the next. Today maybe I had an approximate three weeks of lead time and tomorrow it could be six months."* Two years into the pandemic they are still facing supply problems, especially regarding electrical components.

Case E

Case E is a is a private family-owned organization that operates in the furniture business and provides flat-line furniture for one of the largest home retail companies in the world, covering the European, North/South American and the Middle Eastern market. It employs 500-1000 people. The informant is the Purchasing Manager who deals with the maintenance of the current contracts and suppliers, seeking new suppliers, negotiate terms and prices, develop solutions and improvements for the material that the organization buys. Moreover, acting as a link between different departments primarily with the Quality Department. The pandemic caused double lead times and major shortages in all areas. *"We have been forced into a different way of thinking and handling our purchases. From having quite short lead times and good availability – to more than double lead times and shortages on all areas. This, made us think two steps ahead, be more strategic, plan better and store more to avoid production*

shortages." They still face challenges with increasing costs added to the mix. "*We still face challenges, and many suppliers struggle with shortages and enormous price increases. The ongoing war in Ukraine have also extended the material crisis and surfaced new disruptions."*

Case F

Case F is a privately held organization that operates in hospitality by managing casinos in 5-star hotels. The informant is the Procurement Specialist/Manager of the organization and deals with procuring materials for the construction of the casinos and later on for their maintenance. Seeking new suppliers, contract maintenance and evaluation of the whole processes of the Procurement and purchasing department. Long lead times and spikes in prices of the procured materials but also prices of the raw materials of their suppliers were a major impact for the organization, as noted by the informant. *"Long lead times affect our business a lot because we work with emergencies along with tough deadlines. Moreover, we had an increase in costs […] the transportation cost also increased during this period by close to 30%. Same case with sourcing raw materials or spare parts for those machines, especially the first year of the pandemic."* They still face challenges from the pandemic but now enlarged by the war in Ukraine.

Case G

Case G is a privately held organization that operates in the energy field, it establishes wind farms and manufactures and constructs its own wind turbines. The informant is the Project Manager that deals with the construction of the turbines, managing wind farms and deals extensively with the procurement of the organization's six production sites and arranges the logistics about it. The pandemic largely affected logistics. Cost spikes in every section of the process and visitation and visibility of the whole supply chain decreased when the pandemic hit, but they are far more ready for the next crisis than ever. *"So it is it was it was really a challenge. But now, we are more prepared, budget wise, and contract wise, for the new projects that are coming."*

Case H

Case H is a privately-owned organization that produces wood-based materials. They procure and purchase anything from a simple pencil up to plants and machinery investment. The informant is the Corporate Senior Expert for Technical and General Purchasing. The informant reported that two of the major problems were price increases and longer delivery times. Interestingly, he noted that in the past

they would negotiate prices but now the main negotiation is delivery time. *"Our main problem is the higher prices, but also, we have much longer delivery times. In the past, we did negotiate prices but nowadays we find ourselves negotiating mainly for delivery times. It is not a good time for buyers. We have not get passed the pandemic's effects and in addition now we have the war in Ukraine that again puts an extra strain in the organization."*

4.2. Content Analysis Findings

1.1.1. Supply Chain (Re-)Engineering

Supply Chain (Re-) Engineering are strategies that relate to the supply base, such as supplier development and change.

Onboarding of new suppliers was a strategy that Case A, B and C. In comparison to the rest of the cases they followed different means to tackle the effects of the pandemic, regarding their supply base.

> *"But then we've also **found numerous new suppliers.** It has also been very important during the pandemic, to find new suppliers to try to broaden the view and it paid off to take up on that decision. We had some **lucky decisions to go for a change of few suppliers**." (Case A)*

> *"**A strategy we followed is choosing to cooperate with major and well-known suppliers.** But when you're working with larger companies, they always want to continue the working relationship with you, so they always strive for better terms, quality etc." (Case C)*

Assessment of the suppliers took place in choosing the suppliers that stands out and could tackle the effects of the pandemic more efficiently. They would also provide Case C with the necessary components that were scarce, and still are, such as electronic components.

> *"We sat down and thought of the suppliers we thought **were ill-performing and we considered some alternatives.** This was mainly choosing bigger suppliers who had better reach and production capacity, as they proved to fare better in these circumstances." (Case C)*

> *"We had to believe that these new suppliers were going to be **able to deliver better than the ones we had in this troubling circumstance.** This meant better production and supply chains which allowed them to do that. They also needed **to fit with us in all normal matters, like***

> ***product compatibility and quality etc.*** *Now that we are talking about disruptions, we did take that into account when making these decisions." (Case C)*

Case B described having their long-time strategic suppliers close and presented a scheme of consolidating their suppliers, instead of onboarding new suppliers.

> "*There wasn't much of onboarding new suppliers,* ***perhaps it was kind of more consolidating****, and making sure that key suppliers really feel that they are strategic partners for us, and they might have got a large volume of business, and then perhaps the smaller ones were faded out as a result, but I wouldn't say that new supplies got added." (Case B)*
>
> *"And this is something I think will be sped up a lot since the pandemic. As European companies supplying Europe, we must start to manufacture more here. Even if it's in Eastern Europe, it doesn't matter, because it's much closer [than importing from China/East Asia]." (Case C)*

Case H informant noted that building a new supplier base for certain commodities was also the case for them to mitigate the effects of the pandemic and the scarcity of their most common commodities

> *"For example, increasing the number of our suppliers as an alternative to the increasing need of the most common commodities, as measure to tackle the scarcities."*

Decision-making played a crucial role, especially at the early stages of COVID-19. Quick decision-making, which meant getting ahead of the problem early, proved a good strategy to tackle the disruption effects. Employing proactive decision-making as a strategy made it easier to work around with volumes in combination with trusted suppliers.

> *"Based on all the things that happened, then you really needed to be quick. It was two- or three-weeks max. […] Perhaps that we were able to find a few new suppliers, I would say, as well as* ***spreading out the volumes on the suppliers that we already had."*** *(Case A)*

Total cost management between company case C and its suppliers was and will continue to be an important element for future development with their suppliers. It all comes down to cost.

"The case is that we did not buy the cheapest of our supplied items. We paid top money for it, but we knew what we were getting in return, it's a fair trade off. The costs are not only connected to the items, but in the whole supply chain as a whole. Do not focus on actual price per item. Look at Total Cost Management." (Case C)

1.1.2. Collaboration

Collaboration as one of the elements along the supply chain relates to issues such as risk and information sharing, in all phases of disruptions (Rajesh, 2020). Following the findings, increased collaboration, information sharing, and exponential transparency was emphasised by the informants and their suppliers when the disruption first emerged.

Increased communication with stakeholders proved to be beneficial. And long-term relation with key strategic tier-1 suppliers meant that even in disruptions communication and collaboration was key to surpassing the challenges of COVID-19.

> "I*t is very important to keep contact with the suppliers and just see where all this information comes from and what happens in each step of the supply chain. We have gained a lot, just to* ***know if there is something that has been disrupted in the first tier****, for example. […] Instead of just looking at your first-tier supply, from your perspective, and just seeing that, oh, you don't have any oak anymore. We try to understand. I think that's the most important part.*" *(Case A)*
>
> *"So, when those first problems started to hit us, we were in a lot of contact with suppliers obviously. [...]* ***We started to have more regular contacts with the suppliers****, and we did feel the results, as we were notified of any issues earlier than normal, which also allowed us to react faster. So, in that sense we did benefit from this cooperation." (Case C)*

Closer ties with suppliers meant achieving resilience and getting ahead of things faster, case H emphasized.

> ***"Personal relationships with suppliers mean that problems will be dealt with due diligence****. I spoke to our colleagues in USA regarding a problem and we found a solution for their problem here with our team in our corporate office. This is a good example, of establishing personal contacts,* ***but due to Covid-19 only through Webex we could establish these personal relationships****" (Case H)*

Also, transparency, communication and visibility of the supply chain was key to avoiding any misinterpretations and applying that to both internal and external stakeholders.

> *"Strategic and key suppliers for our operations, those relationships were enhanced, or let's* ***say the interval of meetings and communication was accelerated in order to have it more frequently.*** *[…] It got a little bit a push in terms of really making sure that there is no misinterpretation or assumptions, but that there is* ***transparency and frequent communication, ongoing constant lesson****." (Case B)*

> *"The sourcing world is twofold, it is* ***external towards the suppliers****, but there's also quite extensive communication with the* ***internal stakeholders****. […] I can say that, definitely, I saw an increase also in the communication internally* ***to make sure that we are aligned****." (Case B)*

A key to achieve resilience is communication. An important element for enhancing resilience in terms of crisis and disruptions.

> *"I think that the element of increased communication* ***both internally and externally is key to enhance resilience also during times of crisis****, I would say that the quarterly business reviews, annual business reviews, internal stakeholder meetings, gaining the alignment. I think all those things will actually help, but I would highlight it as perhaps one of the key factors I see as important." (Case B)*

Transparency and visibility as elements of trusted suppliers of organization Case C was important during the pandemic. With travels restrictions and suppliers based in different parts of the world, communication and information sharing was a strategic key element for Case C.

> *"It's extremely important to have a relation because we have a few suppliers in South Africa that actually called me and talked about the actual situation and were transparent about the situation created due to the disruption." (Case C)*

> *"****You know that if you have good relationships with suppliers for example, you can probably deal with things like this better****. Before the pandemic we already tried to improve relations, but this did increase after the disruptions really started to hit us. I don't think we were really prepared. We did not have a protocol, so we did not know directly what to do, this came after thinking and acting based on the circumstances." (Case C)*

A strategy that was strongly emphasised by Case C, was to have an insurance strategy such as reshoring back to local EU countries, Eastern European ones, that way in a future disruption the initial shock would have a lesser impact on the supply chain. An advocate of larger supply base, by paying a bit more but having the insurance strategy already in place.

> *"But the second thing I would say that we need to go in in insurance strategy is to find more local manufacturing resources. […] I have always supported to have **a larger supply base**. For example, we are supplying plants for copper mines, they earn millions of SEK, they don't care if the site is costing one or two or 5% more as long as they can get it in time, so you can start producing. And this is something I think will be speeded up a lot now since the pandemic." (Case C)*

Case E emphasised that already having a close relationship with their suppliers, the strategy was having shorter lead times and coordinate orders and deliveries well ahead in time.

> *"I don't really see that we have done any major changes – more than **buying more and earlier**. […] We have also been asked to place orders early, up to 6 months to a year ahead, coordinate orders and deliveries to make it as efficient as possible."*

1.1.3. Agility

The degree to which firms are agile is largely influenced by several factors, according to literature. These factors include capabilities like visibility along the supply chain, flexibility and velocity (Chopra & Sodhi, 2004; Christopher & Peck, 2004; Tomlin, 2006). For a more elaborate explanation about these factors, we refer to section 2.2.1.

As discussed above, companies in our sample have indicated to reorganize their supply base. Some of these have expressed the reasoning for this to lay in improved flexibility and agility.

> *"We've had so few options in a way, when trying to find new suppliers. If it works out fine with the quality and the price is okay, we say that **at least it is in Europe**. […] It is always easier to work with European suppliers because the disruptions are much smaller […] **We can react quicker**" (Case A)*

> *We are trying to be more **flexible** now, indeed. For example, developing say a local supplier base can be used in two different ways. […] **If disruptions affect local supply bases, we can take it from another part of the world**." (Case C)*

Increasing safety stocks to be agile in cases of long lead times, material shortages, unexpected demands etc, has also been employed by our sample. The increased costs associated with this strategy makes it not always viable as a long-term solution, but is rather a quick fix, according to our informants. The exception to this is case F, who indicated that they were likely continuing this strategy as long as the demand is increasing.

> *"We have had to secure our stock through **increased safety stocks**, to prevent the raw materials shortage. So, we can and know the customer can have their products in* time." (Case D)

> "*It has never been an option not to have material. So, we have, as many others, **bought significantly more material to avoid any disruptions**. […] So, it is **not a long-term solution** and when things start to clear, we will once again go back to more normal levels*." (Case E)

On the other side, Case B employed the opposite for some categories. They bought less in advance, to account for any major disruptions that would cause a drop in the need for these acquired items.

> "*For this category, we have a yearly order base […] But what happened is instead of ordering on a yearly basis, we changed our way of ordering to a two- or three-months basis. This way, we don't have to pay things that we won't use in case of a big shutdown*." (Case B)

Being faster and more flexible allowed Case C to handle arising issues and new circumstances.

> "*All in all, I think across every new circumstance that kind of popped up, **we tried to be quick. Short lines of communication** both to suppliers, customers and internally as well*." (Case C)

Case H used a risk-management tool which alerts the procurement function of any disruptions, allowing them to be more agile in their response. An example of such a notification is provided below in figure 5. Each specific supplier is outlined and given a risk score. The focal firm can thus act faster, minimizing the potential impact of this specific disruption.

"*We were able to act quickly. […] They monitored for us the important suppliers in Risk Methods (the risk analysing tool). We were able to tell immediately in the first lockdown in Italy, for example, which suppliers were affected.*"

FIGURE 5 - RISK-MANAGEMENT SOFTWARE NOTIFICATION DURING COVID-19 DISRUPTION

1.1.4. Risk-management Culture

The culture of identifying and dealing with risks is an important factor in coping with major disruptions, according to our literature review. This importance is not well reflected in our sample, however. It was mentioned that the already existing culture of the firm has aided in reacting and coping with the disruptions. Disruption or risk-management thinking has also unconsciously gained prominence in some firms.

"*I would say that we have seen the damage it can do [disruptions], so we, often* ***unconsciously****, think about it when making decisions. […] We haven't decided formally to include things like* ***disruption risk-assessment*** *into decisions on our operational level. But* ***we do discuss it more often than before the pandemic*** *and all those issues that came with it.*" (Case C)

"*So, there wasn't really a real strategy beforehand, more like the risk* ***culture of the company has helped during the crisis****.*" (Case A)

A change in procurement strategies, involving risk-management culture, is on the agenda for Case C, but has not materialized yet.

"*Before I never have had that in mind [**taking decisions based on possible future disruptions**] but I think that will be a part of it in the future, we are working towards that*." (Case C)

In Case B however, they showed signs of a risk-management culture, as they, before the disruption already, realized the risk-mitigating aspect of the procurement function.

"*The overall role of sourcing, also a supply chain, is **to mitigate risks**, additional to gaining some commercial benefits. It's also to constantly mitigate the risk and then that goes above, solely looking at the commercial aspects. I would say that at [the company] it was rather flexible setup of how we were working with our different suppliers*."

4.3. Unexpected findings

Besides our content analyses, we have looked through the data for any findings that fall outside of the scope of our pre-determined elements. These are findings that we call unexpected findings. More emphasis and interest is shown to procurement strategies under disruptions, as that is the core of this research. However, other interesting findings related to the procurement function under disruption will be discussed here too.

Influence Customer Demand

A strategy that was employed by different cases in our sample revolved around changing suppliers under special conditions. In case a customer requests a certain brand/product/design that cannot be delivered by our focal firms, they try to convince their customers of choosing another, that falls outside of their own collection or supply base. This is different from a regular supplier change, as it also involves a change in customer requirements or demands.

"L*et's say you have equipment, such as the electrical motor. In the beginning it was specified that it should be a Siemens motor, but then you face supply problems for this motor. We cannot get the Siemens, but we are able to get an ABB or other motor instead. We take this to our customer and say that we have this situation, Siemens is not going to be able to deliver because of this and this and this, **would it be possible for us to use another** motor? And eight out of 10 cases they say yes, as long as we can start in time."* (Case C)

"*If we cannot get supply of the fabrics, we ask the customer if they can change the fabric to another supplier. Another type of fabric with other sorts of properties and looks and colours, that is what we do to be able to supply them with what they need*." (Case D)

Supply Chain Finance

Another interesting strategy employed by one of our cases is the use of Supply Chain Finance. By postponing the payment of their procured items, they have aimed to reduce risks.

"*We implemented **Supply Chain Finance**, with one of our major suppliers, which now **allows us to pay in 150 days instead of the classic 60 to 90 days**. They and us were more open to use this model because of the pandemic as it's a good technique to use your bank to manage the capital invested into the supply chain and **reduce risk***." (Case B)

Contract Management

Case B has also aimed to involve contract management, in cooperation with their legal department, to protect their firm following the pandemic disruptions.

"*There is a big focus on that also with our legal department to help us re-write lines in contracts to have a bigger and wider protection on our business. In terms of sourcing and buying and negotiating, that is*." (Case B)

The COVID-19 disruption also allowed them to open negotiations on their indirect-spend contracts, giving them better terms.

*"So, we had **clauses in our contracts that we could use to renegotiate prices** and that's what we did. We got a special case discount from all suppliers with around 20% I would say but there was less in some specific cases." (Case B)*

Improving collaboration and being flexible with cancellation clauses acted as a protection net in order not to fall out with suppliers.

*"So, in case that the pandemic would block the economy further or affect [the company] directly in a bad way like it did with other companies, **then we won't be on a 'falling over a***

***cliff situation' with our suppliers in order to protect themselve**s. So, we had changed a little bit in terms of cancellation parts of contracts in our frame agreements." (Case B)*

Contract management has also been applied by Case F. Contractual agreements, instead of random buying, has created more stability for both sides.

> *"We try to **create contracts** with suppliers, where before we used to just buy the items. If you create a contract, then you are **stable**, you have a fixed price, let's say for a year. And that's what we tried to do during the pandemic. You give the supplier the opportunity that he is a preferred one, and he will continue to work with us. And from the other side, we keep that price for a year. No matter what happened, we have a contract and the price for us will be the same*." (Case F)

Product Design

A unique thing, in our sample, is the strategy of Case C regarding their important components. By thinking of resilience to disruptions in the design phase, they aim to reduce the risk of encountering supply problems during disruptions. This is especially the case in electrical components.

> "*The strategy should also be to **design** with the most common article components and don't make it difficult with the latest high tech equipment, but use proven design. That is something we are trying to do. Common components are **easier** to find and buy*." (Case C)

5. Analysis

This chapter presents the analysis of the empirical findings. This is done through the lens of the literature review and theoretical model of chapter 2. We analyse these findings across cases, starting with the disruption context. Following from the sub-research questions, proactive and reactive strategies are analysed as a whole. Finally, these strategies are analysed under the four SCRES elements of our theoretical model.

The purpose of this research was to explore how procurement strategies have changed under the COVID-19 disruption to become more resilient. The focus lay on which changes firms have implemented to make their procurement more resilient, and why. Following from this purpose was our main Research Question: "*How have procurement strategies changed in the wake of COVID-19 disruption to become more resilient, and why*?" To answer this question, as explained in chapter 1.3., we analyse what strategies our cases had in place to limit the impact of a disruption like the COVID-19 pandemic. Thereafter, we dive deeper in what strategies these cases applied after the crisis occurred. This is in line with our theoretical model, in which proactive and reactive strategies to disruptions are a central tenet.

5.1. Disruption Context

The cases in our sample have experienced the disruptions caused by the COVID-19 pandemic in various ways. Some are still experiencing the negative effects of the disruption, while some have endured stronger shocks to their supply than others. The COVID-19 disruption also manifested itself in different ways for our cases. For some, the demand side fared well under these new conditions, while their supply side experienced shocks. Problems in obtaining adequate supply of materials or products is a recurring theme across the sample. This has often resulted in a drastic increase in lead times. Instability on global markets has also resulted in various price increases for materials and products. Travel restrictions and the avoidance of physical contacts, for example, strained normal operations, for which adaptations were required. For example, operations for product certification.

Most companies are still dealing with the various disruptions caused by COVID-19. For some of our cases, the disruption has shifted, while others are plagued by the same issues since the beginning of the pandemic. The current war in Ukraine has also been a recurring theme, with various cases stating that this crisis has exacerbated their already existing issues stemming from the pandemic. Currently, in mid to late April 2022, a new surge of COVID-19 cases has emerged in China, drastically affecting global supply chains. Fear of this leading to new disruptions has been discussed as well.

5.2. Proactive Strategies

The first research sub-question revolves around the use of proactive strategies that would have limited the impact of the pandemic disruption. In our findings, it has become apparent that these strategies were a rarity. Most of our cases indicated to not have any of such strategies in place, at least consciously. It was indicated that some aspects or characteristics of their firms and work, which were in place before the pandemic, allowed them to handle the disruption better. For case A and B, for example, this included their (culture of) flexibility. These were not conscious strategies, put in place to prepare for a potential crisis situation. Moreover, certain cases (B, C) had good levels of communication and collaboration in place with their suppliers, which helped them cope with the disruption once it hit. This was not a strategy put in place mainly to handle disruptions, but other commercial interests played a big role, too. This strategy of increased collaboration usually expanded after the disruption occurred, in all our cases. This might indicate that levels of collaboration deemed ‘normal’ or ‘sufficient’ under normal circumstances are not adequate to deal with major disruptions, such as the COVID-19 pandemic.

Out of all cases, case E, F and H were the only ones that employed a disruption mitigation strategy before the pandemic. E increased their stock levels to above what is economically best, while Case F already used a multiple-sourcing strategy before the pandemic, i.e., having multiple suppliers for the same items. Case H used software that warns responsible commodity managers of expected or occurring disruptions, allowing them a more agile response. Despite heavy impacts, the majority of the sample does not show signs of aiming to develop profound long-term mitigation and proactive strategies for any potential future disruption.

5.3. Reactive Strategies

Our second research sub-question aimed to uncover what reactive strategies have been employed to deal with the pandemic disruption. As discussed above, the usage of proactive, or pre-disruption, strategies was low. Reactive, or during and post-disruption strategies were widely used in our sample to deal with the pandemic disruption. There was, however, a much bigger emphasis on during-disruption strategies. This is in line with the perception of many informants, who indicated that the disruption is not over yet, thus not having reached the post-disruption phase. Out of those informants, some have not even explored any long-term, post-disruption improvements to their supply chains (A, D, E, C2), while the rest has started to think about them or aims to continue certain strategies (BB, C1, F, G, E, H). There are some during-disruption strategies that were employed, which can be continued after the disruption. This would make their supply chains more resilient in case of a future disruption. These strategies include improved collaboration and communication. As opposed to strategies that are very capital-intensive, such as increasing safety stock, that are hard to maintain over long periods of time. Though, it remains to be seen if the same level of collaboration will be upheld in times of non-disruption, as this was not included in their long-term or post-disruption plans. Despite the sample including big, capital-intensive firms, most showed no indications for using or considering technologies to improve resilience, except for one. Case H employed software that alarms the procurement function of any disruptions, with the corresponding impacted suppliers. All informants indicated that the reactive strategies they implemented, helped in dealing with the disruptions.

A difference between informants working project-based and those that do not has been noticed. Some reactive strategies employed, such as increasing safety stocks, are hard or impossible to implement in project-based work. The often-longer time horizon makes that challenges are different, requiring different solutions. This characteristic allows Case G, for example, to book transport of their high-volume product a year in advance. This long-term reaction to the low availability and increasing prices of transport procurement, is harder to employ by non-project informants.

In the literature, a major area of contention is whether firms evolve to a better state or aim to return to the pre-disruption state. In our sample, there were some signs of both. For example, the proposed shift to more local sourcing, i.e., nearshoring, is perceived as a long-term improvement in terms of risk and disruption-management. In cases where the disruption has slowed down significantly, there have been

signs of decreased intensity and frequency of collaboration already. As noted, this might indicate that a return to the pre-pandemic state in that respect is expected to occur. Moreover, when it comes to the internal perspective, the informants have been generally positive about the shift to a more online procurement function, with hybrid or fully online working becoming the norm. However, it remains to be seen if this will bring about a long-term improvement to supply resilience after the pandemic. What will evolve to an improved state is the companies' culture of risk-management. All informants that touched upon this subject discussed an improvement in the way risks are perceived, considered, and dealt with. All in all, the sample does not provide a clear picture of whether they return to their pre-disruption state or evolve to a better and more resilient state. This differs between strategies and cases alike. This contention in the literature is therefore well reflected in this empirical sample.

5.4. SCRES Elements

These proactive and reactive strategies discussed above, will be further analysed through the lens of the literature and our theoretical model, which detailed four elements of SCRES. Additionally, the empirical data yielded other potential elements or strategies of SCRES. These will be discussed in 5.4.1.

5.4.1. Unexpected findings

Within the literature on SCRES and disruptions, strategies have been grouped into several elements. These elements have been elaborated on in 2.2.1. This part made it clear that whilst there are differences in conceptualization, there are many similarities. One of the most influential and centred frameworks, that of Christopher & Peck (2004), lay at the basis of our theoretical model. The elements of SCRES as they present it capture most of the strategies employed in our sample. However, some strategies we empirically found fall outside of these elements. These mostly comprise of reactive strategies. Some are unique to certain cases, such as the use of Supply Chain Finance. Other strategies, like influencing customer demand and contract management, are similarly found in multiple cases.

Supply Chain Finance during disruptions is not widely studied. For example, Gupta & Chutani (2020) research it from a supplier's perspective, while Moretto & Caniato (2021) provide some industry expertise and future research directions. One might think that in times of disruption, suppliers would

not accept delayed payments. The prospect of improved sales through preferred-supplier status seems to be convincing enough. This same interplay was found in case F. Upgrading the relationship with the supplier, and making them a preferred one, allowed them to negotiate a fixed-price contract for one year. This could be a risky move for the supplier, considering the many price fluctuations, but again, increased business from a customer was convincing enough.

According to (Inman & Blumenfeld (2014), **product complexity** increases vulnerability to supply chain disruptions, such as sensitivity to supply delays, unavailability etc. This possibly leads to profound impacts on manufacturing. Product complexity is conceptualized in many ways, such as number or supply vulnerability of components. They propose certain disruption prevention and mitigation strategies that are like the one identified in our sample. Product simplification through fewer parts or standardization is one of these strategies. Moreover, designing with substitutable parts is another method. If one component is unavailable, others can be sourced and used. In our sample, the design of products with components less sensitive to disruptions and shortages was advocated for, amongst others, in case C. This is not a traditional area for the procurement function. However, this function can make this need known and influence, pressure, and convince other functions to adopt this strategy. Procurement being the door to the external world of supply gives them the knowledge and responsibility to do so.

Influencing customer demands

According to Rojhe (2020), there are a series of decision-making steps to evaluate the best choice that is when identifying patterns, establishing purchasing decisions including whether to acquire commodities and, if any, which sorts of brands and where, interpreting advice, establishing strategies, and carrying out these action plans such as comparative purchasing or actual product purchases. Consequently, strategic decision-making on the side of the procurement professionals side and affecting and leading the customer to the desired purchase for the organization’s best interest, should be the utter target for these professionals. In our sample, great examples of this influencing their customers’ demands was case D and C. Case D's informant noted that in cases where scarcity was the problem they would propose alternatives such an alternative supplier when it came down to parts or motors of the blinds and/or cases of fabrics, thus, achieving two goals, keeping the customer interested to them as a choice and the organization providing the customer with choices that either way would benefit both, but especially the organization.

Van Hoek & Dobrzykowski (2021), noted that procurement begins and ends with the customer, hence, customer purchasing decisions demonstrate how successfully the procurement team of the organization's strategy fits supply demands. Customer patterns encompasses the psychological processes that customers go through to comprehend their needs. Thus, informant in Case C, also, noted that due to increased lead times and scarcity of certain suppliers for motors on the machineries, they would come up with an alternative that would benefit both sides. The informant stated that 8 our 10 times the alternative would be welcomed. The purposive tunnelling of choice between options was an impressive way to tackle the problem of scarcity of materials and longer lead times.

5.4.2. Supply Chain (Re-)engineering

Priorities: Cost association between supplier selection and strategic decision-making

Initial purchase price is important, but there are also benefits and bottlenecks of establishing alternate and near-shoring sources. Due to fluctuating transportation rates and a limited capacity in specific modalities, logistics charges are a common occurrence. The original cost is an important issue for organizations evaluating near-shoring and alternative supplier base to better fulfil demand. Purchase prices could be higher, but firms may be ready to pay a portion of that in exchange for more consistent and timely deliveries. Case C, for example, supported having a larger supplier base but trying to conduct business with larger market stakeholders instead of small suppliers in order to maintain consistency in their supplier base. Whilst Case F tried to maintain close ties with local suppliers and enhance their ties with them in future disruptions. The cost of discovering and vetting new suppliers makes new near-shore suppliers unattractive.

Although purchase price is simply one component of supply chain expenses to examine, it is critical in the setting of a pandemic. According to our sample, the purchasing price advantage of manufacturing in China has been hampered by a lack of product availability, higher shipping costs, and supply resource shortages. Consequently, reducing reliance on Chinese low-cost manufacturing is extremely important as Case C noted. For enterprises who had begun to diversity their supplier base globally in light to tariffs, this presented an opportunity to expedite that work, as well as the added benefit of starting the transformation process before the epidemic. Alternative sources, such as near sourcing, are

significant factors for those who haven't yet done so in order to reduce dependency and shipping costs while boosting product availability. (Kochan & Nowicki, 2018)

Cost might not always entirely justify geographical realignment of the supply base, according to Case E, B and C. Queiroz et al, (2020), as well as aforementioned cases, agree that increased factor costs associated with market manufacture outweigh the additional costs of transportation and inventory buffering for supplies from China. Customers, on the other hand, are willing to pay a portion of the increased prices in exchange for the knowledge that things would be delivered. As a conclusion, the importance of profits and customer satisfaction may outweigh the importance of costs (Zhu et al., 2020). The findings show a common notion of near shoring, which they believe needs to take place to tackle future disruptions. Manufacturing in Eastern Europe was suggested by Case C, who also noted that due to European Regulations about sustainability the shift from Chinese cheap manufacturing to European suppliers it is a common practise for European companies.

Although there is benefit in nearshoring and market sourcing, this would not imply that it must be with different suppliers, far-source suppliers could potentially be part of the geographical realignment. Also, if this is a transitory or foundational shift in cost, costs decision-making is a topic that might be addressed. Logistics prices, for instance, are highly volatile and are likely to alter again soon.

Supplier Configuration

In our findings, from case organizations the literature-suggested supply risk aspects are considered (Chopra & Sodhi, 2004; Jüttner & Maklan, 2011; Kovacs & Sigala, 2021). The emphasis on creating alternate sources and suppliers is typically motivated by capacity limitations and supply performance concerns. For various reasons, the risk of supplier removal is less of a worry if new sources are explored as a supplement to scarce supply. Case F has seen an increase in sales during in the epidemic and is looking for additional sources to enhance capacity and fulfil increased demand, at the same time trying to enhance ties with local suppliers. Case B on the other hand scaled back its volume forecasts at the start of the pandemic and prioritized an evaluation of their most strategic suppliers that could deal with pandemic problems, like scarcity. In the end they decided to consolidate their suppliers instead of employing new ones. Case A is in search of new suppliers that can provide specific items in an industry specific segment like the wood industry, that is. Company case F also tries to balance out

their sustainability metrics by choosing closer suppliers to Europe also the same as organization case C.

5.4.3. Collaboration

Collaboration was identified as a critical aspect in responding to a disruption such as the pandemic, which has already been highlighted in the literature (Christopher & Peck, 2004; Scholten & Schilder, 2015). Collaboration with internal and external stakeholders in our case suppliers and procurement professionals, on the other hand, has become both more vital, but even more demanding. In our sample, higher visibility of the supply chain, exponential communication and transparency were highlighted by the majority of our cases (A, B, C, D, E, F).

Information Sharing and Collaborative Communication

Our findings emphasize the necessity of information-sharing and collaborative communication in increasing supply chain resilience, as they enhance not just visibility but also flexibility and speed. Organizations must consider the type of information shared (transactions, projections, delivery details, forthcoming disruptions, industry trends, and maintenance requirements). Also, the recurrence, direction, and mode of information-sharing in order to accomplish visibility and, inevitably, supply chain resilience through information-sharing.

Face-to-face interaction through online means (Zoom, Teams etc), backed by phone communication, was indicated as the best approach to foresee and/or swiftly resolve supply chain interruptions in our interviews in all cases. Scholten & Schilder, (2015), emphasized that another means would be site visits which assist to develop insights and visibility into the operations of the other organization, which allows for the early detection of potential interruptions. But in our sample only case A and G used it in early stages. There were field inspections but this proved to be very difficult given the different travel restrictions that were in place in many countries, as suppliers could be in a different continent, which was also the case with the majority of our sample. Eventually, trust and increased communication weekly and follow-up meetings if a problem popped up (B, C) replaced site visits.

Additionally, we discovered that having the proper information available at the right time leads to higher speed, lowering the time required to foresee, react to, and rebound from a disruption as informant in Case C "[…] *We started to have more regular contacts with the suppliers, and we did*

feel the results, as we were notified of any issues earlier than normal, which also allowed us to react quicker. So in that sense we did benefit from this cooperation." Altogether, our findings suggest that the quantity, direction, and timing of precise, trustworthy, and data not just linked to disruptions but also, in general, contribute to increased visibility and flexibility, improving agility and therefore supply chain resilience. Simultaneously, we discovered that low levels of information-sharing and collaborative communication diminish flexibility and, hence, resilience.

Reciprocal Reliance

Nevertheless, in our sample we discovered that trade-offs must be made between higher flexibility from reciprocal reliance based on dedicated investments, and the possibility of less flexibility due to investments that inherently bind two partners jointly. As a result, if an organization is tied to a single supplier by specialized procedures and expenditures, it may be more reluctant to communicate a second supplier in the sourcing process, as seen with our sample as a reactive strategy.

Generally, reciprocal reliance appears to boost collaboration (information sharing, collaborative communication, decision synchronization, incentive alignment, resource sharing, and joint knowledge production) and, as a result, indirectly enhances supply chain resilience, "[…] *And another thing also was that we chose to cooperate with major and well-known suppliers*" (Case C).

Participating organizations indicate that the pandemic caused an unanticipated rise in supply risk, and that Chinese suppliers emerged as a bottleneck or even a strategic worry as supply insecurity increased. This was not confined to Chinese suppliers, cases C, F, G, and A also revealed reliance on suppliers in other regions as the pandemic expanded, particularly for electronic components. This danger prompted several collaborative attitudes among the organizations surveyed, as well as an emphasis on cooperating with established suppliers to assure supply. In the experience of firms F, C, and B, payment terms provide a real method to assist this. By paying early, suppliers are in a stronger position to procure scarce materials, assign capacity, and secure supply.

Case B is located farther downstream in the supply chain and has expanded contract payment and cancelation terms with its suppliers to optimize its financial situation. As a consequence, cooperation inclinations between the client and tier 1 suppliers may not spread to tier 2 suppliers. Furthermore, the danger of relying on cooperation to assure supply in the short term is that collaboration is difficult to undertake without previous ties with suppliers. The dilemma is also if bottlenecks dissolve as a

consequence of shifting to additional or different sources of supply, the emphasis on collaboration might fade.

Mutual Data Formulation

Moreover, we discovered that jointly acquired information that is not immediately connected to disruptions (i.e., day-to-day operations) enhances supply chain resilience: organizations gain insights into one other's operations, increasing visibility and velocity.

According to Case B *"[…] I would say that it got a little bit a push in terms of really making sure that there is no kind of misinterpretation or assumptions, but that there is transparency and frequent communication, ongoing constant lesson."*

5.4.4. Agility

Supplier change within our sample was often a result of inability to deliver adequate supply. Prospects of improved agility, through flexibility and responsiveness, was also a driver for our informants (A, C, F) to consider more local production. As was reported by Van Hoek & Dobrzykowski (2021) in the early stages of the pandemic, the decision to re-shore production and supply is a complex, long-term one. They found that companies tend to stick to other short- to medium-term strategies. For two of our cases however, a strategic shift to more local supply has already been implemented. The ability to react quicker, i.e., responsiveness, was an important driver for case A. Flexibility through globally dispersed local supply bases, has been a driver for case C. In all three cases, they have been 'forced' into more local supply, but (the prospect of) agility benefits have convinced them to adopt this as a longer-term strategy.

Safety stocks

As noted, the increased use of safety stocks to handle disruptive shocks to supply was a common and recurring theme in our sample. Except for two cases (E,G), all others increased safety stocks as a reactive measure to disruptions. Normally, safety stocks are a good proactive measure to a supply disruption, allowing the firm more time to source material elsewhere until the disruption is over (Pereira et al., 2014).

However, by the very nature of pandemic disruptions, such as COVID-19, disruptive events do not just 'come and go'. Rather, the impact has been so intense, recurring, and long-lasting, that safety stocks were kept throughout the pandemic. Despite being implemented by most case companies after the start of the pandemic, and therefore being a reactive strategy according to literature, it could actually be seen as a proactive measure. It is proactive in cases where supply shocks are recurring, but not continuous. By increasing safety stocks, they thereby prepare for the next supply shock brought about by the pandemic. These recurring supply shocks can, for example, be the result of new lockdowns in producing countries (Farrer, 2022). In cases where supply was continuously disrupted, as was the case for electrical items, safety stock has also been a valued strategy.

Normally, safety stock is kept to account for daily fluctuations in demand, not for emergency shocks. Sheffi (2001) proposes 'Emergency Stocks', which, much like strategic oil reserves, are to be used in cases of extreme disruptions. Due to the capital-intensive nature of this strategy however, most of our sample has indicated the cease of this measure at the end of the disruption(s). Another perspective one can take on this widespread increase in safety stocks, is that, in itself, that exacerbates the disruption. Scheibe & Blackhurst (2018) refer to this as herding behaviour. If competing customers increase their order volumes and frequencies, they can thereby create shortages on the market, along with price increases. With each firm primarily looking out for its own interest, and with no (supra-) governmental action, it remains hard to adjust this behaviour. Furthermore, whereas normally the literature would suggest keeping inventory on strategic and efficient points in the supply network (Scheibe & Blackhurst, 2018), the disruption to global transportation affected its agility. Lead times have drastically increased, as reported by our sample, making it virtually impossible to be agile and responsive with inventory away from its point of use/consumption.

5.4.5. Risk-management Culture

The influential work by Christopher & Peck (2004), as well as others, have posited that supply chain resilience is made possible by an organisational risk-management culture. This culture should not only include internal corporate risk but revolve more about supply chain continuity management. Considering that our sample consisted of supply chain informants, an understanding of this supply chain-wide focus, instead of a focal firm focus, was noticed. At least, this was the case among those

interviews where the informants discussed or implied risk-management culture. This can be exemplified by our informant in case B, who said: "*The overall role of sourcing, also a supply chain, is to mitigate risks, additional to gaining some commercial benefits."*

The key to building this type of culture within an organization, is support and leadership from higher levels of management. This interplay was touched upon by our informants in case C. Whereas they, on a more tactical and operational level, aimed to have a diverse supply base to be able to cope with any shocks, higher management disagreed. Higher management, especially from the Finance Department, wanted to cut costs by lowering the number of suppliers the company buys from. "*So, that turned into a discussion between middle management and higher management*." In a case like this we can see that risk-management thinking has made its way into the procurement function, whereas other functions or departments are still lagging, creating tensions between objectives. It also limits the support and leadership from higher up, which is crucial according to literature.

Within our sample of cases, risk-management culture was hardly touched upon. In some instances, it was insinuated or implied, but no case company has explicitly aimed to develop their internal culture to promote risk-management because of the pandemic disruption. It was mentioned that the already existing culture of the firm has aided in reacting and coping with the disruptions. Disruption or risk-management thinking has also unconsciously gained prominence in some firms.

The figure below summarizes the empirically identified SCRES procurement strategies from our sample. Comparing this to table 1, which presents the strategies suggested by literature, one can see many differences. The elements however are a rather well reflection of most of the strategies. Below those, the unexpected SCRES elements and strategies are provided.

TABLE 2 - EMPIRICALLY IDENTIFIED PROCUREMENT STRATEGIES

SCRES Element	Empirically Identified Procurement Strategies
Supply Chain (re-) engineering	Resilience-oriented supplier selection
	Onboarding of new suppliers
	Consolidation of existing suppliers
	Sourcing localization/regionalization
Agility	Enhance Supply Chain Visibility
	Reorganize the supply base for improved agility
	Improved speed and flexibility in communication and decision-making
	Risk-management software
	Increase safety stocks
Collaboration	Increased frequency and intensity of communication
	Developing and expanding supplier relationships
	Information sharing
Supply Chain Risk Management Culture	Factor risk considerations into decision making
Contract Management	Supply Chain Finance

	Establish contracts for longer-term fixed prices Renegotiate contracts
Influencing customer's demands	Influence customers' demands, enabling a supplier change in case of shortages
Design	Design important components with potential disruptions and shortages in mind

6. Conclusion

In this chapter, the major results of the study are presented, and conclusions are drawn to the research question.

With this study we aimed to explore how procurement strategies have changed under the COVID-19 disruption to become more resilient. This approach was divided into two sub-questions. One was targeted at uncovering what procurement strategies companies had in place to limit the impact of the COVID-19 disruption. The other at what reactive strategies they have or are planning to implement.

Most of the sample did not have profound proactive strategies aimed at limiting the impact of a potential disruption, leading up to the pandemic. Most of our cases indicated to not have any of such strategies in place, at least consciously. The proactive strategies that were mentioned include good supplier collaboration, multiple-sourcing strategies, and SC risk-management software. The results seem to indicate that levels of collaboration deemed sufficient under normal circumstances are not adequate to deal with major disruptions, such as the COVID-19 pandemic.

Within the literature on SCRES and disruptions, strategies have been grouped into several elements. These elements were used for interpretation of the results, through a content analysis. The elements include collaboration, supply chain (re-) engineering, agility, and risk-management culture. Our findings indicate that most reactive procurement strategies changes for resilience fall within these four elements. The most recurring ones are onboarding and consolidation of new suppliers, improved supplier collaboration, and increasing safety stocks. Strategies that fall outside of these elements include influencing customer demands, contract management and product design. All informants noted an improvement in their situation after implementing these reactive strategy changes.

The sample seemed to indicate a short-term perspective on the crisis, two years into the pandemic. Long-term thinking or strategies was a rarity. By interpreting the results, a reasonable conclusion follows that the disruptions caused by the pandemic has improved risk-management and disruption-thinking. However, this has, in most of our sample, hardly materialized into the development of mitigation strategies for future disruptions. The resilience-focused changes to procurement strategies are therefore mostly only improving SCRES in the short-term.

7. Discussion

This chapter details the contributions of our research to various spheres. Limitations of this study as well as future research areas are discussed thereafter.

7.1. Contributions

Contribution to literature

By analysing the major disruptions of the COVID-19 pandemic and supply chain resilience through empirical data of our sample, this work contributes to the theory of SCRES. More specifically, proactive and reactive strategies in the spectrum of procurement in supply chains. We empirically used the most common SCRES elements from literature, and we recognised that most of the strategies fell within these elements. The prior studies on procurement strategies hardly addressed the value of using a set of strategies based on the SCRES elements as a guiding perspective during a disruption.

This thesis contributes to the prior studies on supply chain resilience by examining professionals' involvement with major disruptions but specifically with the COVID-19 pandemic-related disruptions. We add to earlier research by investigating the complexity, endeavours, and confusions associated with disruption preparedness and response in globally operating supply networks in the setting of a major disruption as the COVID-19 pandemic. Pereira et al. (2014) conducted a comprehensive literature study to investigate the impact of procurement in establishing supply chain resilience. They suggested that future study be more empirical in character and concentrate on specific disruptions. Empirical research was lacking on specific disruptions. Another gap in the literature, as explained in the Research Problem 1.2., is the lack of research on severe and major disruptions. This research on the COVID-19 pandemic is an important contribution to this field. Especially since experts agree that severe global pandemics, fuelled by increasing interconnectedness, will be more common in the future.

Procurement strategies were lacking attention in literature and SCRES elements are often attributed to only one stage in the literature. Nevertheless, the elements appear in various ways across the stages and should not be associated with a particular stage. We extended SCRES theory to a more energetic

stage context in which various elements cohabit to varying degrees. During our research we expanded the spectrum on how procurement strategies change under a major disruption as COVID-19.

This study has also shed light on a major dichotomy in the literature, on whether organizations should strive to improve or revert to their pre-disruption status. There were some indicators including both in our sample. For instance, the anticipated change to greater local sourcing, i.e., nearshoring, is viewed as a long-term risk and disruption-management enhancement. There was already evidence of decreasing severity and duration of collaboration in situations in which the disruption has dropped dramatically. As previously said, this might imply that a return to pre-pandemic levels is likely.

Finally, this study demonstrates that SCRES strategies can fall outside of the four main categories proposed in literature. Whether contract management, design and influencing customer demand can become SCRES elements should be the topic of future research. It is apparent however, that the existing literature on SCRES is not all-encompassing.

Contribution to Practice

This study demonstrates that procurement, sourcing and purchasing professionals need to incorporate the possibility of major disruptions in risk assessment and that virus outbreak disruptions vary from other types of disruptions. This research additionally proposes assessing the supply chain and considering the possibility of a pandemic, through its explorative nature of the pre-disruption and during and after-disruption stages of reactive and proactive strategies of procurement. Organizations are taking longer to adapt to troubled conditions owing to the excessive lead times of global supply networks. Recognizing probable procurement vulnerabilities and bottlenecks in the context of a likely prospective viral pandemic can help to decrease procurement risk that comes when the supply chains are in motion.

We learned that procurement patterns differ throughout a major disruption, specifically a pandemic, resulting in intense rivalry for certain components which cannot be supplied. Moreover, several sectors may be forced to adjust their sourcing strategies to adapt to the pandemic, in cases of shortages and alternatives with multiple suppliers. Managers should be aware of this to assess the risk and maybe change the safety stock of certain items.

Additional measures such as safety stocks, multiple suppliers for a component segment, were recognized as a new redundancy capacity, especially in the possibility of a pandemic. Because of the rapid spread of a new virus, it may be impossible to obtain items from a certain supplier, resulting in substantial expenditures due to longer lead times and missed sales. Even if the main supplier is forced to come to a temporary or permanent termination of operations, an additional supplier with identical products could allow for a continuous flow of goods.

Agility, flexibility, collaboration, supply chain re-engineering, and culture ought to be an ongoing endeavour that begins in the planning phase with flexible contracts with suppliers and alternative sources and extends through the stages of a disruption. Throughout a disruption, the SCRES should be used via resourcefulness, employing the appropriate strategy for priority tasks and the expansion of strategies through the procurement process within a supply chain. Overall, in order to address the proactive and reactive in procurement strategies stance of the organizations.

Lastly, synchronizing key performance indicators (KPIs) amongst the procurement function amid disruption is critical for improving reaction and avoiding troubled situations. As a result, the synchronization can improve the effectiveness of the response to the disruption.

7.2. Limitations

Following from characteristics of Master theses and the way this research was set up, some limitations exist that should be considered when reading this paper. Firstly, the time constraints brought about by the thesis duration have impacted the sample size. Moreover, these eight cases were not specific to one industry or size. Therefore, no accurate conclusions can be drawn to specific industries or company sizes, nor can certain things be attributed to those two variables.

This research was conducted during the COVID-19 pandemic, restricting our possibility to physically visit and interview informants. These visits would allow us to observe both the company and body language of our informants better. The subjective and experience-based nature of these interviews makes the identified patterns in the data unprovable objectively. Since the informants are enquired

about a long period of time, selective memory can arise, as well as exaggerating or downplaying of certain events.

Despite the downturn of the pandemic in recent months, the number of cases still fluctuate. Towards concluding this research, a new wave has struck China, with imposed lockdowns and massive delays in key ports to global supply chains. Therefore, we are unable to have researched the pandemic from beginning to end.

7.3. Future Research Areas

This study had a focus on Sweden. Therefore, shifting this focus to other geographic areas is warranted. This can provide new insights into how buying firms in different regions respond to global disruptions. Moreover, because this study did not focus on a specific industry, the same research can be performed on one industry. This can improve the results insofar as they provide deeper insights into the workings of that segment. Lastly, since this research has been conducted in early to mid-2022, a period characterized by the downturn of the pandemic, this research can be replicated after the pandemic is officially declared over by the WHO. This would yield new results on how companies have learned from this specific disruption, and how they have made their supply chains more (proactively) resilient.

8. Appendices

APPENDIX 1 - GDPR/ INVITATION EMAIL

Participant Information Sheet

You are being invited to take part in a thesis study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

The purpose of the study

This thesis study aims to explore **how** procurement strategies have changed under the COVID-19 disruption, to become more resilient. We focus on which changes firms have implemented to make their procurement more resilient, and **why**. To explore this subject in-depth, we aim to interview procurement professionals in the field. This Master's thesis is part of the International Logistics and Supply Chain Management program at Jönköping University.

It is entirely up to you to decide whether or not to take part. If you decide to do so, you will be given this information sheet to keep and will be asked to give your consent.' All the information that we collect about you during the course of the research will be kept ***strictly confidential****. You and your company will not be able to be identified in any ensuing reports or publications.*

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APPENDIX 2 - INTERVIEW GUIDE

General
• Could you give a short description of what your company and department do, where it procures products/materials from, and what your role is?
• We have had 2 years of the COVID-19 pandemic, could you tell me about what happened to you/your department?
• Could you shortly describe how COVID-19 has disrupted/affected your procurement/purchasing activities specifically? o Are you still facing these disruptions?
• How was your company and its procurement prepared for disruptions like these?
•
• Over the course of the disruption/pandemic, what changes to your procurement (strategies/activities) did you implement, with what goals? And in what order? • How did these changes improve your situation? Do you face the same/other disruptions now?
• Are you discussing or planning to implement any other changes, which ones, and why?
• **Extra**
• Which of the measures and strategies discussed above were most effective in your opinion, and which were not effective?

APPENDIX 3 - INTERVIEW LIST

Case Company	Position	Industry	Size (employees)
A	Purchaser	Wood	100-500
B – 2 Informants	Global Commodity Manager & Group Sourcing Network Leader Operational Buyer	Consumer Durables	10-25.000
C– 2 informants	Sourcing Manager Project Manager	Mining	25-50.000
D	Purchaser	Window Coverings	500-1000
E	Purchasing Manager	Furniture	500-1000
F	Procurement Specialist	Hospitality	10-50
G	Project Manager	Wind turbine	25-50.000
H	Corporate Senior Expert for Technical and General Purchasing	Wood & Furniture	10-25.000

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