

Developing Resilience in SMEs: A Study of Learning from Disruptions

A qualitative study on how SMEs learn to develop resilience

Paulina Colebring (25101) and Matilda Rönnberg (25185)

Abstract. At the recent World Economic Forum 2025, held in Davos Switzerland, resilience in businesses emerged as a key topic, reflecting growing concerns about the ability of organizations to withstand and recover from disruptions. Previous research on resilience have recognized that Small and medium-sized enterprises (SMEs) struggle to invest in resilience and adapt to disruptions such as pandemics, geopolitical tensions, and energy crises. Considering SMEs contribution to local societies and the global economy, this study extends previous research by exploring how the process of learning from disruptions unfolds within SMEs, and what constitutes effective learning that enables firms to develop resilience. Drawing on the theory of dynamic capabilities and a qualitative research approach, the findings are based on interviews with top management in 18 Swedish manufacturing SMEs. The findings reveal that while the majority of firms tried to address resilience weaknesses following disruptions, only some were able to develop resilience. Firms that developed effective resilience demonstrated strong sensing, seizing, and reconfiguring capabilities. Without reconfiguring, even well-identified resilience weaknesses and carefully considered solutions can fail to generate lasting impact. The study identifies five enablers for an effective learning process, contributing to how SMEs can transform disruption experiences into sustainable resilience. These insights contribute to the literature on resilience, organizational learning, and dynamic capabilities, with practical implications for SMEs navigating future uncertainty.

Keywords: resilience, SME, organizational learning, learning, dynamic capabilities, disruption

Supervisor:	Matin Mohaghegh
Date examined:	2025-05-21
Discussant(s):	Nicoló Zoratti
Examiners:	Roberto Verganti and Johan Berglund

Acknowledgements

We want to extend a warm thank you to our supervisor Matin Mohaghegh who has supported us in the process of conducting this study. We also wish to thank all participating SMEs for generously sharing their experiences, reflections, and thoughts, making this study possible.

Table of contents

1. Introduction	5
1.1 Background and purpose	5
1.2 Delimitations	6
1.3 Expected contributions	7
2. Theory	8
2.1 Literature review	8
2.1.1 Disruptions	8
2.1.2 Resilience	9
2.1.3 Organizational learning	13
2.2 Problem definition	15
2.3 Theoretical framework	16
2.3.1 Dynamic capabilities	16
3. Methodology	18
3.1 Methodological fit	18
3.2 Research design	18
3.3 Data collection	18
3.3.1 Data sample	18
3.3.2 Interview design	20
3.3.3 Interview process	20
3.4 Data analysis	22
3.5 Quality considerations	22
4. Empirical analysis	24
4.1 Firms learning from disruption impacts	31
4.2 Firms developing resilience	32
4.2.1 Sensing	32
4.2.2 Seizing	35
4.2.3 Reconfiguring	40
4.3 Summary of key findings	43
4.3.1 Enabling factors for developing resilience	43
4.3.2 Conclusions about firms learning from disruption impacts	45

5. Discussion	47
6. Conclusion.....	49
7. Limitations and future research	51
References	52
Appendices	58
Appendix A.....	58
Appendix B.....	59
Appendix C.....	60
Appendix D.....	62
Appendix E	64

1. Introduction

1.1 Background and purpose

In recent years, firms have experienced various disruptions caused by geopolitics, climate change, pandemics, spiking energy prices and financial instability (Chaudhary et al., 2023; Faruquee et al., 2023; Hepfer & Lawrence, 2022; Lücker et al., 2024; Odulaja et al., 2023), at times even threatening their survival (Hepfer & Lawrence, 2022). More specifically, challenges have concerned disrupted supply chains and distribution channels, shortages in supply, workforce-related challenges, sharp declines in revenue, and rising costs, among others (Chaudhary et al., 2023; Faruquee et al., 2023; Hepfer & Lawrence, 2022; Odulaja et al., 2023). Looking ahead, the World Economic Forum's Global Outlook Report for 2027 describes a growing sense of cynicism among survey respondents, many of whom anticipate continued turbulence in the coming years (World Economic Forum, 2025).

Given the severe impacts of disruptions on firms, the concept of resilience has received increasing attention in the management literature (Faruquee et al., 2023; Hepfer & Lawrence, 2022; Odulaja et al., 2023). Resilience is commonly defined as an organization's ability to "*anticipate, respond to, recover from, and learn from adversity*" (Hepfer & Lawrence, 2022, p.2). Previous literature has explored various strategies firms can adopt to build resilience (Khayer et al., 2022; Lücker et al., 2024; Faruquee et al., 2024), determinants influencing decision making in regards to resilience (Chaudhary et al., 2022; Roscoe et al., 2020; Roscoe et al., 2022; Välikangas & Romme, 2013) and what capabilities contributes to enhancing firms' resilience (Liu & Wei, 2021; Münch & Hartmann, 2022; Odulaja et al., 2023). Concerning firms' ability to develop resilience, previous literature suggests that smaller firms are more vulnerable to disruptions than larger firms, due to limited resources and limited power among stakeholders (Chaudhary et al., 2023; Gorjian Khanzad & Gooyabadi, 2021). Furthermore, SMEs (Small and medium sized enterprises) are argued to be hindered by their internal constraints to proactively invest in resilience strategies to lower their exposure for future threats (Chaudhary et al., 2023; Roscoe et al., 2020). These findings in combination with the outlook of disruptions highlight an alarming insight considering the social and economic value SMEs add to local societies and the global economy (Ates & Bititci, 2011; Bin Hashim et al., 2018).

In light of this, resilience can be expected to be a key determinant of long-term survival and competitiveness. To succeed in this, the definition of resilience highlights learning as a key feature of a firm's overall resilience ability (Hepfer & Lawrence, 2022). If firms can learn from previous disruptions to enhance their resilience, it can reduce the costs and damage associated with disruptions. This is an approach particularly relevant for SMEs operating in resource constrained environments. The idea that firms can learn from disruptions has also been confirmed by research, identifying cases in which firms have developed resilience following disruptions (Chaudhary et al., 2023; Khayer et al., 2022). Prior literature on organizational learning has also suggested that failures (Baumard & Starbuck, 2005) and past experiences (Argote & Miron-Spektor, 2011) can serve as a catalyst to learning and how firms can facilitate effective learning through various learning activities and mechanisms (Mohaghegh & Größler, 2022; Scholten et al., 2019; Zollo & Winter, 2002). However, it is reasonable to argue that it is not certain that firms learn from disruptions in the same way as they learn from more ordinary failures and experiences. Furthermore, literature provides limited insights into how this learning process unfolds within firms in the context of disruptions. As a result, the central question is not whether firms can learn from disruption to develop resilience, but rather how they do so effectively. In response, this study aims to extend previous research by exploring how the process of learning from disruptions unfolds within firms, and what facilitates effective learning that enables firms to develop resilience. To guide this investigation, the following research question is formulated:

What enables SMEs to learn to develop resilience following disruption?

To address the research question, this study draws on qualitative data, collected through interviews with top management in 18 manufacturing SMEs in Sweden. The interview sample was considered to offer a suitable context for addressing the research question, based on the authors' knowledge of industry dynamics and supporting evidence from industry reports confirming its relevance (Tillväxtanalys, 2021). The findings were subsequently analyzed using the theoretical lens of the microfoundations of dynamic capabilities (Teece et al., 1997; Teece, 2007).

1.2 Delimitations

Firstly, the empirical data is delimited to interviews with top management representatives. As such, the study does not include data from lower organizational levels who may have experienced and interpreted the disruption and learning process differently. Including such perspectives could

potentially have provided a more nuanced understanding of learning in organizations. However, the interview subjects were consciously chosen due to their comprehensive understanding of the organization. Secondly, this study focuses on understanding how firms learn to develop resilience, specifically in response to experiencing a disruption. Therefore, the paper does not explore learning as a general or continuous process in organizations. Thirdly, the study captures firms' resilience strategies before and after the disruption, deliberately excluding what might be considered crisis management during the disruption itself. While our aim is to capture how firms reflect and adapt in a post-disruption phase, the authors acknowledge that decisions, workarounds, and learning processes that occur during the disruption may also influence post-disruption learning and resilience.

1.3 Expected contributions

By addressing the research question, this study aims to make three key theoretical contributions. First, by examining the learning processes following disruptions, it seeks to extend existing knowledge on organizational learning in the context of disruptions. Second, in doing so, it aims to contribute to the resilience literature by describing how firms can develop resilience through effective learning processes. Third, by applying the microfoundations of dynamic capabilities as the theoretical lens, the study intends to offer empirical insights into how the theory is practically applied in a post disruption context within SMEs.

Beyond its theoretical aims, the study seeks to provide practical value for managers of SMEs by identifying features of effective learning processes that are more likely to foster resilience. Distinguishing these from less effective approaches, the study hopes to support SMEs in enhancing their learning capabilities to leverage disruption experiences into enhanced resilience.

2. Theory

2.1 Literature review

2.1.1 Disruptions

Recently, businesses worldwide have faced frequent disruptions driven by factors such as pandemics, escalating energy costs, shifts in policy, and financial market volatility (Chaudhary et al., 2023). Given disruptions unpredictable nature, it is difficult for firms to predict disruptions probability, timing, and location (Chaudhary et al., 2023; Durach et al., 2023). This paper takes the definition of a disruption to be an unpredictable event caused by something outside the firm's control and imposes challenges for a firm to sustain its operations. One such example is the Covid-19 pandemic which was unique in terms of its scale and impact (Gorjian Khanzad & Gooyabadi, 2021; Stekelorum et al., 2022; Srinivasan et al., 2023). The pandemic provoked major challenges in firms such as fluctuations in supply, challenges related to employees, declining customer demand, and difficulties related to liquidity (Chaudhary et al., 2023). Prior research suggests that smaller firms are generally more vulnerable to the negative impacts of disruptions than their larger counterparts. This vulnerability is associated with factors such as limited resources, a lack of planning, insufficient structures and formalized processes to assess the environment, and a reduced capacity to handle disruptions in a strategic way (Chaudhary et al., 2023; Gorjian Khanzad & Gooyabadi, 2021; Heider et al., 2021). At the same time, SMEs hold certain structural advantages such as a decentralized structure and less hierarchy which can facilitate faster decision-making and enhance flexibility and agility within the firm (Gorjian Khanzad & Gooyabadi, 2021; Heider et al., 2021).

In conclusion, due to the significant consequences firms have faced from disruptions, not the least SMEs, the concept of resilience has gained increasing attention in both practice and literature as a strategy to reduce organizational vulnerability. The next section explores the concept of resilience further.

2.1.2 Resilience

Defining resilience

The definition of resilience varies between scholars. As seen in Table 1, some scholars refer to the ability to quickly respond to disruptions and recover operations to pre-disruption state (Blackhurst et al., 2011; Linnenluecke & Griffiths, 2010; Ponomaroy & Holcomb, 2009; Rice & Caniato, 2003). Other researchers have expanded this perspective by emphasizing that resilience involves not just returning to normal operations but rather develop into a new better state post-disruption (Chaudhary et al., 2023; Reinmoeller & Van Baardwijk, 2005; McCaan, 2004; Conz & Magnani, 2020). This view highlights resilience as the ability to learn and grow, enabling firms to better anticipate and prepare for future disruptions. Combining these two perspectives on resilience, Hepfer & Lawrence (2022, p. 2) propose a comprehensive definition of resilience as an organization's ability to "*anticipate, respond to, recover from, and learn from adversity*", which is referred to as the definition of resilience in this paper.

Previous research argues that resilience is not a one-size-fits-all concept, but rather an ability that should be seen in the light of firms' unique contexts (Chaudhary et al., 2023; Gorjian Khanzad & Gooyabadi, 2021; Fiksel et al., 2015; Roscoe et al., 2020; Roscoe et al., 2022). Consequently, to what degree firms are resilient can only be judged by their performance during disruptions (Hepfer & Lawrence, 2022). Detangling the concept further, Hepfer and Lawrence's (2022) describe organizational resilience as a heterogeneous concept encompassing three distinct forms: functional resilience, operational resilience, and strategic resilience. Functional resilience is the ability of a specific organizational function to respond positively to adversity, for instance the supply chain function. Operational resilience is an organization's ability to handle disruptions affecting overall operations, using shared awareness, financial slack, and coordination across functions. Lastly, strategic resilience is the ability to address threats to long-term goals and strategies. This involves managers' ability to anticipate, adapt, and innovate in response to challenges, highlighting how firms resilience is influenced by individuals' cognitive capacity (Hepfer & Lawrence, 2022). Kantur and Iseri-Say (2012) confirm this view by suggesting that resilience is dependent on cognitive, behavioral and contextual resilience, where the former refers to individuals' perception of reality and attitude which influence to what degree organizations realize weaknesses in relation to its environment and take action to address them. In relation to learning, their paper suggests that

experiencing disruptions develops firms' sensitivity, improving organizational members' cognitive ability to identify threats (Kantur & Iseri-Say, 2012). Therefore, the degree to which a firm is resilient depends on its specific context, as well as how effectively its organizational resources, capabilities, and individual competencies are configured to address disruptions.

Table 1: Definitions of resilience

Definition	Reference
"Resilience enables small firms to anticipate, respond, cope, and recover from threatening situations" p. 184	Chaudhary et al, 2023
"anticipate, respond to, recover from, and learn from adversity" p. 2	Hepfer and Lawrence, 2022
"Absorb and learn from external shocks, while at the same time preparing to respond to whatever will come" p. 972	Giustiniano et al, 2020
"a dynamic process with five distinct characteristics, it is (a) proactive, (b) adaptive, (c) absorptive, (d) reactive, and (e) dynamic" p.408	Conz and Magnani, 2020
"Both the ability of a system to persist despite disruptions and the ability to regenerate and maintain existing organization" p. 1436	DesJardine et al., 2019
"The ability of a system to return to its original state or move to a new, more desirable state after being disturbed" p. 138	Demirel et al., 2019
"(..) respond more quickly, recover faster, or develop more unusual ways of doing business under duress than others" p.4	Linnenluecke, 2017
"the ability to cope with unanticipated dangers after they have become manifest, learning to bounce back", p. 77	Wildavsky, 2017
"bounce back from hardship and become stronger as a result" p. 345	Bullough and Renko 2013
"the ability of organizations to absorb, respond to, and recover from situations that could threaten their existence", p. 1107	Chrisman et al, 2011
"ability to quickly and efficiently recover from a disruptive event" p. 375	Blackhurst et al., 2011
"resilient supply chains incorporate event readiness, are capable of providing an efficient response, and often are capable of recovering to their original state or even better post the disruptive event." p. 124	Ponomarov and Holcomb, 2009
"At an organizational level, resilience is theorized as the ability of a firm to renew itself" p. 61	Reinmoeller and Van Baardwijk, 2005
"respond to unexpected disruptions and restore normal supply network operations" p. 23	Rice and Caniato, 2003

Resilience strategies

Previous research has explored what organizational capabilities and resources firms should develop to build resilience in specific contexts. One context that has been extensively explored by research is the function of supply chains (Fiksel et al, 2015; Faruquee et al., 2023; Odulaja et al., 2023; Liu & Wei, 2021; Münch & Hartmann, 2022). Whereas some have focused on the anticipation phase, identifying the importance of strategic foresight, agility and analytical capabilities in combination with technological resources (Liu & Wei, 2022; Odulaja et al., 2023), others have argued that anticipating disruptions can be almost impossible, suggesting that firms' ability to respond to disruptions is instead crucial, arguing for capabilities such as flexibility, excess capacity and visibility (Fiksel et al., 2015). Researchers have also started to promote a multi-capability view on resilience (Faruquee et al., 2023; Münch & Hartmann, 2023). Faruquee et al., (2023) argue that firms cannot be considered resilient based on a few isolated capabilities or resources. Drawing on a study of 290 manufacturing firms, the paper emphasizes that resilience stems from the complementarity of multiple resources and capabilities across all phases of resilience. The paper suggests that firms should invest in both proactive and reactive strategies. This implies both reducing exposure to disruptions and enhance the ability to anticipate them and strengthen capacity to respond effectively and mitigate the impact (Faruquee et al., 2023). Münch and Hartmann (2022) also adopt a multi-capability perspective suggesting that internal capabilities, such as redundancy and contingency planning, together with relational capabilities for inter-firm collaboration, coordination, and transparency, is crucial for building resilience (Münch & Hartmann, 2022).

Another stream of research has focused on how resilience strategies can lead to benefits beyond being resilient to disruptions (Lücker et al., 2024) and how firms can adapt their organization to the better post-disruptions (Chaudhary et al., 2023; Khayer et al., 2022). Lücker et al. (2024) divide resilience levers into being dedicated or dual, either being effective if disruptions materialize or whether adopting levers also improve operations in non-disrupted times. Lücker et al. (2024) suggest that resilience is not merely a safety net; when implemented effectively and creatively, it can enhance business performance even in stable non-disruptive environments. Furthermore, another opportunistic view on resilience is highlighted by scholars that have studied how disruptions serve as a catalyst to learning and adaptation (Chaudhary et al., 2023; Khayer et al.,

2022). Khayer et al. (2022) show how learning from the pandemic resulted in improved supply chain coordination in the fast-moving consumer goods industry. Similarly, Chaudhary et al. (2023) show that after SMEs overcame tradeoffs during disruptions, they developed adaptability that entailed structural changes to deal with future environmental uncertainty. These prior findings emphasize that firms facing disruptions can leverage their experiences to develop into more resilient organizations.

Determinants of resilience strategies

While a comprehensive and long-term approach to resilience has been argued important, researchers have also found that this is not the case in all firms, motivating research to explore what influences firms' resilience decisions. In a study by Roscoe et al. (2020) the authors explore firms resilience strategies approaching Brexit. The authors concluded that SMEs are more likely to adopt a "*wait-and-see*"-approach, focusing on reactive strategies to disruptions compared to larger firms who held a "*worst-case scenario*"- attitude and adopted both proactive and reactive strategies when anticipating the disruption. Access to resource slack and firm size were found to distinguish differences in large firms and SMEs resilience strategies (Roscoe et al., 2020). Ates and Bititci (2011) further argue that the change processes in SMEs are shaped by their unique characteristics, often resulting in reactive, short-term approaches that hinder the development of more proactive and strategic responses. Moreover, Chaudhary et al. (2023) found that SMEs face tradeoffs during disruptions relating to short and long-term performance, adaptability and efficiency, and safety and profit. To navigate this context, prior and new knowledge, digitalization, and leadership helped support SMEs in balancing immediate survival with long term goals (Chaudhary et al., 2023). In the context of a large retailer, Välikangas and Romme (2013) identified three organizational conditions that, rather than limiting resilience, actively contributed to the firm's ability to remain resilient. The first condition concerned generative doubt, referring to a constant questioning of the firms future strategic fit. Secondly, organizational slack in combination with mindful engagement was important for enabling innovation and action (Välikangas & Romme, 2013).

In summary, existing research highlights both the organizational conditions that enhance a firm's capacity for resilience and the barriers that hinder it. While evidence shows that firms can learn

and adapt in response to disruptions, becoming more resilient over time, less attention has been given to understanding *how* this learning occurs. To further explore this process, the following section examines the literature on organizational learning.

2.1.3 Organizational learning

Defining organizational learning

Organizational learning is the process through which firms adapt and develop their knowledge and routines to sustain or improve performance (Basten & Haamann, 2018; Jain & Moreno, 2015). Learning is especially essential in environments with high uncertainty, where a firm's capability to learn impacts its ability to adapt and respond (Basten & Haamann, 2018). While the focus in this paper is learning at the organizational level, it is important to note that individual learning is an important driver of firm-level outcomes (Scholten et al., 2019).

The field of organizational learning encompasses several domains which together have shaped the understanding of how firms learn. Learning does not happen by default, but rather it is facilitated by firms' processes and learning mechanisms (Zollo & Winter, 2002). Zollo and Winter (2002) argue that depending on the characteristics of the task and its context, firms can learn by engaging in task accumulation, knowledge articulation and knowledge codification. This has also been confirmed in empirics, showing that structured problem solving together with attention to learning mechanisms enable firms to develop effective long-term solutions (Mohaghegh & Größler, 2022). Another stream of literature have focused on how *learning cultures* foster learning. Research has found that cultures characterized by psychological safety, creativity and encouragement of reflection facilitate organizational members to engage in learning (Argote & Miron-Spektor, 2011; Jain & Moreno, 2015). Moreover, research has also explored how experiences influence learning (Azadegan et al., 2019; Baumard & Starbuck, 2005). In the context of this paper, this research stream is highly relevant to explore further.

Learning from experience

Argote and Miron-Spektor (2011) argue that learning takes place as firms acquire knowledge from both intentional and unintentional experiences. Ambulkar et al. (2015) introduce the concept of supply chain disruption orientation, describing firms that, based on past experiences, recognize the

likelihood of disruptions and are motivated to learn from them. This orientation, combined with the ability to reconfigure resources, is essential for enhancing supply chain resilience in environments impacted by significant disruptions (Ambulkar et al., 2015). Scholten et al. (2019) suggest that experiencing a disruption allows an organization to learn and improve its ability to cope with equivalent disruptions. Furthermore, the study found that companies can learn from disruptions in several stages of the disruption; in preparation, during, and during recovery (Scholten et al., 2019). However, research has also indicated that disruptions and their nature of being ambiguous, and infrequent, can be harder to learn from as it can be challenging for firms to interpret (Argote & Miron-Spektor, 2011).

Moreover, another way learning can happen is through vicarious learning, which is when a firm learns based on other's experiences (Argote & Miron-Spektor, 2011). Building on this idea, Azadegan et al. (2019) highlight that firms do not necessarily need to experience disruptions themselves, instead, situations where a firm narrowly avoids negative impact can be sufficient. In their paper, so-called near-miss events make firms take proactive risk mitigation strategies. To learn effectively from near-miss events, the importance of double-loop learning and deep reflection was highlighted in the paper (Azadegan et al., 2019).

Baumard and Starbuck (2005) offer an additional perspective on learning, arguing that a firm's ability to learn from an event is impacted by the results and knowledge acquired from the experience. Specifically, the paper highlights that firms primarily learn from encountering challenges rather than by experiencing successes (Baumard & Starbuck, 2005; Cyert & March, 1963). The paper describes how repeated success fosters overconfidence and "*learning from repeated success makes future failure very likely*" (Baumard & Starbuck, 2005, p.283). However, learning from failures is not guaranteed, as firms might justify mistakes or failures due to cognitive biases and fear of blame (Baumard & Starbuck, 2005).

In summary, previous literature emphasize the benefits of organizational learning, indicating how; experiences can trigger learning; the role of structures in facilitating the process; and the importance of a supportive culture to inspire. However, research offers contrasting evidence on

whether ambiguous events and major failures can truly lead to learning, and if so, how this process occurs.

2.2 Problem definition

At the recent World Economic Forum held in Davos, Switzerland, resilience in both societies and businesses emerged as a key topic, reflecting growing concerns about the ability of organizations to withstand and recover from disruptions (World Economic Forum, 2025). Looking ahead, disruptions such as armed conflicts, extreme weather events, and geoeconomic confrontations were identified as some of the most pressing risks for 2025 (World Economic Forum, 2025). Evidence from prior literature suggest that firms can derive valuable learnings from disruptions, uncovering synergies between resilience and business improvement (Lücker et al., 2024), and adapting their organizations to become more resilient over time (Chaudhary et al., 2023; Khayer et al., 2022). The notion that experiences can work as a catalyst to learning and change has also been confirmed in the literature on organizational learning (Argote & Miron-Spektor, 2011; Azadegan et al., 2019; Baumard & Starbuck, 2005; Scholten et al., 2019). Considering that SMEs have experienced disruptions in the past, and assuming disruptions will continue to impact companies (World Economic Forum, 2025), it can be argued crucial for firms to learn from these experiences and apply those lessons towards building future resilience.

However, it is reasonable to argue that it is not certain that firms learn from disruptions in the same way as they learn from ordinary business challenges, and prior research provides limited insight into how this specific learning process unfolds within firms. As a result, the central question is not whether firms can leverage disruption experiences into resilience, but rather how they do so effectively. This question becomes particularly compelling in the context of SMEs as prior literature suggests that SMEs often operate with informal processes (Chaudhary et al., 2023; Heider et al., 2021) and face constraints limiting their ability to invest in long-term resilience strategies (Chaudhary et al., 2023; Roscoe et al., 2020). Consequently, it is crucial to understand how SMEs can succeed in this process to prevent bearing costs from future disruptions. Therefore, this study aims to contribute to the understanding of how SMEs turn experiences of disruptions into valuable learning opportunities to develop into more resilient organizations. Against this backdrop, this paper presents the following research question: *What enables SMEs to learn to develop resilience following disruptions?*

2.3 Theoretical framework

2.3.1 Dynamic capabilities

To interpret the empirical data, the study takes support in the theory of dynamic capabilities (DCs). The concept of dynamic capabilities was first introduced by Teece et al., (1997) referring to a firm's "*ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments*" (Teece et al., 1997, p. 516). The term "*dynamic*" highlights the ability to change competencies to sustain alignment with a shifting environment, while "*capabilities*" emphasizes the role of strategic management in changing resources and competencies to respond to the demands of a shifting business landscape (Teece et al., 1997). Teece (2007) argues that DCs are built on three microfoundations: sensing, seizing, and reconfiguring.

- (1) Sensing refers to a firm's ability to identify and interpret opportunities and threats in the external environment. According to Teece (2007), this involves scanning markets and technologies, monitoring competitors, and engaging with customers to detect changes in demand. While some individuals in the firm may have the required sensing skills, a more desirable approach is to embed processes and structure within the firm to facilitate the firm's sensing capability (Teece, 2007).
- (2) Seizing involves acting and investing in the opportunities identified through sensing. Teece (2007) highlights that effective seizing often involves resource allocation, decision-making under uncertainty, and the ability to rapidly scale innovations (Teece, 2007).
- (3) Reconfiguring refers to an ability to continuously adapt and reconfigure a firm's assets, routines, and capabilities to sustain or enhance its competitive advantage. Teece (2007) argues that firms must change internal processes, integrate new knowledge, and remove obsolete competencies to continue to be agile. This can involve restructuring teams, acquiring external expertise, or changing business strategies (Teece, 2007).

The chosen theoretical lens is motivated by two main arguments. Firstly, the theoretical definitions of the concept of resilience and the theory of DCs are closely aligned, as both emphasize an

organization's ability to adapt to change. Teece (1997, 2007) defines DCs as a firm's ability to *sense, seize, and reconfigure* in response to changing conditions. While resilience is defined as a firm's ability to *anticipate, respond to, recover from, and learn from adversity* (Hepfer & Lawrence, 2022, p.2). Furthermore, the argument for the compatibility between the two is reinforced by previous research (Münch & Hartmann, 2022) who argues that DCs and relational capabilities enable firms to develop resilience. This suggests that a theory of DCs can serve as a useful lens for understanding what enables firms to develop resilience.

Secondly, Teece (2007) describes the sequential interconnectedness between the microfoundations, highlighting a process in which capabilities are altered. Thus, analyzing firms' learning process based on the distinction between sensing, seizing, and reconfiguring allows the authors to move beyond merely assessing whether firms have implemented resilience strategies after experiencing a disruption, an area already explored in previous literature. Instead, the focus of this study is to understand the process firms engage in to effectively learn to develop resilience. Teece (2007) highlights how effective learning requires firms to continuously sense, seize, and reconfigure their capabilities. As such, it is argued that the more effectively firms enact these microfoundations, the greater their potential to develop resilience. Understanding a firm's learning process through the microfoundations of DCs was done by Mohaghegh and Größler (2022). The study concluded that problem solving characterized by effective sensing, seizing and reconfiguring resulted in long-term solutions that reduce the likelihood of recurring issues, as opposed to short-term fixes. Although their research focused on improvement programs within a stable manufacturing environment, a similar approach can be suggested to also be used in the context of a disruptive environment. To conclude, the conceptual similarities between resilience and dynamic capabilities, along with the process-oriented nature of microfoundations, underscore how adopting this theoretical lens can contribute to addressing the research question posed in this paper.

3. Methodology

In this section, the research methodology used in the study will be explained. It begins with a discussion of the methodological fit and research design, followed by data collection and analysis, and concludes with considerations regarding the quality of the study.

3.1 Methodological fit

While the concept of resilience and organizational learning has been extensively studied in existing literature, there has been relatively less focus on the process in which firms engage in to develop resilience. Therefore, previous knowledge on this specific topic can be considered at a nascent or intermediate stage, suggesting a need to collect open-ended data to capture nuanced perspectives and insights. Hence, a qualitative research strategy is considered the most suitable (Bell et al., 2019; Edmondson & McManus, 2007).

3.2 Research design

The study adopts an interpretivist approach, perceiving that reality as socially constructed and changeable (Saunders et al., 2012). As a result, the study emphasizes that knowledge is influenced by the viewpoints and experiences of individuals within a particular social and organizational environment (Bell et al., 2019). Given the novelty of the topic and its exploratory nature, an inductive approach is deemed appropriate where theory is used to identify patterns and make sense of the empirical data (Bell et al., 2019). Data is collected through semi-structured interviews to enable the authors to ask follow-up questions and explore interesting topics as the interview proceeds.

3.3 Data collection

3.3.1 Data sample

The study uses a *priori purposive* sampling method, where selection criteria are used to identify interview subjects capable of providing useful answers to the research question (Bell et al., 2019). Firms had to meet the following criteria: (1) a Swedish manufacturing firm; (2) be privately owned (3) qualify as an SME, according to the European Commission's definition of an SME being a

firm with annual revenues between 10–500 million SEK and between 10–250 employees, (4) have a CEO or top manager as the interviewee; and (5) the interviewee must have worked at the company for at least five years. These criteria ensured a homogeneous sample with relevant experiences of disruption and strategic insight. In total, 20 companies were interviewed. However, only 18 firms were included in the final analysis, as two were found to deviate significantly from several of the defined criteria during the interview. These were therefore excluded to maintain sample homogeneity.

The study focuses on manufacturing SMEs that produce physical products, as these firms are integral to Sweden's economy by supplying large industrial companies. The 20 firms share key structural characteristics including: supplier dependence, customer base, production methods, workforce sizes, and KPIs. The firms represent an even narrower range regarding annual revenues and employees than what the European Commission's definition of an SME states, enhancing operational and managerial comparability. The sample excludes firms owned by corporate groups or investment firms to focus on firms dependent on their own resources. Interviewees were chosen for their strategic roles, because of their comprehensive understanding of the firm and its environment.

The data for this paper was collected through interviews with human participants. One interview per company was conducted; however, for three of the firms, an additional interview was performed. This decision was made during the data analysis phase, when gaps in the data were identified which a second interview aimed to fill. This resulted in 23 interviews across 20 companies. Excluding the two firms that did not meet the sample criteria, the data consisted of 21 interviews across 18 companies. The authors acknowledge that a limitation of the study is that, in most cases, only one interview was conducted per company and with a single individual. This introduces potential bias, as the perspective of one person may reflect their individual viewpoint rather than the organization's collective stance. However, a conscious trade-off was made to contribute to breadth by including a larger number of firms, instead of depth. The authors encourage future research to expand on this by offering deeper insights by including multiple perspectives within each organization.

3.3.2 Interview design

Given the exploratory nature of the study, the interviews were conducted in a semi-structured manner, allowing the researchers to gain a deeper understanding of the reasoning behind the respondent's answers (Bell et al., 2019). This approach also enabled the researchers to “*probe*” answers by requesting participants to explain and clarify their responses, which gives deeper more nuanced answers (Saunders et al., 2012). The semi-structured interviews also have some drawbacks due to the lack of standardization which can lead to concerns with reliability and bias, which might reduce the generalizability of the answers (Saunders et al., 2019). To mitigate this, an interview guide was used to ensure consistency across interviews, while still allowing flexibility to explore relevant themes in depth.

Before the interview, an interview guide with open-ended questions was made by the authors, see Appendix B, to ensure the flow of the interview as well as to capture all relevant data for answering the research question (Bell et al., 2019). The interview guide and structure were designed to capture the temporal dimension of the research questions. The interview began with a few warmup questions to let the interviewees introduce themselves and their backgrounds. This was done to initially steer the conversation toward relaxed and positive aspects of the firm before moving into discussions about challenges. This approach helped establish a sense of trust and psychological safety between the interviewers and participants, fostering openness and encouraging the interviewees to share more vulnerable and reflective insights. After the warmup questions, the authors began by asking participants about the impacts and experiences from disruptions in recent years. This was followed by questions related to the firm's previous resilience strategies they employed before experiencing the disruption. Finally, interviewees were asked to reflect on whether their resilience strategies had changed following the disruption, and whether they had learned something from the experience.

3.3.3 Interview process

Prior to the interviews, participants received an email providing an overview of the interview questions. They were encouraged to reflect on these topics beforehand to facilitate a more insightful discussion and enhance depth. According to Bell et al. (2019) providing the interviewees

with an interview guide can strengthen the dependability of the study. However, the authors acknowledge that it can also introduce bias by reducing the spontaneity of the interview and allowing interviewees to prepare answers aligned with social norms. Moreover, variations in how thoroughly participants prepare may affect the consistency and depth of the data, potentially impacting the study's results. However, sending a preparation email was considered important, as the study aimed to capture interviewees' experiences over several years, and giving participants time to recall those experiences was essential.

All interviews were conducted in a digital environment using the video conferencing platform Microsoft Teams. This approach allowed for flexibility in scheduling and ensured that more firms could participate in the study regardless of their geographical location. Most of the interviews lasted between 40-60 minutes with a mean of 45 minutes, see Appendix A for a summary of interview respondents. The digital interviews were recorded and transcribed using Microsoft Teams' built-in AI transcription function. The interviews were conducted in Swedish, the native language of both the interviewers and interviewees, to ensure clarity and comfort, factors that are important for obtaining high-quality data (Bell et al., 2019). The transcripts and relevant citations were later translated into English for analysis and reporting purposes. However, as noted by Xian (2008), the process of translation may introduce three types of challenges: *linguistic*, where there may be no direct English equivalent for a Swedish term; *socio-cultural*, involving the difficulty of precisely translating phrases or meanings; and *methodological*, that the translator may unintentionally enforce their own interpretations or assumptions onto the data. The authors acknowledge Xian's (2008) perspective on the translator's influence on data, recognizing that translation by default involves sensemaking and interpretation (Venuti, 1998), and have therefore kept this in mind throughout the translation process.

All interviews began by obtaining consent to record, with a reminder about anonymity in the study. Both authors were present, with one leading the interview to maintain structure, while the other took notes and prepared relevant follow-up questions. This approach worked well, as the interviews were recorded and automatically transcribed, allowing both authors to focus on extracting valuable data points and leading the interviewee in a direction to get data points to answer the stipulated research question.

3.4 Data analysis

Following each interview, one of the authors immediately reviewed and refined the transcripts for accuracy. The researchers then together assessed the transcripts to ensure coherence. Summaries of interviewees' answers to each section of the interview were compiled, and a reflective notebook was used to document new ideas and reflections, which could act as the starting point for the analysis (Saunders et al., 2012).

The coding of the data was conducted manually by the authors using a Microsoft Excel spreadsheet. The method used in this study to structure and comprehend the data was drawn from the Gioia method (Bell et al., 2019; Gioia et al., 2013). First, first-order coding was conducted, where raw data from the respondents' answers was coded without interpretation (Gioia et al., 2013), capturing the actual concepts and expressions used by the respondents, with the lowest level of abstraction. Each author performed this process independently to reduce individual bias. Thereafter, the authors compared and discussed their initial codes, resolving any discrepancies. In the second-order analysis, the aim is to examine whether the evolving patterns create overarching concepts that can be used to describe and clarify the phenomena studied in the paper (Gioia et al., 2013). Later, the themes were grouped into aggregate dimensions through an iterative process, which allowed the authors to deepen their understanding of the data. This process was repeated multiple times, with different themes emerging based on varying perspectives and the application of theory. Data structures were developed according to the Gioia method for each of the main themes in the interview guide to capture the aggregated dimensions within all, namely, previous resilience strategies, disruption impact, and revised resilience strategies. These data structures are presented in Table 4, Appendix C and D. Subsequently, the data structures developed using the Gioia method were used to compile an aggregated summary of how each individual company responded throughout this longitudinal study. The aggregated themes from the data structures were compiled into one table. The purpose of this analysis is to show the development of each company over time. This overview is presented in Table 5, in the empirical analysis section.

3.5 Quality considerations

To ensure the quality and the generalizability of the study the four criteria for trustworthiness by Lincoln and Guba (1985) were taken into consideration when conducting the study.

Credibility refers to how compelling and authentic the findings of the study are (Bell et al., 2019; Lincoln & Guba, 1985). During the interviews, the authors actively used follow-up questions and paraphrased the interviewees' responses to ensure accurate interpretation and allow for immediate clarification. Furthermore, the rigorous and iterative approach to data analysis where patterns were discussed, refined, and supported with multiple data points also strengthened the credibility of the study.

Transferability refers to the validity of the study. Qualitative research tends to be more contextual oriented, which means that it is challenging to create transferability (Bell et al., 2019). In this study, the authors have attempted to enhance transferability by providing a rich and detailed description of the research context, including the characteristics of the participating firms and interview subjects. Additionally, by presenting extensive extracts from the empirical data and outlining the logic behind the sampling and analysis, the study enables readers to assess the relevance and applicability of the findings to other contexts.

Dependability refers to the consistency and reliability of both the research process and its findings (Bell et al., 2019). To enhance dependability, the authors adopted what Lincoln and Guba (1985) describes as an "*auditing approach*," where supervisors, professors, and peers reviewed and provided feedback throughout the research process to ensure dependability of the paper.

Lastly, confirmability is focused on ensuring that the findings of the research are shaped and created by the participants' responses rather than biases from the researchers (Bell et al, 2019; Lincoln & Guba, 1985). To enhance confirmability, the authors maintained a transparent and traceable research process. Interview transcripts, codes, and data were systematically documented. Additionally, the data analysis was conducted collaboratively and iteratively, where both authors first coded the data independently before comparing and reconciling differences through discussion, reducing individual bias and ensured that the findings remained grounded in the empirical data.

4. Empirical analysis

This section presents the empirical analysis based on data collected through interviews with 18 manufacturing SMEs. The first analysis (4.1) starts by investigating whether firms have addressed disruption impacts. A prerequisite for this was understanding the firm's prior resilience strategies to disruptions as seen in Table 2, the disruption impact as seen in Table 3, and resilience strategies post-disruptions as seen in Table 4. Furthermore, Table 5 presents a consolidation of table 2-4 from a firm-level perspective, disclosing whether firms have learnt and changed following disruptions. The subsequent analysis (4.2) focuses on the process in which these learnings have unfolded, from the perspective of the microfoundations of DCs, and to what degree the process results in improved resilience.

Table 2: Resilience strategies prior to disruptions

Prior resilience strategies	Extract from firms' examples
Resource slack	"Good financial strength" "A buffer makes you survive longer" "Keep inventory to make quick changes"
Monitoring external environment	"Used media as an information source" "Information sharing network with industry" "We work with a continuity plan where we make external analysis"
Rely on prior knowledge	"Rely on luck and positive experiences." "My fathers' experiences are valuable in crises" "Lean on historical knowledge"
Securing energy costs	"Hedging contract on price on electricity" "We bind the electricity contract on 3 years" "Fixed electricity contract"
Diversifying customer risks	"Different customers in different industries" "Always had a diversified customer base to hedge"
Flexibility in operations	"Dual sourcing in geographies, keep warm in case of problem" "Alternative materials to be safe" "Prognosis for changes in supply chain"
Value chain relationships	"Develop long term relationships with customers to lock them in and to create trust" "Relationships is A and O, the better the relationship with the suppliers, the more demands you can have"

Table 3: Impact of disruptions on firms

Disruption impact	Extract from firms' examples
Revenue loss	"We lost a lot of sales, at most 20%" "Sales dropped 75% in 2 months, then hit all time high" "Lost all revenue from two segments, other segments grew"
Increased other costs	"Half of revenue is personnel costs imposing a large challenge when revenue decreases" "The high interest has been tough"
Increased material costs	"Price increases on material of 80% for half a year" "The price of material went up and ruined our profit" "Price increases of 7-8%, but could plan price increases because of their high levels of inventory"
Increased energy costs	"We had an increase of 21 times of electricity" "We consume a lot of energy so therefor it hit very hard" "Delayed increase in electricity price, managed to push it on the customers"
Supply disruptions	"Supply shortages due to price increases" "Prolonged lead times from suppliers" "Expensive and long lead times"
Stress in organization	"Stress in organization due to many challenges at the same time" "Workarounds imply more stress for the firm" "The uncertainty and the ability to adapt was hard"

Table 4: Resilience strategies

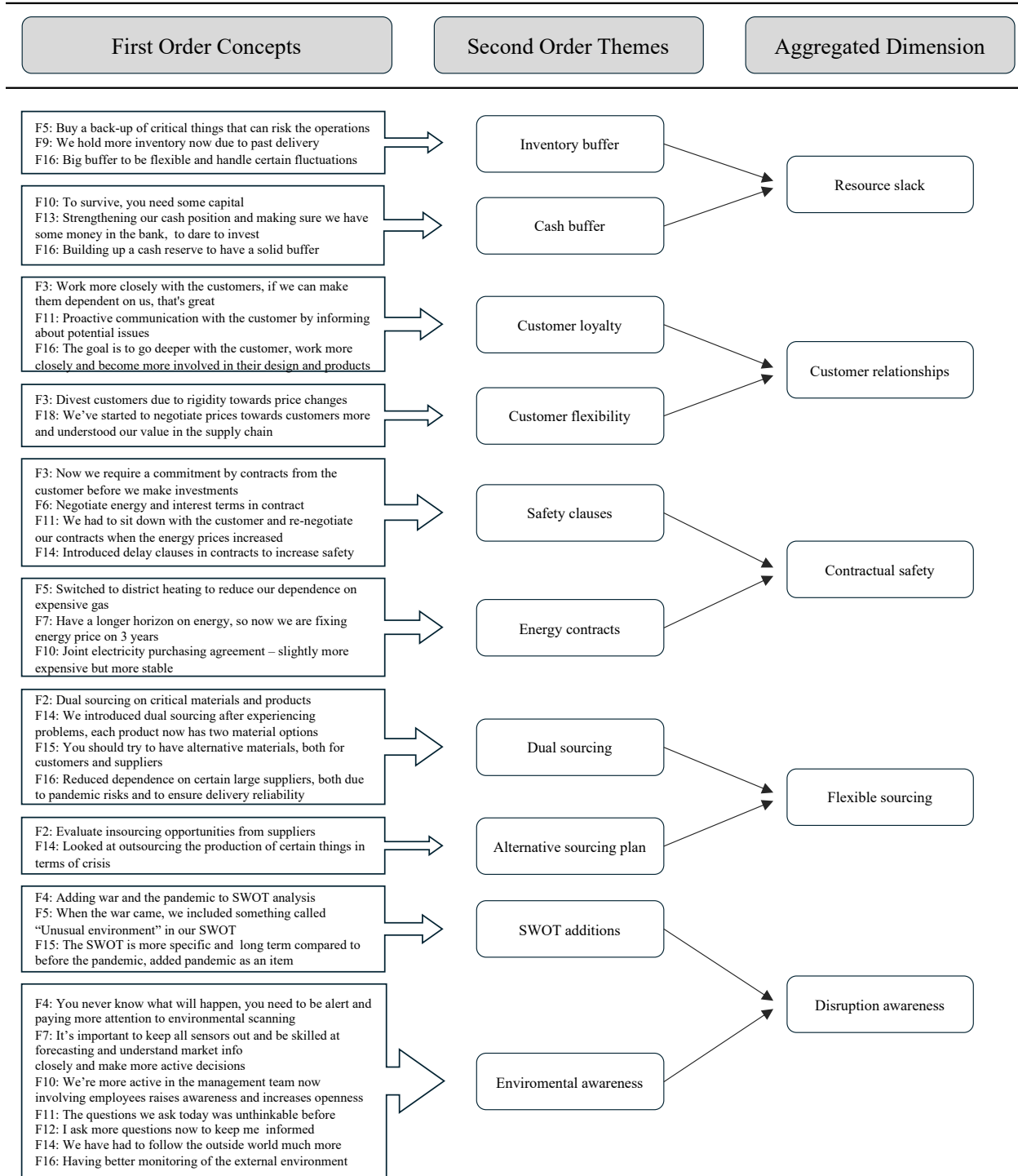


Table 4: Resilience strategies - continued

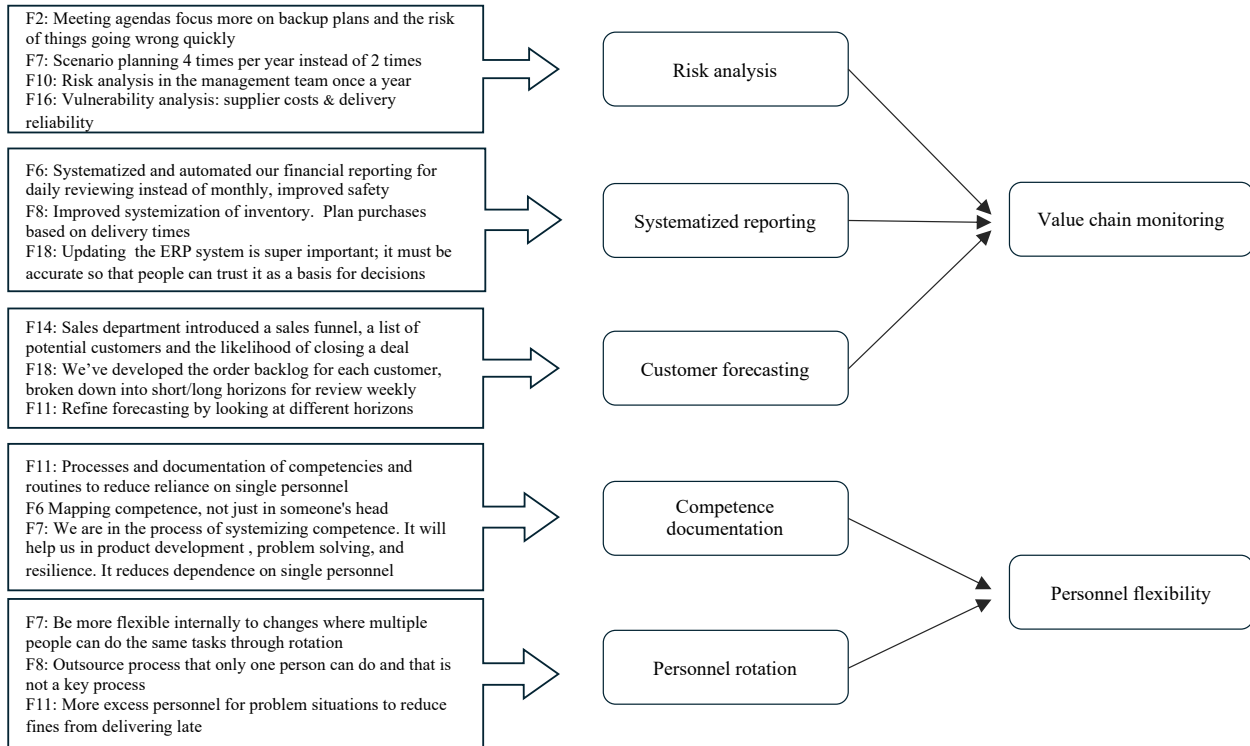
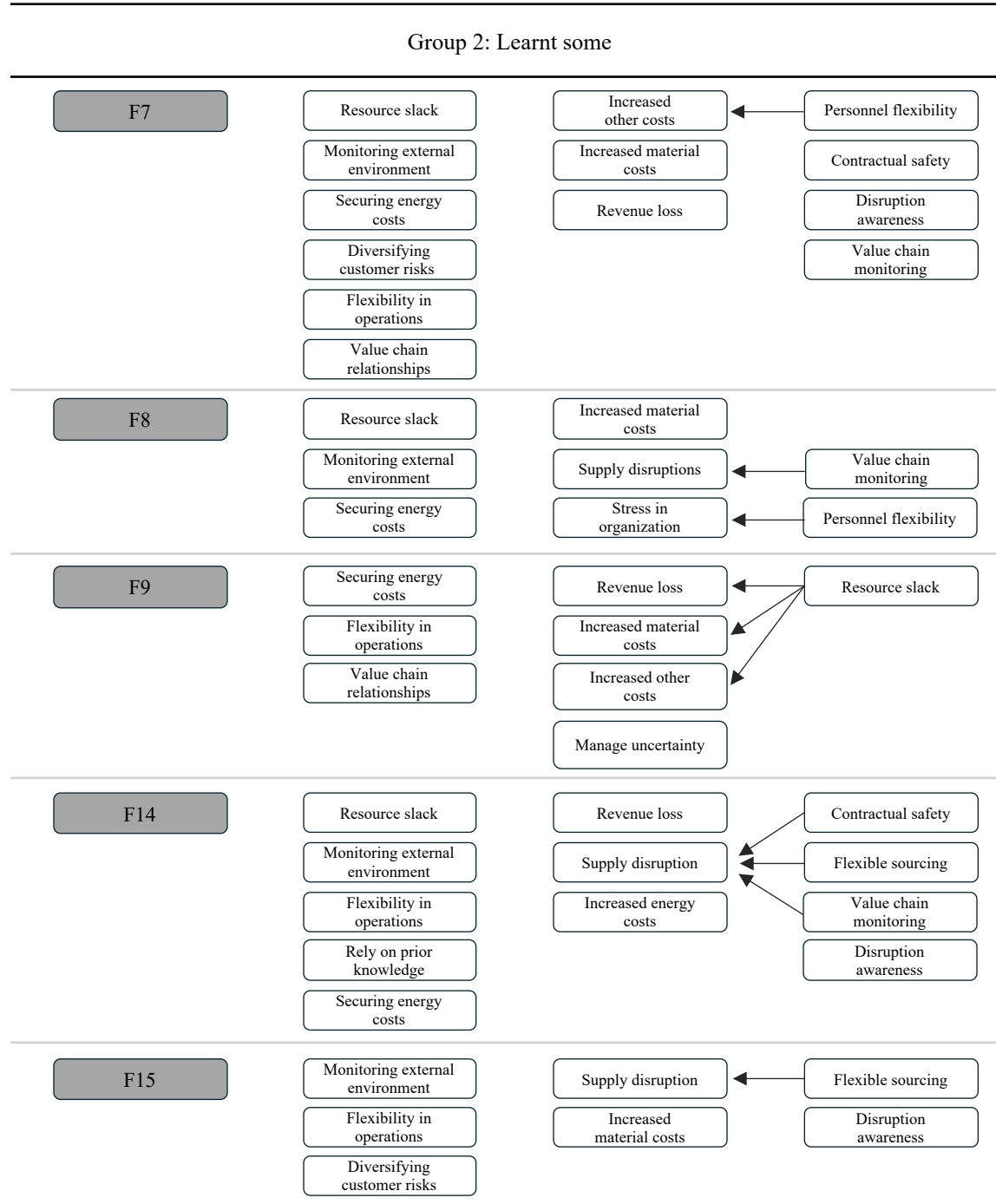


Table 5: Analysis of empirical data

Firm	Previous resilience strategies	Disruption impact	Resilience strategies
Group 1: Did not learn			
F1	Resource slack	Revenue loss	No changes
	Monitoring external environment	Increased other costs	
	Rely on prior knowledge		
	Securing energy costs		
F12	Rely on prior knowledge	Revenue loss	No change
	Diversifying customer risks	Increased energy costs	
F17	Resource slack	Revenue loss	No change
	Monitoring external environment	Supply disruption	
Group 2: Learnt some			
F2	Monitoring external environment	Revenue loss	Value chain monitoring
		Increased energy costs	Flexible sourcing
		Increased material costs	
		Supply disruptions	
F4	Resource slack	Revenue loss	Disruption awareness
	Monitoring external environment		
	Securing energy costs		
	Diversifying customer risks		
F5	Resource slack	Increased energy costs	Contractual safety
	Rely on prior knowledge	Supply disruptions	Disruption awareness
	Flexibility in operations		Resource slack

Table 5: Analysis of empirical data - continued



Group 3: Learnt in full

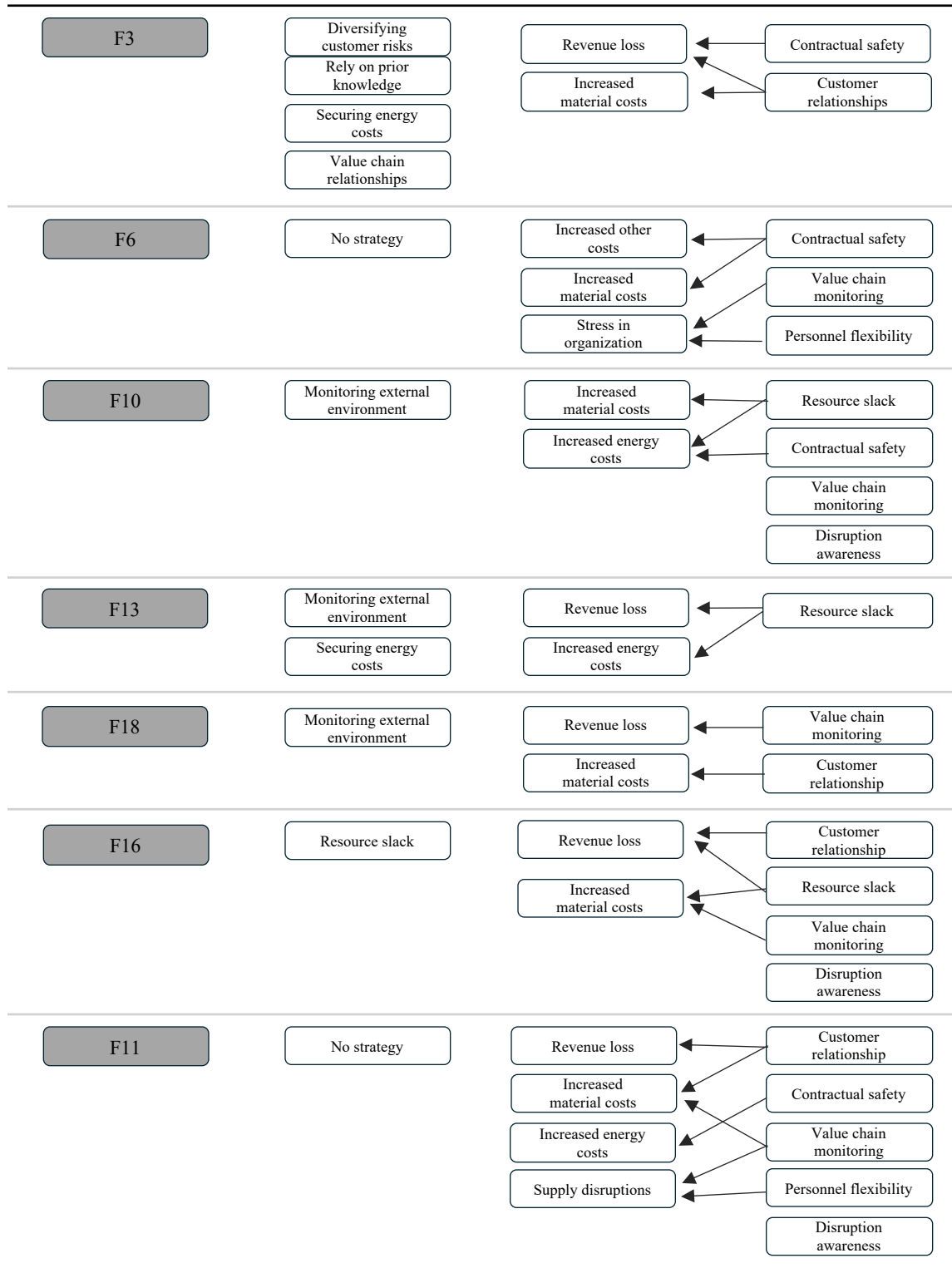


Table 5 provided above is the empirical data condensed in one table. The first column to the left lists the interviewed firms. The second column contains the aggregated themes on firms' resilience strategies prior to disruption. The third column showcases the disruption impact. In the fourth column, resilience strategies post-disruption is found. The arrows in the table indicate which disruption impact the strategy is supposed to address. Furthermore, it should be noted that some firms have implemented resilience strategies in the fourth column that do not have an arrow, indicating that the strategy was a general measure without purpose to address a specific disruption impact.

4.1 Firms learning from disruption impacts

This analysis investigates whether firms have addressed what is referred to as resilience weaknesses, evident from the disruption impact. In this initial state of the analysis, learning is defined as the implementation of strategies in response to problems encountered during a disruption, irrespective of the specific nature of those actions. As shown in the initial part of Table 5, Group 1 were impacted by disruptions but did not adopt any resilience strategies to address their situation. This indicates an absence of learning. Conversely, at the other end of Table 5, Group 3 also experienced disruption impacts but responded by implementing resilience strategies to address the situation. This indicates learning. Situated between these two extremes is Group 2, that developed resilience strategies in response to some disruption impacts but not others and/or adopted resilience strategies that did not address a specific disruption impact.

The three identified groups are summarized below:

- (1) Group One:** consists of three firms that did not implement any resilience strategies following the disruption impacts they experienced.
- (2) Group Two:** includes eight firms that adopted resilience strategies in response to some, but not all, of the disruptions they faced or in response to disruptions different from those they experienced.
- (3) Group Three:** comprises of seven firms that implemented resilience strategies addressing all the disruption impacts they encountered.

Based on the three identified groups, the authors conclude that firms can engage in learning following disruptive experiences. However, their ability to fully address resilience weaknesses varies across firms. This will be further analyzed through the lens of DCs microfoundations; sensing, seizing, and reconfiguring, which the next section addresses.

4.2 Firms developing resilience

4.2.1 Sensing

Sensing is a process by which a firm identifies and understands opportunities and threats. It is described as a process of filtering, shaping and calibrating changes in the market to form meaningful insights of the firm's context (Teece et al., 1997). This is done by scanning, searching and exploring close and distant environments (Teece, 2007).

Learning mindset

Within Group 3, Firm 11 and Firm 6 describes the disruption impact as an opportunity.

"It's either development or liquidation. We want to make new mistakes, not old ones"- Firm 11

"Never waste a good crisis" – Firm 6

Similar responses were found in Group 2 by Firm 7 and Firm 14, the former describing their belief in always improving for the better and the latter emphasizing the importance of a desire to learn from experience.

"I believe that many things can be foreseen in time, so it's always about making improvements and develop- it's the same in business and sports." – Firm 7

"I think it's about will, to not just run ahead but instead stop and review the organization. Doing your homework and make something out of it." – Firm 14

The responses above reflect an opportunistic attitude toward learning from failure within the organization. In contrast, firms belonging to Group 1 demonstrates a mindset characterized by a lack of belief in the opportunity followed by disruption impacts.

“It’s not like we are looking at a war, we wouldn’t have any solutions for that anyway.” – Firm 17

“No, we did not make any changes, you could put 8 professors in the boardroom and still no one would know anything” – Firm 1, suggesting a view that disruptions are fundamentally unknowable and unmanageable.

“It’s not possible to foresee risks. What could it even be? You can’t really prepare for it. You just must hope and believe that there is some wisdom in the world that will make things work out somehow.” – Firm 12

Group 1 holds the attitude that there is no value to be gained from disruptions, as they believe future disruptions cannot be foreseen or prepared for. This group has not engaged in sensing to identify and shape their experiences. When comparing the attitude towards disruptions between Group 1 and 3, the former appears to lack the belief that learning from disruptions can offer value and, hence neglecting that a disruption can be seen as an opportunity. In contrast, Group 3 and 2 view disruptions as opportunities to turn experiences into something valuable. In conclusion, learning mindset seems to be an enabling factor differentiating the firms that engaged in sensing from those that did not. In addition, neglection seems to be a barrier for firms to effectively sense.

External knowledge gathering

A second factor facilitating sensing was identified by Firm 16, another firm in Group 3. The interviewee explains how they leveraged external networks to exchange experiences and gather insights from industry peers.

“I have a few different networks in the region, for example regional CEO networks. There I was pretty open to share what we were experiencing and ask others how it looks for them.” – Firm 16

This activity explains a more distant search process focused on seeking information outside the firm, as the networks enabled the CEO to share information about their experiences and gain insights on how others viewed the situation. Firms in Group 2 also refers to a similar process.

“We try to understand ourselves and our surroundings from different perspectives. By talking to academia, industry networks, etc. we got a lot of good insights and ideas” – Firm 7

Firm 7 highlights that seeking information from different perspectives provided them with new understandings about the firm. Similarly, Firm 15 used their networks to connect with other managers in the industry to discuss the market and the challenges they were facing.

“Cooperation within the industry has been very important. To not be afraid to reach out and talk to your industry peers about how you can solve things. You can learn a lot from hearing how others reason and respond.” – Firm 15

Moreover, Firm 9 describes how using external competence can be helpful to understand and make sense of situations he had never experienced before.

“We have an external board member that holds long experience in business and contributes with a lot of good ideas and thoughts. Me and the other owners discussed a lot back and forth with her. It was hard to discuss these questions with the other owners when we are busy with the daily operations.” – Firm 9

To summarize, firms in Group 3 and 2 appear to have gained valuable information and insights into the impact of disruption through conversations with stakeholders outside the firm, which helped them make sense of the experience. Given the emphasis on firms actively seeking information and insight, this enabling factor is referred to as external knowledge gathering.

In conclusion, two factors facilitating sensing are identified; learning mindset and external knowledge gathering. The first relates to a mindset of wanting to explore disruptions as opportunities for learning, while the second factor emphasizes gathering information through external networks to better understand the impact of the disruption. These two factors were evident in several firms in Group 3 and Group 2.

A less effective sensing process is exemplified by firms in Group 1 that neglected the value of sensing the disruption impact. Neglection can therefore be seen as a barrier to sensing. Moreover,

this barrier to sensing may also explain why these firms failed to seize any remedies for their resilience weaknesses.

4.2.2 Seizing

The second micro foundation of DCs involves seizing which is defined as the process of deciding and investing in opportunities and threats identified from sensing. Seizing involves anticipating future dynamics, making unbiased decisions during uncertainty and being able to change business models thereafter (Teece et al., 1997).

Collaborative problem solving

Firms in Group 3 emphasize the importance of internal group discussions to define the situation and evaluate alternative solutions. Firm 6, for example, explains how the management team went back and forth in dialogue to thoroughly analyze different possibilities.

“We are a diverse management team. There was no specific person that did the work, instead we explored different solutions back and forth between each other. We questioned our decisions to reassure them that everything was under control. It took a lot of time to really analyze everything thoroughly.” – Firm 6

They continued by describing how the discussions made their weakness become evident and realize an opportunity.

“It became very evident in this process, that when disruptions take turns, you appreciate the ability to follow the financial development on an à-la-minute basis. If we would have had the perfect process for this, it would have required a lot less energy and it would have been very nice when we were in it.” – Firm 6

Similarly, Firm 3 compares the discussions in the management team after the disruption compared to before. He describes how they previously hoped that decisions will turn out well and after the disruption they spend more time analyzing and questioning their plans.

“We have become more cynical in a way. Before we did things a bit more unplanned, trusting that things will work out. Today, we look at things more long term, thinking them through in another way, questioning how things are going to turn out. How are we making this work?” – Firm 3

The discussions resulted in an increased understanding of how they had to change sales routines to provide stronger reassurance when the market is volatile.

“If the customer would like us to increase capacity and invest in a new machine, we need to get reassurance in advance from the customer.” – Firm 3

Both Firm 3 and Firm 6 emphasizes how they spent a lot of time questioning decisions to feel more certain about their decisions’ impact, preventing biased decision-making. Firm 11 also refers to group discussions, however, on a cross-departmental level.

“It’s in these meetings that production, machine and maintenance and planning work together [on these issues]. So, I would say that it has been important to create an understanding for each other, to understand what finances us today and what make us realize future earnings.” – Firm 11

As described, by analyzing their situation from different viewpoints, the organization gained insights on interdependences between each other in the firm. In result, they conclude the following about their system aimed to coordinate procurement, production and sales.

“We realized that it was nothing wrong with the system, but we hadn’t nurtured it, we had no reliability in it. We used it as a word-finding program.” – Firm 11

Judging from these descriptions, firms in Group 3 appear to have utilized internal discussions to solve problems, either within the management team or across the organization to develop a thorough understanding of the problem and what would constitute an effective solution. Following this analysis, their motivations for investing in resilience strategies extended beyond resilience alone. The same firms in Group 3 recognize how solutions can be adapted to also bring value in non-disruptive times.

“From a management perspective, you also save a lot of time by having clarity and transparency in your reporting. Just if someone would get sick, the logs will keep on going regardless.” – Firm 6

This highlights that the investment also brings a lot of value in handling common issues like personnel being sick. Firm 11 illustrates a similar reasoning related to their customer relationships.

“If we check on more parameters, we will be able to foresee more things. Then, we can involve the customer early and have a dialogue on how we can prevent the issue. This builds trust in the relationship, and the key for us is to make the customer pay for it.” – Firm 11

This highlights the potential to strengthen customer relationships while also enabling the firm to earn money by better anticipating customer needs. Another example is provided by Firm 3 who describes how long-term relationships with customers enabled them to adapt the product to their production and automatize the process to gain efficiency.

“It [Contractual safety and customer relationships] gives us two things. Partly, we get involved in their design process so we can influence their products to fit our machines better, which makes the customer more tied to us. Secondly, we have better opportunities to automate the production process when the details are adapted to our facilities.” – Firm 3

To summarize, some firms in Group 3 describe a sequential process. The process started with a detailed analysis of various alternatives and how it addressed the problem. This enabled them to identify key characteristics that were important in the solution. Lastly, the choice to invest in the solution became more attractive when they could adapt the solution to also bring value in non-disrupted times. Thus, this facilitating factor to seize solutions is referred to as collaborative problem solving. In contrast, other firms in Group 3, namely Firm 13 and Firm 10, describe how they lacked forums to deliberately discuss disruption issues and potential solutions, highlighting their lack of collaborative problem solving. Firm 13, explains how they lacked continuous forums to address issues and follow up on them.

“We have just started to have management meetings once a month. We have had it just once a year before which I don’t think is enough to address these issues. Because otherwise it’s always the case that these questions must wait, and no one takes charge [of the problems].” – Firm 13

When Firm 10 was asked to describe how they evaluated issues and took decisions, the CEO explained a situation where he acted alone and made decisions based on his own thoughts, informed by what he had read in media. Similar to Firm 13, Firm 10 also highlight how they recently started to work more actively with the management team to bring in more perspectives in discussions.

In conclusion, within Group 3, a clear distinction emerged between firms that engaged in collaborative problem solving to identify and seize solutions, and those that lacked this process. In the latter, important issues often went unaddressed, or decisions were made solely by the CEO. As such, the data reveals how effective seizing was more likely when several organizational members were involved. Thus, collaborative problem solving played a crucial role in enabling firms to seize solutions successfully.

Resource constraints

In addition to collaborative problem solving that enabled firms to seize effectively, a barrier to seizing was also evident among the firms that struggled to seize. Firm 10 describes how the uncertainty in the environment made them hesitant to allocate resources, especially since they lacked financial safety.

“You don’t dare to take any big risks or bets today because you don’t know what will happen in a year. Instead, you need some capital to survive, and we are not there yet. We have gambled too much before and now we just hope we get to continue.” – Firm 10

Firm 9, a firm in Group 2, describes how the tradeoff between investing in energy security compared to new machines made them choose not to invest in resilience, even though they had sensed that their resilience weakness undermined their business performance.

“If we had grown in our pace without all this, with the energy and interest rates, we would have made a lot of money. We have looked at solar panels, but the business case is too bad compared to putting that money on one or two new machines.” – Firm 9

Moreover, resource constraints regarding management time due to many commitments were highlighted by Firm 9 when asked how they develop and evaluate changes in the organization.

“We have spent too little time on it. Since we have grown so fast, it is hard to take the time to these strategic questions, as we made should have.” – Firm 9

Similarly, Firm 13 also explains how strategic topics are usually deprioritized in favor of more immediate, short-term issues.

“We are not like [big industrial company reference] who can have two to three persons working on these questions. For us, it is someone of us who does everything else as well that should do it. If something is a bit harder now, these questions often are left aside” – Firm 13

Firm 14 highlights the same situation, that while they have the will to be more proactive, it requires time and money that can be hard to allocate.

“Its often about the motivation to allocate time and money to a scenario that is not certain it will materialize. All that takes a lot of time and energy to sit down and count on, and that's what hinder us.” – Firm 14

Our findings reveal that firms that faced resource constraints of money and time failed to seize solutions. This barrier hindered them from engaging in seizing which could have resulted in identifying solutions that could have benefits even in non-disruptive times, like the firms in Group 3 who showcased collaborative problem solving. As such, this would have increased the attractiveness to build resilience, even in a resource constrained environment. For example, Firm 9 and 14, in Group 2, demonstrated effective sensing but was unable to seize solutions due to resource constraints. Similarly, Firm 13 and Firm 10 in Group 3 lacked seizing capabilities and

expressed that they had resource constraints. Some of these firms, Firm 9, 10 and 13 are still committed to building a financial buffer, rather than addressing a specific resilience weakness. This was reasoned as a general strategy to survive most disruptions. The emphasis on surviving highlights the recover characteristics of cash as a resilience strategy. However, the remedy of having a financial buffer will not prevent firms from facing the same costs again but rather improve their ability to recover by allowing them to pay higher costs or bridge periods of significant revenue loss.

Summarizing these findings, the conclusions are made that firms that lack seizing capabilities can still adopt remedies to address their resilience weakness. However, the strategies then often become more general and reactive in nature and fail to proactively prevent the firm from bearing the same costs again. This strategy can be seen as sub-optimal compared to the solutions adopted by other firms in Group 3 who utilized collaborative problem solving to seize solutions.

4.2.3 Reconfiguring

The previous data analysis revealed that firms in Group 1 lacked sensing capabilities which can explain why these firms did not engage in seizing. Contrary, in Group 2 the data shows a mix of firms, where some were sensing effectively but fail to seize solutions to all resilience weaknesses due to resource constraints, while others lacked seizing capabilities which result in suboptimal seizing, adopting general or reactive strategies. Lastly, only part of the firms in Group 3 have managed to sense and seize effectively. After firms have sensed their experience and seized a solution, the process of reconfiguring involves adapting systems, structures, and processes to ensure effective implementation and contribute to sustained or improved competitiveness (Teece et al., 1997). In analyzing what enables firms to reconfigure successfully, the analysis starts with the firms in Group 3 that have demonstrated strong capabilities in previous microfoundations.

Fostering participation

To ensure successful adoption and implementation of the seized solutions, some firms in Group 3 highlighted the importance of promoting change in the organization. The CEO of Firm 11 explain his participation in various meetings, such as planning and production meetings, to explain, inspire and motivate the change in value chain monitoring.

“I attend the meetings twice a week to get a sense of what’s going on, but also to explain, inspire, and motivate why we are doing this [the resilience strategy]. In that way, I help broaden perspectives and encourage people to view things differently.” – Firm 11

This emphasis on how the implementation of the value chain monitoring required an attitude shift among the employees to make sure the personnel were motivated to adopt the change. Firm 18 describes a similar situation when facing a cultural barrier within the organization in regard to price negotiations. There was a prevailing mentality of *“don’t mess with the customer,”* which led to reluctance in initiating pricing discussions. The CEO identified this mindset as a key obstacle and worked actively within the sales team to shift attitudes and build confidence amongst the sellers.

“We must act, even if it’s very uncomfortable, as we’re a small company dealing with larger customers. You usually say that don’t mess with the customer, but when I talk to the sales team, I tell them we indeed gonna do that, they should be proud having us a supplier.” – Firm 18

Similarly to Firm 18, the CEO at Firm 6 explained how a frequent reflection exercise with the team worked to highlight achievements they already had realized and create motivation among the employees to take part in change initiatives.

“It [The exercise] usually results in a big notebook of good things we have accomplished. When we then review it together, it becomes an extreme energy injection and a vaccination against a feeling of never-ending things to improve. I think it really motivates the team to what’s next on the agenda” – Firm 6

Firm 6 continues by reflecting on how this exercise has created an understanding of the importance of resilience in the firm.

“I believe I’ve managed to instill an understanding in the team, of the importance of having basic order and redundancy in place.” – Firm 6

In summary, some firms in Group 3 emphasize the importance of support from organizational members to implement the seized solutions. As such, this enabling factor is referred to as fostering participation, emphasizing the need to create buy-in and engagement throughout the organization.

Systemization

The data further suggests that some firms in Group 3 have implemented solutions through systemization as a key enabler to support new routines. This has been important to enable the change in daily operations, providing the organization with the structure necessary to guide behavior. Firm 6 explains how the reporting system and competence mapping of personnel have enhanced decision making in the firm.

“We have systematized and automated our accounting process through our ERP system. This allows us to monitor our balance sheet and track financial developments daily, rather than monthly. This shift has enhanced transparency and clarity, enabling more confident and timely decision-making.” – Firm 6

“The competence mapping support employees during nightshift when there are no managers present, and they use the competence map to find answers to a problem or see who they can ask among the employees working” – Firm 6

Firm 6 argue that systemizations facilitate the organization to act.

“I would say that a decentralized organization is, in my view, quite central to being resilient, where there is strong capacity at the individual, group, and department levels to make decisions and act based on given conditions and rules.” – Firm 6

As such, Firm 6 argued that systemization has enabled decentralization, supporting employees in their work to act and make decisions independently. Additionally, the automated feature of the ERP system has facilitated the adoption of new routines for financial reviews. Firm 11 also emphasized that systemizing their customer forecasts has enabled them to establish new routines for monitoring these forecasts, enhancing their ability to proactively address potential risks.

“Now we have a system that allows us to monitor the customer’s forecasts and order backlog, enabling us to identify risks three months in advance, giving us better capacity to act.” – Firm 11

Similarly to Firm 6 and 11, the CEO at firm 18 also highlights the importance of an improved system for forecasting customer orders which has enabled them to monitor their customers’ order backlogs to anticipate risks.

“Previously, we only looked at our total order backlog. Now, we analyze each customer individually and have also expanded the time horizons we consider. Now we look at both the short-term and the long-term.” – Firm 18

They further explained that improved data accuracy was crucial to support the new price negotiation routine, assuring that sellers felt comfortable in decision making during price negotiations.

“Data management in the ERP is super important so that everyone can trust what is in there and be able to make decisions accordingly” – Firm 18

The data reveals that firms in Group 3 highlight the importance of systemization to realize the potential of seized solutions. The implemented systems provided the organizations with the necessary support structure for decision making and development of new routines.

In summary, the analysis of how firms in Group 3 reconfigured solutions highlights two recurring factors that facilitated adaptation: fostering participation and systemization. The first enabling factor focusses on creating buy-in and engagement within the organization while the latter facilitates change through support structures.

4.3 Summary of key findings

4.3.1 Enabling factors for developing resilience

To answer the research question of what enables firms to learn to develop resilience following a disruption, the analysis identifies five key factors that enable the microfoundations of sensing,

seizing, and reconfiguring. The findings suggest that the sensing capability is facilitated by two main factors. The first is **learning mindset**, which reflects a willingness within the firm to learn from disruptions. The second enabling factor is **external knowledge gathering**, which helps the organization to interpret and reflect on the disruption. Together, these factors enable firms to better explore and interpret the disruption impact. On the contrary, the analysis reveals that some firms experienced barriers to effective sensing due to a **neglection** by top management. This attitude reflects a lack of concern for the value of engaging with and learning from the disruption, which hindered the firm's ability to sense its impact. As a result, these firms were unable to sense and to proceed to the seizing stage.

The seizing capability is primarily facilitated by one key factor: **collaborative problem solving**, which emphasizes the importance of internal discussions and dialogues that enable firms to define the situation, evaluate potential solutions and motivate investment decisions. Furthermore, the firms that used collaborative problem solving had prior to this also enacted one or both factors facilitating sensing. Consequently, collaborative problem solving facilitates firms to decide and invest in resilience weaknesses identified from sensing. In addition to the factors that enabled firms to seize effectively, the analysis also revealed a pattern among the firms that struggled with this capability: **resource constraints**, particularly in the form of limited time that management devoted to discussing the firm's situation. This lack of managerial attention ultimately hindered their ability to seize opportunities.

Lastly, the analysis reveals that the reconfiguring capability is enabled by two factors: **fostering participation** and **systemization**. Fostering participation involves motivating and influencing employees to adopt seized solutions. Systemization is crucial to provide support structures for decision making and the development of new routines.

While the prior microfoundations help firms identify and understand the disruption impact as well as investing in an optimal solution, mastering reconfiguring facilitates sustained resilience by integrating the solutions in the organization. This is argued based on the idea that fostering participation was crucial to motivate change in behaviors and attitudes to ensure support across the organization. Furthermore, systemization provides the necessary structures for guiding employees in their daily work, creating a reinforcing mechanism to ensure sustained change.

Reconfiguring is the final microfoundation in the dynamic capabilities' framework and arguably the most critical. It enables firms to embed learnings from disruptions into organizational routines, ensuring that change becomes an integrated part of daily operations rather than a one-time effort. Without reconfiguring, even well-identified resilience weaknesses and carefully considered solutions may fail to generate lasting impact, as they risk being lost, overlooked, or resisted within the organization. Thus, reconfiguring is essential for transforming opportunities into sustained resilience capabilities, ultimately enabling sustained organizational resilience.

Table 6: Summary – factors enabling firms to develop resilience

Dynamic Capabilities Microfoundations				
	Sensing		Seizing	Reconfiguring
	Interpreting and understanding the disruptions impact on the firm		Deciding and investing in resilience strategies	Adapting the organization to support sustained resilience and strategic fit
Enablers	-	Learning mindset	-	Collaborative problem solving
	-	External knowledge gathering		- Fostering participation
				- Systemization
Barriers	-	Neglection	-	Resource constraints

4.3.2 Conclusions about firms learning from disruption impacts

Under 4.1 three groups across all the firms studied were identified. Group 1 had not implemented any remedies following their experience of disruptions, indicating a lack of organizational learning. Group 2 had made some changes to their resilience strategies, suggesting partial learning. Finally, Group 3 consisted of companies that had adopted strategies across all the areas they had struggled with during the disruption, demonstrating an ability to learn from the disruption experience. However, from the lens of the theory of DCs, the analysis reveals a nuanced perspective on firms' ability to leverage learnings to develop resilience.

By studying which firms effectively sensed, seized and reconfigured after disruptions, three key conclusions can be drawn about the earlier identified groups.

(1) Group 1 failed to address resilience weaknesses due to neglect as a barrier for sensing.

(2) Group 2 includes firms showcasing varying levels of learning capabilities. Some firms (2a) hold sensing capabilities but lack seizing capabilities and/or are subject to resource constraints limiting their seizing potential. These firms often adopted general strategies focusing on recovering ability such as resource slack or did not seize any remedy. The second type of firms in Group 2 (2b) showcased all microfoundations but just in regard to some resilience weakness, this will be further discussed in the discussion section.

(3) Group 3 includes three different types of firms; the first sub-group (3a) of firms showcase all microfoundations and developed resilience effectively. The second sub-group (3b) showcases sensing and seizing capabilities but lacks reconfiguring capabilities. The third sub-group (3c) hold similar characteristics as firms in 2a, which due to lacking seizing capabilities and/or resource constraints adopt general, reactive strategies.

In conclusion, Group 3a comprises of firms with the strongest abilities to learn to develop resilience. Of the initial seven firms that belonged to Group 3, only three firms belonged to Group 3a. These findings imply that a firm addressing all disruption impacts does not imply that it has managed to develop resilience. In the table below a re-grouping of Group 1, 2, 3 is done to illustrate the different sub-group's capabilities in regard to developing resilience.

Table 7: Summary – Firms learning from disruption impacts

	Sensing	Seizing	Reconfiguring
Effective learning facilitated by enabling factors	Group 3a, 3b, 3c Group 2a, (2b)	Group 3a, 3b (Group 2b)	Group 3a (Group 2b)
Ineffective learning, partly influenced by barrier	Group 1	Group 3c Group 2a	Group 3b

5. Discussion

The findings of this study describe the learning process firms undertake to build resilience, structured around the microfoundations of dynamic capabilities. More specifically, our findings identify five enabling factors; learning mindset, external knowledge gathering, collaborative problem solving, fostering participation and systemization, and two barriers; neglect and resource constraints that distinguish firms that successfully developed resilience from those that did not.

Based on these findings, our study is in line with previous literature on organizational learning by suggesting that firms learn from disruptions in a post-disruption phase (Scholten et al., 2019). Moreover, previous research has described contrasting views on what degree firms can learn from severe failures (Baumard & Starbuck, 2005) and rare, ambiguous and complex experiences (Argote & Miron-Spektor, 2011). Our findings extend the understanding of this topic by providing empirical evidence that this is indeed possible, however, it depends on to what degree firms sense, seize and reconfigure during the learning process.

The enabling factors identified in the study confirm previous research on the value of learning cultures and mechanisms. More specifically, in the sensing phase, parallels are observed between a learning mindset and prior literature that emphasizes the importance of a learning culture (Argote & Miron-Spektor, 2011; Jain & Moreno, 2015; Välikangas & Romme, 2013). Furthermore, knowledge articulation emerged as a key feature across all microfoundations, including external knowledge gathering, collaborative problem solving, and fostering participation. In addition, systemization can be interpreted as a form of knowledge codification, which played a critical role in enabling firms to reconfigure seized solutions into sustained resilience strategies. These findings are in line with previous research highlighting learning mechanisms' role in problem solving (Mohaghegh & Größler, 2022) and learning (Zollo & Winter, 2002). Notably, our findings reveal that many of these practices and processes were not in place in the firms before the disruption but were initiated in response to it. This finding suggests that SMEs possess strengths in fast decision-making and flexibility (Gorjian Khanzad & Gooyabadi, 2021) allowing them to rapidly adopt new practices when circumstances demand it.

In relation to the existing literature on resilience, this study identifies that resource constraints in regard to money and time restrict some SMEs from effectively seizing solutions. This finding

supports previous research suggesting that limited financial and organizational resources often hinder SMEs' capacity to invest in proactive resilience strategies (Chaudhary et al., 2023; Heider et al., 2021; Roscoe et al., 2020). The research also extends the findings of Chaudhary et al. (2023) concerning that SMEs face tradeoffs when pursuing resilience during disruptions, by highlighting that even in the post-disruption phase, SMEs perceive tradeoffs between investing in resilience and business competitiveness.

Moreover, the findings from this study contrast previous research that characterizes SMEs as primarily adopting short-term, reactive strategies (Ates & Bititci, 2011; Roscoe et al., 2020). In contrast, this study's findings show how firms that successfully sensed, seized, and reconfigured in response to disruption tended to adopt proactive strategies, sometimes with dual characteristics (Lücker et al., 2024). It was evident that these strategies not only reduced exposure to future disruptions but also contributed to business competitiveness during stable periods. Therefore, our findings suggest that SMEs may not only be limited by resource constraints when attempting to adopt proactive strategies, as also found in this study and described by previous literature (Roscoe et al., 2020), but also lack sensing and seizing capabilities, which limit them from recognizing attractive solutions in the first place. Consequently, the findings suggest that SMEs that do not hold effective sensing and seizing capabilities are more likely to face biased decision making (Teece, 2007) in resilience investments.

This argument is further supported by our observation that firms engaging in collaborative problem solving were more likely to identify opportunities with dual purposes, enhancing both resilience and competitiveness, which made such investments more attractive. Conversely, firms that lacked such this process often perceived resilience efforts as conflicting with other priorities, viewing them as costly trade-offs rather than long-term enablers. Finally, the fact that collaborative problem solving frequently took place in the post-disruption phase highlights this period as a critical window for learning and developing long-term resilience.

6. Conclusion

The aim of this study is to understand what enables SMEs to learn to develop resilience following disruptions. Using a qualitative research approach, the study is based on interviews with top managers from 18 manufacturing SMEs in Sweden. Through an inductive interpretation of the empirical data and guided by the theoretical lens of the microfoundations of DCs, the study identifies concrete activities and processes that SMEs use to sense, seize, and reconfigure their organizations in response to disruption, as summarized in Table 6. By highlighting these enabling factors, the study aims to offer a more comprehensive understanding of how SMEs can transform learning opportunities into sustained resilience capabilities, regardless of a specific disruption or resilience weakness. Drawing on the theory of dynamic capabilities (Teece et al., 1997; Teece, 2007), the findings confirm the sequential relationship among the microfoundations and argue that while sensing and seizing are prerequisites for reconfiguration, it is the reconfiguration phase that ultimately enables firms to develop resilience. In the absence of reconfiguring, resilience strategies are not integrated into daily organizational practices and routines which risks the continuity and effectiveness of these strategies which is crucial since future disruptions are likely to continue to surprise firms, just like they have in the past.

By conducting this study, the findings have contributed to closing the knowledge gap around how SMEs learn from disruptions to develop resilience. While prior research has confirmed that firms can learn and adapt following disruptions (Scholten et al., 2019), often through context-specific case studies of adopted solutions (Chaudhary et al., 2023; Khayer et al., 2022), our study contributes with increased understanding of the underlying process that facilitate this transformation.

Moreover, this paper also contributes to the theory on DCs and specifically the role of microfoundations (Teece et al., 1997, Teece, 2007). While the theory is derived from the assumption that firms need to be dynamic in changing environments, disruptions present a unique context not explicitly highlighted in the theory. Our findings provide an empirical understanding of how these microfoundations are enacted in a SME within a post-disruption setting. In addition, our findings concerning Group 2b suggest avenues for future research. This group showcases all microfoundations in response to some resilience weaknesses but not in others. Firms may engage in selective learning due to resource constraints that prevent them from addressing all resilience

weaknesses, as observed in some cases. However, other plausible explanations exist, such as a failure to sense certain resilience weaknesses, which in turn limits the subsequent seizing and reconfiguring processes. While this paper is not able to provide full answers to this phenomenon, it suggests a nuanced understanding of firms' DCs. Consequently, the authors encourage further research to explore this topic further and develop the theory of DCs.

Managerial contributions

This study provides valuable insights for managers of SMEs and other companies seeking to leverage disruption experiences to build resilience. This contribution is valuable considering that there is a broad consensus that resilience is dependent on each firm's specific context. Prior research has focused on identifying and evaluating different resilience strategies which can foster inspiration and insights, however, these contributions may not be applicable for other firms. Instead, this paper offers concrete, actionable guidance by identifying five enablers that support effective learning. Because the findings draw on a wide range of disruption impacts and resilience strategies, they are well-positioned to offer practical value across diverse contexts.

7. Limitations and future research

A natural limitation of this study is its limited capacity for generalizability, due to a smaller sample size in a single industry context (Bell et al., 2019). While arguing that our findings have the potential to be generalizable across industries since the focus is on the underlying learning process rather than specific resilience strategies, the authors recognize that future research need to confirm this proposition across industries. Secondly, the findings are based on one interview from each SME, limiting the findings to the perspective of that individual respondent. As highlighted in the method, this can be argued to limit the exhaustiveness of the study. Future research could extend our findings by examining learning processes at different organizational levels, adding greater depth to the topic. Thirdly, the authors acknowledge retrospective distortion, such as hindsight bias (Roesse & Vohs, 2012), as a limitation of the study, as it may affect the interviewees' ability to accurately recall and interpret past experiences. This is particularly important given the study's longitudinal perspective. To mitigate this, interviews began with questions about the disruption itself to activate memory, followed by questions about pre-disruption resilience strategies, thereby improving recall accuracy.

References

- Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of Operations Management*, 33–34(1), 111–122. <https://doi.org/10.1016/j.jom.2014.11.002>
- Argote, L., & Miron-Spektor, E. (2011). Organizational Learning: From Experience to Knowledge. *Organization Science*, 22(5), 1123–1137. <https://doi.org.ez.hhs.se/10.1287/orsc.1100.0621>
- Ates, A., and U. Bititci. 2011. “Change Process: A Key Enabler for Building Resilient SMEs.” *International Journal of Production Research* 49 (18): 5601–5618. <https://doi.org/10.1080/00207543.2011.563825>.
- Azadegan, A., Srinivasan, R., Blome, C., & Tajeddini, K. (2019). Learning from near-miss events: An organizational learning perspective on supply chain disruption response. *International Journal of Production Economics*, 216, 215–226. <https://doi.org/10.1016/j.ijpe.2019.04.021>
- Basten, D., & Haamann, T. (2018). Approaches for Organizational Learning: A Literature Review. *Sage Open*, 8(3). <https://doi.org/10.1177/2158244018794224>
- Baumard, P., & Starbuck, W. H. (2005). Learning from failures: Why it May Not Happen. *Long Range Planning*, 38(3), 281–298. <https://doi.org/10.1016/j.lrp.2005.03.004>
- Bell, E., Bryman, A., & Harley, B. (2019). *Business research methods* (5th ed.). Oxford University Press.
- Blackhurst, J., Dunn, K. S., & Craighead, C. W. (2011). An empirically derived framework of global supply resiliency. *Journal of Business Logistics*, 32, 374–391.
- Bin Hashim, N. A., S. Raza, and M. S. Minai. 2018. “Relationship Between Entrepreneurial Competencies and Small Firm Performance: Are Dynamic Capabilities the Missing Link?” *Academy of Strategic Management Journal* 17 (2): 1–11.
- Bullough, A., and M. Renko. 2013. “Entrepreneurial Resilience During Challenging Times.” *Business Horizons* 56 (3): 343–350. <https://doi.org/10.1016/j.bushor.2013.01.001>.
- Chrisman J. J., Chua J. H., Steier L. P. (2011). Resilience of family firms: An introduction. *Entrepreneurship Theory and Practice*, 35, 1107–1119. Crossref. Web of Science.

- Chaudhary, S., Dhir, A., Meenakshi, N., & Christofi, M. (2023). How small firms build resilience to ward off crises: a paradox perspective. *Entrepreneurship & Regional Development*, 36(1–2), 182–207. <https://doi.org/10.1080/08985626.2023.2265327>
- Conz, E., and G. Magnani. 2020. “A Dynamic Perspective on the Resilience of Firms: A Systematic Literature Review and a Framework for Future Research.” *European Management Journal* 38 (3): 400–412. <https://doi.org/10.1016/j.emj.2019.12.004>.
- Cyert R. M. and J. G. March, *A Behavioral Theory of the Firm*, Prentice-Hall, Englewood Cliffs, NJ (1963).
- Demirel, G., MacCarthy, B. L., Ritterskamp, D., Champneys, A. R., & Gross, T. (2019). Identifying dynamical instabilities in supply networks using generalized modeling. *Journal of Operations Management*, 65, 136–159
- DesJardine, M., Bansal, P., & Yang, Y. (2019). Bouncing back: Building resilience through social and environmental practices in the context of the 2008 global financial crisis. *Journal of Management*, 45, 1434–1460.
- Durach, C. F., Repasky, T., & Wiengarten, F. (2023). Patterns in firms’ inventories and flexibility levels after a low-probability, high-impact disruption event: Empirical evidence from the Great East Japan Earthquake. *Production & Operations Management*, 32(6), 1705–1723. <https://doi-org.ez.hhs.se/10.1111/poms.13935>
- Edmondson, A. C., & McManus, S. E. (2007). Methodological fit in organizational research. *Academy of Management Review*, 32(4), 1155–1179. <https://doi.org/10.5465/amr.2007.26586093>
- European Commission. (n.d.). SME definition. European Commission. Retrieved April 6, 2025, from https://single-market-economy.ec.europa.eu/smes/sme-fundamentals/sme-definition_en
- Faruquee, M., Paulraj, A., & Irawan, C. A. (2023). A typology of supply chain resilience: recognising the multi-capability nature of proactive and reactive contexts. *Production Planning & Control*, 35(12), 1503–1523. <https://doi.org/10.1080/09537287.2023.2202151>
- Fiksel, J., Polyviou, M., Croxton, K. L., & Pettit, T. J. (2015). From risk to resilience: learning to deal with disruption. *MIT Sloan Management Review*, 56(2), 79–86.
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods*, 16(1), 15–31. - <https://research-ebsco-com.ez.hhs.se/c/ypcopz/viewer/pdf/6nyj7t42hb?route=details>

- Gorjian Khanzad, Z., & Gooyabadi, A. A. (2021). Development of Strategic Resilience Framework for Small Businesses Post-COVID-19. *Businesses*, 1(3), 127–141. <https://doi.org/10.3390/businesses1030010>
- Giustiniano, L., M. P. E. Cunha, A. V. Simpson, A. Rego, and S. Clegg. 2020. “Resilient Leadership as Paradox Work: Notes from COVID-19.” *Management and Organization Review* 16 (5): 971–975. <https://doi.org/10.1017/mor.2020.57>
- Heider, A., Gerken, M., van Dinther, N., & Hülsbeck, M. (2021). Business model innovation through dynamic capabilities in small and medium enterprises – Evidence from the German Mittelstand. *Journal of Business Research*, 130, 635–645. <https://doi.org/10.1016/j.jbusres.2020.04.051>
- Hepfer, M., & Lawrence, T. B. (2022). The Heterogeneity of Organizational Resilience: Exploring functional, operational and strategic resilience. *Organization Theory*, 3(1). <https://doi.org/10.1177/26317877221074701>
- Jain, A. K., & Moreno, A. (2015). Organizational learning, knowledge management practices and firm’s performance: an empirical study of a heavy engineering firm in India. *The Learning Organization*, 22(1), 14–39. <https://doi.org/10.1108/TLO-05-2013-0024>
- Kantur D., Iseri-Say A. (2012). Organizational resilience: A conceptual integrative framework. *Journal of Management and Organization*, 18, 762–773.
- Khayer, N., Rahul, J., & Chakraborty, S. (2022). Strategies to Counter Supply Chain Disruptions for FMCG Brands during a Pandemic. *Journal of Future Sustainability*, 2(1), 9-16. DOI: 10.5267/j.jfs.2022.8.002
- Lincoln, Y.S., Guba, E.G., 1985. *Naturalistic inquiry*. Sage, Beverly Hills, Calif. Pfeiffer, Y., Manser, T., Wehner, T., 2010. Conceptualising barriers to incident reporting: A psychological framework. *BMJ Qual Saf* 19, e60. <https://doi.org/10.1136/qshc.2008.030445>
- Linnenluecke, M., & Griffiths, A. (2010). Beyond Adaptation: Resilience for Business in Light of Climate Change and Weather Extremes. *Business & Society*, 49(3), 477–511. <https://doi-org.ez.hhs.se/10.1177/0007650310368814>
- Linnenluecke M. K. (2017). Resilience in business and management research: A review of influential publications and a research agenda. *International Journal of Management Reviews*, 19, 4–30
- Liu, H., & Wei, S. (2022). Leveraging supply chain disruption orientation for resilience: the roles of supply chain risk management practices and analytics capability. *International Journal of*

Physical Distribution & Logistics Management, 52(9/10), 771–790.
<https://doi.org/10.1108/IJPDLM-04-2021-0135>

Lücker, F., Timonina-Farkas, A., & Seifert, R. W. (2024). Balancing Resilience and Efficiency: A Literature Review on Overcoming Supply Chain Disruptions. *Production and Operations Management*, 0(0). <https://doi.org/10.1177/10591478241302735>

Mohaghegh, M., & Größler, A. (2022). Exploring organizational problem-solving modes: a dynamic capabilities approach. *Management Decision*, 60(1), 254–277.
<https://doi.org/10.1108/MD-08-2020-1097>

Münch, C., & Hartmann, E. (2022). Transforming resilience in the context of a pandemic: results from a cross-industry case study exploring supply chain viability. *International Journal of Production Research*, 61(8), 2544–2562. <https://doi.org/10.1080/00207543.2022.2029610>

Odulaja, B. A., Oke, T. T., Eleogu, T., Abdul, A. A., & Daraojimba, H. O. (2023). Resilience in the face of uncertainty: A review on the impact of supply chain volatility amid ongoing geopolitical disruptions. *International Journal of Applied Research in Social Sciences*, 5(10), 463–486. <https://doi.org/10.51594/ijarss.v5i10.634>

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *International Journal of Logistics Management*, 20(1), 124–143.
doi:<https://doi.org/10.1108/09574090910954873>

Reinmoeller, P., & Van Baardwijk, N. (2005). The link between diversity and resilience. *MIT Sloan Management Review*, 46, 61–65.

Rice, James B, Jr, & Caniato, F. (2003). Building a secure and resilient supply network. *Supply Chain Management Review*, 7(5), 22–30.

Roese, N. J., & Vohs, K. D. (2012). Hindsight Bias. *Perspectives on Psychological Science*, 7(5), 411–426. <http://www.jstor.org/stable/44280792>

Roscoe, S., Skipworth, H., Aktas, E., & Habib, F. (2020). Managing supply chain uncertainty arising from geopolitical disruptions: evidence from the pharmaceutical industry and Brexit. *International Journal of Operations & Production Management*, 40(9), 1499–1529.
<https://doi.org/10.1108/IJOPM-10-2019-0668>

Roscoe, S., Aktas, E., Petersen, K.J., Skipworth, H.D., Handfield, R.B., & Habib, F. (2022). Redesigning global supply chains during compounding geopolitical disruptions: the role of supply chain logics. *International Journal of Operations & Production Management*, 42(9), 1407–1434. <https://doi.org/10.1108/IJOPM-12-2021-0777>

Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research methods for business students* (6th ed.). Pearson Education Limited.

Scholten, K., Sharkey Scott, P., & Fynes, B. (2019). Building routines for non-routine events: supply chain resilience learning mechanisms and their antecedents. *Supply Chain Management*, 24(3), 430–442. <https://doi.org/10.1108/SCM-05-2018-0186>

Srinivasan, R., Jha, A. K., & Verma, N. K. (2023). To talk or not?: An analysis of firm-initiated social media communication's impact on firm value preservation during a massive disruption across multiple firms and industries. *Decision Sciences*, 54(4), 410–431. <https://doi-org.ez.hhs.se/10.1111/deci.12563>

Stekelorum, R., Gupta, S., Laguir, I., Kumar, S., & Kumar, S. (2022). Pouring cement down one of your oil wells: Relationship between the supply chain disruption orientation and performance. *Production & Operations Management*, 31(5), 2084–2106. <https://doi-org.ez.hhs.se/10.1111/poms.13708>

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>

Tillväxtanalys. (2021). *Coronapandemins effekter på försörjningen av importerade insatsvaror och åtgärder för att minska sårbarheten* (PM 2021:05). Myndigheten för tillväxtpolitiska utvärderingar och analyser.

Venuti, L. (1998), *The Scandals of Translation: Towards an Ethics of Difference*, Routledge, London.

Välikangas L., Romme A. G. L. (2013). How to design for strategic resilience: A case study in retailing. *Journal of Organization Design*, 2, 44–53.

Wildavsky, A. B. (2017). *Searching for safety* (Vol. 10). New Brunswick, NJ: Transaction Publishers.

World Economic Forum. (2025). *The Global Risks Report 2025 (16th ed.)*. World Economic Forum. https://reports.weforum.org/docs/WEF_Global_Risks_Report_2025.pdf

Xian, H. (2008). 'Lost in Translation? Language Culture and

the Roles of Translator in Cross-Cultural Management Research', *Qualitative Research in Organizations and Management*, 3(3): 231–45.

Zollo, M. and Winter, S.G. (2002), "Deliberate learning and the evolution of dynamic capabilities", *Organization Science*, Vol. 13 No. 3, pp. 339-351.

Appendices

Appendix A – Overview of interview respondents

Interview subject - firms	Interviewee position at firm	Interview duration	Interview place
Firm 1 (F1)	CEO	45 min	Online
Firm 2 (F2)	Market and sales manager	43 min	Online
Firm 3 (F3)	Market and sales manager	53 min	Online
Firm 4 (F4)	CEO	44 min	Online
Firm 5 (F5)	CEO	55 min	Online
Firm 6 (F6)	CEO	46 min	Online
Firm 7 (F7)	CEO	37 min 1h 1 min	Online Online
Firm 8 (F8)	CEO	48 min	Online
Firm 9 (F9)	CEO	42 min	Online
Firm 10 (F10)	CEO	48 min	Online
Firm 11 (F11)	CEO	20 min 55 min	Online Online
Firm 12 (F12)	CEO	25 min	Online
Firm 13 (F13)	CEO	41 min	Online
Firm 14 (F14)	CEO	1 h 13 min 29 min	Online Online
Firm 15 (F15)	CEO	41 min	Online
Firm 16 (F16)	CEO	47 min	Online
Firm 17 (F17)	Supply manager	44 min	Online
Firm 18 (F18)	CEO	45 min	Online
Excluded	Market and sales manager	45 min	Online
Excluded	CEO	50 min	Online

Appendix B - Interview guide (English)

Introduction and Warm-up questions

- Presenting ourselves and our education
- Why we are conducting this study – our interest

Interview Structure

- Part 1: We explore a disruption you have experienced
- Part 2: Your strategy to build resilience before the disruption
- Part 3: Today – what you have learned and how (or if) your strategy has changed

Introduce the Interviewee (2 minutes)

- Briefly about you and your background:
- The company, business model, customers, production (location, etc.)
- Your role
- Time at the company
- How would you define resilience?

Questions – Part 1: The Disruption – What happened and how was the company affected

- Can you tell us about a disruption that affected your company and the impact it had on the business
- Which areas were affected – financially, operationally?
- To what extent? More or less than others in the industry?
- How would you assess your response to the disruption (quick/slow, effective/ineffective)?

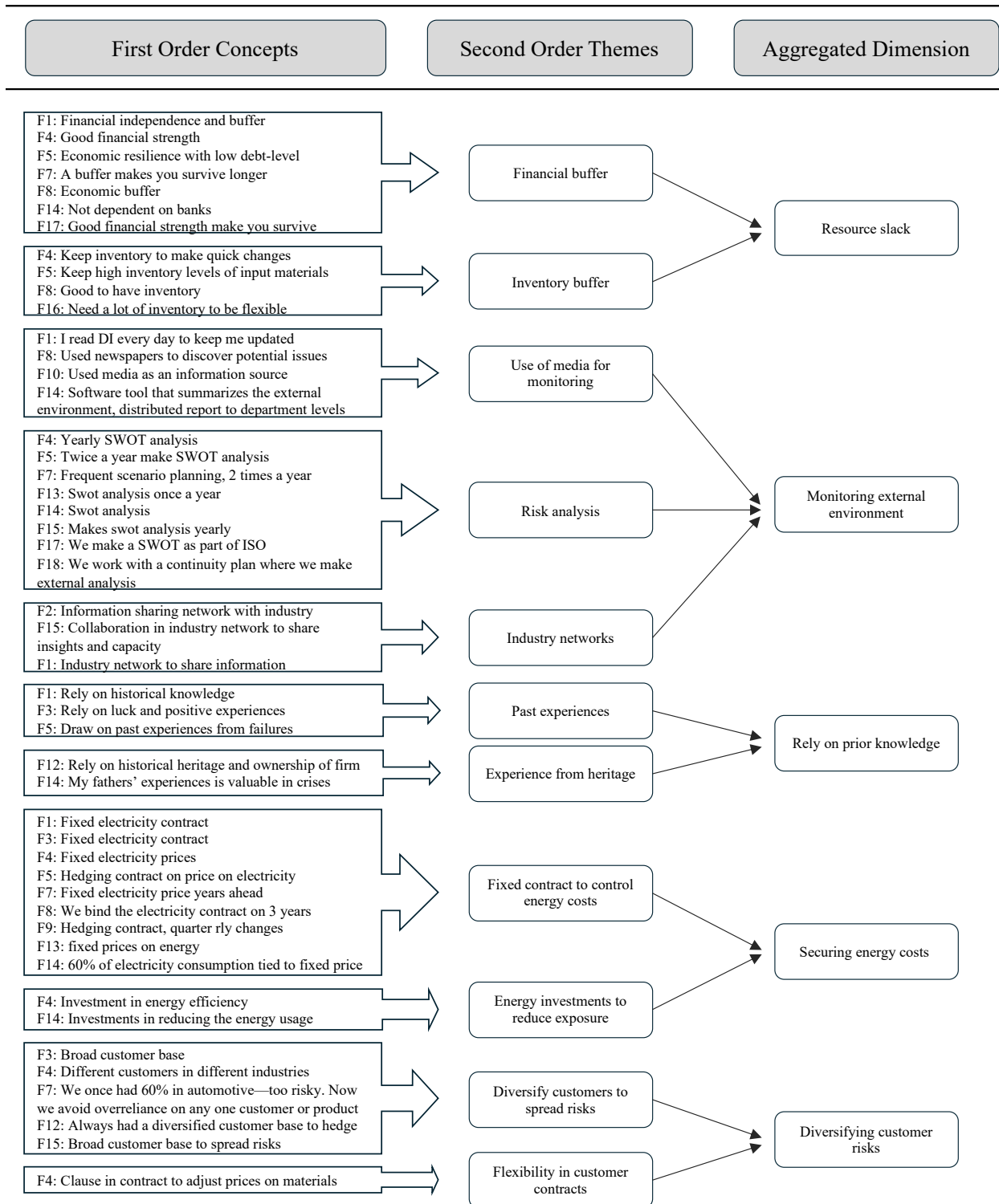
Questions – Part 2: Before the experience

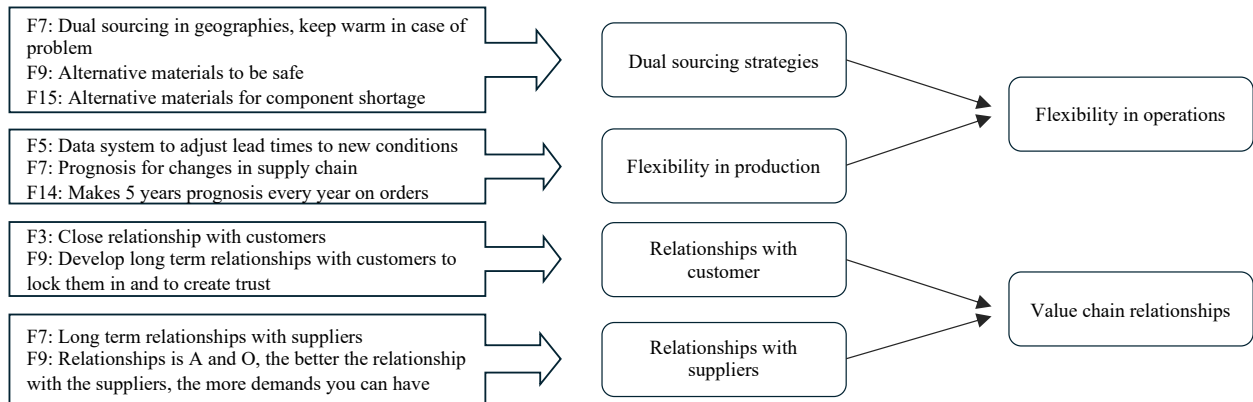
- Did you have any established routines or systems to identify, manage, or prevent potential disruptions?
- Did you have any internal structures or similar to detect general risks? (e.g., monthly meetings on market developments)
- Can you describe how this work was carried out? (who, where, how)
- Did you have any internal structure or strategy to manage disruptions? (e.g., flexible supplier relationships)
- Can you describe how this work was carried out? (who, where, how)
- Did you have any internal structure or similar to reduce your exposure to disruptions? (e.g., own energy production)
- Can you describe how this work was carried out? (who, where, how)

Questions – Part 3: After the experience

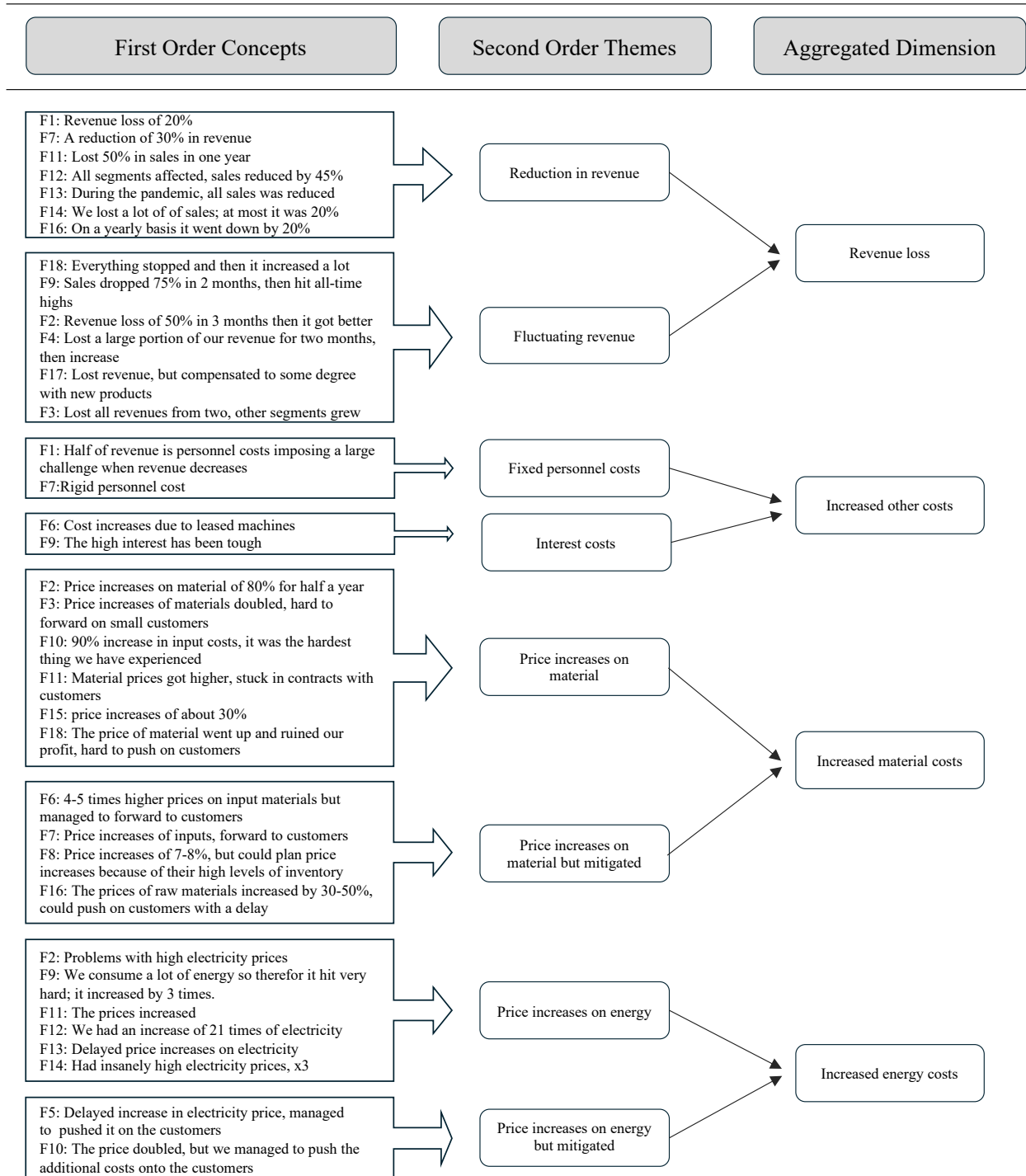
- How do you work today to identify, manage, and prevent external disruptions?
 - If yes, why have you made these changes? What have you learned? (e.g., past failures)
- Have you implemented any new processes or standardized routines?
- Have you observed that other companies in your industry or beyond were affected by external disruptions? Has this changed your way of working?
- What kinds of potential future disruptions do you see? (geopolitics, pandemics, energy crisis)
- What do you think you need to do to remain resilient?
- Given what you know today, how will you work going forward? What is important for you?

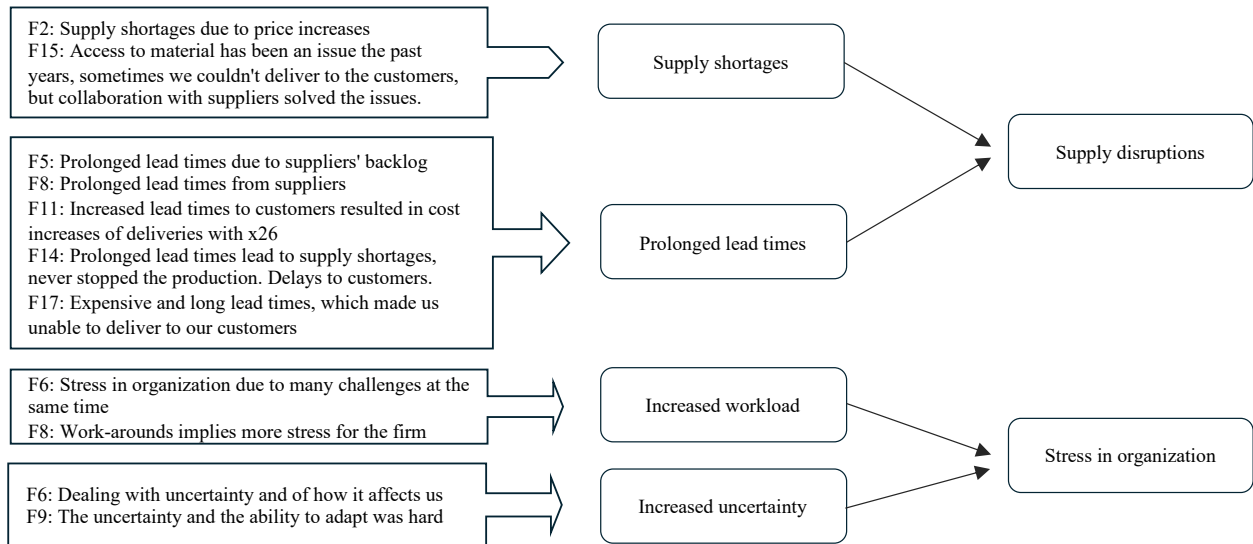
Appendix C – Previous resilience strategies





Appendix D – Disruption impact





Appendix E - AI disclosure

In this research, ChatGPT 3.5, 4.0, Microsoft Team's AI tool for transcribing audio and Microsoft Word spelling and grammar assistance, have been used to support the authors in the process.

Microsoft Team's AI tool was used to provide an automated transcription of the interviews held on Microsoft Teams. This enabled the authors to put their full attention on the interviewee and allowed taking smaller notes for memory that could trigger follow-up questions rather than noting the whole interview. To reduce the risk of incorrect transcription, one author reviewed, refined and controlled the transcription directly after the interview to ensure that mistakes made by the AI were corrected. The use of ChatGPT 3.5 and 4.0 supported the authors in generating synonyms, linking words and translation when the authors felt that they failed to communicate the meaning successfully. Before a word suggested by AI was used in the paper, both authors discussed the case to reduce the risk of reduced quality or accuracy.

The use of AI has contributed to enhanced quality of the paper in two main ways. Firstly, by freeing up time, specifically in relation to transcription, which allowed the authors to spend more time on interpreting the interviewee during interviews. Secondly, using ChatGPT for searching synonyms enhanced the variation in language and readability which can improve the reading experience.

The main insight gained from using AI involves the increased efficiency and quality in data collection. Since the paper is based on more than 20 hours of interview material, the use of AI significantly improved efficiency and data quality.