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**RESILIENCE AS A PART OF INTERNATIONAL SUPPLY CHAIN MANAGEMENT
STRATEGY: INSIGHTS OF RESILIENT STRATEGIES**

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Abstract			
<p>This thesis deals with improving resilience in international supply chain management. The study examines the structures and dynamics of the supply chain, as well as the potential threats that may affect the supply chains. During the study, the following events took place: Covid-19 pandemic, the blockage of the Suez Canal, and recent delivery difficulties due to political influences such as Brexit, which is why these particular events have been taken into consideration in this study.</p> <p>In the time of improving internationalization, supply chains have become increasingly complex to manage. Supply chain structures have changed towards network-like features. One company can be part of several supply chains and as a result, the structures of the supply chain network are very complex.</p> <p>In their strategy work, supply chain management faces many uncertainties, which are affected by the possibility of various disruptions. Disruptions in the organization of the supply chain can affect the entire supply chain network. Disruptions can be longer-term external changes, such as increased political regulation, changes in regional stability, or a pandemic. More shorter-term disruptors can be, for example, changed weather conditions, a fire or a terrorist attack. The effects of disruptions on supply chains can lead to, for example, production issues, weakened cooperation, overstocking, inefficient use of capital, and even endanger business continuity.</p> <p>Some risks can be prepared for, but when the work of others within the supply chain are disrupted, it is only possible to adapt to the prevailing situation in order to minimize the negative effects. Increasing resilience requires both proactive and reactive strategy work. Resilience aims to make operations more flexible so that supply chains can respond to changing situations.</p> <p>The study consists of material compiled in a survey, as well as previous literature and articles. The key findings of the study are that improving market predictability, transparency in the operations of supply chain organizations, and strong collaborations have a positive impact on resilience in the supply chains.</p>			
Keywords Resilience, Supply chain management, Supply chain disruption, Flexibility			
Additional information			

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INTRODUCTION

This introduction presents the realities and the purpose of this research study. The research background begins with a concise presentation of the most important concepts for the research, which are the supply chains, the disruptions faced by the supply chains, and the resilience in the supply chains. The introduction begins by briefly introducing the concept of the supply chain, as well as explaining the types of disruption situations this study seeks to illustrate. In addition, the background to the study introduction provides a definition of resilience. The purpose of the introduction is to introduce that, businesses are vulnerable to many unforeseen factors. Some of these factors that destabilizes the business can be prepared for or adapted to, however this requires a flexible approach from the organization management. Sometimes unexpected situations can even jeopardize the operations of an entire company or supply chain. Historical supply chain disruptions have included for example a terrorist attack in the United States in 2001 (Sheffi & Rice Jr, 2005), a tsunami in Japan in 2011 (Revilla & Saenz 2017), and a fire at the Philips plant in 2000 (Macdonald & Corsi, 2013), and current disruptions during this study, which emerged in surveys such as the Suez Canal blockage (2021) and the Covid-19 pandemic, which is still ongoing at the time of this research. The latest distractions also serve as a strong motivator for conducting this study and leading the way of the research. These challenges and consequences show how organizations are required to be able to adapt to changing situations and threats, which becomes clear from the conclusions of this study.

Background

Disruptions faced by supply chain organizations can be endogenous, supply chain-mediated, or completely external threats (Jüttner, Peck & Christopher, 2003). In this context, a disturbance refers to a situation that has negatively affected one or more processes in a company's supply chain. The disturbance may be short-term, such as a temporary disturbance caused by a storm (Vogus & Sutcliffe, 2007), or long-term, such as a regulatory effect (Gunasekaran, Subramanian & Rahman, 2015). To assess the effects of risks, it is essential to look at the effects of disruptions on fluctuations in supply and demand (Christopher & Peck, 2004b; Gunasekaran, et al., 2015).

Supply chains typically consist of chains formed by several different firms (Christopher & Peck, 2004b). Prater, Biehl, and Smith (2001) divide the supply chain into three parts, which are sourcing, manufacturing, and delivery. The supply chain consists of all the companies and stakeholders that are in any way contributing to a product or a service, from the manufacturers of raw materials to the consumer of the final product. From the perspective of an individual organization, the same organization may be involved in several different supply chains (Mentzer, DeWitt, Keebler, Min, Nix, Smith, & Zacharia, 2001). One factor which has had an effect on the increasing number of various companies in supply chains is that markets have become more complex (Golicic, Flint & Signori, 2017).

There are numerous different studies on resilience and the concept is very multidisciplinary. Resilience in management studies is a relatively new, but unexplored area (Christopher & Peck, 2004b). As the main themes associated with resilience, that emerged in the literature were the company's ability or resource to be able to respond and adapt to change (Golicic et al., 2017; Fiksel, Goodman and Hecht, 2014; Brandon-Jones, Squire, Autry and Petersen, 2014; Ivanov, Sokolov & Dolgui, 2014). Tukamuhabwa, Stevenson, Busby and Zorzini (2015) present resilience as the ability to respond to disruptions and being able to learn to respond to future threats. Golicic et al. (2017) argue that resilience helps to respond to future stress and change. It refers to the ability to adapt to unforeseen situations, as well as to formulate the strategy in such a way that organization can be prepared for future threats. Resilience is often combined with a flexible organizational approach to dealing with unexpected situations. According to Fiksel, et al. (2014), resilience is defined as the ability to even cope with or at least adapt to unexpected situations and the uncertainty that the future will demand. Resilience allows you to adapt to shocks or stressors (Linkov, Carluccio, Pritchard, Bhreasail, Galaitsi, Sarkis & Keisler, 2020).

Definition for the resilience concept combines company's ability for recovery and adaptation (Linkov et al., 2020); and flexible transportation (Govindan, Azevedo, Carvalho & Cruz-Machado, 2015). Sheffi and Rice (2005) defined resilience as the ability to return to normal from a situation caused by a disturbance. This refers to a situation where an organization can quickly recover from the effects of a disruption (Brandon-Jones et al., 2014). Disruptions faced by supply chains can have serious

effects on the productivity and profitability of the entire supply chain (Colicchia, Dallari & Melacini, 2010; Skipper & Hanna, 2009). The value chains of non-resilient companies may even collapse into simple short-term shocks (Linkov et al., 2020).

The topic of the research study brings together a perspective of resilience based on both individual events and broader entities and strategic planning for supply chain management. The topic is relevant, and applicable for example regarding the Covid-19 pandemic that affected different business models in various industries.

The resilience is important for supply chains in the sense that supply chains have become more vulnerable to disruptions (Wagner & Bode, 2008). Market competition has grown steadily (Christopher & Lee, 2004a; Cox, 1999; Golicic et al., 2017; Surana, Kumara, Greaves & Raghavan, 2005), which has had implications for company investments in flexibility (Vogus & Sutcliffe, 2007). Financial risks have increased, and corporate productivity is a key measure of performance (Noor & Abdalla, 2014). At the same time, in recent decades, for example the number of natural disasters has been on the rise. In addition, climate change has been linked to the fact that the trend will also increase in the future. (Fiksel et al., 2014.) The modern environment increasingly exposes the supply chain to various risks and disruptions (Wagner & Bode, 2008).

Resilience helps to respond to unexpected changes and disruptions (Govindan et al., 2015). Resilience has been extensively studied in a variety of disciplines, for example including engineering, psychology, and organizational management (Ponomarov & Holcomb, 2009). The research highlights the causes of disruptions and strategies for how to respond to them and consider resilience in supply chain management and planning. Knowledge of the use of resilience and its impact on organizations helps also in leadership development (Ledesma, 2014).

Objectives of the Study and Research Problems

This research provides a good background for strategic management of international supply chains. The choice of research topic has been influenced by for example reaction time to modern trends, adapting to the Corona-virus pandemic period and

several natural disasters, which we have experienced during the 21st century. Previous studies on resilience have shown that resilience is usually studied when the situation at the time has been particularly motivated, the research of resilience is therefore very fragmented in time (Linnenluecke, 2017). Consulting firm McKinsey also emphasized resilience during the Covid-19 period in its report, as well as the companies speed of adaptability to crisis-situation (McKinsey and Company, 2020).

Research on the capabilities of the supply chain resilience has been conducted in the past mostly regarding individual events and their consequences (Mukherjee, 2008; Norrman & Jansson, 2004; Nikolopoulos, Punia, Schäfers, Tsinopoulos & Vasilakis, 2021), but the means of resilience have not been studied much from the perspective of management support for international supply chains. This research aims to raise the key themes that can be used to implement resilience in an organization's supply chain network. When studying resilience, the most typical research topics have become from individual events, such as accidents or disasters. (Linnenluecke, 2017.) Research has generally focused on examining supply chain design and organizational behavior.

Research Question

This study combines the risks, capabilities and limitations in the modern supply chains and environment. To summarize these targets, the study seeks to identify key themes and demonstrate strategic elements that improve supply chain flexibility. The research creates a framework for the future research of supply chain management development. To achieve the objectives of this study, the structure has been formed to understand the need for resilience and its benefits. Thus, the main objective of this research is to find answers to the research question, that can be found below:

What features can be used to improve the resilience of the international supply chains?

Methods

This study has been carried out as a qualitative survey. The research articles and literature used as research sources are centrally related to the themes, which are related to the topic. ProQuest, Emerald Journals, Science Direct and EBSCOhost were used

as the main databases in this study. Resilience, international supply chain management, flexible strategies and supply chain disruption were used as the main keywords. The research also references in a significant amount of risk management literature. Moreover, the aim for the search criteria is to combine internationality, strategic practices, and their implementation in the companies of the supply chains. The purpose of this is to understand the dynamic and complex structure of supply chains (Pettit, Croxton & Fiksel, 2019) and the potential threats that affect them. The internationalization theme has been highlighted because previous studies have shown that companies invest their production in countries where it is most cost-effective (Ali-Yrkkö, Rouvinen, Seppälä & Ylä-Anttila, 2011). It has also been investigated that the link between flexible supply chain management strategies and environmental uncertainties has not been fully recognized (Candace, Ngai & Moon, 2011). The literature is used to explain and to expand the contexts surrounding supply chains and links between organizations operating within them. Theoretical background shows the relevance and importance of this topic.

The empirical part of the study has been carried out with a qualitative survey. The aim of the questionnaire material is to broaden the perspective beyond the literature. For deeper understanding of the key themes, the research utilizes perspectives of key people in the supply chain, which aims to obtain concrete ways on how to implement the most common resilience-raising practices. The choice of the online survey was natural because it allows people to be reached quickly from a wide area and responses can be quickly summarized using partial automation (Wright, 2005). There are many previous research on supply chain resilience, but most of them had been carried out theoretically or modeled, with only low percentage of research had been conducted by using a survey method (Tukamuhabwa et al., 2015). The surveys will expand on companies' international supply chain aspects, demonstrate different strategies, and look for similarities within the key themes of the background theory. The Likert scale and open-ended question boxes are very traditional methods of qualitative questionnaire research (Wright, 2005) that have been utilized in this study to make answering easy and simple for the participants. The results of the surveys will be critically examined with the help of the literature.

Structure of the Study

The research begins with the first part of the theory section, which explains the structure of the supply chains for the reader and assesses its future development trends, as well as reviews the current stability. The chapter reviews the formation of supply chains and the flows that take place within them.

The second part discusses the common threats faced by the supply chains. This section demonstrates the importance of research and highlights points that pose challenges for the supply chains. The key themes of this part are supply chain globalization, complexity, and increasing competition.

The third part of the theory section aims to open characteristics of the resilience and concept through the definitions of previous studies. The benefits and disadvantages of resilience are sought to be critically assessed from an organizational perspective. A closer look at resilience requires the opening of individual events and major trends affecting to its input. The focus is on the most important themes affecting the supply chain performance in the case of disruption. Based on this theoretical part, the aim is to sum the main influencers which have a decreasing effect on resilience, and to show the capabilities of resilience in supply chain strategy. Disruption strategies are sought to be formed, both from the perspectives of pre-event and post-event management.

The methods section reviews the methodology used to conduct the study and collect data of the qualitative surveys in this study. The section seeks to assess the quality of the results and their fairness, including from a critical perspective. This part evaluates the quality of the data collected for the survey and to present how the survey was conducted.

The fifth part presents empirical evidence of the study. The section looks at the differences between the answers and examines the similarities and differences. The section also uses the table to show the response rates of the survey statements, as well the results' averages.

The sixth part of the study focuses on analyzing the results which have been collected. The aim is to raise central thoughts of the survey participants to bring out consensus. Extracts from the data will be assessed by reflecting on the results of previous studies and literature. The results aim to find value for theoretical findings and build concrete ways for the background suggestions to improve resilience in strategies. As a result of the analysis, the motives to maintain resilience are clarified, as well as to challenge operating principles on a basis of the previous assessment.

In the final part of the study, the main findings are collected together and the main conclusions of the study are highlighted. The implementation of the study and the way the data is collected are critically evaluated to understand the real benefits of the results. At the end of the chapter, the limitations of the research are presented, as well as further research proposals.

INTERNATIONAL SUPPLY CHAIN MANAGEMENT CONTEXT

According to Sukati, Hamid, Baharun & Yusoff (2012) definition, a supply chain is a series of activities that create value for the customer. The value chain thinking emphasizes an aspect that does not focus on the flow of material things but on the values perception created by various stakeholders. This mindset emphasizes information sharing, networking, and value creation. (Linkov et al., 2020.) From a value creation perspective, the supply chain includes all the functions to meet the needs of customers (Sukati et al., 2012). An individual company should not focus on position itself within the supply chain but strive to make the whole supply chain competitive (Cox, 1999).

The velocity in the supply chain is affected by the streamlining of processes, which affects number of different levels and activities in the supply chain (Christopher & Peck, 2004b). It is essential for the supply chain that it is able to adapt along with the market changes, such as trends, by adapting its production lines and interpreting the signals reflected from the market (Christopher & Lee, 2004a). Together, three important elements form the basis of the supply chain, which are: network structure, business processes, and supply chain management components. The structure is influenced by its constituent members and the connections between them. (Lambert & Cooper, 2000.) Strategic supply chain thinking involves firms to understand the various dependencies and continuous threat control (Cox, 1999). Comprehensive supply chain review, coordination, and tactical measures throughout supply chain companies form the supply chain management (Mentzer et al., 2001). In the next section supply chain flows are presented to explain the connections between different actors.

Flows in the Supply Chain

Flows between members of the supply chain are often interpreted from very different perspectives. Ali-Yrkkö, Rouvinen, Seppälä and Ylä-Anttila (2011) define supply chains as internationally operating flows of materials and services. A broader supply chain analysis also includes information and financial flows between companies. By

this definition, flows within the supply chain can be divided into three, which are material flows, information flows, and financial flows. (Hearnshaw & Wilson, 2013.)

The material flows refers to physical products that progress in the supply chain toward the final customer. The information flow arises from the coordination of other flows and shared information between parts of the supply chain. (Hearnshaw & Wilson, 2013.) The disruptions weaken parts of the supply chain's ability to respond to changed demand or supply (Munoz & Dunbar, 2015). The variability in production and sales are key factors in the variation in the supply chain's material flow (Surana et al., 2005). One of risks faced by supply chains is the demand-related risk associated with cash flow disruptions between the supply chain company and the market (Christopher & Peck, 2004b). Underlying the idea of understanding material flow disruptions is to look at unintentional behavior faced by an organization's supply chain, such as a supplier going bankrupt (DuHadway et al., 2019). Also supply chain inefficiencies, such as oversized buffer stocks, increase the financial risks (Christopher & Lee, 2004a). Further, supply chains may contain flows which are inflexible, which means that those cannot be affected by changing strategies. This sets limits for resilience. For example, the delivery of a sea cargo ship is inflexible or very slow. (Prater et al., 2001.) Fluctuations in supply chain flow times can be addressed through mitigation measures and contingency plans (Colicchia et al., 2010).

In order to ensure a smooth product flow, efforts must be made to keep the information flow constant (Lambert et al., 2000). The smooth operation of information flows involves the ability of organizations to predict for the future. Lead times in the supply chain can be used for this assessment. Forecasts have the potential, for example, to facilitate the predictability of demand and to influence overstocking. (Surana et al., 2005.) The flow of information between organizations is affected by the memory of the organizations (McAfee, Glassman & Honeycutt Jr, 2002). Open communication throughout the supply chain contributes significantly to efficient planning, responding to fluctuations in demand (Oleśków-Szłapka & Lubiński, 2016). Planning uncertainties can be reduced when the parties have access to the most up-to-date information available (Kaipia, 2009). It is also important to get feedback to the right actors in the supply chain (Stank, Keller & Daugherty, 2001).

Structure of the Modern Supply Chain

Supply chain construction consists of every company from raw material manufacturers to the consumer of the final product. Complexity of the product is the key factor of defining how many actors the supply chain includes. When a lot of materials are needed, the number of members in the supply chain increases. It is also important how many of the suppliers are available. (Lambert et al., 2000.) As markets become more complex, managing has also become even more challenging (Christopher & Lee, 2004a; Golicic et al., 2017; Ivanov et al., 2014; Surana et al., 2005). As companies outsource their operations from supply chains, it becomes more challenging to control them (Ivanov et al., 2014). According to Lambert & Cooper (2000), smooth material and cash flows in supply chain requires open communication between different supply chain actors. Benefits of open communication and visibility between supply chain actors are greater in the broad and complex supply chain structures (Brandon-Jones et al., 2014.) As competition increases, the efficiency of every company in the supply chain will increasingly affect the way chain members perform. Instead of individual companies, the competition can be considered to be between different supply chains. (Cox, 1999.) Longer supply chains have increased the lack of trust between actors of the supply chain (Christopher & Lee, 2004a). Organizations operating at different levels of the supply chain operate in an interactive configuration. The effects of disruption at one level of the supply chain pass through the other levels of the supply chain. (Munoz & Dunbar, 2015.) If the internal functions of supply chains are not coordinated properly, supply chains will lose potential. Coordination should be handled in the planning, organization, and processes of supply chain flows. (Mentzer et al., 2001.) Pettit, et al. (2019) argue that the biggest contributors to supply chain resilience are suppliers and customers. Supportive supply chain parties are companies that offer their products or services to key members of the supply chain. Supportive activities may include, for example, borrowing assets, consulting or, for example, leasing trucks. (Lambert et al., 2000.) The ultimate purpose of supply chain process coordination is to strive to create value for the end customer. To succeed in this, the input of each company in the supply chain is required. (Stank et al., 2001.)

Supply Chain Network Approach

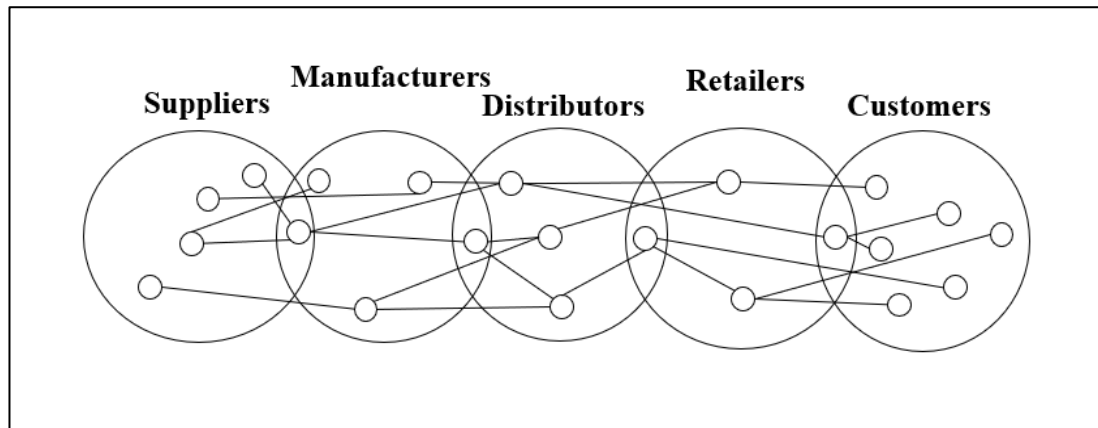


Figure 1. Supply-chain Network (Adapted from Surana et al., 2005, p.4241)

As the figure 1 shows supply chains are no longer thought of as linear processes. According to the modern perspective, the supply chains created by the various stakeholders form complex networks. These networks are not always confined to a particular economy or industry. (Christopher & Peck, 2004b.) Supply chain management usually consists of managing multiple supply chain relationships (Lambert et al., 2000). When several different companies are part of different supply chains, together supply chains form a network of supply chains. This explains the complex structure of the supply chain network. The supply chain network is homogeneous. Its joints represent individual producers, intermediaries, suppliers, or customers. The development of information technology has had a positive effect on the dynamics of knowledge sharing in the network between organizations. (Surana et al., 2005.) Norrman and Jansson (2004) argued that disruptions from the supply chain network are the result of poor interaction. To mitigate risks, coordination should take place through interactive interaction between stakeholders (Revilla & Saenz, 2017). The increase of subcontracting, in the other words so called outsourcing of work, is one of the reasons for the increase in complexity (Gunasekaran, et al., 2015), which has also affected communication between organizations.

Supply chain management requires a broad view of the chain (Cooper & Ellram, 1993). Logistics operations bind together large-scale procurement, manufacturing and

purchasing operations in different countries (Bardi, Raghunathan & Bagchi, 1994). Typically supply chain management strategies are based for the assumption that stakeholders in a company's network are working. Data network traffic, transport or, for example, electricity is considered an absolute value, which functionality is default and trusted in the activities of network members. Understanding the formation of this vast network and its dependencies can improve a company's resilience. (Linkov, Bridges, Creutzig, Decker, Fox-Lent, Kröger & Thiel-Clemen, 2014.) According to the network model, companies interact in a continuous way with other actors, which gives each organization its own role (Håkansson & Snehota, 1989). Relationships between companies in supply chains are typically strong and long-lasting (Mentzer et al., 2001). For example, the original equipment manufacturer is used to work closely with suppliers to make sure that key equipments are available (Lambert et al., 2000). There are a growing number of different suppliers, manufacturers, intermediaries and customers in the supply chains, the increase of which has contributed to an increase in the number of uncertainties (Candace et al., 2011). Employee in business relationships have a major role to play in a company's relationship networks and the organizational image which it conveys to outsiders (McAfee et al., 2002).

Development of the Supply Chain Management

Strategical Philosophies of the Supply Chain Management

Supply chain management has undergone major changes in the recent decades (Giunipero, Handfield & Eltantawy, 2006). In the 1980s, when business strategy thinking changed, the term "supply chain" included not only logistics but also operational management functions such as purchasing, inventory management, production planning and control, and customer service (Christopher & Peck, 2004b). In the history of supply chains, key revolutionary changes have been the transition to mass production and computerization (Oleśków-Szłapka & Lubiński, 2016). Instead of local warehousing, the trend has been to have centralized logistics centers in Europe controlled by major international players (Waters, 2011, p. 55). Changes affecting the supply chain are largely made due to changes in the business environment, which has become more globalized, more technologically advanced and, as a result, more demanding to manage (Giunipero et al., 2006). There has been a shift from a "just in

case” philosophy to a “just in time”, “build to order” and “vendor managed inventories” conceptual mindset (Natarajarathinam, Capar & Narayanan, 2009). Advanced information systems have made it possible to improve the delivery of products in the supply chain (Cooper & Ellram, 1993). Modern supply chain management strategies include, for example, lean, green and resilience strategies. The strategies are divided into a focus on operational efficiency, flexibility, and environmental friendliness. (Govindan et al., 2015.) Lean strategy focuses on eliminating waste of resources and streamlining operations throughout the supply chain (Sukati et al., 2012), when resilience focuses on proactive risk management and business continuity (Pettit, Fiksel & Croxton, 2010).

Impacts of the Technology Development

Utilization of information technology in supply chain management is a growing trend (Auramo, Kauremaa & Tanskanen, 2005). With the technological development, the structures of supply chains have changed, but the products and services moving in them have also created new challenges. Modern products are more complex and require agility from the supply chain (Sukati et al., 2012). Also, the growth of cooperation in supply chains and the integration of data systems have been long-term trends in supply chain management (Giunipero et al., 2006). The sharing of information among members of the supply chain has improved with the development of technology. It is now possible to export and store information in real time throughout the supply chain (Christopher & Lee, 2004a). Smart technology is already being used in supply chain management, and as digital services increase, they also have great potential (Oleśków-Szłapka & Lubiński, 2016). According to the Ivanov et al. (2014) study, quantitative tools and analysis exist, but their practicality has so far been weak due the lack of business models for supply chain control. Oleśków-Szłapka and Lubiński (2016) raised in their study that the next development trend in supply chain management is the integration of artificial intelligence into processes such as Internet of Things (IoT) technology.

Changes in the Business Environment

The development of trends puts supply chains in a situation where they need to be more able to adapt to the demands of the environment. One challenge are environmental legislations, which create new requirements for supply chain logistics processes (Wagner & Bode, 2008). The transition to more responsible supply chain management is significantly slowed down by the fact that logistics are still largely dependent on fossil, non-renewable fuels. The uncertainty between logistics service providers is increased by new legislation, regulation, and rapidly evolving technology. (Abbasi & Nilsson, 2016.) Knowledge of the future, adaptation to trends and awareness are things that will have an increasingly strong impact on the continuity of supply chains in the future (Christopher & Peck, 2004b). A change in legislation that affects a company can increase a great deal of uncertainty throughout its business model (Niemimaa, Järveläinen, Heikkilä & Heikkilä, 2019).

CHALLENGES AND DISRUPTIONS FACED BY INTERNATIONAL SUPPLY CHAINS

The last chapter introduced the structures and dynamics of the supply chain. This section focuses on presenting different disruptions in supply chains, as well as challenges to address them. The aim is to understand what kind of disruptions in supply chains occur and the consequences of disruptions may have.

The Disruptions Types

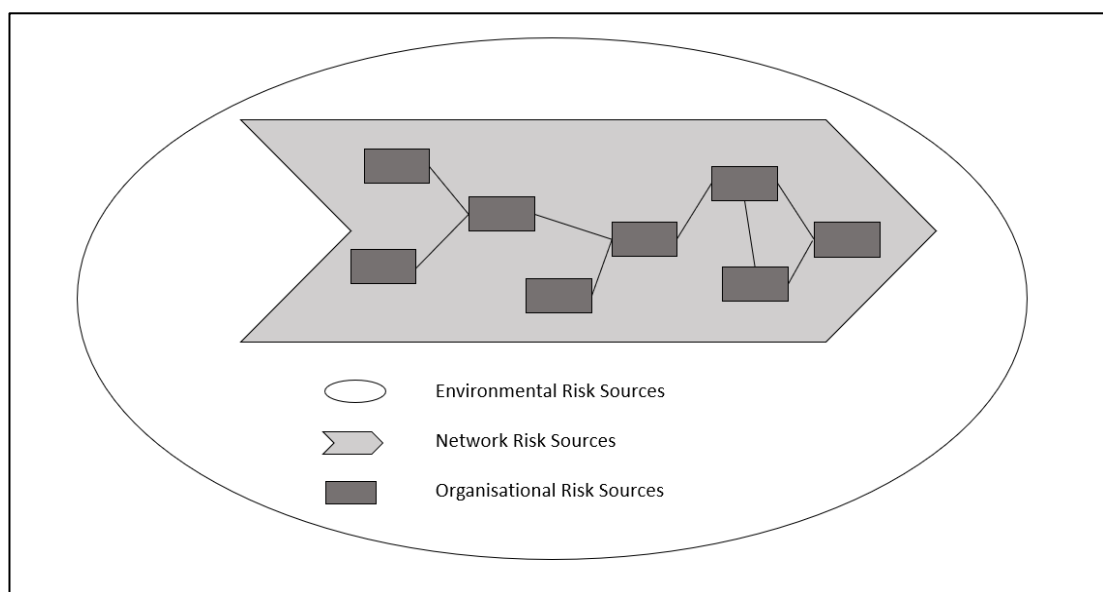


Figure 2. Risk Sources in Supply Chains (Adapted from Jüttner et al., 2003)

One way to divide supply chain risks is to divide them into internal (process and control) and external (demand and supply) risks (Christopher & Peck, 2004b). In a broader model Jüttner, et al. (2003) presents the division of supply chain risks into three different categories, which are external risk factors, network-driven risks, and organizational risks (Figure 2). This study focuses to external and network-based disturbances, which is why the study addresses them in a broader perspective.

The external risk sources include for example political risks, natural risks, social risks, industry/market risks (Norrman & Jansson, 2004). Ability to respond to and protect against disturbances has also been treated as disruption management. The topic has also been studied by examining the relationships between variables and their effects at other levels of the supply chain. (Ivanov et al., 2014.) Revilla and Saenz (2017) found in their research that changes in external environment do not typically determine specific supply chain strategies. Disruptions in the supply chain can have a significant impact on the productivity and profitability of organizations (Colicchia et al., 2010). Not all external threats can be predicted, which makes supply chain management challenging. External threats in supply chain environment can be political threats, natural disasters, terrorist attacks or, for example, labor unrest. (Gunasekaran et al., 2015.) Changes in political systems can also create uncertainty from a corporate perspective. Such uncertainties can be, for example, wars, revolutions, or coups. Changes in the political environment create uncertainty. (Rao & Goldsby, 2009.) Converging political arrangements in the EU region have facilitated the transfer of goods, but in Eastern Europe, for example, procedures and requirements are not implemented (Prater et al., 2001). Researchers have also highlighted the effects of natural disasters on supply chain management (Rao & Goldsby, 2009).

From a management perspective, both internal and external factors must be considered in the management of the recovery process in order to speed up the recovery time and reduce its negative financial impact. (Macdonald & Corsi, 2013.) The complexity of the processes is partly explained by changes in supply and downstream supply and markets (Gunasekaran, et al., 2015). Different companies also face different constraints to increase resilience. For example, companies do not always have the option to choose between single and multiple sourcing (Namdar, Li, Sawhney & Pradhan, 2018). The technology industry faces specific supply chain risk factors due to product complexity (Zsidisin, 2003). Continuity of the supplier-buyer relationship may be compromised by an individual disruption (Wagner & Bode, 2008).

IT-system failures, production compromises, and employee strikes are examples of potential internal uncertainties (Norrman & Jansson, 2004). Management should be able to proactively identify risks and plan how to prepare for them (Waters, 2011, p. 11). Operative uncertainty, such as employee, production uncertainties can indirectly

affect other members of the supply chain. For example, a situation where employees go on strike can have a broad impact on supply chain operations. (Rao & Goldsby, 2009.) The growing uncertainties Candace et al. (2011) mention in their study are lead time, market demand, product quality, and information flow. During internationalization, on the one hand, competition has intensified, but on the other hand, new challenges have arisen for companies to satisfy the needs of a wider customer base (Colicchia et al., 2010). Complexity has weakened resilience and thus increased proactivity from a management perspective to remain competitive responsiveness (Gunasekaran, et al., 2015).

Logistics managers are constantly under severe pressure to keep operations as efficient as possible (Waters, 2011, p. 10). However, optimizing supply chain operations is not easy. Striving to optimize logistics operations alone requires analysis and understanding of several logistical components (Bardi et al., 1994). The growing challenge of managing long supply chains is the continually changing world, as well as its increasing unpredictability (Christopher & Peck, 2004b). In their article, Christopher & Lee (2004a) argue that the risk of “chaos” is increased by supply chain complexity and uncertainties. The resulting nervousness increases inefficient operations in supply chains, such as increasing the number of emergency stocks and over-ordering. Ineffective measures such as this can lead to unintentional price increases. Even if a business is made more flexible, its real effects are not always visible immediately, but they become so over a longer period of time (Niemimaa et al., 2019). Christopher and Lee (2004a) argue in their research that nervousness in the supply chain due to lack of information leads to a chain of events they call the “risk spiral” (Figure 3). Modern complex supply chains are slow to respond to change. This increases the chance of interference. (Tang & Tomlin, 2008.) The number of disturbances has been increasing (Natarajarathinam et al., 2009).

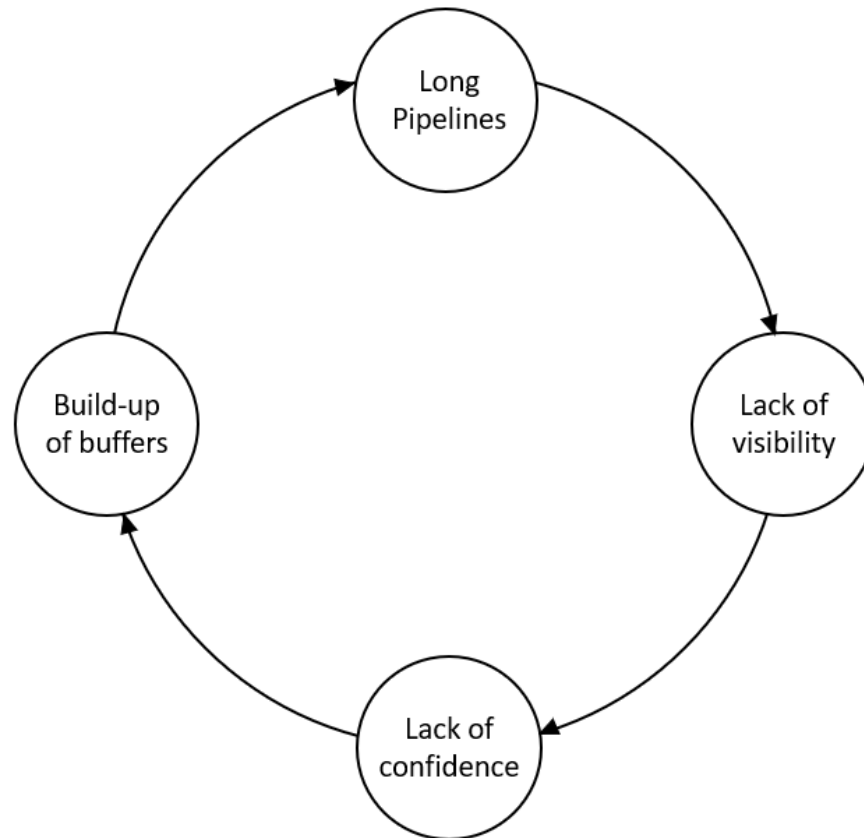


Figure 3. The Risk Spiral (Adapted from Christopher & Lee, 2004a)

Forecasting of the events in supply chain network is challenging (Surana et al., 2005). Christopher and Lee's (2004a) study presents a few levers to decrease the risk of spiraling (Figure 3), with both visibility and control. To improve visibility, the key factors are operational indicators and situation reports. These must be accurate, available, manageable, and updated to all stakeholders in a timely manner. If inside the supply chains lack of control is detected, the involved party should alert the stakeholders. Intelligent control systems can also be used to identify anomalies. The contingency plans must be in place for possible changes, as well as the necessary tools to take corrective action. One possible solution for this, which is raised in the study, is the use of a substitute supplier. For simple supply chains, investments in resilience are less profitable. In this context, simple refers to a supply chain with only a few suppliers. (Brandon-Jones et al., 2014.)

Reasons for Nervousness

In Candace et al. (2011) case study, orders, cost, and the aggressiveness of competition emerged as recurring uncertainties. Because forecasting of the risks is challenging (Surana et al., 2005), supply chain management covers some of the risks with insurance and currency hedging products. Typically, supply chain management is particularly interested in risks related to supply and demand. (Manuj & Mentzer, 2008.) Supply chain management should strive to anticipate market changes and be prepared to integrate new business models. Business continuity may be jeopardized by the rapid emergence of new business models. For this reason, organizations need to consider changes in their environment that may affect its own revenue streams. (Niemimaa et al., 2019.) One of the current trends is that organizations are increasingly interested in the environmental impacts generated by their stakeholders (Fahimnia, Jabbarzadeh & Sarkis, 2018). Logistics service providers have raised that their customers give priority to cost and time of delivery instead of more environmental solutions (Abbasi & Nilsson, 2016). For some operators, capacity constraints create situations where operators are unable to meet the customer's changed demand (Kaipia, 2009).

One problem faced by supply chains is their weak visibility. For example, a situation where the original equipment manufacturer does not know about the manufacturer's sales situation. The operation of an actor in the supply chain may be based on occasional orders, without knowing the real rate of sales by other parties, in which case its operation involves a great deal of uncertainty. The opacity created by the supply chain network affects upstream and downstream operators in particular. (Christopher & Peck, 2004b.) If the internal functions of supply chains are not coordinated properly, supply chains will lose potential. The coordination should be handled properly in the flows of planning, organization or process of the supply chain. (Mentzer et al., 2001.) Proactive strategic supply chain management includes joint forecasting, planning, information sharing, inventory, and control in cooperation with other stakeholders in the supply chain. These activities aim to increase the efficiency of the supply chain and create a competitive advantage. (Min & Mentzer, 2004.) Even if parts of the supply chain are invisible, a lack of control can become a problem. Although, the supply chain manager detects a change in a part of the supply chain, late changes may not be able

to be responded to, for example, with inflexible production, substitution options, or schedules. The problem is typical among semi-conductor manufacturers. (Christopher & Lee, 2004a.) Disruption of time-sensitive supply chains have even greater problematic effects (DuHadway et al., 2019). An individual member of the supply chain always has more information than others. For example, when the stages of production, the size of the inventory and the actual demand are not known to others, the visibility of the activities between the members of the supply chain becomes weak (Christopher & Lee, 2004a).

Globalization of Supply Chain Networks

Globalization has had an affect that the distances between companies have lengthened, the number of organizations in supply chains has increased, and more and more members of the supply chain operate in different countries (Colicchia et al., 2010; Hearnshaw & Wilson, 2013). There are several different motivations behind making international purchases. The background can modify the cost structure, technological features, centralized sourcing, or building new relationships. (Gunasekaran et al., 2015.) Key factors which have had great influence on the globalization of the supply chains are the increase in offshore businesses and subcontracting agreements. (Christopher & Lee, 2004a). In many cases, international supply chains increase the competitiveness of companies (Manuj & Mentzer, 2008). Distributed large-scale networks that do not operate only locally are more vulnerable to the risks posed by a complex structure (Brandon-Jones et al., 2014; Christopher & Peck, 2004b). One of the challenges for supply chains may be the existence of a few suppliers and thus also the building of a dependency relationship with these suppliers (Gunasekaran et al., 2015). The pursuit of optimality can be jeopardized if different levels of supply chains encounter nervousness. High-risk supply chains do not work efficiently. The increase of risks in supply chain improves the lack of confidence between actors. (Christopher & Lee, 2004a). Prater et al. (2001) noted in their research that in many cases a foreign supply chain is not able to operate as flexibly as the rest of the organizations. Supply chain management requires consideration of the factors made by global environment (Surana et al., 2005; Ivanov et al., 2014).

Most international supply chains include a high risk that is not identifiable by management (Christopher & Peck, 2004b). One reason for this is that the structure of international supply chains is very dynamic and complex (Pettit et al., 2019). The goals of supply chain companies may conflict, and supply chains may connect through the local supply chain to an international network that creates new challenges for the supply chain. (Surana et al., 2005.) One challenge faced in foreign supply chains is that all countries do not have the possibility to work as efficiently as the others, because in some countries technology and communication networks are not so developed (Prater et al., 2001). However, internationalization in supply chain networks has not only had a negative impact on the risks faced by the supply chain. The outsourcing of operations and the internationalization of the supply chain have also created new opportunities from a risk management perspective (Revilla & Saenz, 2017).

In the short term, outsourcing the operations may appear to be an attractive option from a cost perspective, but as a result, longer-term uncertainty may be exacerbated by, for example, political uncertainties (Gunasekaran et al., 2015). Before establishing new international supplier relationships, the political climate must be taken into account (Rao & Goldsby, 2009). Each political area or border increases the faced threats of the supply chain, especially if the area is politically unstable (Prater et al., 2001).

Most of the companies are relocating their production to countries where production costs are lower. This is a phenomenon that is also recognized among researchers and decision makers. (Ali-Yrkkö et al., 2011.) Outsourcing and internationalization have been affected by increased competition and more demanding market. The supply chain is efficient when products can be delivered to the right place, in the right quantities, at the right time. All of this should be done cost-effectively. (Christopher & Peck, 2004b.) Multinational companies use tax planning in their operations and seek to export to countries where it is most cost-effective, most of the value added generated by the company is still generated in developed countries (Ali-Yrkkö et al., 2011). Poorly designed and implemented supply chain management leads to inefficient use of the company resources. For example, transportation difficulties and poor inventory management can mean reprocessing and penalties that increase financial risks. (Christopher & Lee, 2004a.)

The Disruption Effects

Unexpected supply chain disruptions may have serious consequences. When all supply chain companies do not have knowledge of upstream and downstream flows, supply chain managers seek to balance their uncertainties by creating additional security stocks. This is a good example of how a lack of visibility leads to a lack of trust and inefficiencies. (Christopher & Lee 2004a.) Another problem is that the fewer suppliers there are, the easier it is to lead the supply chain (Tang & Tomlin, 2008). This encourages management to keep suppliers to a minimum, which increases the company's exposure to potential disruption. Disruptions can cause number of negative effects in different parts of the supply chains. Negative business impacts refer to variables such as price increase or lower quality (Norrman & Jansson, 2004). Revilla & Saenz (2017) presents examples of negative effects in their study:

- Fluctuation in production

- Transportation problems

- Declining sales

- Decrease in turnover

- Dropping market share

- Rising costs

- Exceeding budgets

The rapid fluctuation of demand, the instability it creates, and the uncertainty are typical features of today's marketplace. There is no single reason for this variability and unpredictability, but there are often several reason and it is therefore very difficult to model them. Increasing volatility is also not a change for an individual industry. (Christopher & Lee, 2004a.)

One concrete short-term crisis-situation for corporate supply chains was when, in September 2001, following the terrorist attacks the U.S. government shut down air traffic and borders. One of the firms in which the short-term shock effected was Ford Motor Company, whose shipments were delayed, and production deviated by about 13% from the original plan during the quarter. As the example shows, even a short-term deviation or disruption can have a significant impact on the operations of companies. (Sheffi & Rice Jr, 2005.)

Challenging disruption circumstances include short-term events such as errors, scandals, crises, and shocks, when longer-term include risk-increasing conditions such as competition, stresses, and strain (Vogus & Sutcliffe, 2007). Business continuity management thinking is based on the fact, that when an organization encounters a disruption, it seeks to restore its operations to normal as quickly as possible. In this situation, the intervention only takes place when the disturbance has already occurred. Organizations should strive to understand the underlying causes of disruptions, and learn from experiences to design processes, as well as mitigate the negative effects of their own weaknesses. (Fiksel et al., 2014.) Disruptions are often unexpected. They can be small local events, such as the effects of terrorism, natural disasters, or accidents, or larger, for example, changes in the market, which also react strongly to demand. Resilience enables an organization to better cope or adapt to unexpected changes. (Linnenluecke, 2017.) This means a kind of organizational preparedness and flexibility to adapt in current situation. A pandemic differs from typical supply chain disruptions. For example, it is exceptional because of its wide-ranging impact, regardless of industry or country, and it directly affects more than one part of the supply chain. (Craighead, Ketchen & Darby, 2020.)

RESILIENCE AS A SUPPLY CHAIN MANAGEMENT STRATEGY

This theory part presents resilience as a concept and as a part of supply chain management strategy. The aim is to understand the key capabilities and benefits of resilience in a supply chain management strategy, but also to analyze the effects of resilience in action.

Capabilities of Resilience Strategies

Linkov et al. (2014) divide the functions of risk management and resilience so that when risk management is used to avoid future threats, resilience management is used to manage the change created by the temporary state. Today's world is highly interconnected globally, which means that companies' strategies must also take greater account of external threats that can cause disruptions (Fiksel et al., 2014). Resilience is defined as a resource or capability of the company system (Golicic et al., 2017). As Ponomarov and Holcomb (2009) have mentioned in their resilience study review the most common antecedents for resilience studies are “*agility, flexibility, velocity, visibility, availability, redundancy, mobilization of resources, collaboration and supply chain structure knowledge*”. Vogus & Sutcliffe (2007) define resilience as the adaptation state required by exceptional circumstances. According to their definition, when an organization recovers from special circumstances, it emerges stronger.

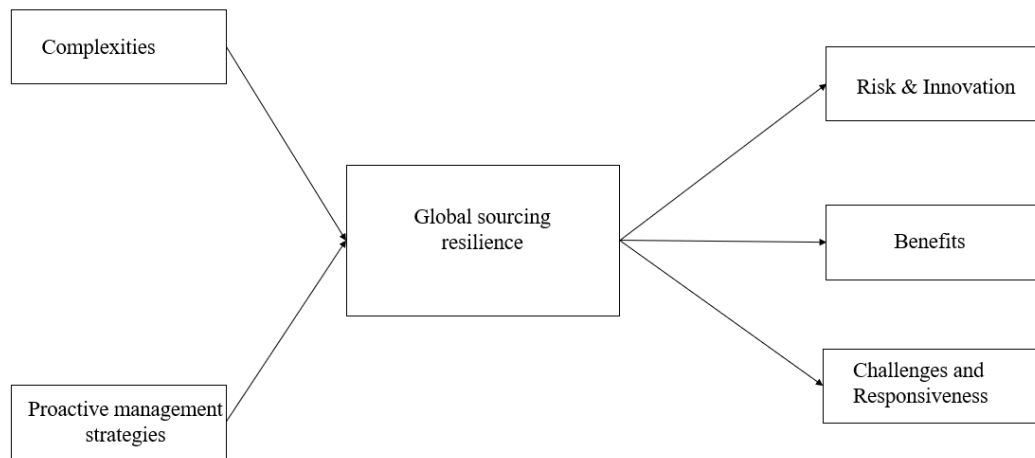


Figure 4. The Global Sourcing Resilience Framework (Adapted from Gunasekaran et al., 2015)

In figure 4 Gunasekaran et al. (2015) explain how global sourcing resilience may have positive effects such as new innovations and benefits, but it also requires taking new risks and having better responsiveness. The concept of resilience is relatively new from a supply chain perspective (Namdar et al., 2018). In supply chains, resilience is often associated with risk management, but resilience provides a broader perspective for capabilities of the firm, for example, in terms of production adjustment (Linkov et al., 2020). The key aspect of how resilience thinking differs from conventional risk management is striving for long-term adaption rather than short-term survival (Pettit et al., 2010). The analogy of the resilience concept can be applied from both the perspective of supply chains and the perspective of value chains (Linkov et al., 2020). Wieland and Wallenburg (2012) argue that both proactive and reactive strategies are needed to manage supply chains. Resilience is not just about an individual act or event, but about the way how organization operates flexibly. Resilience can be increased for example, through experimentation and innovation, which will enable new capabilities to emerge. Resilience in global sourcing can also create new innovations instead of new risks as shown in figure 4. (Golicic et al., 2017.) Increasing collaboration, as well as increasing visibility, are part of a proactive resilience strategy (Namdar et al., 2018).

Resilience in the Event of Short-term Disruption

Case example of rapid proactive risk management was the disruption of orders for mobile phone components subcontracted by Nokia when a fire broke out at the Philips factory in year 2000. Ericsson, which also ordered components from the same factory, found itself in the same situation. Ericsson's proactive disruption management was slow, which jeopardized their business for a long time, but Nokia's proactive management avoided greater losses. Key factor in the situation was the quick response to the disruption event and achieved short recovery time. (Macdonald & Corsi, 2013.) If an organization's risk management model is passive, they jeopardize business continuity by being more vulnerable to even minor disruptions, a good example of which is the disruption of Nokia's Philips subcontracting chain (Tomlin, 2006). Nokia sought to adapt to the change by manufacturing its mobile phone in partnership with Philips to make it possible to take advantage of alternative suppliers. Ericsson suffered potential revenue losses of EUR 2.3 billion. (Hearnshaw & Wilson, 2013.) Nokia reacted quickly and they began preparing for more alternative plans. This small event had a major disruption in the supply chain, and it could have possibly jeopardized Nokia's multi-million phone manufacturing. Thanks to Nokia's quick action, they found an alternative supplier. (Mukherjee, 2008.) This case example can also be explained with the following figure 5. When Nokia understood the risks in the absorbing stage, they started to think recovering strategy, which helped their capability to adapt in the disruption.

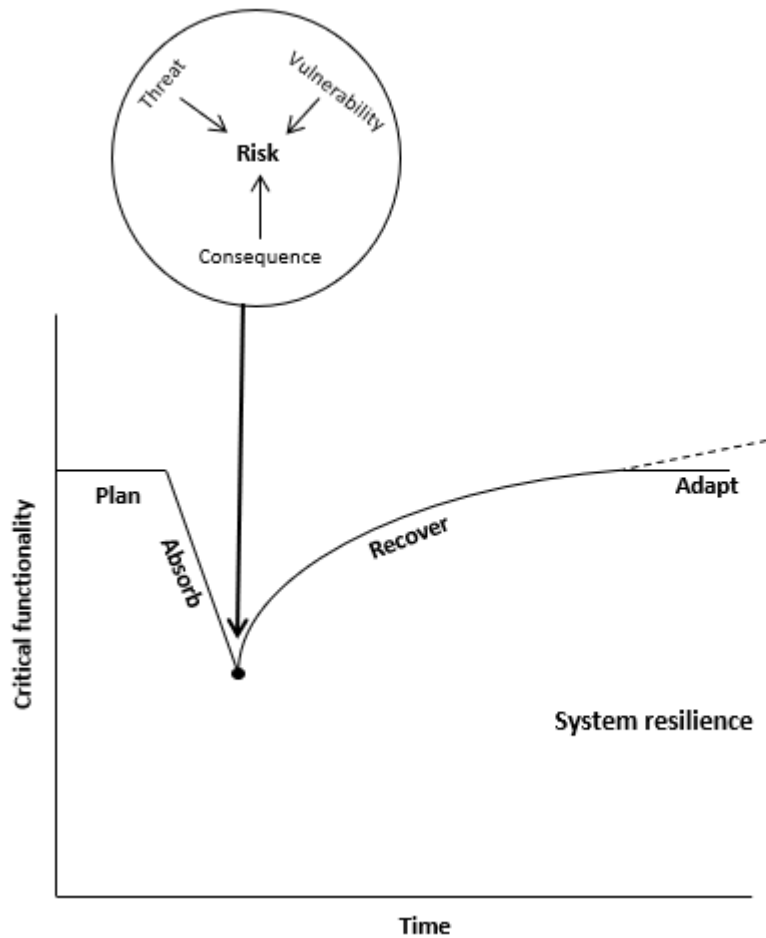


Figure 5. A Roadmap of Critical System Functionality (Adapted from Linkov et al., 2014)

Figure 5 explains critical functionality of resilience in the risk management.

Planning Stage

DuHadway et al. (2019) consider it important that the factors leading to disturbances can be divided to intentional and unintentional disturbances in order to be better prepared for them. Indirectly reflected negative effects on supply chains can be reduced through mitigation actions at the planning stage (Ivanov et al., 2014; Christopher & Peck, 2004b). Contingency plan stages include response phase, recovery phase and restoration phase (Norrman & Jansson, 2004). As seen in the previous Nokia -case example, rapid response and resilience designing can restore processes or at least reduce the negative effects of disruption. Resilience can be seen

as a new kind of concept that seeks to innovate from a traditional style of risk management to a proactive strategy (Pettit et al., 2010). Efforts can be done to predict for future threats through various risk analyzes. By preparing for risks, one can anticipate their real effects and create a resilience adaptation or recovery model to the system (Figure 5). (Linkov et al., 2014.) Targeted investments in the right measures and tools can improve risk preparedness and increase an organization's ability to respond to unforeseen events and their consequences (Vogus & Sutcliffe, 2007).

Absorbing Stage

One way to manage risks is to map them using scenarios. By creating different scenarios for situations, reliable numbers are created for management to be able to make and justify relevant decisions. Company management is interested in estimating actual costs (Cooper & Ellram, 1993). In order to invest in risk prevention measures, management wants information about possible losses, as well as the probability of the occurrence of a disruption (Wagner & Bode, 2008). An important tool for risk assessment is risk mapping, which can be used to understand potential consequences (Norrman & Jansson, 2004). In order to invest in risk prevention measures, management wants information about possible losses, as well as the probability of the occurrence of a disruption (Wagner & Bode, 2008). In their study, Tummala and Schoenherr (2011) recommend that supply chain management utilize risk profiles based on strategic information. Profiles are used to identify the need to increase the ability to tolerate uncertainty, in the other words improve resilience. There is the possibility to improve managerial performance, by increasing the understanding of contingency planning processes in the supply chain network (Skipper, & Hanna, 2009).

Recovery Stage

In the event of a disruption, the decisions made by the manager have a major impact on the recovery process. To minimize the impact, decisions must be made quickly. (Macdonald & Corsi, 2013.) It has been studied that preparing for different types of risks is important for organizations regardless of whether the risks are intentional or unintentional (DuHadway et al., 2019). A key problem for many organizations is that

their ability to adapt to the current market situation is very weak. This is mainly due to the time it takes to adjust, which is often too long. (Christopher & Peck, 2004b.) Turbulent changes can drive supply chains to disruptions that require resilience to adapt (Macdonald & Corsi, 2013). In the event of a disruption, management often seeks to leverage strategies from similar situations in the past (Macdonald & Corsi, 2013). It typically takes a long time for companies to recover from disruptions (Sheffi & Rice Jr, 2005). Organizations with resilience in their operating methods understand their own weaknesses and build resilience, for example, on the basis of organizational experiences (Vogus & Sutcliffe, 2007). By analyzing the effects of past disruption events, decisions can be made that help improve supply chain management (Revilla & Saenz, 2017). Modelling and simulations can be used to find weak points in even complex systems (Linkov et al., 2014).

When dealing with resilience, firm margins, and ability to respond to deviations in different scenarios can be interpreted. The existence of adequate margins increases capabilities to adapt in situations that the organization have not prepared for. (Vogus & Sutcliffe, 2007.) There is rarely a single way to prepare for disruptions (Tomlin, 2006). Different strategies can be developed to respond to disruptions, creating scenarios for situations that allow the organization to respond flexibly to different situations (Macdonald & Corsi, 2013; Tomlin, 2006). Under normal circumstances, so-called spare capacity can prove important to the company in the event of a disruption (Linkov et al., 2020).

Striving to Agility Adaption

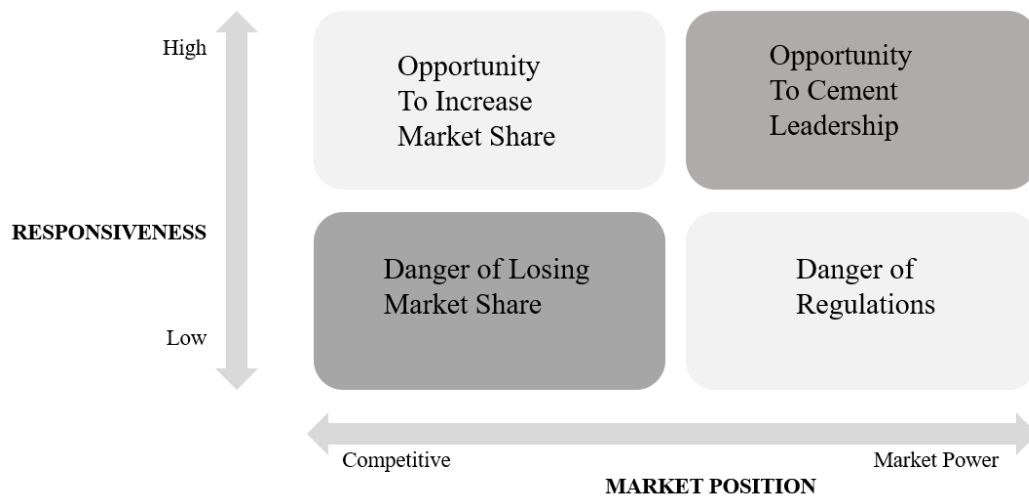


Figure 6. Company Position and Responsiveness (Adapted from Sheffi & Rice Jr, 2005)

In order to operate in dynamic and complex international markets, organizations need to be able respond to changing circumstances with agility (Sukati et al., 2012), fast responsiveness do not only have possibility to save market share but also increase it (Figure 6). In order to function, supply chains need to take into account the robustness of the chain to cope with volatility risks (Wieland & Wallenburg, 2012). The international supply chain flexibility helps coordinate the process, as well as mitigate uncertainties in operations, as well as in the environment (Manuj & Mentzer, 2008). If a company utilizes only one supplier, but strives to minimize risks, it is advisable to choose the most reliable supplier as a priority, but to make back-up agreements in the background, as well as to use spot purchasing (Namdar et al., 2018). Resilience specifically affects the functioning of supply chains, as the complex networks they build are prone to disruptions (Pettit et al., 2010). Companies have begun to take disruptions seriously and take this into account in their supply chain strategy as well (Wagner & Bode, 2008). Companies have sought to improve structural changes to better respond to uncertainty and be more dynamic (Candace et al., 2011).

International supply chains in particular are expected to be increasingly agile to adapt to potential disruptions (Pettit et al., 2019). The complexity of the market requires proactivity in supply chains (Gunasekaran et al., 2015). Supply chain agility has been defined as the ability to respond to the customer, flexibility, integration (Sukati et al., 2012) and speed of the supply chain (Prater et al., 2001). Most of the disruptions affecting supply chains are often recurring and therefore management is able to prepare for them (Linkov et al., 2020). However, there is also possibility for behavior that leads to a disruption situation intentionally. Supply chain stakeholders may intentionally contribute to the disruption. Some intentional ways in which the target company cannot influence its own actions may be products intentionally not supplied by the supplier or intentionally degraded product quality. (DuHadway et al., 2019.) In addition to self-assessment, companies should extend their assessment to the companies operating in the network and to the flexibility of their operations in various exceptional situations (Pettit et al., 2019).

Increasing supply chain resilience implies increasing agility and flexibility (Christopher & Peck, 2004b). Vogus & Sutcliffe (2007) state in their research that responding to sensitive signals and constantly understanding and adapting to the operating image is part of the activities of the resilient organization. In the supply chain, implementing resilience into its strategy can be seen as the proactive risk management to ensure business continuity (Pettit, Fiksel & Croxton, 2010). Large corporate networks are better able to cope and adapt to disruptions (Hearnshaw & Wilson, 2013). The adaptability of organizations explains their resilience (Vogus & Sutcliffe, 2007). Brandon-Jones, Squire, Autry and Petersen (2014) presented, that managers have different views on increasing resilience and robustness in supply chains. As others increase robust to disruption, the strategy of others may be to seek to invest more in the organization's rapid recovery and thereby increase organizational resilience. Unintentional disturbances include natural factors that arise without a separate decision about their occurrence. For example, environmental disasters or economic disruptions occur without unintentional actions, but need to be adapted and prepared for. (DuHadway et al., 2019.) Rapid adjustment or recovery through risk management can be facilitated by a resilience planning (Linkov et al., 2020). In their study, Brandon-Jones, Squire, Autry & Petersen (2014) argue that for small and local

supply chains, the importance of resilience diminishes, and more reliance can be placed on informal risk management and communication.

Example case of unintentional disruption and the need for resilience in supply chains was the 2011 tsunami disaster. The tsunami caused by the earthquake caused great damage and destruction. This caused major disruptions also to supply chains, stopping supply and even productions in Japan. The chain-like effects of the events were widely seen around the world, for example in the form of delivery difficulties. (Revilla & Saenz, 2017.)

Increasing resilience also involves taking the responsible and sustainable perspective into account in business operations, as it is related in part to maintaining business continuity. Responsibility also contributes to the constraints on supply chain flexibility. The relationship between responsibility and the sustainability of supply chains has been studied by Fahimnia, et al. (2018). According to them, a responsible supply chain strategy limits, for example, the number of suppliers, thus negatively affecting supply chain resilience. In their study, Govindan, et al. (2015) address resilience using two variables, which are strategic storage and flexible transportation. For flexible transport, they consider changing the mode of transport, taking advantage of several route options, and multimodal transport. Even if some supply chain functions are inflexible, such as logistics processes, flexibility can be increased, for example, in production, as well as in sourcing processes (Prater et al., 2001).

Unexpected events have historically affected business in many different areas from marketing to production (Linkov et al., 2020). Company leaders have recognized the need for increased resilience in supply chains and markets (Pettit et al., 2019). Strong market players constantly have to prepare for the future developments. The major players in the platform economy have grown rapidly with innovative business models, they need to periodically assess the resilience of their business to adapt to the changing environment (Niemimaa et al., 2019). Golicic et al. (2017) raised three issues in their study that resilience requires. First, they raised the need for innovation and development. Another important issue they considered was the availability of resources and the development of their own capabilities, for example in terms of funding and staffing. Third, they highlighted reliable business relationships.

Companies with weaker networks are more affected by disruptions (Hearnshaw & Wilson, 2013). The complexity of the market is explained by surprising turns in supply and demand when, for example, new competitors enter the market (Golicic et al., 2017).

Flexible Business is Sustainable

Managers with flexible strategies are invaluable to the organization in terms of long-term sustainability (Ledesma, 2014). By guaranteeing the availability of materials and services in the supply chain, as well as the ability to adapt effectively to the changing requirements of purchasing processes, together they form sourcing flexibility. Operational flexibility refers to the ability to adapt the resources utilized by a company to changing needs. (Candace et al., 2011.)

Flexible and sustainable systems pursue similar issues and have similarities in their characteristics. Both strive to understand change and maintain functionality or even improve it. (Linkov et al., 2014.) Green supply chain strategy has even been linked to business continuity (Fahimnia et al., 2018). In line with this view, a green and flexible supply chain management strategy aims at the same thing. However, strategies are not always mutually supportive. Responsible business growth often involves an increase in regulation, which is perceived among companies as a constraint on resources (Fiksel et al., 2014). From this perspective, responsibility undermines the resilience of supply chains. The responsibility and resilience of the supply chain can be developed using the same strategies. One way to greener supply chains is through remanufacturing recovery, where recycled materials can be utilized. A strategy like this can simultaneously increase the availability of materials and thus increase supply chain robustness. (Fahimnia et al., 2018.) Different resource levels play a key role in maintaining a high degree of resilience in a company's operations (Vogus & Sutcliffe, 2007). The risk of changes in demand can be reduced by making production processes flexible (Zsidis, 2003; Lambert et al., 2000).

In an interview study conducted by Abbasi & Nilsson (2016) sums the most common activities of logistics service providers to increase effectiveness and efficiency. In terms of internal resources, the choice of a mode of transport and increasing energy

efficiency were considered to be the key issues. The most important goals among the operators were cost efficiency, fast delivery times and improving environmental responsibility.

Boundaries of Resilience Strategies

When a company is improving flexibility, it also increases the company's costs (Ivanov et al., 2014) and therefore it is always important to determine the level for risk tolerance of a company (Manuj & Mentzer, 2008). Making investments to improve resilience involves a great deal of uncertainty, because rational choices cannot be made for investment decisions. In order to make an investment decision, there is not enough information about the effects it can protect against. (Waters, 2011, p. 21-30.) Supply chain management focuses on identifying the benefits of the total cost. By saving costs, funds can be invested, for example, in the development and research of operations or more competitive prices can be maintained. (Cooper & Ellram, 1993.) Therefore, the level of resilience should also strive to optimize the level of actions when planning its cost generation. (Ivanov et al., 2014.) From a managers' perspective, the problem of making investments to improve resilience is not found to be sufficient incentives when disruptive events may not be expected. Resilience improving supply chain strategies have been divided into proactive and reactive. (Tukamuhabwa et al., 2015.) It is difficult to assess risk effectiveness before they become reality. Risk might be identified in management, but data may not be available, for example on a comparable situation of disruption. (Fiksel et al., 2014.) In addition to financial preparedness, flexibility can also be increased for example, with relational abilities (Vogus & Sutcliffe, 2007). In Giunipero et al. (2006) study, managers pointed out that long-term collaborations had had a declining effect on costs as processes became more efficient. When information can be better shared in supply chains, it can reduce uncertainty between different actors (Christopher & Peck, 2004b). Maintaining long-term relationships have been found to be key to increasing customer value creation (Giunipero et al., 2006).

Companies do not want to invest in flexibility if relevant data on its benefits is not available (Tang & Tomlin, 2008). From the risk management point of view, the most important task remains to implement the desired cost savings and to coordinate the

achievement of profitability targets. For this reason, risks are often sought to be identified only when they are found to have an impact on returns. (Manuj & Mentzer, 2008.) However, cost savings can be a problem if a company does not have a long-term strategy (Gunasekaran et al., 2015). The complex environment of the supply chain requires a resilience strategy from operational management (Candace et al., 2011).

Vogus & Sutcliffe (2007) state in their research that responding in sensitive signals and constantly understanding and adapting to the operating image is part of the activities of the resilient organization. The challenge of creating resilience is the cost of being flexible in the short term. Having backup resources can be seen as an unnecessary increase of costs. Alternative suppliers, emergency stocks and other alternative options which improve resilience are a major cost. (Sheffi & Rice Jr, 2005.) The return on investment for resilience is difficult to measure because a resilient company may not understand the effects it has been able to avoid with resilience (Pettit et al., 2019). Managers try to avoid making poorly justified investments because they have an impact on the price of the final product. Consumers of final products are very price sensitive, which has increased their strength in their market. Supply chain decisions have an impact on the choices made by the customer, but due to price sensitivity, the customer's market power is greater. (Golicic et al., 2017.) Govindan et al. (2015) argue that a resilience strategy is not the most cost-effective option. Management should take broadly into account the benefits and disadvantages of risk management for the company's operations (Manuj & Mentzer, 2008).

METHODOLOGY

This part of the research shows the methods and evaluates the used data. The section presents the research data collection methods, the subjects of the survey and their selection, and evaluates the qualitatively collected data.

Research Methods

This study has been carried out as targeted a questionnaire survey. The survey is organized in such a way that its results can be analyzed with the previous theoretical background. Qualitative research can be used to better understand a person's condition in different situations and to understand perceived situations (Bengtsson, 2016). The qualitative research methodology was chosen for this research because it enables us to obtain different views on supply chain phenomena from key personnel in organizations. By combining the two survey methods, a more detailed analysis of the respondents' responses can be made. The responses obtained through the qualitative study are descriptive (Bengtsson, 2016), which also aims to highlight the concrete ways used to improve resilience in this study. Qualitative analysis has been performed for the Likert Scale responses and an open questions section. The structure of the questions has been strongly influenced by the research data of the theoretical part of the research.

The implementation of the study is qualitative survey, which aims to obtain comparable material for the most important findings in the literature related to the topic. Tukamuhabwa et al. (2015) research revealed that supply chain resilience has been studied mostly theoretically, as well as by modeling. However, case studies and survey forms have been less conducted (Tukamuhabwa et al., 2015). This is the reason why this research focuses on survey study. Also, qualitative surveys aim to find out the perceptions of different people and to combine these phenomena.

Data Collection

The literature of the theoretical part has been utilized as the basis of the interview questions, the main database sources of which are: ProQuest, Emerald Journals,

Science Direct and EBSCOhost. The literature has been used in the analysis of survey data and findings.

In order to implement the empirical part, material has been compiled using a questionnaire survey. 30 people from large and medium-sized companies working in key supply chains have been identified to complete the questionnaire. However, this survey eventually received 7/30 responses, generating a response rate of 23.3%. The respondents for the questionnaire were selected on the basis of their position and that they play a significant role in the operation of their organizations' supply chains. Tasks like this include managing collaborations, coordinating, managing, or expertise. The background research of the individuals and organizations were selected by utilizing the information found on LinkedIn, which were verified from the organizations' own websites.

The survey was built into Google Forms. The answers were collected both in Finnish and English. Respondents were carefully selected based on their background and experience. For this reason, efforts have been made to reach the participants of the study through personal messages. The research was conducted anonymously in order to preserve company-specific secrets. The aim of the survey is to increase the implementation of the main themes of the research on a practical level, and to bring out possible new perspectives. The quality and suitability of the answers will be critically assessed.

In order to understand the background and organizational position of the individuals, basic information is collected from them at the beginning of the study. The response form consists of sections A and B. Section A includes 16 statements and section B includes three open questions. Statements in A section is based on the Likert scale evaluation scorecard. The respondent also always had the opportunity to comment or justify their own answers in each statement. The B section includes three open questions.

Data Analysis

Based on the data, the aim is to create a more accurate understanding of the dynamics of the supply chain network. In addition, the results of the questionnaire can be used to identify similarities in responses, thus constructing an image of relationship structures. Based on the responses, the aim is to find out together with the previous literature possibilities to improve resilience. The aim is to examine the analysis also from a critical point of view. This means that results are also evaluated from the perspective of is it possible or profitable to implement the most resilient strategy.

Empirical data material consists of seven respondents to the survey. It is essential for the research to find similarities and differences in the answers of the individuals. The results of the survey highlight the features of supply chains that have become central and seek to examine them using the research literature. The material is subject to qualitative evaluation. The literature is used to support the evaluation.

The survey was carried out using Likert Scale method and open questions. Respondents were asked to select the closest option based on their own experience and current organization. Options have been created between the numbers one and five (strongly disagree 1, disagree 2, undecided 3, agree 4, and strongly agree 5). The values can be used to make simplified observations of the group's main directions of response. An average from the responses has been created, which can be used to interpret the directions in the statement analysis.

In order to get a better overall picture, respondents have been given the opportunity to supplement their numerical response by commenting or justifying their response. These arguments and comments are analyzed along with the open responses in the qualitative review section. The analysis of the answers utilizes the previous theory.

Because the study focuses on improving resilience from the perspective of strategic supply chain management, respondents to the survey are not limited by industry. As the study previously pointed out, supply chain networks are very complex (Golicic et al., 2017; Ivanov et al., 2014; Surana et al., 2005) and often require very different types of organizations to operate internationally. However, it is essential for the study that

the respondents have an idea of their position in the supply chain, which has been outlined in the background question section. Risks can arise from the organization, the industry or from external factors (Rao & Goldsby, 2009). To narrow the research topic of this study, the research focuses on looking at the interactions and dependencies of organizations. This study excludes industry risk analysis.

Description of the Respondents

For the survey, seven respondents were reached using a targeted method, each respondent working in a different organization. The respondents' organizations are large or medium-sized companies. Their industries vary, but their roles and responsibilities play a significant role in managing each supply chain. Their roles in supply chains varied, creating a perspective for research on different stages of the supply chain. What is significant for the research is that every organization is directly or indirectly part of the international supply chain. Table 1 presents a summarized form with the background information of those who participated in the study.

	Title	Industry	Position In SC	Internationality of SC
1.	Import Logistics Specialist	Technology	Manufacturer	Yes
2.	Sales Manager	Wood	Manufacturer, Distributor	Yes
3.	Head of Business Partners	Chemistry	Retailer, Distributor, Manufacturer	Yes
4.	Supply Chain Development Manager	Grocery	Producer / Manufacturer	Yes
5.	Supply Chain Planner	Grocery	Retailer	Yes
6.	Supply Chain Manager	Grocery	Retailer	Yes

7.	Unknown	Energy	Support organization	Yes
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Number of respondents is 7 (n= 7). The table describes respondents job title, industry of the organization, position in supply chain and internationality of the supply chain.

Table 1. Background of the Respondents

1. The organization of the first respondent in the survey operates in the field of technology industry that manufactures dental equipment. The role of a key person is based on product manufacturing purchases around the world. The products are produced in Finland. The person describes in the survey that 95% of the production is exported abroad.
2. The second respondent works in a wood industry company. The organization operates as a raw material manufacturer and supplier to domestic and international customers. The role of the person in the supply chain is the sales manager.
3. A third organization in the study handles collaborative relationships in supply chains. Organization operates in the chemical industry as a raw material manufacturer, distributor, and retailer. Their company is part of international supply chains. The person is responsible of the indirect materials and services in the company.
4. The fourth organization which participate in the study is the role of supply chain development manager. Respondent of organization operates in the food sector mainly in the role of producer / manufacturer. The respondent's organization is part of international supply chains. The person describes the role of his organization as significant from the customer's point of view in the Finnish domestic market. The person describes the rhythm of his supply chain in answers as short. In the description of the position, the person highlights

how the effects caused by the changes in logistics and production are visible to the customer.

5. The fifth company also plays a significant role at an international level and is directly and indirectly part of numerous international supply chains. The role of the key person in the supply chain is the supply chain designer. The organization mainly acts as a buyer for the products it retails in the Finnish market. The main products of the organization include groceries.
6. The sixth organization operates in retail and the person's role is supply chain manager. Client companies include various international food and other daily consumer goods manufacturing companies. The main products of the organization include groceries.
7. The seventh acts as a support organization in the supply chain by providing energy services to its customer companies. The person did not want to present her title in the actual study, but the person is responsible of contractual supervision with customer companies.

EMPIRICAL EVIDENCE

This section reviews the themes that have become central from the survey results and analyzes the differences and similarities between the responses. The aim is to find matching themes in the answers.

Likert Scale Questions

Table 2 summarizes the responses to the statement of objections by percentage. In addition, the average of the Likert scale results can be used to make a reflection on the main weight of the responses. For example, in argument number 15, the answers are found to be clearly between 4-5 (agree / strongly agree). In conclusion from the responses, we can state that 100% of the respondents agree or almost agree that supply chain resilience is part of risk management.

Likert scale questionnaire is performed on a five-step order scale. The sample of the study is seven respondents (n=7). The variance of the responses is calculated in the table as a percentage. The combined values of the rows in the table can be more than 100% in some situations, due to rounding values.

The results have been averaged. The average of the measured result may be increased by the choices made in step 3 (undecided) if, for example, the person has not understood the question or wanted to take a stance on it. Due to the small sample size, it has been desired to include these results in the analysis phase. It is challenging to draw clear conclusions from the analysis, but the results can be used to evaluate indicative results.

n=7	Statements	Strongly Disagree (1)	Disagree(2)	Undecided (3)	Agree (4)	Strongly Agree (5)	Average (1-5)
1.	Cooperations in supply chains are flexible.	0,0 %	42,9 %	0,0 %	57,1 %	0,0 %	3,142
2.	The operations of our supply chains are flexible in the short term.	0,0 %	57,1 %	0,0 %	28,6 %	14,3 %	3,001
3.	The operations of our supply chains are flexible in the long term.	0,0 %	14,3 %	28,6 %	42,9 %	14,3 %	3,575
4.	The demand for the products / services that we sell and the changes in it are very predictable.	0,0 %	57,1 %	0,0 %	42,9 %	0,0 %	2,858
5.	The supply of products / services we purchase and the changes that take place in it are very predictable.	0,0 %	14,3 %	14,3 %	57,1 %	14,3 %	3,714
6.	The activities of companies indirectly involved in our supply chain are highly predictable.	0,0 %	57,1 %	14,3 %	14,3 %	14,3 %	2,858
7.	We plan our operations together with other supply chain organizations.	14,3 %	14,3 %	0,0 %	57,1 %	14,3 %	3,428
8.	Information about disruptions flows well between supply chain organizations.	0,0 %	14,3 %	14,3 %	57,1 %	14,3 %	3,714
9.	Communication between supply chain organizations is open.	0,0 %	57,1 %	0,0 %	42,9 %	0,0 %	2,858
10.	Increased competition in the market has encouraged companies to take greater risks.	0,0 %	28,6 %	14,3 %	57,1 %	0,0 %	3,285
11.	The internationalization of supply chains increases risks.	0,0 %	0,0 %	14,3 %	28,6 %	57,1 %	4,428
12.	We are well acquainted with the companies indirectly involved in our company's supply chains.	0,0 %	28,6 %	14,3 %	14,3 %	42,9 %	3,718
13.	Increasing resilience in supply chains is considered to be challenging.	0,0 %	14,3 %	14,3 %	42,9 %	28,6 %	3,861
14.	Resilience is considered as an important element of the strategy in supply chains.	0,0 %	14,3 %	14,3 %	42,9 %	28,6 %	3,861
15.	Supply chain resilience is part of the risk management.	0,0 %	0,0 %	0,0 %	71,4 %	28,6 %	4,286
16.	Disruptions in the supply chains are often predictable.	0,0 %	71,4 %	0,0 %	28,6 %	0,0 %	2,572

Table presents the statements used in the questionnaire (16 statements), which were answered by 7 people (n = 7). The table illustrates the distribution of respondents in the questions, with the average of the Likert scale answers on the right.

Table 2. Distribution of Likert Scale Responses

Among the respondents, a few key themes emerged. In particular, the following points emerged from the experts' responses.

Qualitative Analysis

This section reviews the respondents' responses in the survey. This analysis raises the key themes that arise from the participants' responses that are consistent with other respondents.

A-section: Statements

Statements 1-3: Flexibility in Supply Chains

- *Cooperation in supply chains is flexible.*
- *The operations of our supply chains are flexible in the short term.*
- *The operations of our supply chains are flexible in the long term.*

In the survey 42,9 % of the respondents argue that their cooperation in the supply chain is somehow flexible and 57,1 % of the participants stated that their cooperation is not flexible. However, each respondent felt that flexibility in supply chains was important. Some of the responses indicated that their co-operation in the direction of sales is flexible, but there is no flexibility in procurement.

In the survey 57,1% of respondents stressed that short-term flexibility is challenging, but some of respondents considered the supply chain to be more flexible in the longer term. Short delivery times and distances have been considered to have a positive effect on the flexibility of cooperation. As indicated by the survey responses, in the Finnish market supplier relationships have often been seen as flexible, but this is significantly affected by the physical location of the organizations. Another negative factor which is argued to have a negative impact on supply chains is long delivery times.

The flexibility of co-operation has been negatively affected by cultural policy reasons, as well as the fact that organizations operate symbolically in their "own silos". A few of the respondents argued that international co-operation affects negatively on flexibility of the supply chains. One of the respondents describes the relations in the following way: "there is less flexibility with international suppliers, and the farther the

supplier is, the more inflexible the co-operation is” (Respondent 5). One of the respondents estimates that international partners are more reluctant to make changes, but instead it is international actors that receive the most requests for change. This means that international partners are required to be more flexible. One identifies cultural and linguistic differences as a challenge for international actors.

Statements 4-6: Predictability of Operations

- *The demand for the products / services that we sell and the changes in it are very predictable.*
- *The supply of products / services we purchase and the changes that take place in it are very predictable.*
- *The activities of companies indirectly involved in our supply chain are highly predictable.*

Both the demand and supply responses contained very similar features. Respondents' opinions about the predictability of their products / services sales were divided almost evenly to “disagree” and “agree” (57,1 % / 42,9 %). The predictability of an organization’s purchases was better than predicting and comparing the sales of its own products or services in the results of the study. To support predictability, organizations have made seasonal charts that have been used to make comparisons based on sales from previous years. The variability in demand is very product specific. The responses also highlighted the convergence of supply chains. Competitor organizations have become chained, which has seen as intensified competition. Contracts have become bigger and winning them plays an important role.

Negative effects on the predictability of supply and demand have also been seen in the pandemic, as well as in climate change. The biggest effects of these are reflected in supply chains through changed legislation. Short production interruptions from suppliers often occur, with one respondent citing the blockage of the Suez Canal (2021) as an example. The speed of reporting incidents has been estimated to be very supplier specific. However, a slight majority of respondents (57,1%) indicated that the activities of companies indirectly involved in their supply chain are unpredictable.

Several of the respondents argued that they have no visibility of any kind for the actions of indirect actors. One of the respondents stated that changes in indirect suppliers are visible from time to time, but their changes are very difficult to predict.

Statements 7-9: Communication in Supply Chain Network

- *We plan our operations together with other supply chain organizations.*
- *Information about disruptions flows well between supply chain organizations.*
- *Communication between supply chain organizations is open.*

In the survey 14,3% strongly agree and 57,1 % agree with the statement that their organizations plan their activities together with other supply chain organizations. The same percentages of respondents agreed on the good quality of the information flow at the time of the disruption. One of the respondents argues that they largely retain decision-making because the company is privately owned. The person in the retail organization characterizes that they have strong working relationships with stakeholders, and they closely monitor deliveries. One of the respondents presents that their management system is designed in such a way that information is well communicated between different organizations.

Even though the information about disruptions was seen to be good in general, it was felt that communication between supply chain organizations is normally not strong enough. In the survey 57,1% felt that there was room for improvement in communication between the parties. Joint planning has been considered to take place mostly in the long run. The communication challenges between companies are especially emphasized with international actors.

Factors that were mentioned to have an improving affect on visibility among the respondents included long-term relationships, as well as supplier relationships responsible for high-volume distributions.

Statements 10-11: The Risk in Supply Chain Network

- *The Increased competition in the market has encouraged companies to take greater risks.*
- *The internationalization of supply chains increases risks.*

Majority of the respondents (57,1 %) answered that increased competition has encouraged companies to take more risks. According to one respondent, the risks taken by their organization are qualitative or related to lengths of delivery times. Several respondents noted an increase in risk-taking.

In the survey 57,1 % of the respondents strongly agree and 28,6 % raised that internationality has increased risks in the supply chains. Most of the participants also thought that number of actors in the supply chains has increased due to internationalization. Several respondents mentioned that internationalization increases the risks, especially in transport, which may include variations in delivery time. Another mentioned factor was country-specific conditions. These are affected by combinations of different modes of transport, weather conditions and sudden changes, such as the effects of a pandemic.

The Statement 12: Knowledge of the Supply Chain Network

- *We are well acquainted with the companies indirectly involved in our company's supply chains.*

Respondents' views on the claim varied widely, which may have been influenced by the different industries of the companies. Most of the respondents state that they are familiar with organizations which are operating indirectly in their supply chains. In practice, this means, for example, that companies know the organizations that act as the producers of the raw materials for their suppliers. One argues that their company only knows the organizations that work directly with them, but not the subcontractor companies. Weakened knowledge of the parties is affected by selling through dealers or subsidiaries in an organization, even if the respondent's organization seeks to purchase their own products / services from reliable and long-term operators.

Statements 13-15: Resilience in Supply Chains

- *Increasing resilience in supply chains considered being challenging.*
- *Resilience is considered as an important element of the strategy in supply chains.*
- *Supply chain resilience is part of the risk management.*

Most of the respondents answered that they agree (42,9 %) or strongly agree (28,6 %) with the statement: *Increasing resilience in supply chains is considered being challenging*. Increasing resilience requires joint action by several different actors. The challenge is that some may experience their own operations as very stable while others do not. Therefore, common interests do not meet. One argues that exceptions and disruptions can be prepared for through risk analyzes and action plans.

Resilience has been seen by most respondents (42,9 % agree, 28,6 % strongly agree) as an important strategic element. Two of the respondents argued that, for example, the current pandemic situation (Covid-19) has highlighted the importance of resilience (Respondents 1 & 3). One respondent says resilience is negatively affected by their organization's conservative leadership style, which does not include long-term planning for the future (Respondent 1).

Each of the respondents agreed (71,4 %) or strongly agreed (28,6 %) that resilience is part of an organization's risk management. One has justified his response in such a way that resilience can be used to influence the amount of risk taken. Another says the analysis in their organization has improved, which has had a positive effect on the increase in resilience.

Statement 16: Predictability of Disturbances

- *Disruptions in the supply chains are often predictable.*

Most of the respondents (71,4 %) stated that predicting for disruptions is challenging and that they often come as a surprise. One of the respondents mentions poorly

predictable disturbances to be for example production disturbances due to suppliers, while more unpredictable disturbances include disturbances formed by negative events such as bad weather conditions (Respondent 5). Another respondent commented that they have recently been affected by disruptions caused by Brexit and the blockage of the Suez Canal.

B-section: The Open Questions

Question 1: Predictability: *What factors do you think will improve the predictability of supply / demand changes in supply chains?*

Predictability in this context refers to the ability to make high-quality predictions about future changes in order to be able to adapt to these changes.

Among the respondents, several similar answers emerged. The resilience-enhancing factor which was most often mentioned is effective communication throughout the supply chain. More than half of the respondents stated that an open flow of information in supply chains improves the supply chain operations. It was also pointed out from the statements part that communication in supply chains was not perceived as open to the majority (statement 9).

The second most important factor in improving resilience that emerged in the survey was strong strategic partnerships. These strategic partnerships include cooperation with suppliers and customer firms, but also established stakeholder relations. The actions of all members of the supply chain were also not predictable based on the allegations, but even the majority said they were making plans in collaboration with other parties.

In the open section, participants in the survey mentioned that predictability could be improved and thus better prepared for future changes. Improvement in predictability of purchases was particularly hoped for by those whose company's supply chain included so-called "risk countries", as exemplified by respondent 7 example, which was China. According to respondents, ways to improve predictability are needed to improve market knowledge. Areas include consumer behavior, financing decisions,

policy decisions, and industry changes. In particular trends should be identified, and their potential impact on demand. Respondents argued that better demand-supply analyzes could improve resilience. For example, the analysis should be performed on the basis of actual sales and forecasts. The use of common data by supply chain members, which several respondents felt should be added, was seen as having a positive effect on the analysis. This type of data could include timely reporting, risk communication and preparedness. Reporting should be clear between the parties and easier to access (survey).

Question 2: Flexibility: *How would you concretely describe the flexibility of supply chains and how do you think it could be improved?*

Flexibility in this context refers to a situation where an organization must take advantage of resilience in the event of a sudden disruption.

Operational supply chain flexibility is clearly seen to be different among different actors. One argues that flexible supply chain tolerates product design changes, as well as fluctuations in the demand. Another respondent sees that identifying the limits of flexibility in their own activities is important so that there is possibility to know in which frameworks one can be flexible without a separate decision. According to several respondents, flexibility and adaptability were weakened precisely by bureaucracy, in other words the freedom to make exceptions.

Open communication was seen as a concrete way to improve flexibility. The need for change must be discussed more openly and work towards a common state of mind. Also in this section, the lack of communication about the disturbances was highlighted. Stakeholders were also expected to be flexible when there is a particular need for it.

Representatives of several organizations mentioned that supply chain flexibility would be improved if products / services were purchased from a supplier that would be physically closer. Many disruptions have been affected by international factors and long delivery distances. According to one respondent, delivery difficulties could also be affected by a rapid change of carrier.

Other key themes that emerged were the strong co-operation relationships that had already emerged in previous responses, market predictability, and transparency of information.

Question 3: Ways to Improve Preparedness: *How could your organization and potential partner organizations prepare for supply chain disruptions?*

In this context, preparedness refers to the organization's concrete means of preparing for future changes.

Respondents suggested that both their own organization and partner organizations could form better strategic partnerships, improve communication between actors, and make joint back-up plans.

The responses of many respondents were very product oriented. To ensure the availability of products and materials, and the factors that improved resilience were mentioned to be safety stocks, substitute products, and alternative producers. The availability of products was seen to be positively affected by the possibility to make purchases in a decentralized manner, for example from different countries.

From an operational point of view, flexibility was seen to be improved by the a fore mentioned capability to switch logistic actor or supplier. In addition, it was seen necessary to make so-called simulations of the operations, in which the ability to respond to various disturbances could be modeled. It was considered beneficial for the operations to create alternative ways to perform them in the event of disturbances. The strategy should also be constantly adapted to market developments.

FINDINGS

This part will discuss about survey findings and find connections between previous theoretical findings. As the previous literature findings showed in the theoretical part, it was also proved in the survey results that supply chains have become more complex and their operations are more unpredictable. The study found that a large proportion of respondents considered resilience as a means of risk management. Although resilience cannot be considered as a traditional risk management method (Pettit et al., 2010). Instead of incorporating corporate resilience thinking into corporate strategy, it is often outsourced to risk management, a similar actor, or insurance professionals, for example. Resilience should therefore be seen as a factor of increasing competitiveness. (Sheffi & Rice Jr, 2005.) The effects of endogenous disruptions on stakeholders outside the organization are greater and may negatively affect relationships inside the network. At worst, strong signals can weaken negotiating power, lead to weaker demand, and lower corporate value. (DuHadway et al., 2019.)

Figure 7 sums the common strategical methods which questionnaire participants found to be important to improve resilience in international supply chain management.

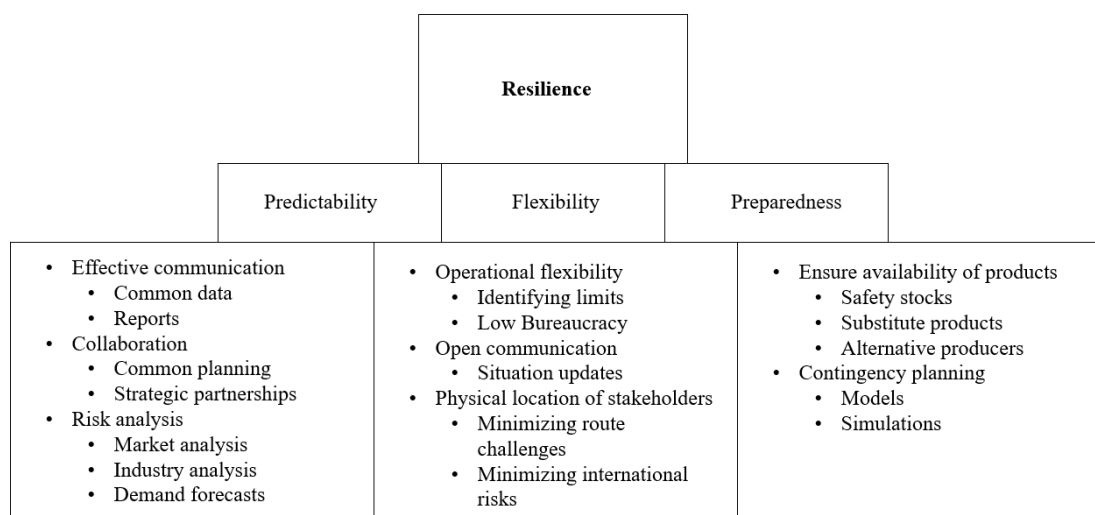


Figure 7. Survey Insights

Figure 7 shows the most common dimensions that emerged from the survey. The key phenomena that emerged as the main findings of this study have been already significantly highlighted and these are risk analysis, risk preparedness, cooperation, visibility, proactive and reactive strategies, which will be examined in more detail below.

Preparing for Potential Future Threats

According to the survey dimension, organizations saw that product/service purchases are more predictable than their own sales, this is affected by their flexible possibilities in production (survey). Due to the limited time available the supply chain management needs to carefully assess which parts of the supply chain it pays special attention to. At the heart of the evaluation are typically companies that play a key role for their own business. (Lambert et al., 2000.) From this point of view, organizations need to be more capable to adapt in demand changes. Operational supply chain disruption monitoring can be used to find anomalous behavior at other levels of the supply chain (Munoz & Dunbar, 2015). Resilience in management through risk analysis aims to form an understanding of potential threats and to make assessments of their various impacts (Linkov et al., 2014). The problem is that data used internally within the organization is often used to identify problems. To support the identification of risks, participants in the survey highlighted more accurate reporting from outside the organization. The business model should strive to create resilience by understanding its potential challenges (Niemimaa et al., 2019). Already many companies have increasingly begun to invest in business continuity planning (Sheffi & Rice Jr, 2005), but as the survey results pointed out for example, the covid pandemic has also reminded organizations of their ability to adapt to exceptional situations.

When preparing for risks, the organization must continuously monitor processes and control risks (Ivanov et al., 2014). When a disruption occurs, new forecasts are needed to support management, even daily or weekly. Longer-term supply chain planning is usually done on a monthly, quarterly, or annual basis. (Nikolopoulos et al., 2021.) It is understandable that smaller companies do not implement a supply chain management strategy that is as active as those used by large companies (Revilla & Saenz, 2017).

Most of the respondents in the survey saw resilience as part of risk management. Pettit et al. (2019) suggest ways to support leadership in disruptions management to increase resilience. They argue that traditional risk management is outdated. According to them, instead of trying to adapt to emergency situations, organizations should create indicators that could be used to identify signals of the possibility of disruptions. Due to the complex drivers based on disruptions, there should be indicators internally and externally. Internal indicators could be based on own capacities and products, while external indicators could take into account the business environment, such as policy decisions and resource availability. To ensure a safe and continuous business, planning and collaboration between buyers and suppliers is recommended as a supply chain management strategy. Managers should play an active role in making sure that supply chain management and risk management disciplines evolve together. (Revilla & Saenz, 2017.) Individuals from the organizations involved in the study also agreed that planning with the parties is important for both parties. By reacting to predictive signals, one can prepare for future disturbances. For example, a situation where there is increasing risk of labor disputes, the situation can be mitigated by temporarily increasing the amount of emergency stocks. (Tomlin, 2006.) The problem with complex supply chains is that many suppliers do not receive current information about possible disruptions in supply chains. The importance of giving warning signals to partners is significant in terms of resilience. (Namdar et al., 2018.)

Strategic relationships emerged as one of the factors that improved predictability. In order to lead supply chain operations in the desired direction, it requires careful planning and control of operations by management (Lambert et al., 2000). One possible tactic to mitigate supply chain disruptions is contingent rerouting. The tactic is possible if the company's relationship network includes reliable suppliers with opportunities to increase processing capacity and thus making its production volume flexible. This type of strategic partnerships has been studied to reduce the costs of the company. (Tomlin, 2006.)

Proactive and Reactive Adaption

The effects of a pandemic can be seen in changes in supply and demand in the supply chain (Nikolopoulos et al., 2021), which was also highlighted in the responses to the

study. Covid-19 has highlighted the companies' weak resilience, which emerged from the survey. The resilience requires reactivity, but its ability to adapt also requires proactivity. Sometimes actions require the involvement of other supply chain members. (Golicic et al., 2017.) Spot purchasing and multiple sourcing are types of reactive strategies to increase resilience (Namdar et al., 2018). An aggressive flexible strategy may not be only adaptable to changing situations but be also used for new opportunities and initiatives (Candace et al., 2011). Both agile the adaptability to changing market and long-term robustness for future threats together increase the performance of a business, and also improve the value for customers (Wieland & Wallenburg, 2012). A reactive supply chain management plan may include various supply chain route choices or the utilization of alternative suppliers. In the reactive phase, the implementation of actions must take place quickly so that the organization and its network can avoid longer-term negative impacts. (Ivanov et al., 2014.) Namdar et al. (2018) argue in their study that choices of sourcing strategies play a major role in improving resilience in the event of a potential disruption. They name coping sourcing strategies as single and multiple sourcing, backup supplier contracts and spot purchasing. Also, researchers highlight collaboration and visibility as factors that improve resilience. According to the survey, corporate risk-taking has been seen as a growing phenomenon. While single sourcing can be a cost-effective and attractive solution from a management perspective, from a resilience perspective, it increases risks. In order to increase resilience and improve continuity in the supply chain, it is worthwhile to utilize more suppliers (Christopher & Peck, 2004b). Single sourcing means that there is only one supplier for a manufacturer, which increases the risk of disruption in the supply chain (Namdar et al., 2018).

The respondents highlighted as a decreasing factor of resilience the inflexible rights of employees to make changes to processes. When decisions can be made at the discretion of the company within the framework of the company's policy, the flexibility of processes can be improved (Stank et al., 2001). The challenge of supply chain management is to build more resilient supply chains (Christopher & Peck, 2004b). Changes in one supply chain variable can be reflected throughout the supply chain, which is called rippling performance. Indirectly affecting supply chain challenges are important to identify for tackling the problem. (Ivanov et al., 2014.) Supply chain agility refers to the unpredictability of the market and its ability to adapt to rapid

changes (Christopher & Peck, 2004b). For example, the limited rights of staff to make flexible decisions were seen as a challenge to adapt to the suddenly changed market situation during the Covid-19 pandemic and the Suez Canal blockage (survey). Rules, procedures, and systems are important parts for controlling processes (Christopher & Peck, 2004b), but in order for organizations to remain competitive after disruptive situations, they must strive to adapt quickly to the situation (Munoz & Dunbar, 2015). Disruption recovery is typically the longest level at which an effort is made to restore an organization to normal levels (Ivanov et al., 2014). Integrating new principles and methods into the strategy will help leverage resilience as part of value chain thinking. When an organization faces an unexpected and long-term change, such as a global pandemic, risk management alone is not enough to provide the necessary security for the company and its operations. (Linkov et al., 2020.)

Collaboration Between the Firms

One of the key dimensions raised in the survey was collaboration with the supply chain parties. According to the respondents, maintaining a working relationship requires trust, which requires timely information, communication, and reporting on changes. Supply chains require cooperation between companies in order to function. Increasing collaboration within supply chains can also mitigate risk. Resilience is enhanced by collaborative relationships, as well as information transparency. (Christopher & Peck, 2004b.) Methods to increase collaboration between companies suggested by Stank et al., (2001) are empowerment and cross-functional work teams. Using precise plans made in collaboration with the relevant partners, helps to develop strategies that benefit all parties (Revilla & Saenz, 2017). Long-term relationships benefit both parties from the perspectives of employees and organizations as a whole. Long-term bonds require a bond of allegiance to be born. (McAfee et al., 2002.) There are systems and tools for sharing information, but sharing information becomes essential for stakeholders. To build collaboration, common information management through enterprise resource planning (ERP) systems are required. (Gunasekaran et al., 2015.) Cooperation and visibility between the buyer and the supplier improve disruption preparedness and recovery (Namdar et al., 2018). Cross-border cooperation has also improved companies' broader risk management capabilities (Brandon-Jones et al., 2014). In their study, Abbasi and Nilsson (2016) present that the Scandinavian

countries have a good logistical infrastructure, because they see co-operation between organizations to be strong in the region. Companies are increasingly forming long-lasting and stronger supplier relationships (Christopher & Lee, 2004a). Supplier risks can be decreased by multiple sourcing, if one supplier faces problems, there is opportunity to use another (Waters, 2011, p. 8). This tactic was also raised in the survey where respondent 6 considered the rapid switching of logistic actors as a good thing, in which flexibility in schedules and activities in general was used as justification. The importance of long-term partnerships is emphasized in increasing customer value (Cox, 1999).

Getting to the schedules required by the customer is an important part of supply chain management (Lambert et al., 2000). When making supplier choices, it is reliable to prefer suppliers who have volume flexibility. The capacity of suppliers can play a key role in adapting to a disruption. (Tomlin, 2006.) The supply chain consists of different companies that are dependent on each other and on each other's actions (Sheffi & Rice Jr, 2005). Relationships between different actors should be through different levels of the supply chain (Cox, 1999). When the relationship between suppliers and buyers is open, they operate in a mutually visible relationship, they are able to streamline supply chain operations and risk coordination (Revilla & Saenz, 2017). If supply chain member organizations have a similar management style and culture, it is easier to develop common practices (Mentzer et al., 2001).

Visibility in Operations

In the survey organizational quality of communication varied among actors, which may have had an impact on, for example, organizational sectors. However, poor communication from customer companies came to the fore more often among the respondents. Information sharing must take place in both upstream and downstream (Kaipia, 2009). There are also past findings that the strategic flow of information between purchase and sales organizations improves their performance from the perspective of both parties. (Klein & Rai, 2009). As companies no longer operate only locally, supply chain management needs to make the planning more transparent with the network (Brandon-Jones et al., 2014). Information of the risk sources which have negative effects to performance could be used to improve supply chain flexibility

(Colicchia et al., 2010). Multiple business areas of supply chains form information for utilization, such as planning, designing, sales and distribution (Auramo et al., 2005). As in the Peck and Christopher (2003) figure 2, these risks are network risk sources and then external, which makes preparing for them more difficult (Gunasekaran et al., 2015). Sharing useful information between partners in the supply chain helps to improve supply chain management (Cooper & Ellram, 1993). Regardless of the company's internationality, delivery times or number of suppliers, increasing visibility is an opportunity to invest in resilience (Brandon-Jones et al., 2014). Visible activities provide partner organizations with information that allows them to prepare for various changes (Namdar et al., 2018). As shown in the theory section in figure 2, a lack of visibility also leads to a lack of trust in the supply chain. It has been typical of risk management that functions take place within the organization, without taking stakeholders into account (Revilla & Saenz, 2017). The boundaries for an organization can be set due to, for example proprietors or contracts. Set boundary criteria may set clear dividing lines between the organization and its environment, which for example makes it difficult to improve communication. (Håkansson & Snehota, 1989). Open communication, coordination and cooperation increase the trust experienced between stakeholders (Revilla & Saenz, 2017). If the uncertainty faced by an organization towards other actors decreases, it can have a concrete effect on emergency stocks by lowering the levels (Cooper & Ellram, 1993) and thus more efficient use of capital. Information sharing increases decision-making capacity of supply chain parties and reduces nervousness in supply chain planning (Kaipia, 2009).

The benefits of good corporate relationships can be seen in terms of risk-sharing and reward-sharing on both sides. Such relationships are increasingly being formed, for example, between buyers and suppliers. (Giunipero et al., 2006.) By making better information flows in other words by increasing visibility, a supply chain has the opportunity to streamline material flows (Christopher & Lee, 2004a). The study strongly highlighted that flexibility was not found with international actors as much as with local domestic actors. The visibility of companies' operations in supply chains makes it easier to detect bottlenecks and anticipate disruptions and risks (Brandon-Jones et al., 2014). Key factor of a customer-centric strategy is a fast and accurate flow of information. This allows you to react quickly to changes in customer demand and try to control the uncertainty it creates. (Lambert, et al., 2000). Revilla and Saenz

(2017) pointed out in their study that individual-driven opportunistic thinking may jeopardize the resilience capability of the entire supply chain. The optimal situation would be one in which each part of the supply chain would have full awareness of the variability in supply and demand of other factors and thus the ability to adapt to change. Due the lack of shared information, most organizations operate based on forecasts rather than on actual demand. As communication between organizations within the supply chain improves, it can influence the scheduling of production and purchases. (Christopher & Peck, 2004b). The visibility of supply chain actors can be concretely increased, for example, by sharing data on inventory situations (Brandon-Jones et al., 2014). Christopher & Lee's (2004a) focus their research on supply chain risk shapers in mutual confidence. They recognize that lack of confidence is one of the factors that increase the riskiness of supply chains, but they note that a lack of mutual confidence is only one of the things that make up risk, and it does not cover all the risk within the supply chains.

Utilization of Digitalization and Intelligent Technology

To improve visibility, as well as to develop market analysis, there are clearly many tools that are presented in this section. Rapidly evolving technology has contributed to the fact that many of the business models developed have become obsolete as new, more efficient models have been developed to replace them (Niemimaa et al., 2019). Technological solutions create time for personnel to perform with critical functions (Auramo et al., 2005). Utilization of information technology has been a growing trend in supply chain management (Surana et al., 2005). The development of information technology has had significant advantages for supply chain management. With advanced information technology better understanding of resilience activity and cause-and-effect relationships can be obtained (Pettit et al., 2019). In value-adding chains, companies' processes are linked to each other and can also be monitored internationally. Intelligent technology has facilitated data processing and the boundaries between organizations have been blurred. (Oleśków-Szłapka & Lubiński, 2016.) Control can be improved by integrating different analysis tools to identify anomalies (Christopher & Lee, 2004a). Also, online-based systems facilitate network communication. With the help of the online based systems communication between a supplier and a buyer can be real-time. (Giunipero et al., 2006.) Intelligent technology

is expected to revolutionize the entire logistics value chain through new business models that also impact process efficiencies, security, and the customer experience (Oleśków-Szłapka & Lubiński, 2016). By providing real-time data from supply chains, the transparency of operations and thus the control of operations can also be improved (Gunasekaran et al., 2015). The growth of the Internet and e-commerce have created integrations inside supply chains (Stank et al., 2001). To get the most out of new innovations, it requires strong support from key people in the organization or the network (Skipper, & Hanna, 2009).

Resilience can be managed by understanding the functioning of complex systems and their key threats (Linkov et al., 2014). Resilience analysis requires the interpretation of complex systems to understand the sums caused by several variables (Linkov et al., 2020). Analytical decision-making tools can be used to analyze the environmental impacts associated with supply chains (Fahimnia et al., 2018). Internet of Things (IoT) technology plays a major role in actions monitoring and giving more detailed information to reduce uncertainties (Gunasekaran et al., 2015).

CONCLUSIONS

Short Summary

As many of research have presented, increasing number of international players are directly and indirectly involved in modern supply chains (Christopher & Lee, 2004a; Colicchia et al., 2010; Hearnshaw & Wilson, 2013). The supply chains of several different international players have been estimated to have lower resilience (Brandon-Jones et al., 2014; Christopher & Peck, 2004b; Surana et al., 2005). Corporate risk-taking negatively affects resilience (Christopher & Peck, 2004b). There is found to be growing number of uncertainties in supply chain organizations (Candace et al., 2011; Gunasekaran et al., 2015; Rao & Goldsby, 2009), which increase the potential of a disruption. Uncertainties are related to changes in supply and demand. The results are in line with the findings of Zsidis (2003), whose study suggests that inflexibility and unpredictability increase demand risks.

Supply chain management needs to think of new resilience strategies to address and survive with uncertainties (Waters, 2011, p. 11; Macdonald & Corsi, 2013). Need for resilience is also recognizable among the organizations which participated in the study. In particular, the need for resilience has been exacerbated by disruptions in recent years such as increased regulation of climate change, the Covid-19 pandemic, Brexit, the closure of the Suez Canal, and exceptional weather conditions (survey).

The themes that emerged in the theoretical part of the study were clearly topical in many companies in different industries, which is highlighted in the survey. Improving supply chain resilience increases business continuity and increases responsibility (Fahimnia, et al., 2018).

Main Findings

What features can be used to improve the resilience of the international supply chains?

Resilience can be improved by predictability of market developments. This can be influenced by analyzing consumer behavior, the environment and industry

developments (survey). Advanced technology can be used to detect cause-and-effect relationships and to model the effects of future disturbances (Pettit et al., 2019; Christopher & Lee, 2004a), but also improve transparency in supply chain operations (Giunipero et al., 2006).

Another key tool was found to be the visibility between supply chain organizations (survey). Organizations in the supply chain should strive to share information quickly about changes in supply and demand with its stakeholders. This will give stakeholders a better chance to prepare for risks, which reduces the chance of disruption (Christopher & Lee, 2004a).

The third factor that improved resilience were strong partnerships with suppliers and customers (Lambert et al., 2000), which was justified in the survey. In particular, high volumes as well as the longevity of the relationship, had a positive effect on the flexibility showcased by companies (survey).

Managerial and Social Contribution

This study provides a good basis for future research and practical measures to increase resilience in the supply chains. The findings of the study can be used to assess and verify supply chain performance in a variety of disruption situations.

The importance of resilience thinking has been emphasized in the supply chain. Supply chain managers need to pay more attention to sustainability considerations and supply chain resilience. (Brandon-Jones et al., 2014.) New types of modern technology can be used to better meet customer expectations, for example through improved visibility (Oleśków-Szłapka & Lubiński, 2016). On the other hand, because of several ways to increase flexibility can create new costs, in some situations a passive strategy may even be necessary (Tomlin, 2006).

Limitations

The limited target group of the study has created challenges in reaching suitable individuals. The research results that were collected consists of a small sample of

research responses. Seven respondents have been reached to conduct this study. The small number of respondents affects the quality of the survey results.

It is also essential to note that the roles, and personal experiences of the respondents are individual, even though the quality of the roles and job descriptions are quite similar. In addition, individuals' perceptions may be affected by the variability in the responsibilities of their roles.

Differences in the respondents' industries also create their own limitations for analyzing survey results. The people involved in the study work in different industries that may have an impact on the results of the study. Although an organization's resilience capability is seen as a positive thing in many contexts, it largely depends on the organization's operating environment what kind of strategy is most appropriate. For example, a high level of competition affects whether an organization should strive for more flexibility or optimization in its operations. (Vogus & Sutcliffe, 2007.)

Supply chain organizational roles were unclear to several respondents. In the background study several respondents downplayed their organization's role in the supply chain by selecting fewer roles for their organizations than the organizations actually had, which was proved in the other parts of the survey. For example, some respondents looked at their position in relation to their customers, rather than mentioning the organizations that provides them services / products or parts of them. This was revealed through their answers in later questions. This could have been influenced by the layout and design of the study. The weakness of an online survey is its designing, which places its own limitations on the survey (Wright, 2005). There is also a possibility that respondents were not fully aware of the broad importance of their organization in the supply chain network.

Based on the conclusions, it is not possible to make precise estimates on how increasing resilience affects the company's targets or revenue. Although the key purpose of the resilience perspective is to emphasize and look at the continuity of a company's business (Pettit et al., 2010) more research is needed to model the profitability of investments made in resilience using quantitative methods.

Further Research

Due to the complexity of resilience, this study did not focus on looking at the interactions between individual links. It has been noted that calculating the actual productivity of resilience has been perceived as challenging (Pettit et al., 2019). Still, there is many possibilities for more specific statistical research for resilience capabilities in disruptions.

The study's conclusions was collected from different industries, and it would be interesting for further research to choose for example, a targeted supply chain role, such as manufacturer or retailer. An industry-specific analysis was not carried out in this work, as the purpose of the work was to reflect on the dependencies in the supply chains, as well as the disturbances that arise from them. However, the study can provide a good background for further research studies. This study emphasizes on the importance of the need for supply chain flexibility and provides a good basis for modeling strategic elements that may increase resiliency.

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APPENDIX 1 GOOGLE FORMS SURVEY IN ENGLISH

University of Oulu, Oulu Business school, International Business Management

Research type: Master's thesis

Creator: Jyri Pitkänen

Topic: Resiliency as a part of international supply chain management strategy: Insights of resilient strategies

Important note!

This survey is anonymous and your or your organization's name will not be published in connection with the survey.

Survey structure and guidelines

The questionnaire consists of the statements in section A (16) and the open-ended questions in section B (3).

Try to answer your questions based on your own experience and the experiences of your organization. If you wish, you can comment briefly on the end of the study, its contents and provide feedback.

Key terms for research:

1. Resilience

Resilience refers to the ability to adapt to unforeseen situations, as well as to formulate a strategy in such a way that it can better prepare for future threats. Resilience is often combined with a flexible organizational approach to dealing with extreme situations.

2. Disruption

In this context, a disruption refers to a situation that has negatively affected one or more processes in the supply chain of companies. The disturbance can be short-term, such as a temporary disturbance caused by a storm, or long-term, such as a long-term effect created by regulation.

Background information:

1. Job title (optional):
2. Company industry:
3. Where in the following supply chain positions does your organization operate?

Select one or more options.

(Raw material manufacturer, Importer / broker, Distributor, Retailer, Consumer, Support organization, Other)

4. The organization is directly or indirectly part of the international supply chain.

(Yes/No/I do not know)

5. Briefly describe the role of your organization in supply chains.

A-section: Statements

(Strongly disagree 1, Disagree 2, Undecided 3, Agree 4, Strongly agree 5)

1. Cooperation in supply chains is flexible.
2. The operations of our supply chains are flexible in the short term.
3. The operations of our supply chains are flexible in the long term.
4. The demand for the products / services that we sell and the changes in it are very predictable.
5. The supply of products / services we purchase and the changes that take place in it are very predictable.
6. The activities of companies indirectly involved in our supply chain are highly predictable.
7. We plan our operations together with other supply chain organizations.
8. Information about disruptions flows well between supply chain organizations.

9. Communication between supply chain organizations is open.
10. Increased competition in the market has encouraged companies to take greater risks.
11. The internationalization of supply chains increases risks.
12. We are well acquainted with the companies indirectly involved in our company's supply chains.
13. Increasing resilience in supply chains is considered to be challenging.
14. Resilience is considered as an important element of the strategy in supply chains.
15. Supply chain resilience is part of the risk management.
16. Disruptions in the supply chains are often predictable.

B-section: Open questions

1. What factors do you think will improve the predictability of supply / demand changes in supply chains?
2. How would you concretely describe the flexibility of supply chains and how do you think it could be improved?
3. How could your organization and potential partner organizations prepare for supply chain disruptions?

Survey termination and feedback

In the last section, you can comment or provide feedback on the survey.

Free word on research (optional):

Thank you so much for your answers!

Best regards,

Jyri Pitkänen,

Business student, University of Oulu

APPENDIX 2 GOOGLE FORMS SURVEY IN FINNISH

Oulun yliopisto, Kauppakorkeakoulu, Kansainvälisen liiketoiminnan johtamisen laitos

Tutkimustyyppi: Maisteritutkinnon lopputyö

Kyselyn toteuttaja: Jyri Pitkänen

Aihe: Resiliency as a part of international supply chain management strategy: Insights of resilient strategies

TÄRKEÄ HUOMAUTUS

Tämä tutkimus on anonyymi ja sinun tai organisaatiosi nimeä ei tulla julkaisemaan tutkimuksen yhteydessä.

Kyselyn rakenne ja ohjeistus

Kysely koostuu A-osion väittämistä (16 kpl), sekä B-osion avoimista kysymyksistä (3 kpl).

Pyri vastaamaan kysymyksiisi oman kokemuksesi ja organisaatiosi kokemusten pohjalta. Mikäli haluat, voit kommentoida loppuun lyhyesti tutkimusta, sen sisältöjä ja antaa palautetta.

Tutkimuksen kannalta keskeisiä termejä:

1. Resilienssi

Resilienssillä tarkoitetaan sopeutumiskykyä ennalta arvaamattomiin tilanteisiin, sekä strategian muodostamista sellaiseksi, että sen avulla pystytään varautumaan paremmin tulevaisuuden uhkiin. Resilienssi yhdistetään usein joustavaan organisaation tapaan toimia äärimmäisissä tilanteissa.

2. Häiriö

Häiriöllä viitataan tässä yhteydessä tilanteeseen, joka on vaikuttanut negatiivisesti yrityksen toimitusketjun toiminnan yhteen tai useampaan prosessiin. Häiriö voi olla lyhytaikainen, kuten myrskyn aiheuttama tilapäinen häiriö tai pitkäaikainen, kuten esimerkiksi sääntelyn luoma pitkäaikainen vaikutus.

Vastaajan taustatiedot

1. Työnimike (vapaaehtoinen)
2. Yrityksen toimiala
3. Missä seuraavista toimitusketjun asemista organisaatiosi toimii?

Valitse yksi tai useampi vaihtoehto.

(Raaka-ainevalmistaja, Maahantuojavälittäjä, Jakelija, Jälleenmyyjä, Kuluttaja, Tukiorganisaatio, Muu)

4. Organisaatio on suoraan tai välillisesti osana kansainvälistä toimitusketjua

(Kyllä/Ei/En osaa sanoa)

5. Kuvaile lyhyesti organisaatiosi asemaa toimitusketjuissa

A-Osio: Väittämät

Tämä osio sisältää 16 kpl väittämiä. Jokaisen väittämän jälkeen voit kommentoida ja perustella vastauksesi.

(Täysin eri mieltä 1, Osin eri mieltä 2, Ei samaa eikä eri mieltä 3, Osin samaa mieltä 4, Täysin samaa mieltä 5)

1. Yhteistyösuhteet toimitusketjuissa ovat joustavia.
2. Toimitusketjujemme toiminta on joustavaa lyhyellä aikavälillä.

3. Toimitusketjujemme toiminta on joustavaa pitkällä aikavälillä.
4. Myymiemme tuotteiden/palveluiden kysyntä ja siinä tapahtuvat muutokset ovat hyvin ennustettavissa.
5. Ostamiemme tuotteiden/palveluiden tarjonta ja siinä tapahtuvat muutokset ovat hyvin ennustettavissa.
6. Toimitusketjussamme välillisesti mukana olevien yritysten toiminta on hyvin ennustettavissa.
7. Suunnittelemme toimintaamme yhdessä muiden toimitusketjun organisaatioiden kanssa.
8. Tieto häiriöistä kulkee hyvin toimitusketjujen organisaatioiden välillä.
9. Kommunikaatio toimitusketjun organisaatioiden välillä on avointa.
10. Markkinoiden kasvanut kilpailu on kannustanut yrityksiä ottamaan suurempia riskejä.
11. Toimitusketjujen kansainvälisyys kasvattaa riskejä.
12. Tunnettuamme hyvin yrityksemme toimitusketjuissa välillisesti mukana olevia yrityksiä.
13. Resilienssin kasvattamista toimitusketjuissa pidetään haastavana.
14. Resilienssiä pidetään tärkeänä strategian elementtinä toimitusketjuissa.
15. Toimitusketjujen resilienssi on osa riskijohtamista.
16. Toimitusketjujen häiriöt ovat usein ennustettavissa.

B-osio: Avoimet kysymykset

Osio koostuu 3 kappaleesta avoimia kysymyksiä. Vastauksen pituuden voit määrittellä itse.

1. Ennustettavuus: Mitkä tekijät mielestäsi parantavat kysynnän/tarjonnan muutosten ennustettavuutta toimitusketjuissa?
2. Joustavuus: Miten kuvailisit toimitusketjujen joustavuutta konkreettisesti ja kuinka sitä voitaisiin mielestäsi parantaa?

3. Varautuminen: Miten organisaatiosi ja mahdolliset kumppaniorganisaatiot voisivat varautua toimitusketjua koskettaviin häiriöihin?

Kyselyn lopetus ja palaute

Viimeisessä osiossa voit halutessasi kommentoida tai antaa palautetta kyselyyn liittyen.

Vapaa sana tutkimuksesta (valinnainen)

Kiitos paljon vastauksistasi!

Ystävällisin terveisin,

Jyri Pitkänen

Kauppätieteiden maisteriopiskelija, Oulun yliopisto