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DEPARTMENT OF ECONOMICS AND MANAGEMENT
MASTER PROGRAMME IN INTERNATIONAL BUSINESS AND
ENTREPRENEURSHIP

SMES AND GLOBAL DISRUPTIONS: NAVIGATING EXTERNAL
SHOCKS IN THE GLOBAL VALUE CHAIN

LE PMI E LE PERTURBAZIONI GLOBALI: NAVIGARE TRA GLI
SHOCK ESTERNI NELLA CATENA DEL VALORE GLOBALE

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Abstract

The repeated shocks and crises of the past fifteen years have slowed down the previous phase of hyperglobalisation and the rise of Global Value Chains (GVCs). Small and Medium sized enterprises (SMEs) have been especially vulnerable as they often do not have the resources needed to adequately mitigate such shocks. This master thesis therefore explores how SMEs within the GVC react to external shocks, investigating the impacts on both the supply chain and the sales side of SMEs. The data of semi-structured interviews with six SMEs within the GVC has been analysed using the Gioia Method in order to develop a grounded model based on the interview data. The findings show that the SMEs used both proactive and reactive strategies to mitigate disruptions. Transportation and supplier disruptions turned out to be the most significant impacts on the supply chain side, whereas disruptions in demand were the most significant on the sales side. Supplier diversification, both proactive and reactive, and reactive supplier collaboration were critical strategies for supply chain resilience. Proactive customer diversification as well as reactive collaboration proved to be the most important strategies on the sales side. The nature of the business strongly influences the severity of impacts and the feasibility and effectiveness of various mitigation strategies. The study highlights the necessity of considering the interplay of strategies, business nature, and specific shocks holistically to ensure SMEs navigate crises effectively.

I ripetuti shock e crisi degli ultimi quindici anni hanno rallentato la precedente fase di iperglobalizzazione e l'ascesa delle catene del valore globali (GVC). Le piccole e medie imprese (PMI) sono state particolarmente vulnerabili, poiché spesso non dispongono delle risorse necessarie per mitigare adeguatamente tali shock. Questa tesi di laurea magistrale esplora quindi come le PMI all'interno delle catene del valore globali reagiscano agli shock esterni, indagando sugli impatti sia sulla catena di approvvigionamento che sul lato delle vendite. I dati

provenienti da interviste semi-strutturate con sei PMI all'interno delle GVC sono stati analizzati utilizzando il Metodo Gioia per sviluppare un modello fondato basato sui dati delle interviste. I risultati mostrano che le PMI hanno utilizzato strategie sia proattive che reattive per mitigare le interruzioni. Le interruzioni nel trasporto e nei fornitori si sono rivelate gli impatti più significativi sul lato della catena di approvvigionamento, mentre le interruzioni della domanda sono state le più significative sul lato delle vendite. La diversificazione dei fornitori, sia proattiva che reattiva, e la collaborazione reattiva con i fornitori sono state strategie fondamentali per la resilienza della catena di approvvigionamento. La diversificazione proattiva dei clienti e la collaborazione reattiva si sono dimostrate le strategie più importanti sul lato delle vendite. La natura dell'attività influenza fortemente la gravità degli impatti e la fattibilità e l'efficacia delle varie strategie di mitigazione. Lo studio evidenzia la necessità di considerare l'interazione tra strategie, natura dell'attività e shock specifici in modo olistico per garantire che le PMI affrontino efficacemente le crisi.

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List of Abbreviations

DACH.....	Germany, Austria and Switzerland
GDP.....	Gross Domestic Product
GVC	Global Value Chain
MNE.....	Multinational Enterprise
SCRES.....	Supply Chain Resilience
SME	Small and Medium sized Enterprise

1. Introduction

„No one had ever experienced this before, things happened that no one had thought possible (Queo, LB).” This was said by one of the interviewees of this master thesis describing the feeling people experienced during the Covid-19 pandemic. This pandemic led to the infection of over three quarters of a billion people and to the death millions which devastated the whole globe (WHO, n.d.-b, n.d.-a). Governments imposed restrictions and the lives of most people in the world changed drastically from one day to the next (Ciravegna & Michailova, 2022). The Ukraine Crisis, which was started as a war of aggression by Russia, devastated Ukraine and led to countless deaths (Mbah & Wasum, 2022). These shocks are just two of many external shocks changing the lives of people around the globe in the last years. But the impacts of these shocks were not only limited to the private lives of people, but also affected economies, industries and businesses. During the pandemic, the world was experiencing the worst recession since the second world war (Xu et al., 2020). Especially Global Value Chains (GVCs) were hit hard by these impacts and restrictions as they link businesses and organisations across the whole world. They rely on working together and on the transfer of goods and services across borders. The functioning over borders was greatly disrupted during this time (Ciravegna & Michailova, 2022; Contractor, 2022; Fernandez-Stark & Gereffi, 2019). GVCs are usually shaped around one focal Multinational Enterprise (MNE) (Gereffi, 2020), but the GVCs would not function without Small and Medium sized Enterprises (SMEs) that are often acting as suppliers in the GVC structure (Dilyard et al., 2021). SMEs make up the biggest portion of firms around the world and, despite their limited size and their limited resources, make up 30 to 40% of all exported goods in developed economies like Germany, France or Sweden (Ganne & Lundquist, 2017). This shows their relevance for GVCs. As just mentioned, SMEs usually have limited resources and capabilities. Pairing this with the fact that smaller firms are also often newer and lack experience makes them the group of firms most vulnerable to external shocks (Eggers,

2020; Miklian & Hoelscher, 2022; Oetzel & Oh, 2021; Paul et al., 2021). This makes mitigation strategies for SMEs crucial to assure the survival during the occurrence of external shocks. Especially the interactions with other firms over borders have been disturbed by the pandemic. These interactions mostly consist of sourcing and sales activities which are crucial to the functioning of GVCs to assure a smooth flow of goods over the GVC (Fernandez-Stark & Gereffi, 2019). Mitigation strategies against external shocks and crises can vary widely and the implementation of such strategies takes time and money which are valuable resources during a crisis, especially for an SME. So, the selection of strategic measures needs to be heavily considered, and choices need to be taken carefully. But with a good set of mitigation strategies, the odds of survival of a firm or even coming out of the crisis stronger than before can be significantly increased.

Despite growing literature on the mitigation strategies in the GVC, few research has focused on SMEs. Rather, most research focuses on large enterprises, in particular MNEs that are the focal firms in their GVCs. SMEs are the backbone of every economy as they make up 99,8% of all firms in the EU, account for 65% of total employment and for 53% of total value added in the EU (European Commission, 2021). They are responsible for 30 to 40% of exports, so business continuity for SMEs is as important for an economy and GVCs as business continuity of big corporations (Bourletidis & Triantafyllopoulos, 2014). Like mentioned above, due to their limited size and their limited resources and capabilities, SMEs are the most prone to be heavily impacted by a crisis (Miklian & Hoelscher, 2022; Paul et al., 2021). Through his, they often find it difficult to recover from shocks (Miklian & Hoelscher, 2022). But on the other hand, they proved to be more agile and adaptable than larger firms (Bourletidis & Triantafyllopoulos, 2014). The strategies of firms in GVCs to mitigate external shocks have been looked upon, but there is a substantial lack in research on the relationships and the interplay of different mitigation strategies and how they influence each other, especially with a

focus on SMEs. GVCs have been highly influenced by crises in the last years and, also with this influence, are in a dynamic state right now. As the Covid-19 crisis is over, the Ukraine crisis as well as the Israel-Gaza War have been going on for some time, there can be drawn first conclusions about the effectiveness of countermeasures that businesses took, especially as research in this field on SMEs are scarce.

Thus, the following research question is posed: How do SMEs within GVCs handle the impacts on their supply chain and the sales side caused by unforeseen external shocks?

The primary goal of this master thesis is to acquire more knowledge about the mitigation strategies of SMEs within GVCs. This should be done by investigating which proactive strategies and which reactive strategies are pursued by SMEs in GVCs. Thereby, the relationships between the different strategies as well as the relationships between the strategies and the impacts of external shocks should be pointed out. This should lead to the formulation of two models that propose different strategies that could mitigate specific impacts of external shocks.

This research contributes to the understanding of how SMEs act in the face of crises and how they try to mitigate external shocks. SMEs are often overlooked as most literature only focuses on the focal MNEs in their value chains. The findings should help to further extend and broaden the existing literature on the impact and the handling of unforeseen external shocks by SMEs within GVCs through practical insights and giving implications to managers on how to prepare for the occurrence of another unforeseen event and how to react to them. The practical insights provide a deep understanding of why firms pursue which proactive strategies and further deepens the understanding of the reasons of why SME managers choose which reactive strategies.

For this, the proactive strategies, impacts of and reactions to external shocks that occurred since the end of 2019, starting with the Covid-19 pandemic, have been analysed and brought into

context. The focus lies on the supply chain side and the sales side as these are critical parts in the functioning of GVCs which heavily depend on the smooth functioning of supply chains and sourcing. Sales on the other hand makes sure that the produced goods and services reach their destinations and thus also enables the smooth transfer of goods and services. Firms in GVCs heavily depend on their sales as this is what brings revenue and consequently grants the survival of the firm. As these two areas in particular include interactions with other firms and organisations, they are heavily and directly impacted by external shocks. Disruptions in these two areas could cripple GVCs and heavily impact their functioning. These two functions are on the input and output sides of firms in GVCs that were especially highlighted by Fernandez-Stark and Gereffi (2019) pointing out their criticality to the functioning of GVCs as they represent the smooth flow of goods between GVC actors that guarantee its efficient and effective functioning. This master thesis does not only cover manufacturing firms but also service firms as both of these types of inputs are critical to the functioning of GVCs. Services make up 50% of value-added to all exports which shows their importance (Miroudot & Cadestin, 2017). Fernandez-Stark and Gereffi (2019) also point out the importance of both goods and services for the functioning of the input-output structure of GVCs.

The answering of the research question is achieved by carrying out semi-structured interviews with SMEs within GVCs in order to get in-depth information about their proactive strategic decisions, the impact the crises have on them and their reactions to the crises. This method of gathering data is especially rewarding in terms of the depth of the collected data as the questions are mostly open-ended and bring the opportunity for further inquiries. This helps not only in understanding what SMEs did during the crises but also to get to know their motivations for their actions. The collected data has been analysed using the Gioia Method. Using this method, 1st-order concepts have been derived from the interview data. These have been grouped into 2nd-order themes which have been taken from literature. The 2nd-order themes have been further

aggregated into aggregate dimensions. This method provides a link from empirical data to scientific literature and makes sure that a qualitative approach can meet high standards of scholarly rigor. The data structure provides the static data for the formulation of grounded models which shows the relationships among the data (Gioia et al., 2013; Magnani & Gioia, 2023).

After this short introduction follows a literature analysis focusing on GVCs, their structure and the role SMEs play in them. Then follows an overview of external shocks and which external shocks impacted SMEs and GVCs in the last years with a special focus on Covid-19 and the Ukraine Crisis. The specific impacts of external shocks, in particular the crises of the last years, are pointed out. After that, there is a section on the proactive strategies SMEs in GVCs engage in to mitigate the impacts of crises proactively as well as on the reactive strategies SMEs in GVCs pursue to react to the impacts of the external shocks. These sections are split into impacts and strategies on the supply chain and the sales side of operations. Following this, the methods used in this master thesis are shown and explained in detail. The next section is the findings section in which firstly the data structures for both the supply chain and the sales side are shown. The data structure is explained by showing the aggregate dimensions and how they relate to the 2nd-order themes and the 1st-order concepts. After each of these sections, the data is brought into context and a grounded model of Resilience and Reactions to external shocks of SMEs in GVCs is developed and explained. In the next step, the findings are discussed by bringing them into context with the literature through which propositions have been developed. Implications for practice and theory, limitations of this master thesis and future research are pointed out. Concluding this thesis, the main findings and the significance of the study are pointed out and an outlook into the future as well as a short call to action for SME managers is given.

This master thesis offers insights into how SMEs in GVCs can navigate the impacts of external shocks contributing both to business practice and academic literature.

2. Literature Review

2.1. Global Value Chains – Definition, Actors and Ongoing Dynamics

2.1.1. Definition and Actors

The GVC and GVC participation are defined as consisting “of a series of stages involved in producing a product or service that is sold to consumers, with each stage adding value, and with at least two stages being produced in different countries. A firm participates in a GVC if it produces at least one stage in a GVC (Antràs, 2020a, p. 553).” GVC members represent a coordinated network of businesses and other participants involving a sophisticated division of labour across multiple nations with all participants adding value (Gereffi et al., 2022; Gölgeci et al., 2021). At the top of a GVC is an MNE that orchestrates complex, multi-tiered global supply chains which leverage the advantages of low cost, bigger scale and geographical flexibility through combining production and access to large pools of labour in low-cost countries, proximity to natural resources, the efficiency of global logistics providers as well as innovation, design and marketing capabilities of lead firms in various industries (Gereffi, 2020). GVCs combine different levels with each other. The macro-level consisting of international trade, investment and finance is linked with the meso-level consisting of national and regional economies as well as the micro-levels of local suppliers, communities and workers (Gereffi, 2020). The following are several features of the holistic, multi-level and actor-oriented GVC framework that show its interacting dimensions building blocks. GVCs have specific governance structures orchestrated by the lead firm. Global supply chains within the GVCs have specialised division of labour over various locations and various firms to increase the efficiency of the whole GVC. This geography can differ over time as this is influenced by various factors like strategies of companies, government policies or country conditions. But it is likely that both local and global sourcing play a part in GVCs. Across the supply chain, the value is distributed unevenly (Gereffi, 2020) as high value activities like pre-production

activities (R&D, design) and post-production activities (marketing, services) are often located in specialised developed countries and low-value activities like production in developing countries (Fernandez-Stark & Gereffi, 2019). The last feature is that state policies like the US-China trade war, economic nationalism or Covid-19 that can exert conflicting pressure on lead firms and suppliers (Gereffi, 2020).

GVCs operate in tiered structures where one lead or focal firm produces the final product. This focal firm is supplied by a small number of usually large first-tier suppliers that are themselves supplied by other suppliers and so on (Abonyi, 2007).

GVC participation includes two types. The first is backward GVC participation in which imported inputs from other countries are incorporated into export products produced in the home country of a company. The second type is forward GVC participation in which a company includes domestic inputs into their exported goods that are then used by companies in a third country to produce their products (Antràs, 2020b; Manghnani et al., 2021). These are measured by the ratio of foreign value added in gross exports respectively domestic value added in third country exports to gross exports (Manghnani et al., 2021). This can include raw materials, intermediate inputs or services. The inputs are often highly customised and sourced repeatedly in large quantities. GVCs can be structured differently, ranging from spider-like structures with one focal firm in the middle to snake-like structures with firms supplying firms that supply other firms or mixed forms of this (Antràs, 2020a).

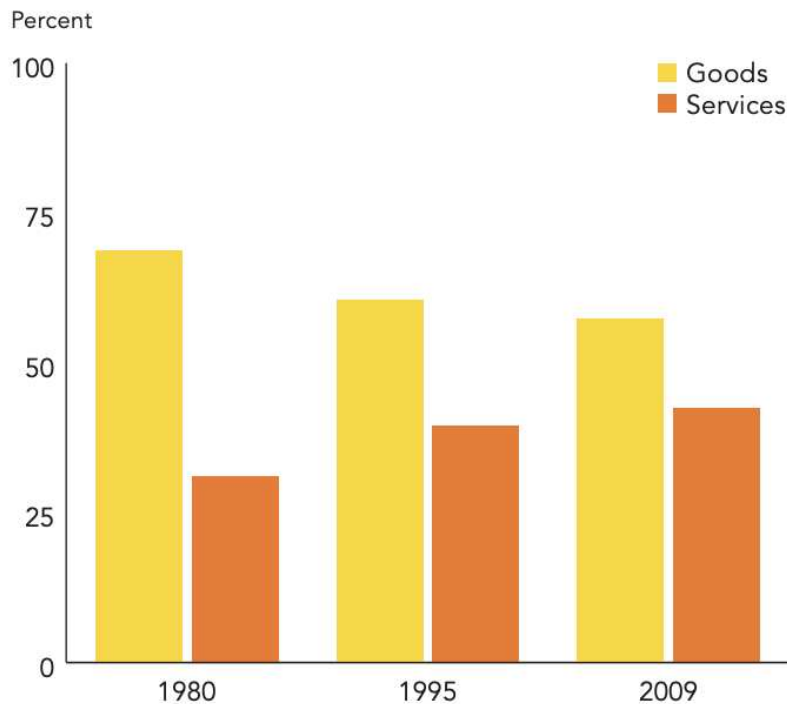
To identify the involvement of a company in the GVC, the intensity of a company's internationalisation strategy is looked upon. That is how many and how intensive three different international activities are used in combination. Firstly, an intensive importer is a company that imports at least one third of all inputs; secondly, an intensive exporter is a company that exports at least two thirds of their outputs; thirdly, is the firm foreign owned or is a majority shareholder of a foreign business (Veugelers et al., 2013)? If no criterion is met, the firm has limited access

to GVCs, if one criterion is met, the company can be considered as integrated into GVCs at a low depth, if they fulfil two criteria, they are integrated at an intermediate depth and if all three are fulfilled, they are considered to be highly integrated into the GVC. If a company does not export, import or has linkages to foreign businesses at all, it is considered as having no integration into GVCs (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013).

From the perspective of a GVC member that is not the focal firm in their supply chain, the relevant parts of the GVC are the ones upstream, that means its supply chain, as well as downstream, so its sales ecosystem and customers. If it is looked at the upstream GVC, the firm imports intermediary goods itself or has domestic suppliers that import intermediary goods. The downstream GVC perspective means that the focal firm has customers in other countries, so it exports itself, or it has domestic customers, often MNEs, that export goods that include the good supplied by the focal firm (Ganne & Lundquist, 2017).

Despite GVC literature being mostly focused on physical goods, the input of services into GVC products and the trade in services, so the sale of services across borders, that has also been increasing due to the heavy global interconnectedness, is a major factor that should not be neglected (Gölgeci et al., 2021). Two thirds of the world economic activity is made up by services, but only 20-25% of world trade is accounted for by them. But when using a value-added approach, services account for about 37% of the value of exported physical goods and for up to 50% of value-added to all exports showing their importance for world trade and for GVCs (Miroudot & Cadestin, 2017). In recent years, the export of services in relation to Gross Domestic Product (GDP) grew rapidly (e.g. Figure 1 showing the value-added exports of goods and services as a percentage of total world value-added exports from 1980 to 2009) while the ratio of overall services to GDP also grew but much slower showing that exports in services and the ratio of service to manufacturing in GVCs are increasing (Antràs, 2020b).

Figure 1: Value-added exports of goods and services as a percentage of total world value-added exports



Source: (Heuser et al., 2017, p. 145)

Services are a very important part in the functioning of GVCs as they fulfil a dual role by providing intermediate inputs in production but also acting as a coordination facilitator (Manghnani et al., 2021) like a glue to hold together the different participants (Miroudot & Cadestin, 2017). In the latter role, they coordinate the different stages of the GVC and permit the businesses to further specialise and focus on their core competencies (Manghnani et al., 2021). Firms that use few services are less likely to be deeply integrated in the GVC. Vice versa, being integrated into the GVC normally leads to a higher usage of services (Manghnani et al., 2021). Services create value by facilitating exchanges among different value chain participants and by solving problems that can be better solved by the providers through tailored solutions (Miroudot & Cadestin, 2017). During the evolution of GVCs and trade, services like transportation, logistics and supply chain services as well as information and communication technology services have become a crucial part in their functioning (Manghnani et al., 2021). But not exclusively pure service providers offer services as a lot of manufacturing businesses

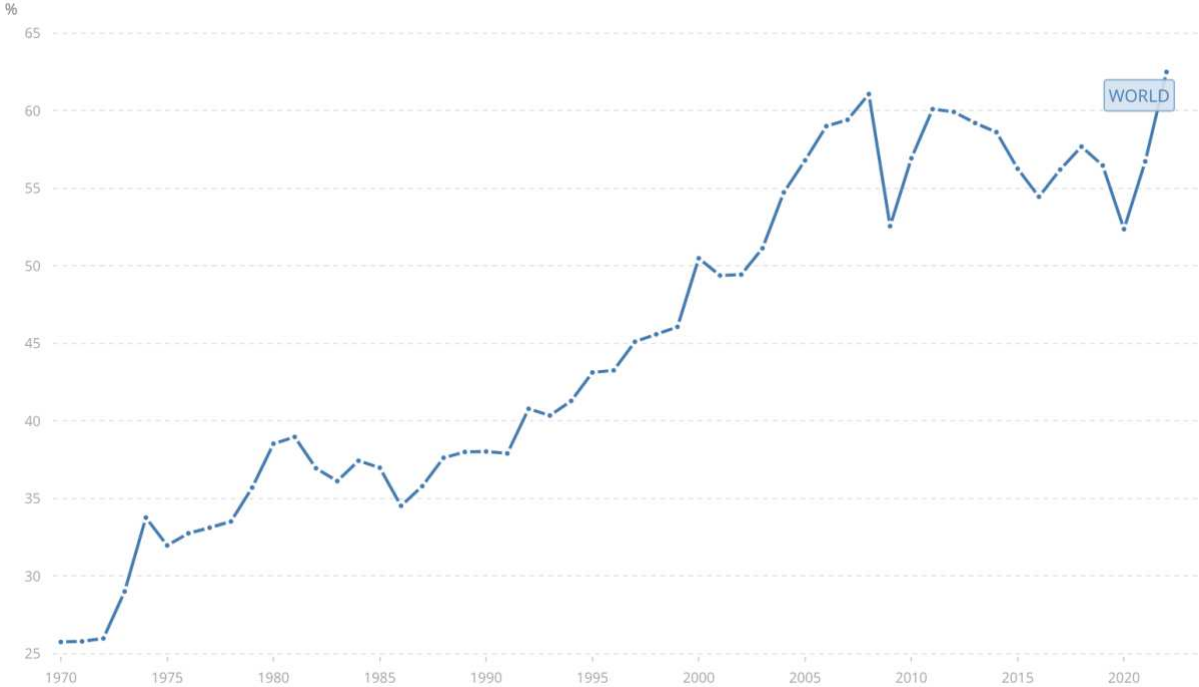
complete their offering by providing their customers with services along the product lifecycle to create even more value as well as long-term customer relationships (Miroudot & Cadestin, 2017). Without services, GVCs would not exist (Miroudot & Cadestin, 2017). This is why this master thesis focuses on both manufacturing firms as well as service firms to picture a holistic view on GVC members and their reactions to external shocks.

2.1.2. Ongoing Dynamics in GVCs

GVCs have been undergoing dynamic and ongoing changes in the last four decades. In the years before and during the 2000s, developments in politics, technology and institutions led to the rise of the globalisation of production processes across the world with a steadily increasing number of firms to participate. This led to a deeper global integration that includes sourcing internationally, offshoring production globally and exporting goods. With this, deep networks of GVCs have developed with them involving multiple crossed borders and often more than two countries (Antràs, 2020a). During the 1990s and the early 2000s leading up to 2008, the share of goods of world trade that was part of the GVC increased steeply in a period of “hyperglobalisation” until it reached about 50% (Antràs, 2020a; Marvasi, 2023). Congruently, the ratio of world trade to world GDP also increased steadily during the 1990s and early 2000s, which is shown in Figure 2 (The World Bank Group, n.d.-a). Responsible for this growth were the rise of technologies like the internet resulting in faster communication, faster and cheaper transportation methods and political developments like the fall of communism in Eastern Europe, the increased integration of East and South-East Asia into trade and new trade agreements (Antràs, 2020b; Marvasi, 2023). The period of hyperglobalisation lasted until 2008 when the share of goods of world trade that was part of the GVC started stagnating at about 50% and even slightly declined in the 2010s, which can be seen in Figure 3, while also the ratio of world trade to world GDP stagnated at around 55-60% starting the period of

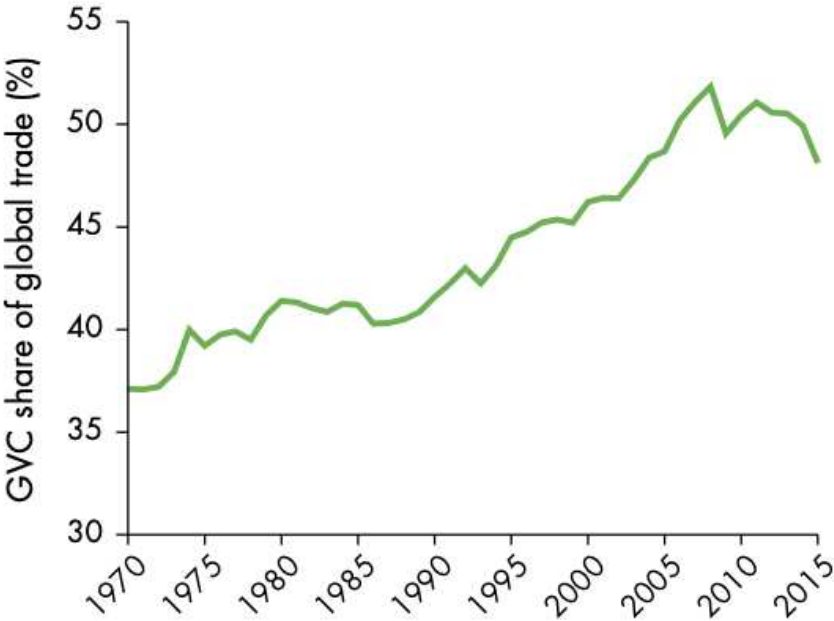
“Slowbalisation” (Antràs, 2020a; Ghauri et al., 2021; Marvasi, 2023; The World Bank Group, n.d.-a).

Figure 2: World trade in % of GDP



Source: (The World Bank Group, n.d.-c)

Figure 3: GVC Share of Global Trade



Source: (The World Bank Group, 2020, p. 2)

The stagnation started with the global financial crisis in 2008 and is accounted for by political events like the trade disputes between the US and China, the exit of the United Kingdom from the European Union, the resurgence of populism and economic nationalism (Antràs, 2020b; Ciravegna & Michailova, 2022; Contractor, 2022; Ghauri et al., 2021), and Russia's invasion of the Crimea, by the recent technological developments not having as big of an impact as the invention of the internet and similar developments during the period of hyperglobalisation, by the increase of labour costs in former cheap labour economies and by the propelling effects during hyperglobalisation not having the same effect anymore (Antràs, 2020b). In the new phase of globalisation which is characterised by several disruptions, GVCs shift from being only focused on efficiency (e.g. lean, just-in-time sourcing from few suppliers that are not geographically dispersed) to more sustainability, security and resilience as businesses must find reliable partners in countries that have stable connections to their domestic market so that they can react effectively to unexpected events (Ciravegna & Michailova, 2022; Ghauri et al., 2021; Marvasi, 2023).

The participation in the GVC is not evenly spread around the globe. While Europe and East Asia are deeply involved in the GVC, the participation in continents like South America and Africa is much smaller. Also, the sectors in which the countries take part in the GVC are very different and can range from agriculture over natural resources, manufacturing and services to the provision of innovative goods and services which is where most Western European countries specialise in. New technologies like e-commerce and high-speed internet reduce many barriers of global trade and facilitate participation. This is also true for smaller firms with less resources that could not afford to take part in the GVC before (Antràs, 2020a).

2.2. SMEs and their Role in GVCs

Such SMEs are defined by two factors according to the European Commission. The headcount needs to be below 50 to be considered a small and below 250 to be considered a medium-sized

company. Additionally, the turnover or the balance sheet total of a small company has to be below 10 million €. For a medium-sized company, the turnover has to be below 50 million € or the balance sheet total below 43 million € (European Commission, 2003). SMEs make up 99,8% of all firms in the EU, 65% of total employment and 53% of total value added in the EU (European Commission, 2021). Usually, their share of participation in the GVC stays limited (Ganne & Lundquist, 2017) as the likelihood of firms participating internationally and also of participating in the GVC rises with higher productivity (Melitz, 2003; Wagner, 2012) and firm size (Wagner, 2012), but in countries like Germany, France or Sweden they still produce up 30-40% of all exported goods (Ganne & Lundquist, 2017).

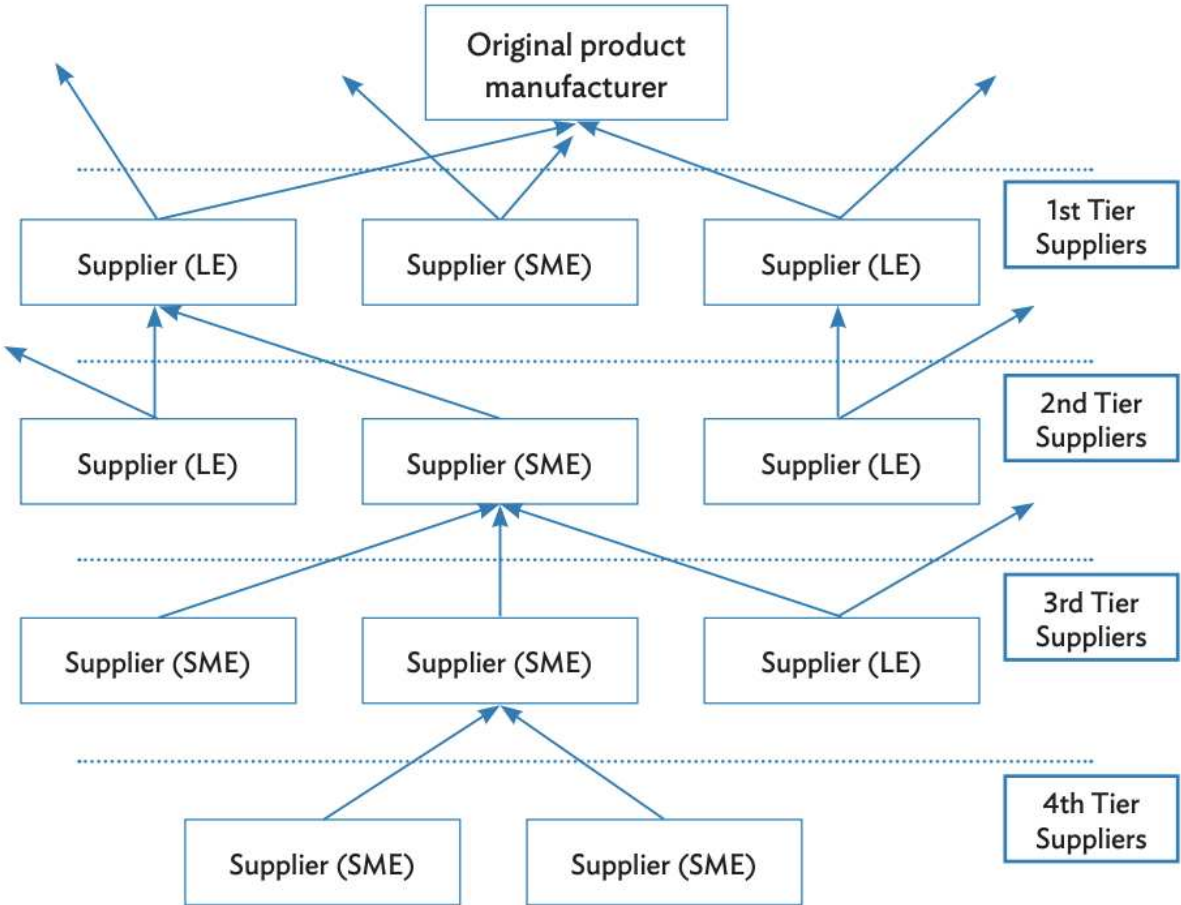
SMEs can take part in the GVC by being direct exporters, but usually, in a GVC, they take on the role of suppliers, subcontractors or distributors of MNEs that often control the market end of the chain (Lunati, 2008; Wignaraja, 2013). In the role of supplying MNEs, they are crucial to the functioning of GVCs (Dilyard et al., 2021). They can act both as direct suppliers of the focal MNEs or as lower tier suppliers of other suppliers in the supply chains of these MNEs (Abonyi, 2007; Chen, 2019). An exemplary structure of a GVC and the roles of SMEs is shown in Figure 4. So, they tend not to be the focal firms in their GVCs (Lunati, 2008). But even though they might not be the focal firm in supply chains, they nonetheless act as buyers in their own supply chain and are often selling to businesses outside of the value chain as well (Egels-Zandén, 2017).

2.1. SMEs experiencing repeated shocks within GVCs

GVCs are a complex interplay of many geographically distributed firms which makes them vulnerable to disruptions whose occurrence in one part of the GVC can influence efficiency and resilience efforts throughout the entire GVC (Gereffi et al., 2022). An external shock is an unexpected disturbance that did not originate in the home country or home market and has significant impact on the home economy, market or a firm in the home market. It can be both

positive and negative but the term is mostly used for negative impacts (Kar & Bhattacharya, 2011; Ramey, 2016). External shocks have a big influence on economies (Ahlquist et al., 2020) and can appear in many different forms and natures (Ahlquist et al., 2020; Rodrik, 1999) as well as

Figure 4: How SMEs fit into the GVC



LE = Large Enterprises; SME = Small and Medium Sized Enterprises

Source: (Harvie & Charoenrat, 2015, p. 10)

in different magnitudes. This means also that every external shock has different consequences and impacts (Miklian & Hoelscher, 2022). One external shock can also influence businesses across various regions and economic sectors differently (Ahlquist et al., 2020; Rodrik, 1999). The same is true for businesses with different characteristics and different products and services as, next to the nature of the crisis and the mitigation strategies of a firm, the nature of a firm,

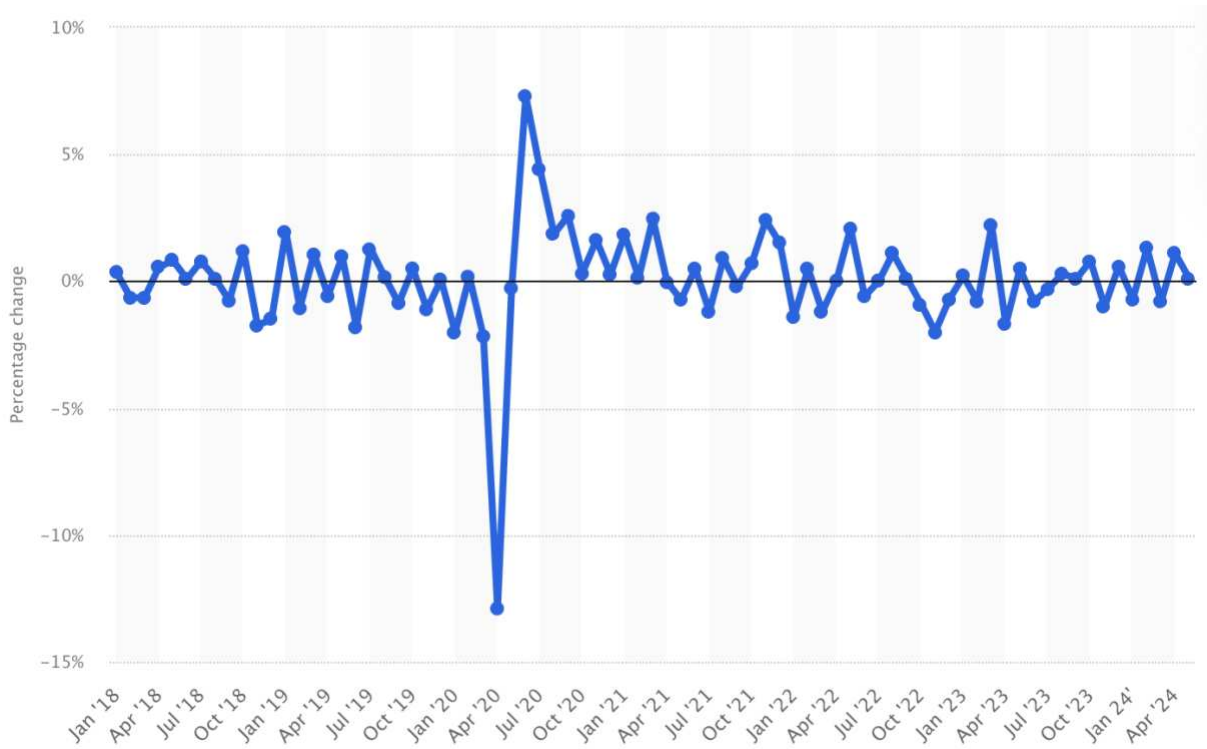
meaning its size, age, the sector it operates in, its experience as well as how the business is organised, plays a critical role in how external shocks and crises affect it. This could lead to some businesses being severely harmed while others may even profit from a crisis. Also, more experienced firms, especially if they have experienced such disruptions in the past, could be better prepared and more able to manage a crisis better than newer firms (Miklian & Hoelscher, 2022; Oetzel & Oh, 2021), which are often also smaller (Eggers, 2020) and have limited resources, capabilities, access to capital and limited opportunity to diversify across different sectors and markets (Miklian & Hoelscher, 2022; Paul et al., 2021). The harsher the crisis they experienced before, the more likely they are to prepare for a new crisis (Oetzel & Oh, 2021). The uncertainty created by external shocks is also even harsher to businesses that have never faced big crises or shocks before (Conz et al., 2023) leaving them more vulnerable to external shocks from which they often find it more difficult to recover (Miklian & Hoelscher, 2022). The dependency of SMEs on few customers and few suppliers, weaknesses in technological, managerial and human capabilities as well as their limited financial resources, dependency on loans and high interest rates can lead to great difficulties in continuing business during a crisis (Bourletidis & Triantafyllopoulos, 2014; Penrose, 2000; Shama, 1993). So often times, SMEs are the first and most important victims of a prolonged crisis (Latham, 2009).

The most regarded types of shocks include financial or economic crises - which can include among others terms-of-trade fluctuations (Raddatz, 2007), income shocks, supply and demand shocks (Berman & Couttenier, 2015) and (monetary) policy shocks (Maćkowiak, 2007; Ramey, 2016) - natural disasters, armed conflict and political violence as well as societal insecurity (Miklian & Hoelscher, 2022). Covid-19 is a special new type of major shock that has not been preceded before. Each of them brings different consequences and impacts (Miklian & Hoelscher, 2022). Some external shocks can also lead to other shocks (Conz et al., 2023). The

shocks regarded in this thesis include Covid-19, an economic crisis, natural disasters as well as armed conflicts and political violence.

The Covid-19 pandemic that started at the end of 2019 and the start of 2020 was a highly infectious and dangerous virus outbreak with about 775 million reported cases resulting in the death of about 7 million people globally until the end of July 2024 (WHO, n.d.-b, n.d.-a). This was the biggest external shock in the last years. It was completely unexpected and also unprecedented as there were no previous signs and there was no disruption of the same order and nature previously experienced in today's environment (Ali et al., 2021) which made it difficult to estimate future developments, to strategize and plan for a recovery (Hossain et al., 2022). The pandemic also created an economic shock (Kalogiannidis, 2020) as the world was experiencing the worst recession since the second world war (Xu et al., 2020). The worldwide connections through the GVC caused these shocks to quickly transfer around the world (Marvasi, 2023). The pandemic led to a massive decrease in global trade by 17.6% at its lowest point as seen in Figure 5. Although it recovered up to 4.4% less than the year before in three months after its lowest point and reaching new heights after the pandemic, it still had a big impact during this time severely impacting the functioning of the GVCs through mostly a supply and a demand shock (Antràs, 2020b; The World Bank Group, n.d.-b).

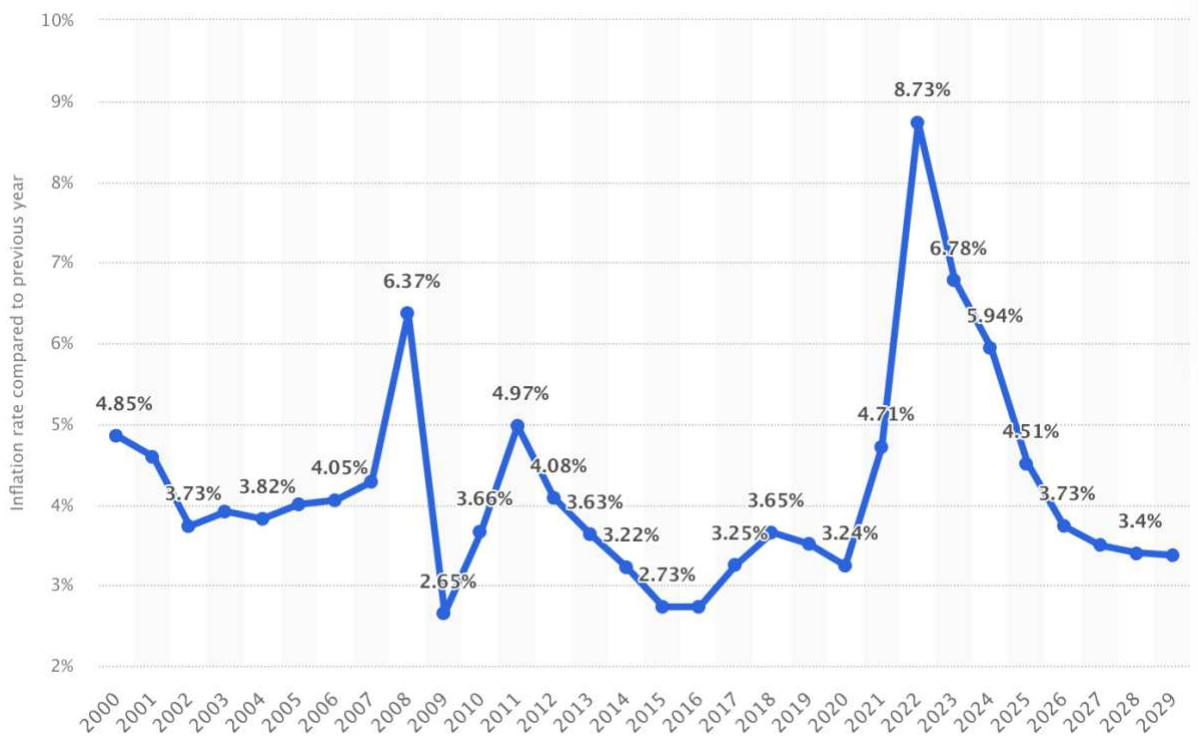
Figure 5: Change in Global Goods Trade Volume from January 2018 to May 2024



Source: (Statista, n.d.-a)

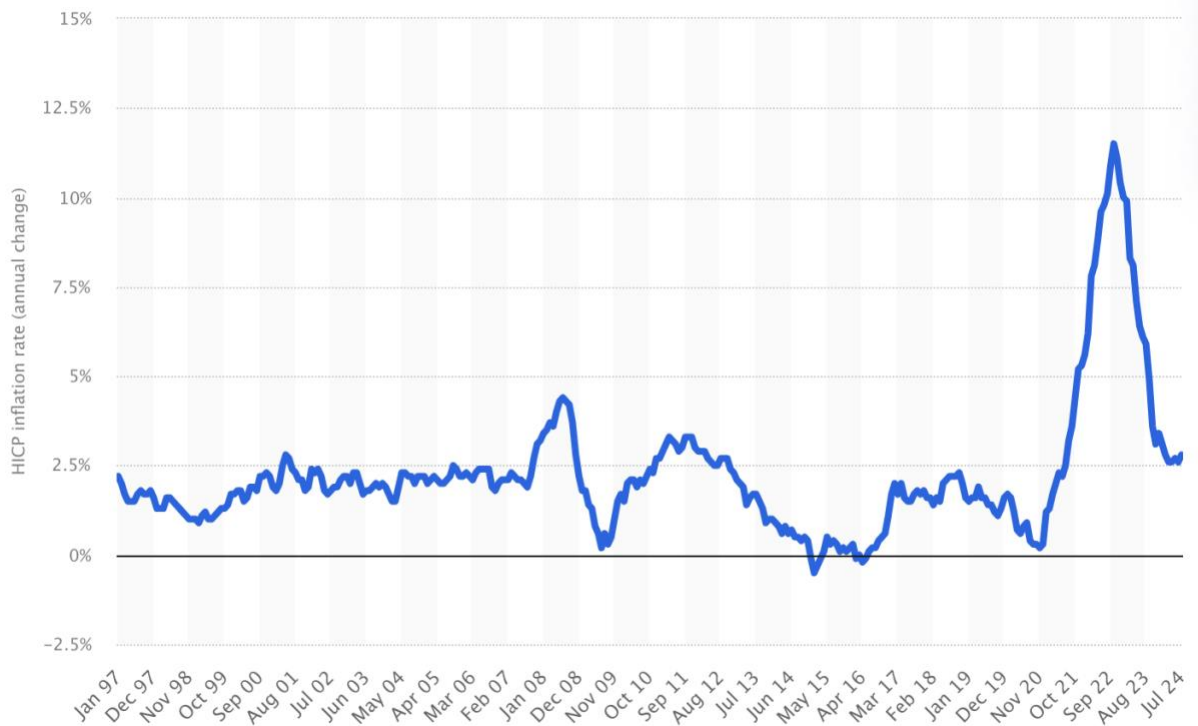
In 2014, Russia invaded Crimea. This was the first step of the attacking war of Russia against Ukraine. The second and much bigger step followed in 2022 with the Russia-Ukraine war which devastated Ukraine and led to countless deaths. The EU, the US, Canada and the UK have been answering this aggression by financially sanctioning Russia in hopes of keeping it from continuing attacks. This has however not stopped them (Mbah & Wasum, 2022). It hurt Russia's economy, but at the price of high inflation in the whole world (see Figure 6), but especially in Europe (see Figure 7) (Liadze et al., 2023; Mbah & Wasum, 2022).

Figure 6: Global Inflation Rate from 2000 to 2022, with Forecasts until 2028



Source: (Statista, n.d.-c)

Figure 7: Inflation Rate of the European Union from 1997 to 2024



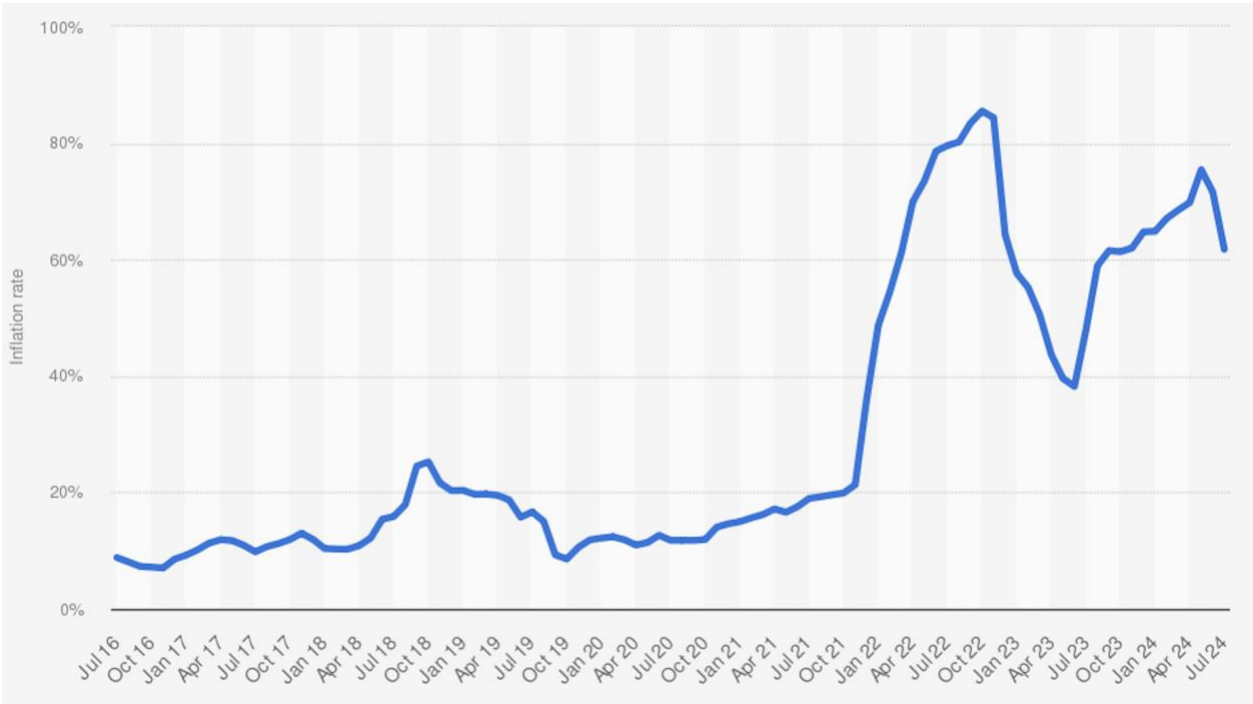
Source: (Statista, n.d.-b)

The ongoing Israel Hamas War starting in October 2023 caused a lot of deaths and destroyed infrastructure as well as commercial and residential buildings in the area causing businesses in the area to stop its operations (Bhattacharya, 2023).

In the Red Sea Crisis at the end of 2023, the Houthis started attacking international ships that entered the red sea from the south. The red sea is the entrance to the Suez channel through which around 12-15% of world goods trade traverses (Notteboom et al., 2024). Armed conflict and political violence like these three crises can cause threats to the physical security of people and businesses, destabilise local politics and the local economy, disturb labour supply and the ability to produce as well as cause problems to transportation (Miklian & Hoelscher, 2022).

Turkey is amidst an economic crisis starting in 2018 following poor monetary policy. The crisis led to a lengthy recession period, an extremely high inflation peaking at above 85% and a rapid depreciation of the Lira as seen in Figure 8 (Orhangazi & Yeldan, 2021). Economic crises lead to a lot of uncertainties in businesses in the affected economy and a difficulty to obtain loans from banks (Miklian & Hoelscher, 2022).

Figure 8: Inflation Rate in Turkey from 2016 to 2023



Source: (Statista, n.d.-e)

The earthquake in Turkey and Syria in February 2023, where actually two earthquakes with magnitudes of 7.8 and 7.5, stronger than any earthquake ever recorded before in the region, occurred, resulted in the death of 45,000 people in Turkey and 7,000 in Syria and major damage to buildings and infrastructure (Dal Zilio & Ampuero, 2023) causing a need of 135 billion € in financing to rebuild the region (AFP, 2024).

The 2023 floods in Slovenia, deemed the worst natural disaster to ever hit the country, caused rivers to overflow and break out into fields and cities which destroyed roads and infrastructure. It killed 6 people (Mendonca, 2023), left around 5 billion € worth of damage in total and 400 million € of damages to business and industry (Bezjak et al., 2023). Natural disasters like these lead to a lot of physical destruction that also have significant economic consequences like the inability to produce, the lack of human capital and destruction of public infrastructure and logistics (Miklian & Hoelscher, 2022).

In the following sections, the impacts of external shocks on the supply chains and the sales ecosystem of SMEs in general, and in particular the impacts of the Covid-19 crisis and the just mentioned crises in the last years, will be pointed out.

2.1.1. Impacts on the Supply Side of firms in GVCs

Covid-19 led to disruptions at the suppliers, in demand and in transportation in nearly all industries on a larger scope (Cagri Gurbuz et al., 2023; Espitia et al., 2022; Xu et al., 2020). Although both supply and demand were disrupted, there was a supply-demand mismatch with the supply side being more severely impacted (Hayakawa & Mukunoki, 2021a; Hossain et al., 2022).

Supply chains have been hit hard by external shocks in the past during events like the SARS outbreak in China in 2003 or the big earthquake in Japan in 2011, but global supply chains recovered from these disruptions within weeks. This did not happen during Covid-19 showing

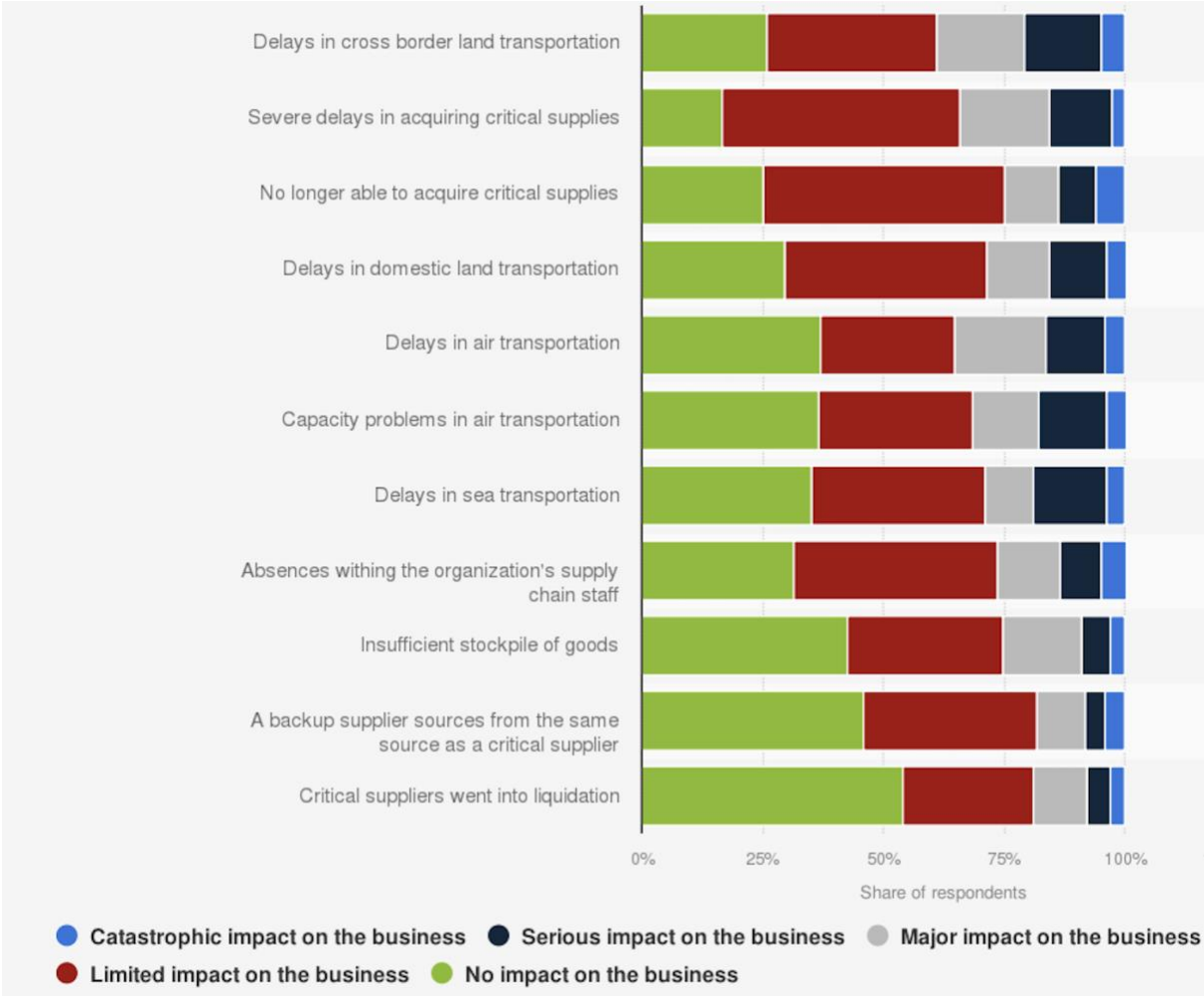
the gravity of its impact which can be explained by its geographical spread around the entire globe in a short time and the relatively long duration of the crisis (Xu et al., 2020).

The pandemic caused governments to implement new measures to counteract the spread of the virus. These were mostly lockdowns, movement restrictions and social distancing guidelines (Ciravegna & Michailova, 2022; Espitia et al., 2022; Juergensen et al., 2020) to which businesses needed to adapt (Cai & Luo, 2020; Miklian & Hoelscher, 2022). The reduced worker mobility led to a sudden halt of production and the closing of many factories which resulted in a global supply shortage of many input factors that in turn led to further production stops in other businesses disrupting GVCs (Cai & Luo, 2020; Ciravegna & Michailova, 2022; Espitia et al., 2022; Juergensen et al., 2020). Consequently, there were inventory shortages after a short time and often production could not be kept up (Xu et al., 2020). Europe, the US and China as the biggest importers and exporters in the global supply chain were severely disrupted which in turn disrupted most other markets in the world (Kalogiannidis, 2020). Shortly after the disruption of the pandemic eased, the Ukraine crisis led to further halts of production for many raw materials and resources from Russia and Ukraine causing a new supply shortages which also disrupted supply chains and production in importing countries significantly which created a second supply shock in a short period of time (Khudaykulova et al., 2022; Liadze et al., 2023). This was particularly impactful in the EU (Liadze et al., 2023; Mbah & Wasum, 2022), as many important raw materials for many industries stem from those two countries (Liadze et al., 2023; Mbah & Wasum, 2022). After this, production halts due to the earthquake in Turkey, the floods in Slovenia and the Israel-Gaza war that left manufacturing facilities destroyed and businesses unable to continue operations, consequently disrupting supply chains for businesses sourcing in these regions (Bezak et al., 2023; Bhattacharya, 2023; Dal Zilio & Ampuero, 2023).

In the recent past, supply chains have been designed for cost optimisation and just-in-time production (Juergensen et al., 2020) which can be seen by frequent sourcing in low-cost

countries and minimal inventory management for many firms. This caused a great dependency both on sources that are often located remotely, e.g. in Asia, and on timely delivery through well thought-out and complex logistics (Cai & Luo, 2020). The pandemic proved them to be severely flawed during times of disruption, which can be seen by some of the impacts of the pandemic on supply chains shown in Figure 9, putting more focus on Supply Chain Resilience (SCRES) in the future (Juergensen et al., 2020). Some businesses could not withstand the financial pressure this caused and went bankrupt or shut down operations for some time leading to a loss of suppliers that their customers had not planned for. All of these disruptions led to a reduction of sourcing options (Paul et al., 2021).

Figure 9: Negative Impacts on Supply Chains because of Covid-19



Source: (Statista, n.d.-d)

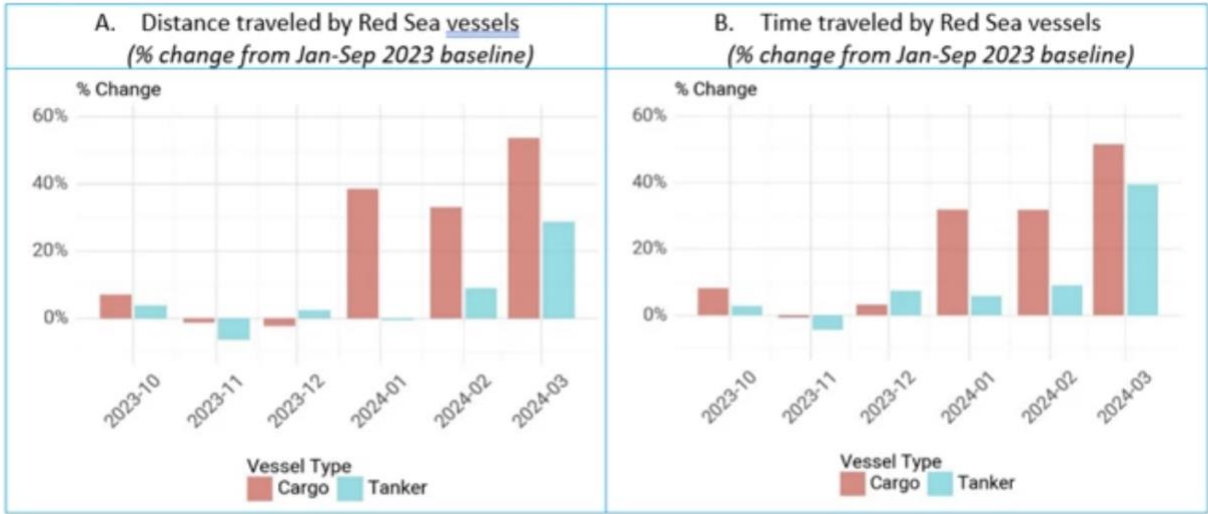
While the supply of most products and raw materials decreased, the supply of raw materials and products that were deemed essential rose at the start of the pandemic (Cai & Luo, 2020) as essential industries could stay open causing different industries to be impacted differently (Bartik et al., 2020). This also led to businesses switching production towards necessities or products that helped in the protection against Covid-19 like face masks while production for their usual products has been stopped. This led to an overproduction and also caused another supply shortage for the raw materials needed to produce the essential products as the demand grew sharper than the supply could grow (Cai & Luo, 2020).

Because of the pandemic, restrictions concerning the closing of borders (Xu et al., 2020), the movement of goods carriers like export-import restrictions, stricter commodity inspection and air-flight control the international shipping was disturbed with importing times doubling (Ciravegna & Michailova, 2022; Hossain et al., 2022; Ivanov, 2020). Further logistics have been disrupted by price surges at air freight and other modes of transportation, frequent cancellation of air freight and increased lead time (Cai & Luo, 2020). Air freight was also greatly suspended as 50-60% is carried by passenger airplanes which were greatly reduced by about 95% (Xu et al., 2020). Delivery delays included a quarantine process at some borders which also led to some changes in shipping routes, causing further delays (Cai & Luo, 2020). During the first phase of the pandemic, the ocean shipping demand dropped dramatically due to the cancellation of many contracts without being renewed and ship owners refusing to dock at certain ports due to restrictions (Sharma et al., 2020; Singh et al., 2021). Importing times have returned to the normal time and restrictions have been eased after the first phase (Hossain et al., 2022) but recovery was still not easy for many firms (Kuckertz et al., 2020). But suppliers caused delivery delays, too, as the production halt left orders cancelled or with delayed shipment (Cai & Luo, 2020). Not only the pandemic, but also the earthquake in Turkey and the floods in Slovenia due to destroyed infrastructure led to logistics having to reroute and causing

delays (Bezak et al., 2023; Dal Zilio & Ampuero, 2023). But the biggest impact on logistics after the pandemic was caused by the Red Sea Crisis. The attacks caused around 80% of vessels from Asia that were headed to Europe to take the alternative route around Africa adding between one and two weeks of traveling time, which can be seen in by the increase in time and distance in Figure 10, and a 340% increase in transportation costs at its highest point which led to disruptions and delays in transportation that disturbed manufacturing businesses in Europe (Notteboom et al., 2024). The cost increases are indicated in

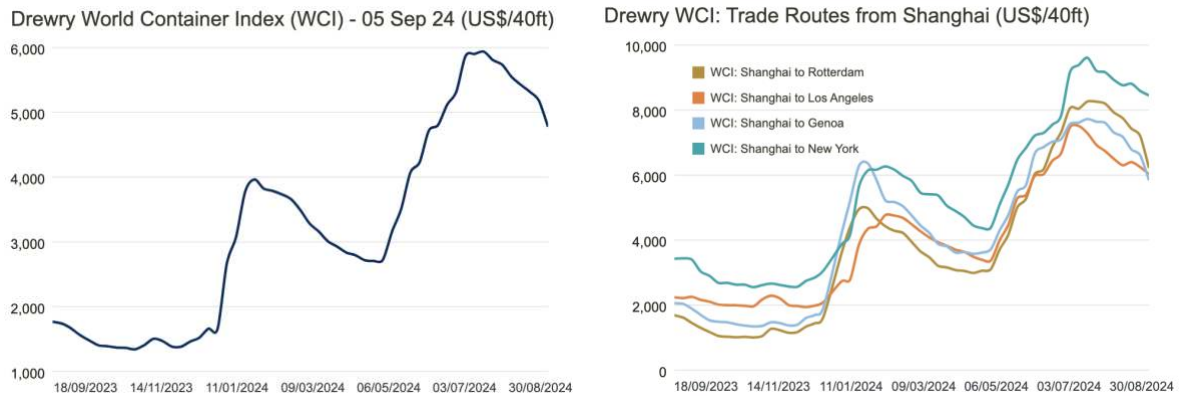
Figure 11. Because of these delays and the need for alternative shipment, a big share of demand could not be satisfied (Cai & Luo, 2020).

Figure 10: Additional Time and Distance travelled by Red Sea Vessels during the Red Sea Crisis



Source: (Bogetic et al., 2024)

Figure 11: Global Container Shipping Rates since the beginning of the Red Sea Crisis



Source: (Drewry, 2024)

Another factor having an impact on logistics during the pandemic was the lack of available workers (Juergensen et al., 2020; Xu et al., 2020). The disruption in the labour market (Miklian & Hoelscher, 2022) caused not only workers in transportation but workers across all industries to be unavailable to work due to infections, quarantine measures (Xu et al., 2020) and lockdowns. This impacted some sectors more than others as some could rely more on staff working from home (Ali et al., 2021; Marvasi, 2023).

Financial distress has been one of the biggest problems for SMEs during the pandemic (Cowling et al., 2020; Thorgren & Williams, 2020). Especially financial illiquidity posed big problems (Miklian & Hoelscher, 2022) which often left SMEs without the funds to make investments needed in order to recover from the losses they endured over the times of crisis (Bartik et al., 2020; Kalogiannidis, 2020). SMEs were left on the brink of bankruptcy as getting back to production proved hard and working capital reserves were limited (Cai & Luo, 2020) when at the same time prices for transportation and raw materials rose due to their limited supply (Cai & Luo, 2020; Paul et al., 2021). The price for raw materials and energy prices rose even further after the start of the Ukraine crisis. There was a high inflation rate in many countries and especially in Europe as prices of oil, natural gas and food rose significantly due to Russia being the main oil and natural gas supplier for many European countries. The immediate proximity

of the Ukraine crisis and the pandemic made it hard for many businesses to keep recovering from the Covid-19 disruptions (Liadze et al., 2023; Mbah & Wasum, 2022). Not every external shock has to include price increases for every business as the economic crisis in Turkey shows. The extremely high inflation leads to higher prices for domestic residents and businesses but due to the depreciated Lira foreign businesses experience much lower prices (Orhangazi & Yeldan, 2021).

The limited supply choice during the crises left some businesses with the only option of procuring alternative materials that work but are not optimal for the needed purposes which can lead to a decreased product quality (Raj et al., 2022).

Uncertainty is commonly defined as “perceived inability to predict something accurately” (Milliken, 1987, p. 136) because a firm or a person does not have sufficient information or is unable to differentiate between relevant or irrelevant data (Gifford et al., 1979). This was a big problem for all businesses as external shocks are often coming with a new environment. This was the case during Covid with an unknown timeline for recovery and the lifting of restrictions where it specifically created market as well as regulatory and policy uncertainty (Cai & Luo, 2020; Miklian & Hoelscher, 2022). The same is true for the Ukraine crisis when it was uncertain when the supply shock and the inflation would ease off (Liadze et al., 2023; Mbah & Wasum, 2022). Also, during the still ongoing Turkish economic crisis, the uncertainty for both domestic businesses and foreign businesses wanting to conduct business there is extremely high as prices constantly rise due to the extremely high inflation (Orhangazi & Yeldan, 2021). These uncertain situations take a toll on qualitatively good planning of strategic action (Cai & Luo, 2020; Miklian & Hoelscher, 2022).

The mentioned problems have been acknowledged and tried to be counteracted by most governments through interventions firstly through implementing directives and laws like the restrictions to counteract the spread of the Covid-19 virus and secondly by providing financial

and regulatory support to affected firms in order to increase the resilience of businesses and to prevent the layoff of employees as well as liquidity problems (Hossain et al., 2022). In the case of Covid-19, these assistance programs were not granted in every country or to every business (Bartik et al., 2020). It was higher in wealthier countries than in poorer countries which means business continuity was better provided in wealthier countries than in poorer ones' (Kalogiannidis, 2020) making it harder for SMEs there (Hossain et al., 2022).

2.1.2. Impacts on the Sales Side of firms in GVCs

External shocks can also have grave impacts on the sales side. The biggest impact here could be a demand reduction to which the reasons can be manifold.

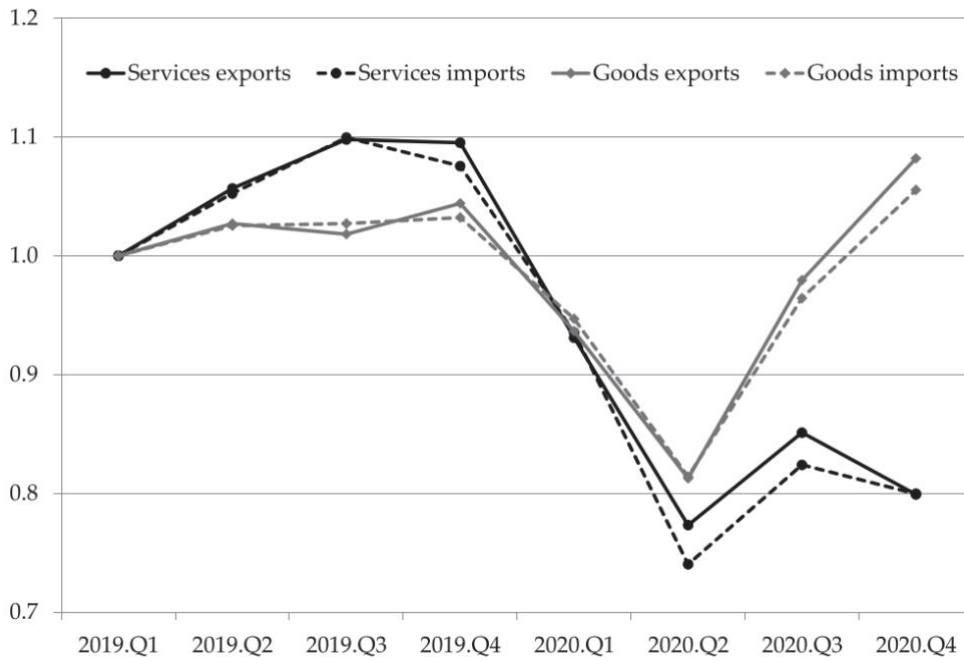
During a major crisis, many people expect lower incomes, losing their jobs or high inflation rates which leads affected people to spend less which happened during Covid-19 and during the Ukraine crisis. During Covid-19, restrictions also led people to stay at home which further decreased consumption and thus demand (Cai & Luo, 2020; Espitia et al., 2022; Hayakawa & Mukunoki, 2021b; Liadze et al., 2023; Mbah & Wasum, 2022). Not only consumers but also businesses demanded less as the stop in production across GVCs led to a reduction in demand as no new raw materials and input factors were needed at the time. This led to cancellation of orders causing liquidity problems for suppliers (Cagri Gurbuz et al., 2023; Paul et al., 2021). SMEs may find themselves in exclusive sales agreements, or only supplying few customers which means a sudden stop in demand from key customers could also lead to a stop in production on their side. The uncertainty during external shocks often leads to decreased customer confidence which makes them more cautious leading to a reduced demand (Juergensen et al., 2020). Also disruptions in foreign countries can lead to a drop in demand as seen during the Israel Gaza war which led to reduced trade and thus to a decreased demand for imports (Bhattacharya, 2023). The same could be said about affected businesses of natural crises (AFP, 2024; Bezak et al., 2023) as well as about the Turkish economic crisis where the

Lira depreciated which leads to increased prices for imports consequently leading to less demand (Orhangazi & Yeldan, 2021). Supply shocks in exporting countries can benefit international businesses as they can create unsatisfied demand which could be exploited (Espitia et al., 2022).

The impact on trade in services during the pandemic was more severe and more prolonged than the impact on trade in goods which can be seen in Figure 12 (Ando & Hayakawa, 2022; Marvasi, 2023). Generally, trade in services is rather resilient against external shocks, particularly when compared to the trade in goods. This could be seen during the global financial crisis where the trade in services was hardly impacted while the trade in goods plummeted. (Ando & Hayakawa, 2022). This is shown in Figure 14. The change in impact gravity can be explained because of the nature of services and the crises as a lot of services require contact between the service provider and the customer which was restricted during the pandemic implying a varying impact gravity over different service sectors which can be seen in Figure 13 (Ando & Hayakawa, 2022; Marvasi, 2023; Rapaccini et al., 2020). The tourism and transport sectors were impacted the heaviest while the impact on IT services was nearly neglectable.

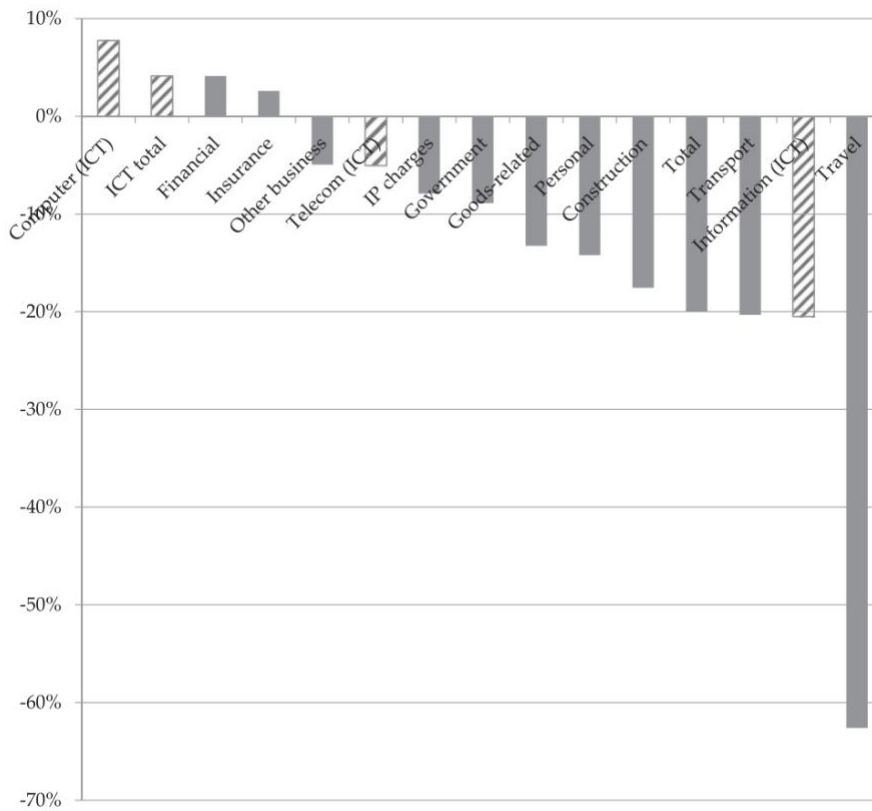
Freight

Figure 12: Quarterly World Trade in Services and Goods



Source: (Ando & Hayakawa, 2022, p. 6)

Figure 13: Change of World Trade in Different Sectors of Services



Source: (Ando & Hayakawa, 2022, p. 15)

transport services can be indirectly linked to a decrease in the trade of goods. Services distributed online were impacted significantly less than the previously mentioned. Although there was a negative impact on the export of IT services, it was impacted the least, stemming from a decrease being offset by the growing demand of other online IT services (e.g. meeting software). This is also owed to the rise in digitalisation during the pandemic (Ando & Hayakawa, 2022).

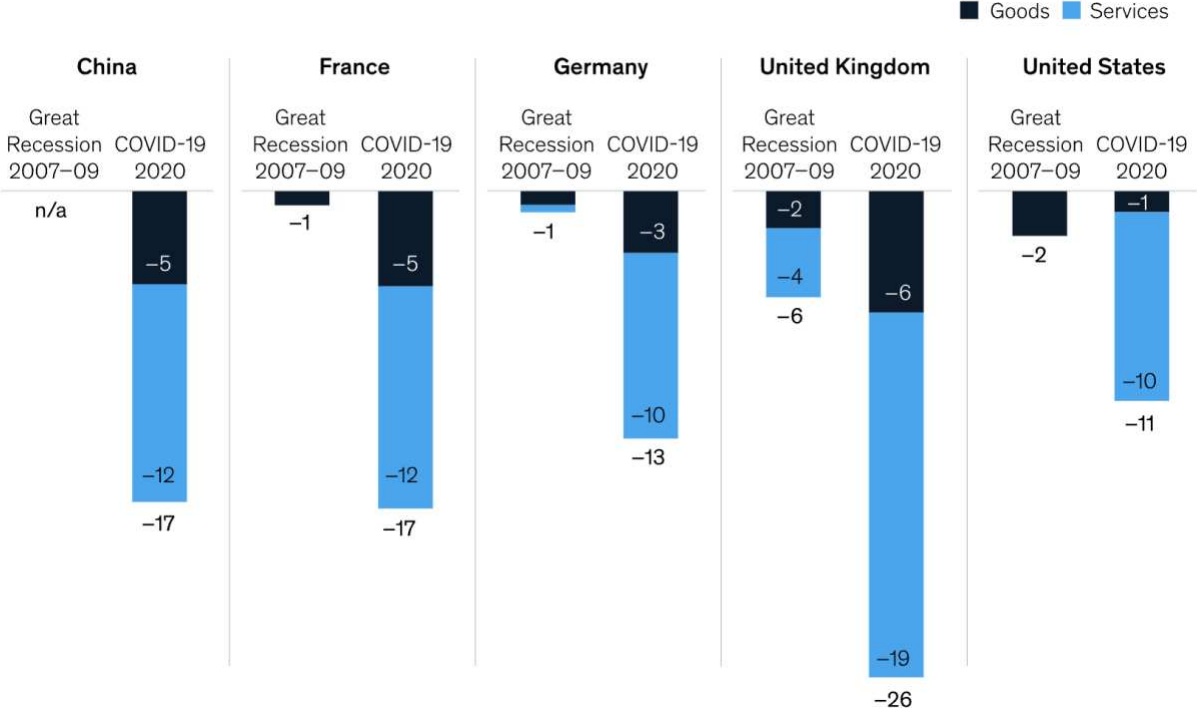
Like it could be seen by the change in demand for different IT services, external shocks usually lead to a shift in buying behaviour leading to some products being demanded more and some being demanded less (Raj et al., 2022). During Covid-19, demand for most products went down while the demand for products and raw materials that were deemed necessary (Cai & Luo, 2020; Espitia et al., 2022), that were affected by panic buys, that helped in the protection against the virus (Xu et al., 2020) or products for people's homes (Espitia et al., 2022) went up causing businesses that produced such goods to experience an increase (Cai & Luo, 2020) leading to huge profits for businesses selling essential goods (Kalogiannidis, 2020).

Some companies that experience disruptions might redesign their supply chains. This could lead to reduced demand as customers of SMEs could also be reorganising their supply chains. However, this could be again offset by other firms reorganising their supply chains and incorporating the firm in their newly organised supply chain (Juergensen et al., 2020).

For most SMEs during the pandemic, the sudden decline in demand which led to major revenue drops (Kalogiannidis, 2020) and simultaneous supply chain issues put additional strain on already present financial constraints leading to liquidity problems (Juergensen et al., 2020). The decline in consumption can be seen in Figure 14. Although demand for goods plummeted during lockdown measures and at the start of the pandemic, it quickly recovered to a similar level as before the pandemic (Kalogiannidis, 2020). But this risen demand could not be satisfied as logistics were severely impacted. This left SMEs on the brink of bankruptcy as getting back to

production proved hard and working capital reserves were limited when at the same time prices for transportation and raw materials rose (Espitia et al., 2022).

Figure 14: Consumption Changes for Goods and Services in major Economies during Covid-19 and the Great Recession



Source: (Remes et al., 2021)

Government policies and restrictions make it difficult to organise and to implement measures in the tight budgets of SMEs to keep continuity and to stay able to deliver under new conditions (Juergensen et al., 2020), especially if government measures proved to be ineffective like in some countries during the pandemic (Hossain et al., 2022) or if they are abrupt and different across countries as well as breaching some existing laws or treaties. This patchwork of regulations can lead to large uncertainties among internationally active firms (Ciravegna & Michailova, 2022).

Participating in GVCs as an SME leads to them being more vulnerable because bigger focal firms become more demanding and regularly pass the difficulties they experience on to their GVC as those firms mostly have limited bargaining power against bigger firms. This collaboration challenge leads to a pressure to solve additional problems of big focal firms while

needing to keep their quality standards high as well as prices constant which in turn means there is a pressure for keeping costs low when the prices for other goods, raw materials and transportation are rising (Juergensen et al., 2020).

Other problems during the pandemic arose with sales channels as people had to avoid business meetings or going outside causing a big increase in online sales channel demand in comparison to in person shopping and sales meetings (Cai & Luo, 2020).

2.2. Building Resilient Value Chains

Although they are less well equipped to face crises, SMEs do not just take on the role of victims but rather try to exploit new opportunities created by crises and innovate through them to come out stronger than before. They try to achieve this by reducing negative impacts and implementing new business practices that both build resilience and leverage positive impacts of crises (Miklian & Hoelscher, 2022). It is impossible to know which external shock might come next, when it will appear and to exactly plan on measures to take once it arrives, but precautions, plans and mitigation strategies can be set in place for the possibility of the appearance of such a shock which can be a source of competitive advantage when a disruption occurs (Oh & Oetzel, 2022; Xu et al., 2020). There are proactive strategies that try to mitigate the impacts of a shock through preparation and there are reactive strategies that come into play after a disruption happened. This chapter will focus on proactive strategies that try to build resilience in the value chain (Cagri Gurbuz et al., 2023; Paul et al., 2021).

Resilience in the GVC context refers to the ability to return to their normal operations after a disruption has occurred (Gereffi et al., 2022).

GVC resilience is a multidimensional concept that includes elements from the firm level, from the GVC level and also from the state or government level. Resilience of firms in the GVC means how these firms adjust to disruptions in their production network. The resilience of GVCs consists of the ability of firms to respond and to adjust to a disruption in their GVC and

the integration of strategies on the firm level and the evolving structural context of the GVC (Gereffi et al., 2022). Countries' roles in GVC resilience are facilitator or regulator, which means taking part indirectly, and producer or buyer, which means taking part directly (Gereffi et al., 2022; Horner & Alford, 2019). The state is a facilitator when it helps businesses to overcome challenges in the global economy through measures like subsidies, industrial policies, tax incentives. As a regulator, it can restrict GVC participation by implementing price and export controls or other types of trade restrictions. The state can produce through state-owned enterprises, and it can act as a buyer through public procurement contracts. These three levels, firm, GVC and state, have to work together to guarantee a resilient GVC when a shock occurs. They can only guarantee resilience when they return back to their previous status or when they find a new equilibrium (Gereffi et al., 2022).

2.2.1. Building Resilient Supply Chains

In order for businesses to keep continuity in case of a disruption and to come out unscathed or even stronger, they need to have a resilient supply chain. The Supply Chain Resilience (SCRES) approach can be used to find the best way to configure the structure of a firm's supply chain, which strategies and practices to implement and which degree of geographical dispersion would be desirable (Ali et al., 2021; Cagri Gurbuz et al., 2023; Hossain et al., 2022).

SCRES is the adaptive capability of a supply chain to prepare for and respond to disruptions in order to make a timely and cost-effective recovery to progress to a state of ideally better operations after the disruption than before (Tukamuhabwa et al., 2015).

This means there are four phases to SCRES. They are readiness, response, recovery and growth (Hohenstein et al., 2015; Tukamuhabwa et al., 2015). SCRES should aim at maximising these four phases in a cost-effective and timely manner. SCRES strategies should be adapted over time to ensure a fit in a changing environment and an adaptation to protect the supply chain from new disruptions. This means after adapting to a disruption, a future disruption of this

nature should not damage the supply chain that heavily anymore as the supply chain should now be prepared for such a disruption (Tukamuhabwa et al., 2015).

The strategies for achieving SCRES can be divided into proactive and reactive strategies where the phase preparedness consists of proactive and the other three phases of reactive strategies (Tukamuhabwa et al., 2015) Some strategies can both be implemented as a proactive as well as a reactive strategy or include planning before the disruption and enactment after it. Some of them also influence each other (Hohenstein et al., 2015; Tukamuhabwa et al., 2015). The four key strategy types are flexibility, collaboration, redundancy and agility (Tukamuhabwa et al., 2015).

Flexibility is the ability to adapt to changing requirements of a firm's environment and stakeholders in the shortest time and with the lowest effort possible (Hohenstein et al., 2015; Tukamuhabwa et al., 2015). Redundancy means the ability to use spare capacity and inventory strategically during a disruption to handle supply shortages or demand surges (Erol et al., 2010). This includes multiple sourcing (Christopher & Peck, 2004; Linnenluecke, 2017). Building redundancy can increase flexibility as having resources that can be adaptably deployed facilitates response (Hohenstein et al., 2015). Collaboration means working together effectively with other supply chain members to gain mutual benefits through practices like postponement, risk sharing, forecasting (Johnson et al., 2013), information sharing (Pettit et al., 2013) and visibility (Christopher & Peck, 2004), which is the ability to see through the entire supply chain (Christopher & Peck, 2004). Agility means responding quickly in case of an unexpected change in demand or supply (Ali et al., 2021; Christopher & Peck, 2004; Rapaccini et al., 2020) through for example a quick change of business practices or systems (Erol et al., 2010). Agility includes velocity (Erol et al., 2010), the ability to react quickly (Christopher, 2000; Stevenson & Spring, 2007).

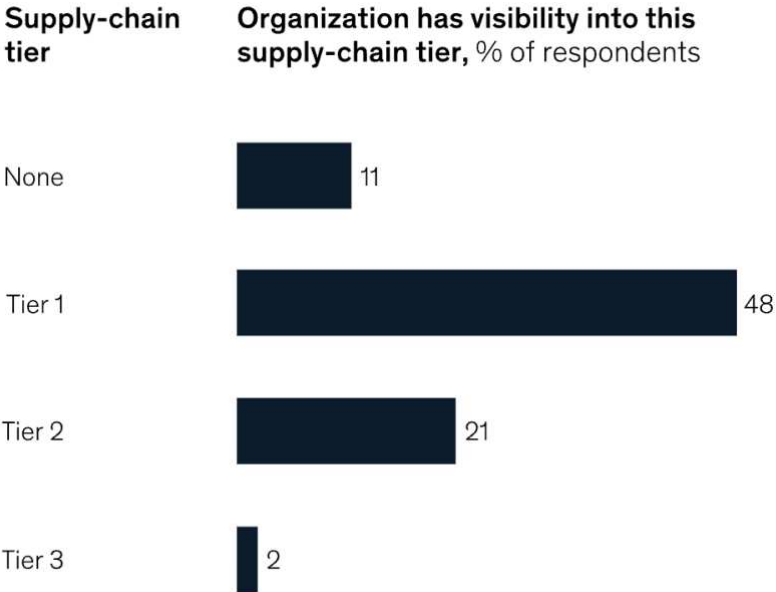
Proactive strategies for supply chain disruptions can include strategic planning, collaboration, digitalisation, inventory management, supplier diversification and Human Resource Management (Hohenstein et al., 2015).

The easiest way to try and increase the preparedness for an external shock is to make predefined contingency plans and communication protocols to ensure a decrease in response time and a reduction of mistakes in case of a disruption (Hohenstein et al., 2015; Knemeyer et al., 2009). Before engaging in continuity planning activities, firms need to firstly analyse the risks around the firm in order to know for which risks to plan for (Ciravegna & Michailova, 2022; Czinkota et al., 2010; Oh & Oetzel, 2022). With the pandemic, the unexpectedness as well as the unprecedented nature meant that there were usually no specific mitigation plans prepared as well as no data on how to react to such a disruption (Ali et al., 2021). After a shock, businesses want to get back to their normal pre-crisis socio-political equilibrium, which is not always possible depending on the gravity of the impact, and try to focus on growth, rarely seeming to plan and prepare for a next shock after the last one is overcome (Miklian & Hoelscher, 2022; Oetzel & Oh, 2021). Although some managers do prioritise crisis readiness after a major crisis hit their company, they tend to forget past experiences and downgrade the priority of crisis readiness over time. This is unless managers foresee a concrete and significant threat to the business (Oh & Oetzel, 2022).

Collaboration in the form of knowledge sharing and working together with suppliers is crucial to the preparedness for external shocks (Hohenstein et al., 2015; Pettit et al., 2013). This can include joint coordination, cooperation, joint decision-making and supplier development (Hohenstein et al., 2015). Especially working with critical suppliers to come up with a risk mitigation strategy in case of supply or capacity shortages is a very effective strategy. When collaborating, it is important to understand critical weaknesses in suppliers and the supply chain and to always try to monitor potential disruptions (Xu et al., 2020). This means also mapping

the whole supply chain to create Visibility which can lead to an early detection of warning signals along the supply chain (Blackhurst et al., 2011; Christopher & Peck, 2004). This can be assisted by digitalising the supply chain and incorporating analysis tools (Oh & Oetzel, 2022; Xu et al., 2020). Only two percent of companies have visibility below the 2nd tier as seen in Figure 15 (McKinsey, 2023).

Figure 15: Visibility of Companies along the Supply Chain



Source: (McKinsey, 2023)

Through analysis tools, partners can be tracked and evaluated easier as well as be involved in decisions (Oh & Oetzel, 2022). Cooperation in R&D can pose a viable alternative to focusing on R&D on their own as the resources of SMEs are often limited. This can greatly increase the quality of the results, decrease the costs for one partner as well as decrease the risk of one partner by sharing it (Contractor, 2022). Information sharing and collaboration with other firms and organisations that are experienced in certain disruptions can help in gathering information that is necessary to improve strategic planning as sometimes crises or disasters can be too difficult to tackle alone (Oh & Oetzel, 2022) as gathering information and formulating plans as well as implementing these plans can sometimes be too time consuming or too expensive for one firm to tackle alone (Oetzel & Oh, 2021). Some information is even impossible to obtain if

a firm operates alone (Oetzel & Oh, 2021; Oh et al., 2020). Crisis readiness increases significantly by having insight into diverse experiences from several other organisations, so, these collaborations increase the preparation efforts of a firm. Especially diverse viewpoints can help a firm to avoid biases to mitigation measures. Best practices can help in giving a clear view of how crisis readiness could look like (Oetzel & Oh, 2021). This could include multi-sector partnerships including actors from public, private, and civil society organisations (Oh & Oetzel, 2022). Especially partnerships with complementary capabilities and mutual interests are most likely to effectively respond to crises (Dahan et al., 2010). Collaborations for crisis mitigation should not be exploited for one's own benefit, rather it should create value for all collaborators. The collaboration strategies need to be up and running before a disruption occurs as otherwise, it could be too late to identify and establish these connections (Oh & Oetzel, 2022).

Redundancy strategies like having multiple suppliers, slack in production resources and transport can also help to absorb external shocks (Ciravegna & Michailova, 2022; Czinkota et al., 2010; Hohenstein et al., 2015). In normal times, most firms try to reduce inventory stock to become more efficient, but during a crisis, replenishment can prove to be difficult. So, slack resources can enable a firm to continue its business operations and even help in providing resources for crisis mitigation (Oh & Oetzel, 2022). Flexible contracts and standardised input factors make it easier to pursue these redundancy strategies (Ali et al., 2021). Slack resources can be created through a good inventory strategy with safety stocks (Blackhurst et al., 2011; Wu et al., 2013).

Redundancy through supplier diversification is created by having multiple suppliers in different geographical regions (Cagri Gurbuz et al., 2023; Xu et al., 2020) to offset changing supply conditions like shortages or delays (Hendricks et al., 2009). Having alternative sourcing options

in place before a crisis is crucial for overcoming this crisis (Ciravegna & Michailova, 2022; Czinkota et al., 2010; Oh & Oetzel, 2022).

Fewer suppliers in one region help in building stronger and longer-term supplier relationships, better collaboration with uncomplicated communication and a more effective supply chain management. This is because a smaller group of suppliers can handle different criteria like quality and cost of supplies or the timeliness and the speed of delivery better (Burke et al., 2007; Treleven & Bergman Schweikhart, 1988). Suppliers can become more familiar with the needs of the firm as well as its requirements and can continuously improve (Namdar et al., 2017)). It also limits administrative as well as transaction costs because of reduced coordination efforts which leads to shorter negotiating times, less delays and less disturbances in production schedules (Berger & Zeng, 2006; Cagri Gurbuz et al., 2023). But under a single big disruptive event it could break down (Cagri Gurbuz et al., 2023; Marvasi, 2023). So, a dual- or multi-sourcing approach in multiple markets could be a suitable strategy to spread the risk of shock exposure (Hayakawa & Mukunoki, 2021a; Marvasi, 2023; Xu et al., 2020).

Multi-sourcing or the use of backup suppliers to have other sourcing options in case a supplier is disturbed benefits businesses as it limits the dependency on one or few suppliers making supply chains more resilient (Cagri Gurbuz et al., 2023; Juergensen et al., 2020; Xu et al., 2020)). Having backup suppliers ready may lead to lower search costs and easier access to alternative sources as already established connections lead to more trust, shared knowledge and collective insights which is more efficient for both the firm and the supplier than to search for other customers or suppliers (Oh & Oetzel, 2022). It helps particularly when there is a need to give priority to supplier reliability (Kumar et al., 2018). It is also necessary if flexibility in sourcing is wanted (Cagri Gurbuz et al., 2023). When coping with supply chain disruptions, it is important to ensure that not all suppliers and customers are affected by the disruption at the same time. This is why suppliers should be geographically dispersed. This is especially true for

events that disrupt all operations in a whole region (Paul et al., 2021) which is why suppliers in regions that are less prone to crises like natural disasters should be preferred (Cagri Gurbuz et al., 2023; Oh & Oetzel, 2022). Dispersing a greater range of suppliers in geographically dispersed regions, especially when they are unlikely to be exposed to the same shocks (Marvasi, 2023), reduces risks of supply disruptions significantly and mitigates damaging effects of regional disruptions (Hendricks et al., 2009). Both global sourcing as well as local sourcing play an important role in supplier diversification as global sourcing helps in staying efficient and low cost and local sourcing helps in staying agile and responding quickly in case of an emergency (Xu et al., 2020). This helps even in global events such as the Covid-19 pandemic (Cagri Gurbuz et al., 2023) as businesses could become more adaptable to new environments due to more flexibility (Eggers, 2020).

Human Resource Management in training employees to know what to do in times of crisis can also be of the essence (Blackhurst et al., 2011; Oh & Oetzel, 2022). Having organisational and human resource capabilities that can react well to sudden changes and disruptions can greatly increase resilience as the firm can embrace change through change readiness which increases the likelihood of the business coping with a disruption (Duchek, 2014; Oh & Oetzel, 2022).

2.2.2. Building resilient Sales Ecosystems

But only a resilient supply chain won't generate revenues and profits. This is why also the sales ecosystem of a business has to be resilient in case of a disruption.

Like for SCRES, strategic planning is a way of preparing proactively for a crisis by analysing the organisational environment, recognising possible disruptions and developing a contingency plan that will be put into action if the crisis comes into reality (Oh & Oetzel, 2022; Vargo & Seville, 2011). When planning with demand disruptions and fluctuations, specific risks can be considered and be prepared for to ensure a high customer service and the ability to deliver. Here, demand and capacity should be estimated and pricing can also be taken into account

(Dittfeld et al., 2020). This saves time, increases responsiveness and resilience and gives a clear view of what to do in case of a disruption (Vargo & Seville, 2011).

Collaborating and keeping close communication with customers also during normal times can build closer relationships with them leading to more trust and also a more resilient customer relationship during a disruption (Raj et al., 2022). This can include joint coordination, cooperation and joint decision-making (Hohenstein et al., 2015). Like the information sharing for planning in the supply chain part, gathering information through information sharing and collaboration with other firms and organisations that are experienced in certain disruptions improve strategic planning as sometimes crises or disasters can be too difficult to tackle alone (Oh & Oetzel, 2022).

Having redundancy in production resources can increase the ability to deliver in case of supply shortages and delivery problems and can prevent lost sales and even increase sales through overtaking orders of competitors (Blackhurst et al., 2011).

Similarly to diversifying supply chains, creating redundancy by diversifying the customer base of a company creates resilience and the ability to mitigate demand disruptions through spreading the risks. This can be done by geographically or by customer segment diversification (Leung & Sun, 2021).

Few customers mitigate the risk of having demand uncertainty during disruptions because the firm can focus more on the relational ties with its customers (Saboo et al., 2017). On the other hand, having fewer customers increases the dependency on those customers which in turn can lead to higher cash flow risks (Cagri Gurbuz et al., 2023; Huang et al., 2016). Fewer customers also lead to a bigger bargaining power of the customer in relation to the supplying firm. Because of this, firms with a high customer concentration need more cash and flexibility to adapt to the changing needs of the market (Huang et al., 2016). A disruption that hits the few concentrated customers can quickly lead to demand and revenue drops endangering the survival of the

business. This is especially true in uncertain situations like the Covid-19 pandemic (Cagri Gurbuz et al., 2023; Huang et al., 2016; Paul et al., 2021).

This is why it is important to ensure that not all customers are affected by a disruption at the same time through having a multitude of different customers in different regions and industries and thus building resilience in the customer base. This is especially true for events that disrupt all operations in a whole region (Bacchetta et al., 2007; Conz et al., 2023; Paul et al., 2021). Dispersing customers geographically reduces risks, mitigates damaging effects of regional disruptions and at the same time increases performance, flexibility and thus resilience (Cagri Gurbuz et al., 2023; Jiang et al., 2023; Leung & Sun, 2021; Marvasi, 2023; Oh & Oetzel, 2022). This should be in stable markets with low risks of external shocks (Bacchetta et al., 2007; Oh & Oetzel, 2022). Even global events such as the Covid-19 pandemic can be mitigated by this because disruptions mostly did not appear simultaneously everywhere (Cagri Gurbuz et al., 2023).

Having organisational and human resource capabilities that can react well to sudden changes and disruptions can greatly increase resilience. So, training employees in how to react to different crises and making sure they can embrace change through change readiness increases the likelihood of the business coping with a disruption (Duchek, 2014; Oh & Oetzel, 2022).

2.3. Reactive Strategies for the Mitigation of Shock Impacts

Although proactive strategies are important, risk mitigation has to also include reactive strategies to ensure a timely and smooth recovery (Cagri Gurbuz et al., 2023; Paul et al., 2021). In order to maximise the benefits of reactive strategies, there should be short-term strategies that mitigate the immediate risks posed by the external shock and long-term strategies in order to adapt to a new normal after the crisis (Raj et al., 2022).

2.3.1. Reactive Strategies for the Mitigation of Shock Impacts on Supply Chains

When an external shock appears, it becomes a great priority for many businesses to develop risk mitigation strategies for their global supply chains in order to secure a constant supply of raw materials (Ivanov & Dolgui, 2020).

Long-term strategies could include analysis, planning and digitalisation. Businesses could review their business plans and alter or update them to include risk mitigation strategies and strategies for the new normal after the crisis (Blackhurst et al., 2011; Hohenstein et al., 2015; Raj et al., 2022). Planning could be greatly assisted by digitalisation of supply chains (Cai & Luo, 2020) as it can aid in the planning process with in-depth analysis (Dilyard et al., 2021; Raj et al., 2022) by carrying out simulations and the broad usage of data to be able to understand the current state of the supply chain (Cai & Luo, 2020). This new knowledge can greatly facilitate decision making (Dilyard et al., 2021). Knowing all factors influencing the functioning of supply chains is crucial to plan an agile supply chain that can mitigate disruptions and impacts of external shocks. It can also help to not only build new supply chains but also to reevaluate and redesign current supply chains (Cai & Luo, 2020). Digitalisation also helps to collaborate with suppliers, increase responsiveness, keep timely information on possible disruptions and mitigate such disruptions in a cost-effective way through cloud and big data (Cai & Luo, 2020). Linking and integrating digital systems between GVC firms and their suppliers in real-time to track the status of orders and the supplier's schedule and the goods during shipment (Contractor, 2022) can greatly increase the collection, transmission and coordination of information which decreases volatility, uncertainty, complexity and ambiguity (Buckley, 2020). These aspects also decrease transaction costs (Ciravegna & Michailova, 2022; Contractor, 2022). However, contrary to Contractor (2022), Ciravegna and Michailova (2022) argue that not everyone can afford digitalisation and thus, it will only benefit rich individuals and organisations. Digitalisation can increase the connectedness among GVC actors and

improve the trust between them (Dilyard et al., 2021). Through technology, connections to new firms can be made easier. This also includes connections with firms in other countries which means, the adoption of digital technologies can facilitate the search and the finding of new suppliers in both the home and foreign markets (Contractor, 2022; Dilyard et al., 2021). These easier and more direct connections also lead to less intermediaries being involved which leads to an improved speed of the flow of information, goods and services. On the other hand, technology leads to more complex independent relationships that increase uncertainty (Dilyard et al., 2021). Ciravegna and Michailova (2022) on the other hand argue that digitalisation limits globalisation as digital platforms and websites are rather regional than global and are subsidised by regional governments which are also erecting barriers against foreign competition which compartmentalises the world.

For analysing supply chains, creating visibility is of the essence as it helps in gaining efficiency and agility in normal times but is also necessary for understanding disruptions in the global supply chain. It is beneficial to locate all suppliers in the supply chain that could be affected by an external shock (Xu et al., 2020) as a disruption can have a ripple effect in the supply chain (Dolgui et al., 2018). Created end-to-end visibility greatly reduces reaction time in case of an actual disruption (Xu et al., 2020). Further analysis could be conducted with logistics across the supply chain. In case of a necessity to reconfigure logistics, collaborating with long-term suppliers in order to close long-term contracts with third party transportation businesses to ensure preferential treatment or handling transportation on their own in case of a new external shock could be a way to ensure logistics continuity. Additionally, firms could start tracking their goods and keeping close contact with logistic providers in order to constantly know where their shipments are and to have the chance to reroute in case of a disruption (Raj et al., 2022).

Besides these long-term collaboration strategies, short-term collaboration strategies should also be deployed (Hohenstein et al., 2015). Constant information sharing is important in the short-

term to gain valuable information on the status of one's supply chain and to know if a supply chain member is affected, what consequences this has and if he needs help (Cai & Luo, 2020). Information is one of the most valuable resources in times of crisis. It is needed to improve decision making and to effectively strategize and respond to disruptions. This information can only be obtained through connections with other organisations. For this, it is important to keep good and trusting relationships with diverse firms and organisations in order to get as many viewpoints and experiences as possible. (Oh & Oetzel, 2022). Supporting a supply chain member in need and working together to find solutions can greatly increase the functioning of the supply chain by bridging bottlenecks and assuring its intactness making the whole supply chain less vulnerable (Cai & Luo, 2020; Hohenstein et al., 2015; Xu et al., 2020). Sharing feedback and cooperating on making capacity plans can reduce delay and quality issues (Raj et al., 2022). It can help to collaboratively plan supply forecasts with suppliers analysing demand forecast and determining reasonable inventory stocks (Xu et al., 2020). Integrating suppliers so that the different supply chain members can learn from each other and create mutual knowledge between them and the firm leads to better SCRES (Ali et al., 2021), a faster response time, better performance (Hohenstein et al., 2015) and can greatly increase the effectiveness of the supply chain (Ali et al., 2021). Other short-term collaboration measures could include joint coordination and joint decision making (Hohenstein et al., 2015).

Creating redundancy through slack resources and transportation in the short-term helps to quickly react to disruptions (Craighead et al., 2007; Hohenstein et al., 2015). Inventory redundancy by stockpiling in anticipation of supply and logistic disruptions in order to stay able to produce and to continue operations could be of great assistance in bridging disruptions in the own firm and in suppliers (Raj et al., 2022; Xu et al., 2020). Because of this, businesses can endure a longer time without needing to engage with disrupted supply chains and changing prices. But it also means that there is limited flexibility and liquidity issues over time as a lot

of capital is tied up in stocks (Raj et al., 2022). In the long-term, a new inventory strategy for the future with optimised stock levels could be thought out and implemented to ensure a lower level of vulnerability (Hohenstein et al., 2015).

Creating redundancy through backup suppliers makes businesses flexible and ensures quick and easy supplier switching in the short-term (Bode et al., 2011; Hohenstein et al., 2015).

Performing a risk assessment of all suppliers to find potential for disruption and seeking alternative sourcing options could greatly increase flexibility (Raj et al., 2022; Xu et al., 2020).

Contractor (2022) suggests that diversification in periods with perceived risk shows itself through an increasing number of suppliers, sourcing nations and alliance partners. This increases flexibility through a greater range of partners. This is amplified by a willingness to share information to jointly gain efficiency (Buckley, 2020). The alternative suppliers should be located in regions that are less prone and less affected by disruptions than the original location (Oh & Oetzel, 2022) and, if possible, close to the manufacturing facility to ensure a timely delivery as also transportation could be disrupted (Raj et al., 2022; Xu et al., 2020).

Contractor (2022) argues that there is a temporary weighted-average decrease in cultural, political and geographical distance between GVC members during shocks but no complete back- or nearshoring of GVCs. Ciravegna and Michailova (2022) agree with the reduced distance between GVC members, but argue that this is not a temporary phenomenon but will persist and that GVCs will become more regionally concentrated in the long-term as firms need time and financial resources to redesign their supply chains. This started during the pandemic and according to Ciravegna and Michailova (2022) will not be quickly overturned as firms have noticed that GVCs are vulnerable and may need to be protected. It could be also beneficial to find alternatives for certain materials to not be dependent on only one option to guarantee better availability and shorter delivery times (Xu et al., 2020). In the long-term, a customised sourcing strategy including multiple suppliers for every material could be thought out. Having one global

sourcing channel for known or fixed quantities to ensure keeping costs low while also having a local supplier for uncertain quantities to ensure a timely and flexible delivery with high responsiveness can facilitate recovery (Blackhurst et al., 2011; Hohenstein et al., 2015; Raj et al., 2022). This means backshoring is a viable strategy for many businesses (Juergensen et al., 2020). Also, the option of nearshoring presents itself which means sourcing from suppliers geographically closer to the production facility but not in the market where it is located. Instead, they are sourcing from an area closer, to both still benefit from lower production costs and quick delivery through smaller distances (Foerstl et al., 2016; Piatanesi & Arauzo-Carod, 2019). But a permanent change in the supply chain structure involves great effort and investments as well as time and should be well thought out (Cagri Gurbuz et al., 2023). Nearshoring might increase responsiveness and benefit a quick delivery, but nonetheless, geographical spread of suppliers should not be neglected as a disruption can happen at any time in any place (Oh & Oetzel, 2022).

During major crises, some governments may aid its population and its businesses in the short-term. This happened during the Covid-19 pandemic in many countries through financial aid. A good measure to assure business continuity and to get financial help is for businesses to seek this government aid and try to maximise the benefits that come from it (Cai & Luo, 2020).

A drastic long-term flexibility strategy to ensure business continuity would be to redesign the business to fit the specific needs of a crisis. This has to be thoroughly planned as the new organisational structure has to be fully understood to work well in both times of crisis and normal times. An organisational redesign can increase performance and mitigate supply chain risks during a crisis if done right, but business practices have to be adapted to the new structure as well which can be hard while dealing with a crisis from the outside (Lin et al., 2006).

2.3.1. Reactive Strategies for the Mitigation of Shock Impacts on Sales Ecosystems

Mitigation strategies of shock impacts on the sales ecosystem could be analysis and planning, digitalisation, product adaptation, servitisation, collaboration, customer diversification, human resource management and reorganisation.

Like the reactive strategies for the supply chain, it is also a good idea to make long-term plans and integrating the new knowledge from the crisis. Contingency plans that were made before the occurrence of the crisis should be reviewed and adapted to fit the specific circumstances (Dittfeld et al., 2020). Digitalisation in the form of cloud and big data as well as AI technology, which is getting better and better, can help with reducing risks by anticipating customer's needs, analysing global markets and other factors, giving forecasts on demand patterns and helping in suggesting management strategies for political and weather-related risks, the optimisation of costs and prices as well as transportation and logistics (Cai & Luo, 2020; Contractor, 2022). Long-term reactive strategies for international sales could include incorporating flexible and alternative distribution channels (Pettit et al., 2013). For this and in order to upkeep sales and marketing activities during the pandemic, a lot of firms further invested into digitalisation increasing responsiveness towards customers through creating a quick means of communication and collaboration by making the business available online also during lockdown periods and times of social distancing (Cai & Luo, 2020; Juergensen et al., 2020; Raj et al., 2022). This benefit is increased by the facilitation of forming new connections to new firms. This also includes connections with firms in other countries which means, the adoption of digital technologies can facilitate the search and the finding of new customers in both the home and foreign markets (Contractor, 2022; Dilyard et al., 2021). The communication advantage of digitalisation can also be seen as a way of communicating through the whole GVC creating information connectivity and transparency between the SMEs and their customers as

well as the focal MNE so that inventory management, flexible production and alternative supply options can be better planned (Dilyard et al., 2021).

But digitalisation can not only help in analysing, planning, sales and marketing, but also in transforming products and services digitally. This can include changes such as providing virtual training instead of physical meetings to train and educate workers and employees as well as transforming product related services into smart working solutions which can be a facilitator as workers providing help, managing service networks, performing machine supervision and many more can work remotely through digitalisation (Rapaccini et al., 2020).

Product adaptations could also be adapted to new needs that arise because of a crisis. This could be short-term or long-term, depending on how long the trend lasts (Juergensen et al., 2020). Especially SMEs are often more able to better adapt their products to new crisis environments (Bourletidis & Triantafyllopoulos, 2014). They could change their manufacturing in order to switch to producing products that are essential for a crisis. This change in product manufacturing happened often during Covid-19 as a lot of businesses switched to producing face masks or sanitisers in the short-term (Kalogiannidis, 2020; Xu et al., 2020). This is a strategy for keeping sales numbers up and making up for the losses during the hard times of crisis or even increasing revenues and profits (Kalogiannidis, 2020). Another long-term way of both adapting products and increasing revenue would be to shift the portfolio of manufacturing firms more into servitisation. This means providing product related services as the sales of these types of services are not as vulnerable to crises as physical sales are, which means shifting to more services could provide some form of revenue stabilisation (Rapaccini et al., 2020).

Firms could also try to mitigate losses and higher prices of raw materials by increasing prices or by incorporating differential pricing charging more for preferential treatment and timelier delivery (Raj et al., 2022). This weakens their competitiveness in the market. Reducing prices in the face of a crisis increases sales numbers when the quality of the product stays the same

but also lowers profitability which could lead to problems in the long-term. Also, customers might not go along when the firm wants to return to its normal price level. Price stability has no effect on sales numbers during a crisis. (Haluk Köksal & Özgül, 2007). Loyalty tends to decrease price sensitivity which means increasing prices if customers are loyal could work (Semerciöz et al., 2015).

SMEs may perform short-term collaboration with other firms and even competitors in order to learn from each other or to pool resources to get orders or projects they would not have gotten without each other to ensure joint survival (Miklian & Hoelscher, 2022). Keeping close communication with customers to find joint solutions for disruptions and granting them with end-to-end visibility to let them know exactly where the product is in the supply chain process can increase trust and establish a sense of cooperation (Raj et al., 2022). Closer relationships of firms with their customers in the GVC such as the focal firm can increase the handling of risks as working and governing jointly in the GVC can greatly increase the flow of information which lowers uncertainty (Contractor, 2022).

Diversification of the customer base through numbers, customer segments and geographically is also a viable short-term option for many businesses during crises as it brings increased business performance and resilience during crises through spreading overall risk but no significant performance change and resilience improvement during recovery and normal times (Jiang et al., 2023; Leung & Sun, 2021). But in the long-term it is also a great choice as it is always important to spread the risk of customers' simultaneous exposure to external shocks for the future (Bacchetta et al., 2007; Cagri Gurbuz et al., 2023).

A reorganisation of the company can also work for international sales when it is done right so that it complements the future objectives (Lin et al., 2006). Part of an organisational redesign could be a sales transformation as for example they had to endure a lot of social, technological, and structural challenges during Covid anyway which could have worked as a starting point for

reorganisation. Fitting a new sales structure and new sales practices with the needs of the crisis can greatly increase the functioning of the sales force (Hartmann & Lussier, 2020).

3. Method

3.1. Research Design and Data Collection

To gather data, six semi-structured interviews with open questions have been conducted with SMEs within GVCs. The questions for these interviews have been designed on basis of an initial literature analysis. They have been split into three parts that could be answered independently from each other as some interviewed firms may only practice either sourcing or sales or interviewees are experts on only one field. The first part was about general information on the company in order to classify the SMEs. The second part was about international sourcing asking about the general information on procurement, the impacts that the crises had and on proactive strategies that were already in place before the crises and reactive strategies the companies implemented as well as their effectiveness. The same was conducted in the third part of the questionnaire for the sales side. The interview questions have been revised and adapted over the course of the interviews to optimise the results. The interviews have been conducted online via Microsoft Teams with the semi-structured interviews providing for flexible answering, giving room for additional enquiries to gather more in-depth data and the open questions leading the interviewees to give more broad data. The shortest interview has taken 13 minutes, the longest 77 minutes and the average duration of the interviews was 49 minutes. The interviews have been recorded and have been automatically transcribed simultaneously by two different types of transcription software in order to prevent losing any data. These transcriptions have been reviewed and all mistakes have been corrected. These corrected transcripts served as the starting point for data analysis.

3.2. Selection of Interview Partners

The interview partners have been searched by an initial screening in the world wide web. The criteria for the interview partners were that they had to be an SME and that they had to be internationally active as otherwise it is difficult to estimate if the firm is part of a GVC. To confirm businesses being SMEs, the number of employees was checked by searching the websites of companies where this number is often displayed. The revenue and balance sheet total were viewed in the “Bundesanzeiger”, an announcement and publication organ of the German federal authorities where annual financial statements and more have to be published by firms that fit certain criteria. Here, the number of employees is also often displayed. After this check, their websites have been thoroughly screened to find evidence of international activity as this is not as common among SMEs as it is among bigger firms. Fitting SMEs have been contacted after the last screening. The author contacted both manufacturing firms and service providers with the intention of painting a full picture and not just having manufacturing firms as interview partners. If contact information was available, employees that were deemed suitable for interviews have been contacted directly next to sending e-mails to general e-mail addresses of the companies alongside a request to forward the e-mail to employees that are suitable for the interviews. Employees that have been deemed suitable were ones that either worked in purchasing or sales and that had a rank high enough to have decision power and be involved in strategy development to know the reasons behind certain decisions or higher-ranking employees that have an overview over both purchasing and sales. If no direct contact information was available, only the general e-mail addresses alongside the request have been contacted. 18 companies have been initially contacted of which eight answered and six accepted the interview request. The interviewed SMEs include two service providers, three manufacturing companies and one company that operates both in manufacturing and service. Table 1 presents an overview over the interviewees and their firms.

Table 1: Overview over the Interviewed SMEs

Name of the Firm	Home Country	Industry / Products and Services	Number of Employees	Position of the Interviewee	Use of Data for Supply Chain or the Sales side
Veldener Präzisionstechnik	Germany	Producer of precision turn parts for the automotive industry	nearly 250	Head of Procurement	Supply Chain
TRICERA energy	Germany	Engineering, project development and manufacturing firm for battery storage systems	90-100	Strategic Procurement Manager	Supply Chain
Creavac	Germany	Mechanical engineering firm that produces machines for coating materials in vacuum, but also provides coating services with its own machines	105	Managing Director in the commercial area and sales	Supply Chain / Sales
KAMA	Germany	Manufacturer of machines for print finishing	115	Chief Operating Officer & Chief Business Officer	Supply Chain / Sales
Queo Group	Germany	Customised software development	150	Director Corporate Development	Sales
Yordas Group	United Kingdom	Service firm that supports import and export companies in complying with chemical regulations, advise companies on sustainability strategies and offers trainings for employees	60-70	Managing Director for Europe, the Middle East and Africa	Sales

The first selected company was the “Yordas Group”, a service firm from the United Kingdom that supports import and export companies in complying with chemical regulations, advise companies on sustainability strategies and offers trainings for employees. The company had 60-70 employees at the start of Covid which spread over four offices in the UK, Germany, Turkey and Canada. Yordas Group is foreign owned, and it owns Yordas GmbH, its German subsidiary. It exported 70% of all services at the start of the pandemic shrinking to 50-60% because of the opening of its offices in Germany, Turkey and Canada as sales in these countries are then seen as domestic by the company. Because it is a consulting and import and export supporting firm, purchasing is not relevant for them (Yordas, JF). This means that the company fulfils two out of three characteristics to identify the involvement in the GVC as it is an intensive exporter, is foreign owned and it owns foreign business with the third criterion not being relevant to the company.

This means it is highly integrated into the GVC (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewee is the Managing Director for Europe, the Middle East and Africa (EMEA) (Yordas, JF).

The second service company is the German “Queo Group” which operates under six different brands and focuses mainly on customised software development. The Group had around 150 employees during Covid-19. It bought another software company 3 years ago that has offices in Germany and Romania and it also has a distribution partnership in Switzerland but the international contribution in value creation is rather small. The direct exports of the firm are also rather small, but 40% of its sales go to large German corporations that operate internationally. As it is a software development firm, purchasing and imports are also not relevant for them (Queo, LB). This means the company is integrated into the GVC at a low depth as it fulfils one criterion (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewee is the Director Corporate Development (Queo, LB).

The third company is Creavac, a German mechanical engineering firm that produces machines for coating materials in vacuum, but also provides coating services with its own machines. The company has 105 employees and does not own foreign businesses and is not foreign owned. Materials only make up about 20% of the total output of which 50% are procured internationally. They export about 30-40% to and sell 20-30% of their output to German internationally operating customers (Creavac, PR). So, Creavac is an intensive importer through which it fulfils one of three criteria making it a company with an integration into the GVC at a low depth (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewee is the Managing Director in the commercial area and sales (Creavac, PR).

The fourth one is TRICERA energy, a German engineering, project development and manufacturing firm for battery storage systems with 90-100 employees. It is not foreign owned and does not own foreign business. During Covid-19, the company sourced 30-40% internationally which rose to 50% now. The exporting is neglectable (Tricera, AT). This means the company is an intensive importer and is thus integrated into the GVC at a low depth (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewee works in strategic procurement (Tricera, AT).

The fifth interview was conducted with Veldener Präzisionstechnik, a German producer of precision turn parts for the automotive industry with nearly 250 employees. It is not owned by a foreign company nor owns foreign business. It procures 30-40% of all materials internationally and also exports 30-40% of their output (Veldener, HB). This means it is an intensive importer, thus, the company is integrated into the GVC at a low depth as well (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewee is the head of procurement (Veldener, HB).

The last interviewed company is KAMA, a German manufacturer of machines for print finishing with 115 employees during Covid. It does not own foreign business nor is it foreign

owned. They source 30% of their raw materials internationally and they export more than two thirds (KAMA, RL & JG) which means they are an intensive exporter making it also integrated into the GVC at a low depth (Gereffi & Fernandez-Stark, 2011; Veugelers et al., 2013). The interviewees were the Chief Operating Officer for purchasing and the Chief Business Officer for sales (KAMA, RL & JG).

Creavac, Tricera, Veldener and KAMA, so the manufacturing firms have all given insight into their purchasing while purchasing is irrelevant for the interviewed pure service provider firms. The service providers, Yordas and Queo, as well as Creavac and KAMA have given insights into their sales which results in four different viewpoints for purchasing and 4 different viewpoints for sales.

3.3. Data Analysis

For the coding of the qualitative data, the Gioia Methodology (Gioia et al., 2013) has been used to analyse and categorise the contents of the semi-structured interviews. This methodology has been used to both keep qualitative rigor but also to take the interviewed people's thoughts, intentions and actions into account to demonstrate the connections among the data, the emerging concepts as well as the resulting grounded theory. For this, the interviews have been conducted and the interview protocol has been revised as the research progressed in order to further improve the research process, to uncover new concepts and to deepen the understanding of the findings (Gioia et al., 2013).

At the start of analysing the data, a first-order analysis has been conducted. This means the information given by the interviewees, so the corrected transcripts, have been inductively coded into first-order concepts that reflect the verbatim sense the interviewee wanted to bring across and stay as close as possible to the interviewees' words. These have been compared with each other and duplicates have been merged (Gioia et al., 2013). After this, the terms and categories have been screened to find similarities and common themes from literature in order to reduce

the categories. They have been abductively named after themes, dimensions and narratives found in theory to formulate second-order themes in order to examine the relations of informant-based concepts compared to research-based concepts (Magnani & Gioia, 2023). The structure of this array has been analysed to find a deeper structure and to make sense of the categories. After finding a structure, the questions of the remaining two interviews have been adapted in order to try and fill in gaps in the structure. After completing all interviews and analysing all data to find no more first-order terms and second-order themes, the themes have been further distilled to aggregate dimensions also taken from literature. All of the data has been split into purchasing and sales as the data is not comparable in the first-order and second-order analysis. With these first-order terms, second-order themes and aggregate dimensions, data structures have been built to get a theoretical view on the interview data. As the data of purchasing and sales is split into two, there are also two data structures. The concepts, themes and dimensions have been compared to the literature in detail in order to find precedents or to see if new concepts emerged. The newly found aggregate dimensions are then reviewed again in order to find relationships among them. This was brought together in a model that is grounded in the data linking it with theory. It shows that different mitigation factors and strategies occur at different times and can influence the outcome of a business after a disruption.

4. Findings

4.1. Supply Chain

The following findings are depicted in the data structure in Table 2. This abducted structure is then brought into a grounded model of resilience and reactions to external shocks in supply chains of SMEs in GVCs depicted in Figure 16.

The interviews have shown that there are three phases or categories of aggregate dimensions which follow the process a firm goes through if an external shock occurs. They are firstly proactive supply chain strategies that try to mitigate the second category, the impacts of external

shocks when they appear, and then the firm tries to mitigate these impacts reactively with the third step of the process, the reactive supply chain strategies. This all is influenced by the nature of the business which gives the context in which the firm can react.

4.1.1. Nature of the Business

4.1.1.1. Nature of Goods and Services

The nature of the firm includes firstly the nature of its goods and services which is the specific products it produces or which services it offers.

We are vacuum coaters, which means that we coat plastic parts with metal layers [... and] we work a lot with resistance evaporators, which we design ourselves (Creavac, PR).

Engineering, procurement and construction [of battery storage systems] (Tricera, AT).

We are a machine manufacturer, and our machines consist of over 10,000 parts. We have four types, so I assume there are around 30,000 different components that we buy (KAMA, RL).

[We produce] precision turned parts primarily for the automotive and mobility industry (Veldener, HB).

This could even be the extent of material consumption in relation to revenue.

Materials make up around 20% of the total output (Creavac, PR).

4.1.1.1. Nature of the Business

Secondly, the nature of a company can refer to its age and the size of the company which can also be about the quantity it produces.

111 [employees]. [...] We sell 12 to 20 machines of our main type. [...] KAMA will be celebrating its 130th anniversary this year (KAMA, RL).

Rather 250 [employees] (Veldener, HB).

105 [employees] (Creavac, PR).

Table 2: Data Structure for the Supply Chain Side

Aggregate Dimension	2nd-order Theme	1st-order Concept
Nature of the Business	Nature of Goods and Services	Nature of goods or services Extent of material consumption in relation to revenue
	Nature of the Business	Age and Size of the company
Proactive Supply Chain Strategies		
Proactive Supplier Diversification	Regional Sourcing	Sourcing in Germany for machines Sourcing in Europe
	Global Sourcing	Supplier diversification in geography, especially in Asia Sourcing in Asia (China, India, South Korea, Japan) mostly for raw materials
	Single Sourcing	Only one supplier for one raw material because of low quantities
	Multiple Sourcing	At least two suppliers and if one had difficulties, the other should be able to step in Reliable and resilient suppliers
	Diversification in Supplier Size	Use of different types of suppliers (small, large internationally operating)
Proactive Inventory Redundancy	Procurement Strategy	Stock-controlled procurement system before Covid
	Inventory Strategy	Conservative approach with stock levels of 6 months
Proactive Supplier Collaboration	Long-Term Supplier Agreements	Framework contracts with suppliers with companies in the EU
	Supplier Relationship	Good relationship with suppliers at any time

Table 2 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Impacts of External Shocks		
Financial Distress	Liquidity	Liquidity problems
Disruptions in Transportation	Logistical Disruptions	Logistic problems because of port closures and diversions
		Movement restrictions during Covid, Quarantine, Border Controls
		Lorries did not drive Trains from Eastern Europe did not run or had to be diverted due to Ukraine
Price Fluctuations	Delivery Time Increase	Drastic delivery time increase
	Price Increase for Goods	Drastic increase in purchasing prices due to Ukraine
		Energy price increase during Ukraine crisis
	Price Increase in Transportation	Drastic price increase in transportation Flight deliveries too expensive and rarely available
	Price Decrease for Goods	In turkey 30-40% cheaper than in Germany due to inflation
Uncertainty	Market Uncertainty	Uncertainty in the market New market situation during the crisis
		Supply Chain Uncertainty
Government Interventions	Directives and Laws	Social Distancing, Lockdowns Turkish government ordered companies to first satisfy Turkish demands and not export
	Government support	Government supporting businesses in some countries Government not supporting businesses in some countries

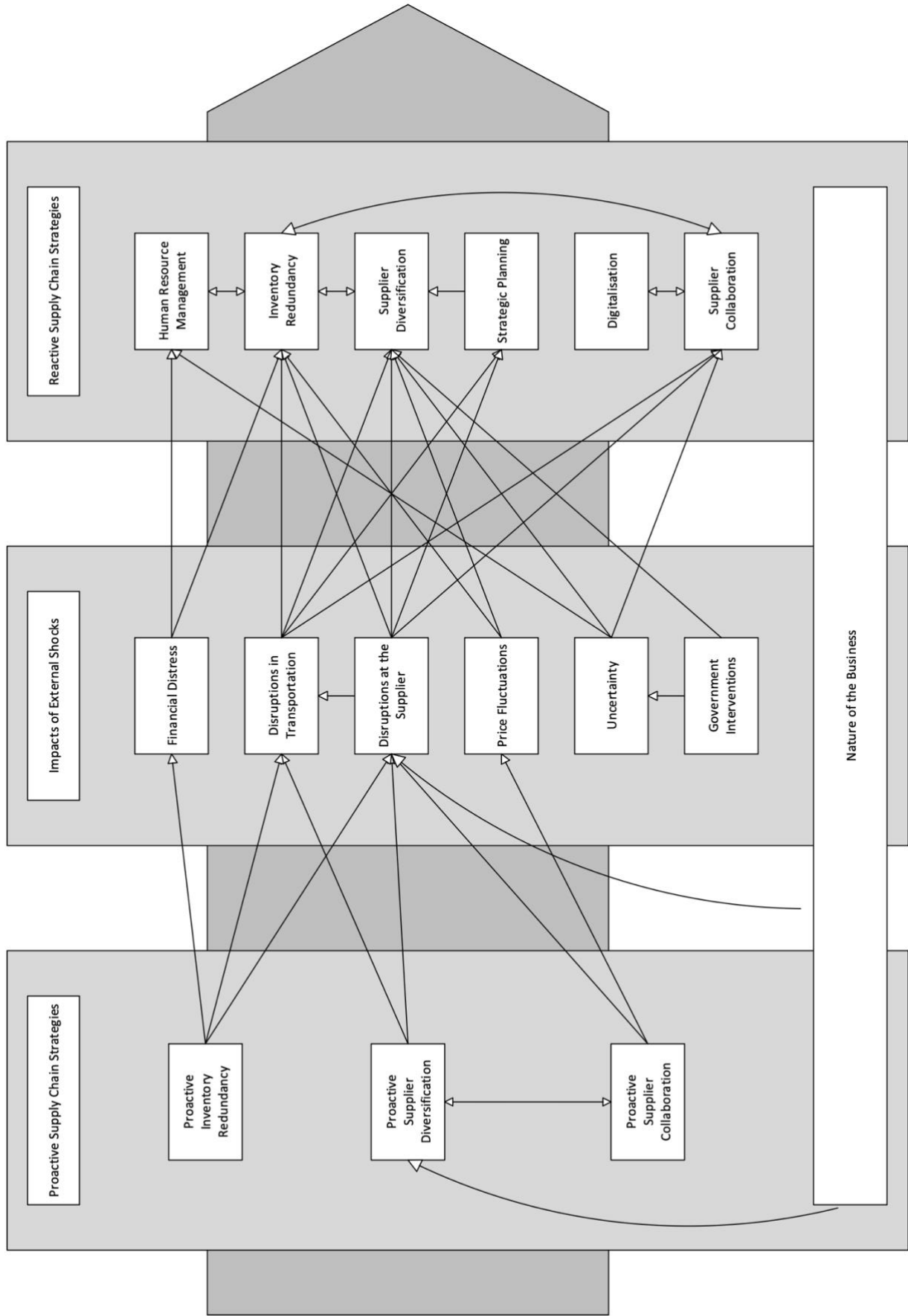
Table 2 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Disruptions at the Supplier	Supply shortage	Companies sourcing from China and India produced less as many plants in Asia were closed leading to less production Home market suppliers unable to deliver Supply of raw materials from Europe cut short during Ukraine Bankrupt suppliers
	Quality Issues	Problems in quality of suppliers' products
Reactive Supply Chain Strategies		
Human Resource Management	Reorganisation	Reorganisation of the company after Covid and Installing new Chief Operating Officer
Inventory Redundancy	Stockpiling	Building up stock levels to 12-18 months at the start of the pandemic Stockpile for 8-12 months after the crises
	Change of Procurement Strategy	Change in procurement system to a system based on customer orders
Strategic Planning	Contingency planning	Legal security through better contracts Time, buffer and cash flow management
		Legal security through better contracts

Table 2 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Supplier Collaboration	Relationship Management	Keep close connection and good relationship with suppliers
	Information Sharing and Collaborative Planning	More communication, keeping track of delivery dates and to stay informed Communicate directly with shipping companies Increased planning with the and raw material releases
	Cooperation	Help suppliers with raw material deliveries if they have problems in procuring In case of a disruption, try and figure something out in the middle Regional portal for supplier partnerships and establishing supplier networks Work with brokers Pay more to get moved up in the production schedule Working together closely with shipping company
Digitalisation	Digital Supply Chain	Digital interface to the supplier Tracking goods during transportation
Supplier Diversification	Backshoring and Nearshoring	Procure alternative components in Europe Changing suppliers from the outskirts of Eastern Europe closer to Germany due to Ukraine
	Offshoring	Shift to more international sourcing
	Multi Supplier strategy	Diversify procurement When signing a contract with a Chinese company, also sign a contract with a European entity
	Supplier Selection	Blacklist companies producing in India with bad products and bad after-sales service Stopped working with them because of warranty issues as they have a high risk of bankruptcy Look for suppliers in countries that respect private business

Figure 16: A Grounded Model of Resilience and Reactions to External Shocks in Supply Chains of SMEs in GVCs



I would say it is 90 plus to 100 [employees] (Tricera, AT).

4.1.2. Proactive Supplier Diversification

The first and most important proactive supply chain strategy is the proactive supplier diversification.

4.1.2.1. Regional Sourcing

Diversification in this sense includes the geographical spread of suppliers, divided into regional sourcing which they do either only in the home market or in Europe. Most of the materials and components usually are from Germany, which is the home market for these companies. In particular machines are often sourced in there.

It [the machines] all comes from Germany (Creavac, PR).

We have a couple of Swiss machine manufacturers, but mainly German machines (Veldener, HB).

We have main producers in Germany [...] Most of these small components are from Germany, so I would say 60 to 70% (Tricera, AT).

We source 90% of all parts in Europe. I would now have to estimate that that is probably 70 % actually in Germany (KAMA, RL).

Regional sourcing is also often performed in other parts of Europe.

30-40% of the raw material we buy comes from other Western European countries [...Italy, France and Poland] (Veldener, HB).

Another 20 % in Europe. In Europe, we are focussing on the Czech Republic, Poland and Slovakia. There are still a few Italians, but those are the four (KAMA , RL).

And there is also in Hungary. There are also some suppliers in Italy, [...] a Spanish company, [...] we are sourcing from Turkey (Tricera, AT).

4.1.2.2. Global Sourcing

Global sourcing with geographical diversification is often done in Asia.

And 10 % actually in Asia [...] located in the metropolitan area, which I think is Shenzhen (KAMA, RL).

[...] in China, [...] factories in India (Tricera, AT) ”.

Especially raw materials are bought in Asia.

We buy the raw materials in Asia, China and South Korea [...] and in some cases from India (Creavac, PR).

4.1.2.3. Single Sourcing

The number of suppliers for one raw material or component can be split into either single or multiple sourcing. Single sourcing was only performed by one of the interviewed firms.

Yes, a [one] supplier (KAMA, RL).

4.1.2.4. Multiple Sourcing

Multiple sourcing on the other hand was done by most of the interviewees with least two suppliers and if one had difficulties, the other one could step in.

We don't usually buy from a single supplier, but that we should have at least two suppliers and if one had difficulties, the other should be able to step in (Veldener, HB).

So, we usually have between 2 and 5 suppliers, I would say as an average, which we then select according to price, delivery performance or readiness to deliver or delivery time (Creavac, PR).

It's a multi supplier structure (Tricera, AT).

Multiple sourcing can also include the selection of suppliers for specific criteria which can be reliability and resilience.

I believe that we have very reliable and resilient suppliers who were able to cushion this very well (Veldener, HB).

4.1.2.5. Diversification in Supplier Size

And lastly it can be diversified by sizes of suppliers.

These are larger steelworks with more than 1,000 employees that operate internationally (Veldener, HB).

Our suppliers include everything from large international companies to the small blacksmith around the corner (KAMA, RL).

4.1.3. Proactive Inventory Redundancy

The second proactive supply chain structure is proactive inventory redundancy. This can be divided into procurement strategy and inventory strategy.

4.1.3.1. Procurement Strategy

The procurement strategy has to do with when an order for restocking is triggered. This was the case with a stock-controlled procurement system here.

KAMA used to have a purely stock-controlled procurement system. In other words, I had a warehouse and if the stock ran out at some point and fell below a minimum level, the system would reorder (KAMA, RL).

4.1.3.2. Inventory Strategy

The inventory strategy could be a lean strategy with just-in-time delivery or a stockpiling strategy with high stock levels like it was the case with Creavac.

We are relatively conservative, which means we have stock levels. [...] We had an average stock level of around 6 months before the crisis (Creavac, PR).

4.1.4. Proactive Supplier Collaboration

The last proactive supply chain strategy that emerged was proactive supplier collaboration which consists of long-term supplier agreements and supplier relationships.

4.1.4.1. Long-Term Supplier Agreements

Framework contracts are a way of closing a long-term supplier agreement.

We conclude framework agreements for certain suppliers. These are usually put out to tender every two years and then the framework agreements are concluded (Creavac, PR).

We sign a framework contract with the supplier, then we secure all of the technical requirements first and then the commercial requirements and then only we request regular offers from this supplier (Tricera, AT).

4.1.4.2. Supplier Relationship

Holding good supplier relationships is important to always be able to fall back onto in case of a disruption.

[Question: Does that mean your supplier relationships were so good that you were favoured over other customers?] Probably both [to this and their suppliers being well positioned] (Veldener, HB).

4.1.5. Financial Distress

The impacts of external shocks consist of six aggregate dimensions. The first one is financial distress.

4.1.5.1. Liquidity

In the interviews, the topic of liquidity was mentioned.

Of course, this is certainly an issue in terms of liquidity and capital commitment (Creavac, PR).

And then it delays the payment and then when the payment is delayed, you have a lower cash flow and so then you cannot buy something more for other projects (Tricera, AT).

The losses at KAMA were so great that we had liquidity problems. [...] The corona crisis has already pushed the company to liquidity bottlenecks (KAMA, RL).

4.1.6. Disruptions in Transportation

4.1.6.1. Logistical Disruptions

Disruptions in transportation had a big role among the interviewees which has shown itself through logistical disruptions. Those were caused by port closures and ship diversions to other ports.

There was a lot of uncertainty basically with the transport routes. The port in China, we had the problem with the Hamburg port. And recently, the blockade in the Red Sea (Tricera, AT).

The biggest problem was the logistics, some ports were closed, everything was diverted to alternative ports. [...] That was the main problem, that the Italians closed their harbours. That meant that I couldn't get any lorries from the port in the south, so everything went to Hamburg, and of course there were traffic jams for weeks before customs clearance (KAMA, RL).

There were movement restrictions, quarantines and border controls which applied also for workers in transportation.

There were border controls. The Poles stood there like that. Then they weren't allowed into the companies. Then we had the problem that when they drove back, lorry drivers were also quarantined for 14 days (KAMA, LR).

Trucks could not drive.

If the lorry doesn't drive, it doesn't drive. If the logistics didn't work, there were no lorries (KAMA, RL).

So, things we experienced was, first, the earthquake in Turkey, then the flood that happened in Slovenia (Tricera, AT).

Trains did not go from near Ukraine or had to be diverted.

And of course there were also problems there during the war with Ukraine. Trains that didn't run at all, trains that had to be diverted. (KAMA, RL).

4.1.6.2. Delivery Time Increase

The other disruption to transportation were drastic delivery time increases where delivery times often doubled in time or even more, also accounted for by the logistics disruptions.

That was also the case at the beginning, when you talk about a [supplier] control system, the hardware had a delivery time of 52 weeks at peak times (Creavac, PR).

Now it is 15 weeks. Sometimes even with German suppliers, the delivery of Transformers was 52 weeks before. [...] It was the delivery of an inverter at that time, double the time from now. [...]

So, with the with the blockade in the and the Red Sea, [...] basically the delivery time drastically increased everywhere and even now suppliers from China calculate for the sea freight two months.

Which is a very long time. Before it was four weeks maximum. Just to have a buffer so that they don't have to pay penalties if something happens. [...] We ordered some Transformers and because of the earthquake, there was a delay of about 20 weeks in the delivery (Tricera, AT).

And then of course the goods arrived much later. I think we were at 16 weeks from plant to plant back then. We were used to eight (KAMA, RL).

4.1.7. Price Fluctuations

Price Fluctuations were often named as an impact of the crises.

4.1.7.1. Price Increase for Goods

The prices for goods increased a lot during the Ukraine crisis.

We have seen a price increase of 15%, mainly in the area of electrical components. [...] the fact that, of course, logistics costs were so high at the time - that was a tenfold increase in container prices at the time. [...] Because air transport is of course too expensive. (KAMA, RL).

What is interesting to say is that we all experienced an increase in the price of raw materials since the beginning of the war on Ukraine. And that was drastic. [...] So, we experience the price increase in year 23 which was about 20% due to the war in Ukraine. [...] It was affected very

fast. You can see that we experienced an increase of 30 to 40% of the raw material price (Tricera, AT).

The Ukraine crisis also drastically increased energy prices.

Ukraine has of course had an impact, not so much on the procurement market in the broadest sense, but of course on energy prices (Creavac, PR).

4.1.7.2. Price Increase in Transportation

Price fluctuations have been also noticed through an increase of delivery prices. This was especially drastic during the Red Sea Crisis.

So, with the with the blockade in the Red Sea, the price of delivery from China increased drastically. So, I can give you an indicator for the delivery cost of a module, it was 1.9€ per kWh then and I think it increased to 9.6€ per kWh (Tricera, AT).

But also during the pandemic, prices for air freight was rather high.

Air transport is of course too expensive. Nobody wants to pay for that (KAMA, RL).

4.1.7.3. Price Decrease for Goods

But there were also price decreases like during the economic crisis in Turkey which is also characterised with high inflation leading to cheaper prices for foreign businesses.

The product is very suitable for the European market and at the same time having the benefit of the deep inflation or the hyperinflation that is happening in Turkey. So, the value of the currency in Turkey is dropping compared to the euro. So, this is why the product from Turkey, you can see at least the transformer, is 30 to 40% cheaper than in Germany (Tricera, AT).

4.1.8. Uncertainty

4.1.8.1. Market Uncertainty

The overall uncertainty during the crises was also a big influence for most businesses as there was market uncertainty during the crisis.

I think mostly it was the uncertainty in the market (Tricera, AT).

Also the new market situation had to be faced.

Face the current situation in the market (KAMA, JG).

4.1.8.2. Supply Chain Uncertainty

But there was also supply chain uncertainty that could be seen in non-European suppliers not linked to European law not respecting contracts in bad situations.

With suppliers, basically we were linked with contracts. [...] This is what is important about dealing with companies in the EU. That there is always a binding contract between you and the company. When the selling price decreased so much, then they realized that the price of the cell is much cheaper than the price of the production. So, this is why they decided to get out of the deal. And we had a project that should have been delivered in two months (Tricera, AT).

4.1.9. Government Interventions

Government interventions were another big impact on firms, especially during the pandemic.

4.1.9.1. Directives and Laws

There were new directives and laws like the social distancing and lockdowns.

That was particularly bad in China. They were rigorous there with lockdowns. [...] There were border controls. Then they weren't allowed into the companies. Then we had the problem that when they drove back, lorry drivers were also quarantined for 14 days (Creavac, PR).

But also, during other crises like the Turkish earthquake, there were export restrictions for certain goods.

Even also after the earthquake in Turkey. There was a time where most of the exports from Turkey were internalized. [...] The Turkish government forced companies to focus on delivering Transformers to the Turkish market. (Tricera, AT).

4.1.9.2. Government support

On the other hand, the government interventions included government support in some countries which could help,

I would say at least here in Germany, the Government basically still supported the businesses.

So, we still saw for us innovation tenders, we still saw it (Tricera, AT).

But in other countries this was not the case.

[...] and for other companies in other countries, it's not the same case. This was reflected very bad. In Turkey, a lot of lot of businesses went bankrupt, or even the production became slower (Tricera, AT).

4.1.10. Disruptions at the Supplier

The biggest problems however were disruptions at the supplier. These can be split into supply shortages and quality issues.

4.1.10.1. Supply shortage

Supply shortages happened both during the pandemic and during the Ukraine crisis. They came about from Chinese and Indian firms not producing that much anymore.

And because of the problems that arose, they were producing less because plants were closed in China. Shortage of containers (KAMA, RL).

After Corona basically, the supply chain became easier, things became easier, mostly regarding the availability of products, lots of the chips that we buy from China are available again. Also, Transformers, because inverters have small auxiliary Transformers inside them and this is mostly produced in India. And that was severely affected during Corona (Tricera, AT).

But also in Germany and Europe, there were availability problems.

But what we do know is that there were also delivery problems with the Asians and availability was a huge issue with European suppliers because they simply didn't have them in stock (Creavac, PR).

German suppliers didn't have availability for inverters (Tricera, AT).

The supply shortage also was seen during the Ukraine crisis.

I would say from Ukraine used to come a lot of steel which was blocked (Tricera, AT).

And perhaps specifically about Ukraine. Ukraine is a very large supplier of neon. And this is needed for the production of printed circuit boards. It must have taken 1 ½ years for these supply chains for neon production out of Ukraine to function again (KAMA, RL).

Also, bankrupt suppliers were a problem for an interviewee.

In Turkey, a lot of lot of businesses went bankrupt, or even the production became slower. [...] A company [went bankrupt] and then it was acquired by another owner 3 times already in two years (Tricera, AT).

4.1.10.2. Quality Issues

The quality issues are accounted for by suppliers trying to save in the wrong place.

And a lot of problems have emerged in the inverters. It's natural to have a problem with a product, but what is not accountable is that the after sales services is bad and this was the problem with [supplier]. I think it is mostly connected with companies trying to save price, but in the in the wrong way, you know. There is a lot of production that is going on in India. So, it's not about that it is produced in India, it's about how it is produced there (Tricera, AT).

4.1.11. Human Resource Management

To mitigate these, a firm usually cannot just rely on proactive supply chain strategies, but it has to also engage in reactive supply chain strategies. Here, reactive human resource management can be an effective strategy.

4.1.11.1. Reorganisation

In the interviews, reorganisation after Covid-19 and installing a new Chief Operating Officer has been mentioned as a way to tackle the crisis.

We are also going through a big reorganisation of the company. [...] A lot of things happened at the company. The owners decided to change the company to face the current situation in the market. [A new Chief Operating Officer] came to KAMA to change production [and sourcing] (KAMA, RL, JG).

4.1.12. Inventory Redundancy

4.1.12.1. Stockpiling

Reactive inventory redundancy was used by firms to tackle the crises by Stockpiling and changing the procurement strategy. For stockpiling, Creavac built up stocks at the start of the pandemic through which impacts could be buffered.

We then built it up to 12-18 months during the crisis, depending on which material we are talking about. [...] But a material that we actually buy in Germany, we make heat protection visors or infrared reflectors that are then coated with gold, of course we don't have a 6-month supply because that's expensive. We are talking about a 6-week supply, but we have actually doubled our stocks in this area. [...] We then simply buffer this via the warehouse and the issue is over for us (Creavac, PR).

After the crises, they kept their stockpiling but reduced it a bit.

We still have a minimum stock level or stock range of one year between 8 and 12 months, which has of course now fallen a little (Creavac, PR).

4.1.12.2. Change of Procurement Strategy

Changing the procurement strategy was done from an interviewee as they changed from a purely stock-controlled strategy to a strategy based on customer orders.

We now orientate ourselves on customer orders, and only when the customer orders from us do I actually trigger the requirement. [...] Now comes the demand-driven warehouse management. We have agreed with our sales department on a period of four months. We have to be able to deliver within this period. [...] And everything within this framework can only be ordered from our supplier after the customer has placed an order. I'll use the time I have in production, because it won't be needed until later, and then I can order it here. That's how a modern procurement system works: I simply eliminate any buffer week that might exist somewhere, as was done in the past, and determine the latest possible order date (KAMA, RL).

4.1.13. Strategic Planning

4.1.13.1. Contingency planning

Strategic planning for the future can also be a reactive strategy which works again with contingency planning. In the interviews, firms did this by planning out better contracts with more legal security.

It is from the legislative side, how to manage your security as a customer if you paid money or if you invested time. I'm looking for more binding techniques to be implemented in the conditional order because even just saying that there is a penalty, this doesn't mean that all problems are resolved (Tricera, AT).

Contingency planning also works with planning more time, buffer and cash flow management.

More security measures should be taken into account. [...] Providing more buffer for us within the ordering process. And like I've seen it now, whenever you delay delivery then it delays then it delays the commissioning of the project. And then it delays the payment and then when the payment is delayed, you have a lower cash flow and so then you cannot buy something more for other projects. And when you cannot buy for other projects, then the project is also delayed (Tricera, AT).

4.1.14. Supplier Collaboration

Supplier collaboration strategies are important measures that the interviewees mentioned. Collaboration includes relationship management, information sharing and collaborative planning as well as cooperation.

4.1.14.1. Relationship Management

Relationship management is done by keeping close communication and a good relationship with the supplier.

We have been working together for three years, so it was on the other side that we were worried about them. Yeah, you know, like Marco, I've known him now for three years, so I was worried about him and about his family. When the earthquake happened and in Turkey I've called the factory first. I know some of the engineers there. So hey, how are you guys? Are you and your family ok (Tricera, AT)?

4.1.14.2. Information Sharing and Collaborative Planning

Through information sharing and collaborative planning this is taken another step up as keeping more communication, keeping track of delivery dates and staying informed can already help to be in control.

A bit more communication, proactively keeping track of delivery dates in order to be informed. So, the flow of information has already been intensified, what used to be normal in the standard process has been followed up even more (Veldener, HB).

Keeping direct contact with shipping companies can also increase control and help in staying informed.

Now I'm asking also for direct communication with the logistics company. So, to be always included in the communication in case something happens (Tricera, AT).

Planning together with suppliers by sending forecasts and giving production and raw material releases can be a good collaboration strategy.

These are simply processes that can be accelerated quite simply by planning together with the supplier. Now we do the following. I work out a forecast with our sales department. And if I have a plan like this, knowing full well that it will of course be constantly changing from week to week, where I have customer information, I first have a plan that I can share with my supplier. And if I now say to the supplier, the first six weeks in our forecast, you'll get a production release from me. And for the next few weeks, for example 12 weeks, which we have to define together, I'll give you a raw material release. That means you can order material, but for the area in the back, that's just information for rough planning, such as capacities and personnel. If I implement this in this way, I naturally ensure that my supplier looks six weeks into the future, starts production and I already have at least a semi-finished product with him, if not a finished product, when I need the part (KAMA, RL).

4.1.14.3. Cooperation

Another step up would be cooperation. This includes helping a supplier in need.

Supporting the supplier even if they themselves have Asian suppliers and say it takes too long, I can't offer a better replenishment time, then we just have to get involved (KAMA, RL).

Are you and your family OK? Do you need any help?(Tricera, AT)

Trying to figure something out in the middle in case of a disruption is done by Tricera.

So a direct reaction to things that were happening is that whenever something happens, we go back to the contract, look for the force majeure clause and then contact the supplier and try to not pay penalties and also at the same time try to be nice to the suppliers and also at the same time trying to figure something out in the middle. [...] And then also we delayed some payments when we were short on cash flow (Tricera, AT).

Taking part in supplier partnerships and networks, also through supplier portals to gain advantages of scale.

There are now hundreds of machine manufacturers here in Dresden. We just have to find partnerships. And not in the sense of, we now have 100 people as suppliers, do you still want to sell to us? But together with them. Because he has an advantage if he produces a higher quantity, he actually saves costs. The keyword is portal partnerships. There are already portals where suppliers can join forces. Not very regional, though. I always like it regional. We will probably look again to see if we can't pioneer something of our own here in Dresden, like a small start-up for a new portal (KAMA, RL).

Working together with brokers from Asia is another way of trying to get access to supplies, especially for scarce resources like circuit boards.

You can find a lot of them online, these brokers, especially when it comes to circuit boards, which we have also installed in our company. And yes, that was still Asian, of course. That's how we sourced them (KAMA, RL).

Another way of collaborating is just to pay more that you get moved up in the production schedule.

There were still parts in stock, or they could be produced relatively quickly, so that we then got them, sometimes at a higher price of course, in order to simply move up in the production schedule, we also paid them a lot of money. (KAMA, RL).

Cooperating directly with logistics providers instead of letting transportation be handled by the supplier makes a firm less dependent.

And the thing is like if we had a like a bigger forecast, let's say, from different companies, then to manage these logistics by ourselves. (Tricera, AT).

4.1.15. Digitalisation

4.1.15.1. Digital Supply Chain

Digitalisation is another strategy that can mitigate impacts of external shocks through a digital supply chain. A digital supply chain can be created by providing an interface to suppliers over a company's ERP system

So of course we will improve our supply chain. We will digitalise the whole thing. [...] The issue of digitalisation also comes into play here. After all, I already have this information digitised in our ERP system. So, I need an interface to the supplier, at least to the big ones, so that they can access our current data, so that I don't have to send my updated production plan by fax every week and then someone sits there and types it up (KAMA, RL).

Tracking goods during transportation also helps with digitalising a supply chain.

We even have to chip our goods at some point. If I have really expensive goods that I might want to trade as just-in-time parts in mechanical engineering, then I should know where they are (KAMA, RL).

4.1.16. Supplier Diversification

The last and most mentioned reactive strategy by the interviewees is supplier diversification, not just proactive, but also reactive. Strategies here include geographical diversification, divided into back-, near- and also offshoring. There were also some that made use of multiple sourcing and further diversified in terms of numbers and there was supplier selection.

4.1.16.1. Backshoring and Nearshoring

Back- and nearshoring was performed by firms that wanted to change their sourcing back from Asia to closer countries in Europe. Destinations were both Germany and Western Europe, but also a lot in Eastern Europe to still produce cheaper than in Western Europe.

We then resolved this by simply procuring alternative components on the market. And these changes were also implemented permanently. In other words, we didn't go back to the Asian suppliers after the crisis. And then later, and that was a problem, we didn't bring everything to Germany, but also went to some of the peripheral areas in Europe. If you look at the Czech Republic, Poland, the border areas where you can still produce cheaply (KAMA, RL).

Due to subsequent crises like the Ukraine crises and the Turkish earthquake, firms relocated their sourcing from the outskirts of Europe even closer.

And of course there were also problems there during the war with Ukraine. So, these suppliers have actually died for us with the Ukraine crisis. [...] [Question: Do you want to go back to China or somewhere else or do you intend to stay there?] Ideally here in Germany and then perhaps our border areas in the Czech Republic, for example, I can imagine that very well. Otherwise, everything should come from here regionally (KAMA, RL).

With the suppliers from Turkey, after what happened with the Transformers, basically, we started looking again for new suppliers, and sorry, I'm going to be a bit political here, in countries that respect private business. Because in the end also for us, if we didn't have this buffer of two months in the order, then all of our projects would have been penalized. So we started looking for suppliers that are closer: In Hungary and in Romania. We're still in discussion with these suppliers and then Italy (Tricera, AT).

4.1.16.2. Offshoring

Offshoring due to a shift to international suppliers was done from Germany mostly to other European countries.

For our previous projects, [...] most of these small components are from Germany, so I would say 60-70%. With the current situation now, I would say 50/50. [...] These two [Spanish] suppliers are basically going strong now in the German market and they are lowering the price compared to other suppliers. So, I would say in the next coming years they will be pretty competitive (Tricera, AT).

4.1.16.3. Multi Supplier strategy

Supplier diversification by multi sourcing includes diversifying the procurement through an increase in suppliers.

So, we can buy on the spot market, buy in. So, our procurement strategy is now somewhat more diversified (Creavac, PR).

Increasing the number of suppliers was also used to mitigate the risks of contracts with Chinese firms.

If we are going to sign a contract with a Chinese company, we sign a contract with a European entity (Tricera, AT).

4.1.16.4. Supplier Selection

Supplier selection was used to stop working with companies and to blacklist those with which a firm had bad experiences.

[Company] was blacklisted by us because it had a lot of problems. They outsourced some of the production to India, which is sometimes leading to a long lead time and sometimes that you cannot have good after sales services (Tricera, AT).

Tricera also stopped working with a company where the risk of bankruptcy was too high.

With [supplier], the company, [went bankrupt]. And then it was acquired by another owner, 3 times already in two years. So, this is why we prefer not working with them at the moment, because also it is scary with the warranty basically. You have a project that should be functioning for 20 years, you know. So whenever you sign a contract with the supplier, you should make sure that it is functioning for 20 years (Tricera, AT).

This can also be the case for all companies in a specific country as it is tried to move into countries that have a good business environment.

So now after what happened with the Transformers, basically, we started looking again for new suppliers, and sorry, I'm going to be a bit political here, in countries that respect private business (Tricera, AT).

4.1. A Grounded Model of Resilience and Reactions to external shocks in Supply Chains of SMEs in GVCs

The data structure in Table 2 shows 64 1st-order concepts in the 1st-order analysis which could be transferred into 35 2nd-order themes. Those could be aggregated into 16 aggregate dimensions which have been explained in the previous section. The first aggregate dimension is the nature of the business. Three aggregate dimensions are in the phase of proactive supply chain strategies. Six aggregate dimensions are in the impacts of external shocks category and another six are in the reactive supply chain strategies phase.

The grounded model of resilience and reactions to external shocks in supply chains of SMEs in GVCs in Figure 16 shows the aggregate dimensions with the nature of the business and in the three phases that were just mentioned. This mimics the process a firm goes through when an external shock appears. To ensure readiness for an external shock, SCRES needs to be assured by implementing proactive strategies in the ex-ante disruption stage. In the post-disruption phase, the firm has to implement reactive strategies in order to respond, recover and grow (Hohenstein et al., 2015). The interviews showed that not all strategies work for every firm and that the choice of strategies as well as the gravity of the impacts strongly depends on the nature of the business. As such, it influences all aspects of the process as it embeds the context in which firms can act and choose viable strategies. The nature of the firm can also directly influence specific elements. The proactive supply chain strategies or the SCRES try to mitigate the impacts of the external shock. The impacts of the external shocks are events or circumstances that happen because of the external shock. There are relationships between the impacts and the ex-ante as well as the ex-post phase and also relationships between aggregate

dimensions of one phase, respectively impacts, which can also influence other dimensions in the same phase, respectively impacts.

There is one specific link from the nature of business to a proactive supply chain strategy and one link to an impact of external shocks. There is one link between two proactive supply chain strategies, two links between impacts of external shocks and five links between reactive supply chain strategies. Seven links are present between proactive supply chain strategies that try to mitigate impacts of external shocks and 16 links from impacts of external shocks to reactive supply chain strategies. In total, 33 links, connections and relationships have been extracted from the interviews.

The nature of the businesses of the interviewees and their proactive strategies are shortly summarised here in order to give context so the reader can better understand the impacts and the reactive strategies of the interviewed firms.

Tricera is a German company that produces battery storage systems. They have 90-100 employees. They perform a multiple sourcing strategy and source 30-40% internationally with most suppliers being from Germany, many in Europe and some in Asia, mostly in China and India. They close framework contracts with their main suppliers and keep generally good relationships with them (Tricera, AT).

Veldener is a German automotive supplier that produces precision turn parts with nearly 250 employees. They have also implemented a multiple supplier strategy and procure 30-40% of all materials internationally, mostly in Western Europe. They also try to keep good supplier relationships at all times (Veldener, HB).

Creavac is a German mechanical engineering firm that produces machines for coating materials in vacuum, but also provides coating services with their own machines. The company has 105 employees. Their materials only make up about 20% of the total output. They tried to keep high stocks of about 6 months before the pandemic. They proactively diversified their suppliers, and

50% of their materials are procured internationally, mostly in Asia, in China, India and South Korea (Creavac, PR).

KAMA is a German manufacturer of machines for print finishing with 115 employees. They have a single sourcing strategy and at the start of the pandemic they had a stock-oriented oriented procurement system with higher stocks which was then changed to a procurement system oriented by customer orders. They source 30% of their raw materials internationally, at the start of the pandemic mostly in Asia, in China (KAMA, RL).

The nature of business in form of the nature of their products influences the choice of supplier diversification in numbers and in sizes and through this their proactive supplier diversification. KAMA produces machines for print finishing which consist of over 10.000 parts. They have four different types of machines, so they have to procure around 30.000 different components.

This means that our suppliers include everything from large international companies to the small blacksmith around the corner. [...] Yes, a supplier [one supplier per component]. This is simply due to the quantities. We sell 12 to 20 machines of our main type. And in that case, I only buy 12 to 20 units if the part is only filled once. And if you simply split the quantity again, then I have no more purchasing volume at all (KAMA, RL).

Proactive Supplier Diversification and Proactive Supplier Collaboration go hand in hand as a joint strategy through specific long-term supplier agreements. Tricera tried to build SCRES by engaging in a multiple sourcing strategy both for flexibility and to try and find the products with the best requirements for each project from which they could choose from. They closed long-term agreements with suppliers in form of framework contracts with the manufacturers of the best fitting components to keep prices stable and to guarantee being supplied while the others from the last supplier selection round were kept as backup suppliers (Tricera, AT).

Proactive inventory redundancy can influence financial distress as liquidity is influenced by an inventory strategy with high stock rates. Creavac's inventory strategy was having high stock

levels of six months. This led to a lot of capital being tied up in those stocks which can lead to liquidity issues.

The only influence, which could also be a negative one, was that we had a relatively large amount of tied-up capital in the form of stock. [...] Of course, this is certainly an issue in terms of liquidity and capital commitment (Creavac, PR).

KAMA had problems with this, too.

With the inventory-managed system that KAMA had back in the Coronavirus era, it naturally also had relatively high stock levels. We had a bit of a problem with that. This is very expensive stock management. (KAMA, RL).

But such an inventory strategy can mitigate disruptions in transportation, both increased delivery times and disrupted logistics, as firms do not need to procure anything in this time as they can buffer this via the warehouse (Creavac, PR). Through this, it can also mitigate disruptions at the suppliers like supply shortages. Creavac had stock levels of up to six months before the pandemic. This led to them being well prepared against the supply shortages that took place during the crisis.

We are relatively conservative, which means we have stock levels. In contrast to other potential competitors, we were always able to deliver in full, and that was more important than the amount of capital tied up in stock. When we talk about raw materials or certain parts, we have of course also seen in Germany that our suppliers have endeavoured to build up stocks accordingly. Some were relatively late, so that they were temporarily unable to deliver, but overall, it was the case that our Asian suppliers, we can't judge it in case of doubt, because we procured little at the time and lived off the stocks. But what we do know is that there were also delivery problems with the Asians, logistical problems, and availability was a huge issue with European suppliers because they simply didn't have them in stock (Creavac, PR).

Through proactive supplier diversification, especially through multiple sourcing and a combination of domestic and global sourcing, impacts from disruptions in transportation and impacts from disruptions at the supplier are mitigated. Only regional sourcing went also well during the pandemic as the example of Veldener shows. They had a multiple supplier strategy in place before the crises with at least two or more suppliers for one raw material

as the other could step in if one had difficulties. [...] They are located in Italy, France and Poland.

[...] Our own supply chains weren't broken.

They did not feel any supply chain impacts from any of the crises.

We have very reliable and resilient suppliers who were able to cushion this very well. (Veldener, HB).

KAMA is a negative example for how the company with single sourcing in Asia was hit heavily by transportation disruptions.

So, the Coronavirus pandemic in 2020 affected KAMA in the sense that we naturally had even more Asian suppliers at the time. And because of the problems that arose, on the one hand they were producing less because plants were closed in China, and on the other hand the logistics issue. That was a bit more serious for us because, let me say, with our small quantities, there were still parts in stock, or they could be produced relatively quickly. The biggest problem was the logistics, some ports were closed, everything was diverted to alternative ports, and then of course the goods arrived much later. I think we were at 16 weeks from plant to plant back then. We were used to eight. That was the main problem, that the Italians closed their harbours. That meant that I couldn't get any lorries from the port in the south, so everything went to Hamburg, and of course there were traffic jams for weeks before customs clearance (KAMA, RL).

Then, they also had similar problems with the Ukraine crisis.

Trains that didn't run at all, trains that had to be diverted. That was the somewhat crazier problem for us (KAMA, RL)."

Proactively collaborating with suppliers through having good supplier relationships helps also during crises as a good supplier relationship could guarantee favoured treatment in case of disruptions at the suppliers. This is shown by Veldener.

[Question: Does that mean that your supplier relationships were so good that you were favoured over other customers? Or does it mean that they simply didn't have a problem because they were so well positioned?] Probably both (Veldener, HB).

Proactive supplier collaboration through long-term supplier agreements can also mitigate price fluctuations, especially price increases. Tricera as well as Creavac had this strategy in place in order to keep prices stable for a specific amount of time.

With suppliers, basically we were linked with contracts, so they cannot change the price and we cannot change the price (Tricera, AT).

We conclude framework agreements for certain suppliers. These are usually put out to tender every two years and then the framework agreements are concluded (Creavac, PR).

Some disruptions at the suppliers, especially supply shortages, are influenced by the nature of the business. This happened for KAMA with them only producing 12-20 machines of their main type, its orders are so low that the quantity can be produced even with supply shortages.

And because of the problems that arose, they were producing less because plants were closed in China. With our small quantities, there were still parts in stock or they could be produced relatively quickly, in contrast to the automotive industry, where 10 or 100,000 are needed quickly, so that we then got them (KAMA, RL).

Disruptions at the suppliers through supply shortages can sometimes be blamed for disruptions in transportation through delivery time increases. During the pandemic, products from Asia like Chips from China or transformers from India were not available. The same was the case with other components from Germany and Europe where delivery times went up from 15 to 52 weeks

for both Asian and European suppliers. For the Asian suppliers this was both due to production disruptions and high uncertainty with transport routes (Tricera, AT).

Government interventions through new directives and laws or government support can influence uncertainty in the market. This was shown by Tricera.

Mostly it was the uncertainty in the market. I would say at least like here in Germany, the Government basically still supported the businesses. So, we still saw like for us innovation tenders, we still saw it and other company and other countries, it's not the same case. Yeah, so this was reflected very bad. In Turkey, a lot of lot of businesses went bankrupt, or even the production became slower (Tricera, AT).

Financial distress in the form of illiquidity can be mitigated by changing the procurement strategy to eliminate inventory redundancy which frees up tied up capital and leaves them with more capital to invest making them more flexible. This has been done by KAMA through changing their inventory strategy.

KAMA used to have a purely stock-controlled procurement system. In other words, I had a warehouse and if the stock ran out at some point and fell below a minimum level, the system would reorder. However, this is very expensive stock management. We now orientate ourselves on customer orders, and only when the customer orders from us do I actually trigger the requirement. [...] The corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales. [...] I can only manufacture on demand to simply fuel liquidity (KAMA, RL).

Also, financial distress in the form of illiquidity can be mitigated by human resource management strategies in the form of a reorganisation of the company that can better work with the current financial situation and with the new market situation.

The Corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales, to the point that the company was still a reorganisation case after this corona crisis and

needed additional money from banks, and then with this reorganisation, this reorganisation report naturally also includes a stock transfer, reduction (KAMA, RL).

Disruptions in transportation, both disrupted logistics and delivery time increases, can be mitigated reactively by building inventory redundancy through stockpiling so that a firm can live off stocks during the disruptions. This happened at Creavac which already had high stock levels of up to six months. But at the start of the pandemic, they were quick to increase these stock levels and after this, the disturbed supply chains did not affect them.

We then built it up to 12 to 18 months during the crisis, depending on which material we are talking about, so that corona has not disturbed us at all in the supply chains. So, it hasn't had any impact on us at all, except of course that we had higher stocks (Creavac, PR).

They could just

buffer this via the warehouse. We can't judge it in case of doubt, because we procured little at the time and lived off the stocks. But what we do know is that there were also delivery problems with the Asians, logistical problems (Creavac, PR).

They also continue to keep higher stock levels of eight to twelve months after the crises to mitigate possible new disruptions (Creavac, PR).

The reactive diversification of suppliers can also mitigate transportation disruptions, and especially in logistics, through re- or nearshoring as it is likely that the disruptions in transportation are not as grave when the distance is lower. KAMA had their main problems in the disruptions in transportation as they could not get supplies from Asia which is why they back- and nearshored their sourcing. This helped them in not being affected by the disruptions in transportations anymore and guaranteed them a quick delivery time.

The biggest problem was the logistics. [...] We then resolved this by simply procuring alternative components on the market. And these changes were also implemented permanently. In other words, we didn't go back to the Asian suppliers after the crisis. And then later, and that was a

problem, we didn't bring everything to Germany, but also went to some of the peripheral areas in Europe. If you look at the Czech Republic, Poland, the border areas where you can still produce cheaply. And of course there were also problems there during the war with Ukraine. Trains that didn't run at all, trains that had to be diverted. Of course, I have to rely on short replenishment times so that I can still offer fast delivery times. I can no longer afford to say that a part will only come from Asia or the outskirts of Europe and the train won't run for three weeks. So, these suppliers have actually died for us with the Ukraine crisis (KAMA, RL)

Also, Tricera made use of this strategy as the delivery time increase due to the earthquake in Turkey, the floods in Slovenia and the Red Sea Crisis could be mitigated by switching suppliers through nearshoring.

Things we experienced was, first, the earthquake in Turkey, then the flood that happened in Slovenia. And recently, the blockade and the in the Mediterranean, in the Red Sea where the Houthis are bombing. [...] Because in the end also for us, if we didn't have this buffer of two months in the order, then all of our projects would have been penalized. So, we started looking for suppliers that are closer. In Hungary and in Romania and then Italy. Of course, we are still in discussion with these suppliers (Tricera, AT).

The delivery time increase leading to disruptions in transportation can be counteracted by strategic planning through contingency planning. Tricera tries to do this with planning in more buffer time and more security measures in contracts and at the same time balancing this out with cash flow management.

If we said that peace is going to happen in Ukraine or in Gaza, but then it's also natural disasters, this is something you cannot expect. And this is something happening on a regular basis. So, with the supply chain, I think that more security measures should be taken into account. [...] Providing more buffer for us within the ordering process. [...] This is sometime is not good for the cash flow of the company. So, you should always balance it, you know, because we don't have a high working capital. [...] Whenever you delay delivery then it delays the commissioning of the project. And

then it delays the payment and then when the payment is delayed, you have a lower cash flow and so then you cannot buy something more for other projects. And when you cannot buy for other projects, then the project is also delayed. So, I'm looking for more binding techniques to be implemented in the conditional order because even just saying that there is a penalty, this doesn't mean that all problems are resolved (Tricera, AT).

Reactive collaboration can also mitigate logistical disruptions in disrupted transportation and logistics through information sharing and cooperation with the logistics company in order to have more control over transportation e.g. through changing routes. Veldener mitigated the problem by keeping closer communication.

Yes, a bit more communication, proactively keeping track of delivery dates in order to be informed (Veldener, HB).

Also, Tricera mitigated disruptions in transportation and logistics through keeping contact and even cooperating with the logistics companies to handle logistics themselves.

We used to depend on the customer, so incoterms are DAP, they have to manage the logistics. Now I'm asking also the communication, direct communication with the logistics company, to be always included in the communication in case something happens. And the thing is like if we had a bigger forecast [from the supplier] from different companies then to manage these logistics by ourselves. To get the incoterms as ex works, so from factory and then from there we manage everything by ourselves (Tricera, AT).

Disruptions at the suppliers in the form of supply shortages can be mitigated reactively by building inventory redundancy through stockpiling which could make a company outlast the disruption. Similarly to the disruptions in transportation, the disruptions at the suppliers were mitigated by Creavac by stockpiling and living off stocks during the crises.

We then built it up to 12 to 18 months during the crisis, depending on which material we are talking about, so that corona has not disturbed us at all in the supply chains. So, it hasn't had any

impact on us at all. [...] When we talk about raw materials or certain parts, we have of course also seen in Germany that our suppliers have endeavoured to build up stocks accordingly. Some were relatively late, so that they were temporarily unable to deliver, but overall, it was the case that our Asian suppliers, we can't judge it in case of doubt, because we procured little at the time and lived off the stocks. But what we do know is that there were also delivery problems with the Asians and availability was a huge issue with European suppliers because they simply didn't have them in stock (Creavac, PR).

Supply shortages and also quality issues in disrupted suppliers can also be counteracted by reactively diversifying suppliers to suppliers that are not affected by the disruptions. Tricera had the problem that during the pandemic, products from Asia like Chips from China or transformers from India were not available.

That was severely affected during Corona (Tricera, AT).

The same was the case with other components from Germany and Europe.

Sometimes even with German suppliers, the delivery of Transformers was 52 weeks before. Now it is dropping also, so that was that was very much affected (Tricera, AT).

For the Asian suppliers this was both due to production disruptions. With the supply shortage from German suppliers due to production disruptions caused by the raw material shortage, they decided to look for international suppliers which is also planned for the long-term as the company shifts to more international procurement after the crises for cost and also availability reasons to go from 60-70% of German inputs to about 50%. This international diversification is mostly in Europe, but also in China as products from there are a lot cheaper, so much that it is worth taking risks. The quality issues from suppliers in China and India are also taken into account by supplier selection as it is not going to be worked with these anymore (Tricera, AT).

They outsourced some of the production to India, which is sometimes leading to a long lead time and sometimes that you cannot have good after sales services. So, this is why we prefer not

working with them at the moment, because also it is scary with the warranty basically. You have a project that should be functioning for 20 years, you know. So, whenever you sign a contract with the supplier, you should make sure that it is functioning for 20 years (Tricera, AT).

They also mitigated these quality issues at the suppliers for the future through numerical and geographical diversification.

And one of the lessons learned is that if we are going to sign a contract with a Chinese company, we sign a contract with a European entity (Tricera, AT).

Also, similarly to the disruptions in transportation, KAMA reacted to disruptions at the suppliers by diversifying their suppliers geographically through back- and nearshoring.

And because of the problems that arose, on the one hand they were producing less because plants were closed in China. [...] We then resolved this by simply procuring alternative components on the market. And these changes were also implemented permanently. In other words, we didn't go back to the Asian suppliers after the crisis (KAMA, RL).

Disruptions at the supplier, especially supply shortages, can also be counteracted by strategic planning through contingency planning with buffers and legal security measures. This was also seen at Tricera through planning in more buffer time and more security measures in contracts and at the same time balancing this out with cash flow management. The reasons are the same as the mitigation of strategic planning to disruptions in transportation (Tricera, AT).

The last strategy that could mitigate disruptions at the suppliers because of supply shortages is collaboration through information sharing and cooperation to work out a way to solve the issues. As Asian suppliers were not reliable during the pandemic, KAMA cooperated with Asian brokers to get access to critical parts that were otherwise difficult to come by because of the supply shortages at suppliers.

You can find a lot of them online, on LinkedIn, these brokers, especially when it comes to circuit boards, which we have also installed in our company, with almost every component that is

electrical somewhere. There's a circuit board in there. And yes, that was still Asian, of course.

That's how we sourced them (KAMA, RL).

They also paid their suppliers more to move up in the production schedule to guarantee a quick delivery.

Sometimes at a higher price of course, in order to simply move up in the production schedule, we also paid them a lot of money. I'll pay double the price, as long as they send me the parts now and take them before someone else (KAMA, RL).

Tricera practices collaborative problem solving in case of any disruption at the supplier.

So, a direct reaction to things that were happening is that whenever something happens, we go back to the contract, look for the force majeure clause and then contact the supplier and try to not pay penalties and also at the same time try to be nice to the suppliers and also at the same time trying to figure something out in the middle. It worked out with containers basically. I would say this was reflected when we had problems in our cash flow [supplier] gave us a buffer of time and we delayed some payments (Tricera, AT).

Building inventory redundancy through stockpiling can help in bridging price fluctuations like price surges for supplies and transportation. Creavac performs a stockpiling strategy and increased their stock to 12-18 months at the start of the crisis from which they lived off during the crises.

They were also favourable for us because we had built up the stock at the beginning, so that we were ultimately cheaper on average than at peak times due to the crisis. So, we didn't experience any of this turbulence, which also affected precious metals in particular. [...] Of course, we didn't experience every peak and every price drop on the market. That's just the way it is. You also commit to the price if you put it in stock accordingly (Creavac, PR).

After the crises, they still hold stock levels of about eight to twelve months which is even favourable for their purchasing price.

We are now trying to prioritise the issue of prices again, but we still have a minimum stock level or stock range of one year between 8 and 12 months, which has of course now fallen a little in order to be able to take advantage of price effects when they occur. This means that we can take our time and negotiate things accordingly or take advantage of setbacks in precious metals to buy at favourable prices. We can optimise the price if there are one or two days when there are setbacks on the commodity markets (Creavac, PR).

Diversifying suppliers geographically can mitigate the price fluctuations if there are price increases. This diversification can also make use of them when prices decrease. Tricera tried to make use of decreased costs due to the Turkish economic crisis. Since the beginning of the Ukraine Crisis, there was a drastic increase in prices.

You can see that we experienced an increase of 30 to 40% of the raw material price (Tricera, AT).

After the prices increased, the company started sourcing in Turkey.

The product is very suitable for the European market and at the same time having the benefit of the deep inflation or the hyperinflation that is happening in Turkey. So, the value of the currency in Turkey is dropping compared to the euro. This is why the product from Turkey, at least the transformer, is 30 to 40% cheaper than in Germany (Tricera, AT).

Price increases in transportation can be mitigated by near- or reshoring, too. KAMA near- and reshored their sourcing which led to an increase in goods prices but also a decrease in transportation prices.

We have seen a price increase of 15 per cent, mainly in the area of electrical components. That was first absorbed by the fact that, of course, logistics costs were so high at the time - that was a tenfold increase in container prices at the time - and I say, buy in Germany, a little more expensive, but no logistics costs. But when the logistics costs went down again, I could of course have bought cheaper in Asia, but we didn't do that. So now, of course, I buy more expensively compared to before (KAMA, RL).

Creavac also diversified their sourcing numerically through also buying on the spot market.

[...] take advantage of price effects when they occur. So, we can buy on the spot market, buy in (Creavac, PR).

Uncertainty through new market situations during a crisis can be mitigated by human resource management strategies like reorganising the firm to fit the new needs. This is what KAMA did. After Covid-19, the company was in a bad state and had to be reorganised according to new needs during the crisis. They installed a new Chief Operating Officer that also changed the way the company sources.

The corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales, to the point that the company was a reorganisation case after this corona crisis (KAMA, RL).

Uncertainty in suppliers can be mitigated by diversifying suppliers both numerically and geographically to spread risks. Tricera experienced this with a Chinese supplier with which they had a long-term supplier agreement which did not respect the agreement. Alternatively, they had German backup supplier with quick delivery time.

They decided to get out of the deal. And we had a project that should have been delivered in two months. So it was for our luck that we found available batteries by [alternative supplier] at the time (Tricera, AT).

Uncertainty in the market can also be mitigated by collaborating with suppliers that assure delivery. This can be achieved by closing long-term supplier agreements like framework contacts that guarantee the supply of a specified number of units each year, if it is respected. This works especially well with European suppliers (Creavac, PR; Tricera, AT).

This is what is important about dealing with companies in the EU. That there is always a binding contract between you and the company (Tricera, AT).

Government interventions through directives and laws can be mitigated through geographically diversifying suppliers into another region where the interventions do not apply. This happened to Tricera in the case with Turkey.

After the earthquake in Turkey, there was a time that most of the exports from Turkey were internalized. So for us, we ordered some Transformers and because of the earthquake, there was a delay of about like a 20 weeks in the delivery because the Turkish government forced companies to focus on delivering Transformers to the Turkish market. [...] Basically, now with the suppliers from Turkey. After what happened with the transformers, basically, we started looking again for new suppliers, and sorry, I'm going to be a bit political here, in countries that respect private business. So, we started looking for suppliers that are closer (Tricera, AT).

Human resource management strategies like reorganising can go hand in hand with inventory redundancy strategies through changing the procurement strategy. When a company is reorganising, it can make sense to adapt the procurement strategy at the same time.

The Corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales, to the point that the company was still a reorganisation case after this corona crisis and needed additional money from banks, and then with this reorganisation, this reorganisation report naturally also includes a stock transfer, reduction. [...] We] reorganised our procurement system at the time. [...] And then I simply need the fastest possible replenishment times (KAMA, RL).

An Inventory redundancy strategy combined with a supplier diversification strategy can help in achieving a low price through living off stocks and waiting until the prices for certain materials have gone down at one of the suppliers to replenish. Creavac with its high stock levels waited for the right time to buy at the cheapest time at their cheapest supplier.

We are now trying to prioritise the issue of prices again, but we still have a minimum stock level or stock range of one year between eight and twelve months, which has of course now fallen a little in order to be able to take advantage of price effects when they occur. So, we can buy on the spot market, buy in. So, our procurement strategy is now somewhat more diversified. Due to the

fact that we have a relatively high stock level, we have no time pressure. This means that we can take our time and negotiate things accordingly or take advantage of setbacks in precious metals to buy at favourable prices (Creavac, PR).

A change in procurement strategy can also mean that it is necessary to diversify suppliers as can be seen with KAMA when they changed their procurement strategy from a purely stock-controlled procurement system with higher stock levels to a procurement system that orients itself on customer orders. For this, they needed fast delivery times, and thus, they backshored to Germany (KAMA, RL).

Of course, I have to rely on short replenishment times so that I can still offer fast delivery times. I can no longer afford to say that a part will only come from Asia or the outskirts of Europe and the train won't run for three weeks (KAMA, RL).

Combining an inventory redundancy strategy with a collaboration strategy can be positive for achieving faster replenishment times and lower prices. KAMA changed their procurement strategy to a system where they orientate themselves on customer orders and eliminate any buffer weeks. They combine this with collaborating with suppliers as some components would take longer in delivery than the delivery time of their finished goods. To counteract this, they plan collaboratively with their suppliers as they give them forecasts for the coming period of time and with that a production release, where the supplier can pre-produce a certain component, and a raw material release for the following period of time, where the supplier can procure raw material.

That means you can order material, but for the area in the back, that's just information for rough planning, such as capacities and personnel. [...] If I implement this in this way, I naturally ensure that my supplier looks six weeks into the future, starts production and I already have at least a semi-finished product with him, if not a finished product, when I need the part and he doesn't have to order material from his raw material release. It will finally be cheaper for the supplier, because

he is now in a position to plan with KAMA as a supplier or as a customer, who doesn't always have to make a new production plan with our individual orders. And that is the approach we want to take to reduce costs with our suppliers (KAMA, RL).

Additionally, they help their suppliers when they experience disruptions in order to keep operations going and to ensure a timely delivery.

Supporting the supplier even if they themselves have Asian suppliers and say it takes too long, I can't offer a better replenishment time, then we just have to get involved (KAMA, RL).

Another way to assure cheaper and timelier sourcing with this new procurement strategy for KAMA is to form partnerships and supplier networks.

The next step is how do I reduce costs? I buy 12 pieces a year. There are now hundreds of machine manufacturers here in Dresden. We just have to find partnerships. And not in the sense of, we now have 100 people as suppliers, do you still want to sell to us? But together with them. Because he has an advantage if he produces a higher quantity, he actually saves costs. The keyword is portal partnerships. There are already portals where suppliers can join forces (KAMA, RL).

Strategic planning can enable a firm to consider geographically dispersed suppliers. Tricera shifted to more international procurement after the crises for cost and also availability reasons to go from 60-70% of German inputs to about 50%. This international diversification is mostly in Europe, but also in China as products from there are a lot cheaper, so much that it is worth taking risks. Because of the increased risk of disruptions in transportation, the company now plans with a higher buffer than before meaning they order earlier than they need the component to account for delays in delivery of raw materials and components. They accounted for this by performing more contingency planning and with this included more buffer time.

I would say with the buffer, a two-month buffer is a good thing. Seems that we have to have a higher buffer (Tricera, AT).

Collaboration strategies can be assisted by and go hand in hand with digitalisation through digital supply chains and sharing information digitally. The cooperation mentioned above by KAMA and their suppliers is supported by digitalisation which makes the collaboration a lot easier.

So of course we will improve our supply chain. We will digitalise the whole thing. [...] After all, I already have this information digitalised in our ERP system. So, I need an interface to the supplier, at least to the big ones, so that they can access our current data, so that I don't have to send my updated production plan by fax every week and then someone sits there and types it up. We even have to chip our goods at some point. If I have really expensive goods that I might want to trade as just-in-time parts in mechanical engineering, then I should know where they are (KAMA, RL).

4.2. Sales

For the sales side, the findings are depicted in the data following data structure in Table 3. This abducted structure is then brought into a grounded model of resilience and reactions to external shocks on the sales side of SMEs in GVCs which is depicted in **Error! Not a valid bookmark self-reference..**

The same categories of aggregate dimensions as in the model of supply chains are applicable here as well. They again follow the process a firm goes through if an external shock occurs. They are firstly proactive sales strategies that try to mitigate the second category, the impacts of external shocks, and then the firm tries to mitigate these impacts reactively with the third category, the reactive sales strategies. This all is influenced by the nature of the business which gives the context in which the firm can react.

4.2.1. Nature of the Business

4.2.1.1. Nature of Goods and Services

As mentioned already in the supply chain part, the nature of the firm includes the nature of its goods and services which are the specific products it produces or which services it offers as

We are vacuum coaters, which means that we coat plastic parts with metal layers [... and] we work a lot with resistance evaporators, which we design ourselves (Creavac, PR).

First of all, we are a machine manufacturer. (KAMA, RL).

The companies in the group actually focus on customised software development and communication, i.e. classic agency business (Queo, LB).

Support for import and export companies in complying with chemical regulations, categorising chemical products and advising on requirements, hazard communication and on sustainability strategies as well as chemicals management through software (Yordas, JF).

4.2.1.1. Nature of the Business

Its age and size are the second aspect of the nature of the business which can also be the number of employees as well as the number of sales.

111 [employees]. [...] We sell 12 to 20 machines of our main type. [...] KAMA will be celebrating its 130th anniversary this year (KAMA, RL).

105 [employees] (Creavac, PR).

Certainly around 150 [employees] (Queo, LB).

I think that in 2020 we had around 60-70 employees worldwide (Yordas, JF).

Table 3: Data Structure for the Sales Side

Aggregate Dimension	2nd-order Theme	1st-order Concept
Nature of the Business	Nature of Goods and Services	Nature of goods or services
	Nature of the Business	Age and Size of the company
Proactive Sales Strategies		
Proactive Customer Diversification	Proactive Customer Segment Diversification	Big and small businesses from very different manufacturing industries as customers that are part of the GVC
		Smaller businesses as customers
		Big variety of industries in customers
		Customers that are in industries not affected
Proactive Inventory Redundancy	Regional Customers	Local customers
	Global Customers	European Customers (major countries, few Eastern European, Ukraine)
		Customers from all over the world
Strategic Planning	Contingency Planning	Exports to Asia
		Large sales and service network with partners in all countries or regions
Proactive Customer Collaboration	Inventory Strategy	High stock levels to be able to deliver
	Customer Relationship Management	Business continuity plans
Proactive Human Resource Management	Customer Relationship Management	Bad relationship with customers before the pandemic
	Sales Approach	Waiting for customers to contact for sales and keeping low in the market
Proactive Human Resource Management	Change Readiness	Company already used to change and is resilient as well as willing to change
		Good change management

Table 3 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Impacts of External Shocks		
Customer Collaboration Challenges	Demanding Customers	Got pushed very hard by customers Bad mood gets passed on between distressed MNEs and service providers due to bad service provider mentality
	Disruptions in demand	Business with Russian chemical legislation stopped, so less demand War in Israel: main partner in Israel dropped relationship leading to less sales Sales Shifts and more difficult selling Demand fluctuations
	Demand Increase	High volume orders as customers tried to build stock Boom in health products Explosion of orders for critical infrastructure products during Covid
New Environment	Government interventions	Easement of laws for Disinfectants
	Uncertainty	Uncertainty in the market and cautious customers Changing environment
Internal Challenges	Human Resource Challenges	Employee fluctuation All sales were stopped after Covid and company in a sleep mode, sales staff inactive
	Financial Distress	Liquidity bottlenecks

Table 3 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Reactive Sales Strategies		
Digitalisation	Digital Transformation	Digitalisation and setting up new IT tools Digital Communication with Customers
	Service Digitalisation	Service changes from face-to-face trainings to e-learning courses
Collaboration	Customer Relationship Management	Intensify Account management and strengthen customer relationships Finding a better system of communicating with customers Reactivating connections Try and strategically position yourself for other projects with customers
	Cooperation	Work in service provider networks to join forces to get projects that one would not have gotten on their own Communicate with other service providers to learn about problems and possible solutions and to learn from each other Planning capacities and delivery schedules with customers Increasing partnerships with mutually beneficial partners and decreasing non-beneficial partnerships

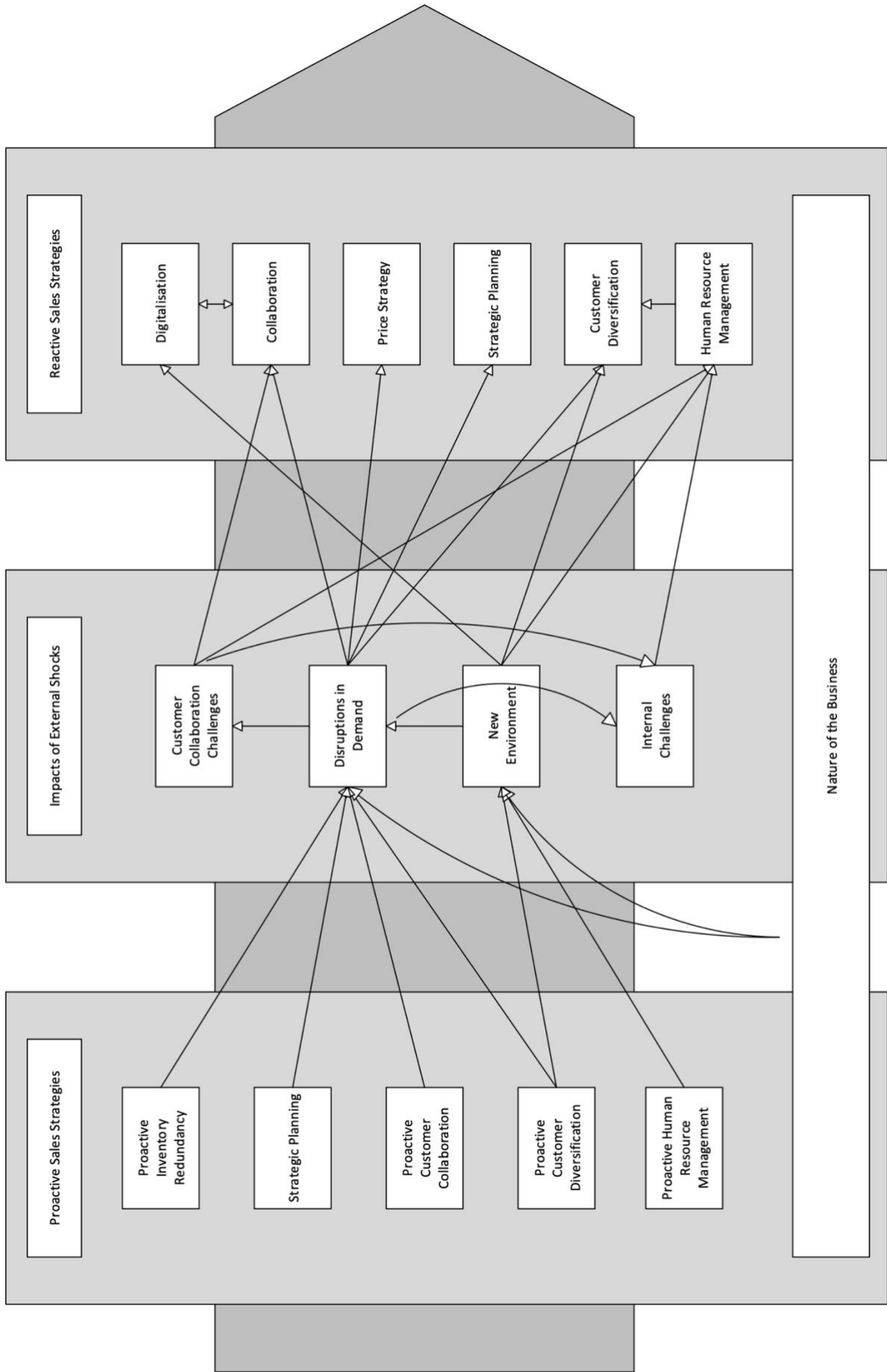
Table 3 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Price Strategy	Price Increase	Raising prices after Ukraine
	Price Stability	Keeping prices stable in 2024 with increased costs because of the already high price level, but raising them again in 2025 Swallow cost increases
	Price Decrease	Bigger discounts to sell more
Strategic Planning	Contingency Planning	Better planning Better processes and better risk assessment Contract preparedness in case of a new crisis
		Customer Diversification
Customer Diversification	Customer Segment Diversification	Calculate industry dependencies in relation to products, calculate correlations, correlate industries in sales trends Trying to move into sectors that are as broadly diversified as possible (No customer more than 5%, no sector more than 10% of sales) Targeting of big global accounts
	Geographical Diversification	Diversify customers more geographically More careful customer selection with countries with which not to work

Table 3 continued

Aggregate Dimension	2nd-order Theme	1st-order Concept
Human Resource Management	Supportive Leadership	Give affected Team Members space to express bad feelings and assign to other motivating topics
	Reorganisation	Reorganisation of the company against the crises including new Chief Business Officer and new sales staff Change sales in the big European countries to direct sales and service with sales and service people caring for regions (Central, Western, Eastern Europe) Sales Subsidiaries in China and USA Reorganise sales network to have distributors for regions and not countries
	Sales Transformation	Changing nearly everything in sales

Figure 17: A Grounded Model of Resilience and Reactions to External Shocks on the Sales Side of SMEs in GVCs



4.2.2. Proactive Customer Diversification

On the sales side again, diversification is the most mentioned and most important proactive strategy. Sales diversification includes proactive customer segment diversification and the geographical diversification through regional and global customers.

4.2.2.1. Proactive Customer Segment Diversification

In the proactive customer segment diversification, distinctions can be made between the sizes of customers, as firms can target smaller customers or large ones, and the different industries of customers a firm supplies. Some firms have both larger and smaller customers.

I would say it's a mixture. So, we really do have something from the very small 2- or 3-man businesses to the really big ones that we do. Depending on what kind of service it is, of course. Exactly, so depending on what kind of service it is, in one category it might be the larger ones and in the other it's probably more of a mid-to-large size focus, but we also have some large enterprise customers (Yordas, JF).

Some firms only had small firms as customers.

So, historically, KAMA has always sold machines for small companies. Our products historically have always been sold to the kind of dad and mum workshops. So, to small businesses, in a garage (KAMA, JG).

Customer segment diversification also includes the spread over different industries.

Chemistry is one area. They tend to be the larger midsize companies, and then we have some very large manufacturing companies, a lot of automotive companies, for example, which we have, and then there are actually all the manufacturers that you know, or electronics companies. Everywhere that contains chemicals, and it's almost everywhere, is theoretically our customer, but that has crystallised a bit, especially in the automotive and aerospace sectors, where they always have a longer life cycle. Yes, exactly, but theoretically it's also consumer goods. It can really be anything. (Yordas, JF).

[Large international customers] for heat protection visors. Otherwise, we supply the automotive industry. That goes to the tier one suppliers. It goes very strongly into the defence sector. So, there are parts where we deliver to suppliers or directly to the end customer (Creavac, PR).

We have customers who operate internationally, definitely a lot in the automotive sector. We have also had various other customers in the past, such as in the banking sector (Queo, LB).

Queo was diversified in such a way that they had customers in industries that were not affected by the crises.

A large focus is actually on the healthcare sector, i.e. the insurance sector, health insurance companies and so on, and they are actually in the German market [, also authorities]. (Queo, LB).

4.2.2.2. Regional Customers

The geographic diversification of customers can be divided into both global and regional customers. The regional customers are mostly local, so German customers for three of the firms and British for Yordas. Queo has nearly exclusively German customers from which a good part is international.

But let's say that our main market is Europe, especially DACH [Germany, Austria, Switzerland] (KAMA, JG)

Around 30-40% [operate internationally.](Queo, LB)

20% goes to large German MNEs, and 40% to smaller German customers (Creavac, PR).

Not only the home market but also the other European countries have a large part in buying their products and services.

Europe being the largest single market. Geographically within the framework of what makes sense for us. Relatively little in Eastern Europe, which is growing, especially for Ukraine. (Creavac, PR).

4.2.2.3. Global Customers

But two of the firms heavily diversified themselves globally. A lot of Exports go to Asia.

We have customers from all over the world. [...] The second biggest markets for us are China and USA. [...] The second third is China and USA together. [...] A bit of South East Asia (Creavac, PR).

The majority of that is actually in Asia, we have a lot from Japan. But I think we only had one country accounting for a good 70% in total (Yordas, JF).

The rest of the global customers can range from North America, e.g. the US, Canada and Mexico, over Australia to all over the world.

“We have customers from all over the world. Even in countries where we're not even sure where the country is. The second biggest markets for us are China and USA. To put it simply, we can say that the market is about one third DACH. The second third is China and USA together. And the third third is the rest of the world. Roughly (KAMA, JG).

That goes to the USA, Mexico and Australia. Roughly between 30 and 40%. The USA and a bit of Southeast Asia and Australia (Creavac, PR).

At the beginning of Corona was maybe, well, if you look mainly at the UK now, probably a good 70% export and because we now also have the locations in Turkey, Germany and Canada, of course, exports are declining a bit because we are no longer exporting, so yes, but I would still, probably still around 50-60%, I would still say (Yordas, JF).

The sales can also be managed by a large network of distributors with a contact person in every country of the world that consists of resellers and agents.

And it was not easy to expand our sales activities to other countries, because if you want to go to another country with sales, you need someone who lives in that country and only works in that country and who speaks the local language. And that's not easy for a small company like KAMA maybe in the past because if you have a sales person, just in one country, so let's say we're talking

about the UK, to have a sales person, even with service, even with another person doing service or whatever, just to work in the UK market, you need to generate a sales volume to pay for that investment. And our markets have always evolved a lot. We've never had a very stable market other than DACH. We've always seen ups and downs in the US and China as well. And that's why it was difficult to build a KAMA network. But that's why we have so many distributors. The model for growth for KAMA has always been to find the right partner in each country and then use them for sales and service. We define distributors on two levels. One is the reseller. So, they buy the machine from us and then they sell it to the customer. And then they do the service and everything because they are the one, the company that sells the product to the end customer. And we have agents. So, the agents just get money to open the door. And most of the time the agents don't do any service and they don't do anything. In the US and in China, big markets, we have resellers. And in small markets, like I don't know, for example Greece, we have an agent (KAMA, JG). ”

4.2.3. Proactive Inventory Redundancy

4.2.3.1. Inventory Strategy

Proactive inventory redundancy means the inventory strategy which could include high stocks that help in always being able to deliver.

The high stock levels have of course also helped the ability to deliver (Creavac, PR).

4.2.4. Strategic Planning

4.2.4.1. Contingency Planning

Proactive strategic planning includes contingency planning which includes business continuity plans, even though one could not plan for Covid or the Ukraine crisis.

We do have a business continuity plan, but that came out differently (Yordas, JF).

4.2.5. Proactive Customer Collaboration

Proactive customer collaboration consists of customer relationship management and the sales approach.

4.2.5.1. Customer Relationship Management

It is important to always keep good relationships with customers, which was differently at KAMA at the start of the pandemic.

One of my predecessors was very well connected in the market. Very, very well connected. Always visiting customers, supporting customers and looking after them. He was a very good partner. When he left KAMA, somehow this close relationship with the customers was lost because nobody did that (KAMA, JG).

4.2.5.2. Sales Approach

The second way of proactive customer collaboration is the sales approach. KAMA had a reactive sales approach which means they waited for customers to approach them.

In sales you can wait until someone buys a machine, or you can go to the market to sell your products. We waited a little bit to sell machines. So, the customers, we always thought that the customers come to buy what they need. And then we were very modest, always trying to have a very low level without being very pushy (KAMA, JG).

4.2.6. Proactive Human Resource Management

4.2.6.1. Change Readiness

The last proactive sales strategy is proactive human resource management which includes change readiness. Here, it is beneficial to have a company that is already used to change, that is resilient to it and that is also willing to change.

We are also a company that has a lot to do with change. We are generally exposed to a very dynamic environment and that's why the topic of resilience or willingness to change plays a role anyway and enables us to deal with it, to react accordingly to Corona. [...] The resilience of organisations comes, among other things, from having people who are also able to accept change and because we change frequently anyway, we wouldn't attract people who can't do that at all, right. So that also has a lot to do with our industry. Software and communication is also an

industry that is developing very quickly, where you have to keep up somehow. [...] That's not our job, it's not anyone's job, and that's why these are usually people who have a certain willingness to change and who also experience this with us (Queo, LB).

Also, a good change management is important for change readiness.

We do quite a lot in the area of change management and supporting change, and in recent years we have focussed a lot on what actually happens during change (Queo, LB).

4.2.7. Customer Collaboration Challenges

4.2.7.1. Demanding Customers

There are four aggregate dimensions in which the impacts of external shocks could be grouped. The first ones are customer collaboration challenges which include demanding customers. Firms were pushed very hard by their customers leading to high pressure.

I think [German MNE] got involved very quickly in March, when the full extent was not yet clear, and they pushed us extremely hard (Creavac, PR).

Queo had problems with MNEs as they often have bad service provider mentality and through this pass their bad mood and pressure on to service providers.

On the one hand, this has something to do with the general service provider mentality or the understanding of service providers. So do I have the understanding that this is someone I can replace at any time and who is simply an extended workbench for me, to whom you can push things over and then he has to do it and gets paid for it, or do I have the understanding that you can only achieve good results in a long-term, trusting partnership of equals? In this first understanding, we notice that when many people are made redundant there, the atmosphere sometimes becomes even more difficult, even on the customer side, and those who work there, who are under pressure themselves to do a good job, pass this pressure on even more to the service provider teams. That's everywhere, it's not industry-specific, it just depends on who I'm working with and what is the mentality of this company when it comes to working with service providers?

But in the automotive sector, it's often the case that we realise that there are employees who really don't want to work with customers anymore and say, no, the deadlines just feel crap and they're so top-down and no, I want to work with someone on an equal footing and not have someone tell me what I have to do and if I give my opinion, they think it's stupid or something. Logically, that has an impact on it and is possibly amplified in crises by the effect I just described. (Queo, LB).

4.2.8. Disruptions in demand

The most important and also drastic impacts on the sales side however are the disruptions in demand. They are not only negative as sometimes also demand increases occur.

4.2.8.1. Demand Decrease

Demand decreases happened manifold during the crises. For Yordas, business with Russia stopped after the start of the Ukraine crisis.

For a short time, we didn't have that much, but shortly before that, Russia had actually introduced chemicals legislation, where we actually had a few customers, where we were also active, and of course we had to stop that completely. And we actually had relatively few Russian customers. And of course, we also had to stop that, but yes, it was more the case that European or Western companies could no longer go to Russia (Yordas, JF).

The war in Israel led to an important sales partner dropping the relationship resulting in less demand.

One of our main partners in the industry is in Israel. It's a company that is in Israel. If they don't sell, we sell less. That also has an impact. I would say, from a market perspective, that the war in Israel and Gaza has a much bigger impact than the war in Ukraine (KAMA, JG).

The pandemic did not cut the sales in half but made selling more difficult. For KAMA, there were also sales shifts.

[During the pandemic,] all sales were stopped. No activity in the market. [...] [There were] sales shifts, not sales losses. All these effects, combined with the wars in Israel, Ukraine and so on,

make our lives a bit more difficult. But that doesn't halve our sales performance or anything (KAMA, JG, RL).

Maybe at the very beginning [of the pandemic ...], perhaps that also declined a bit, but it recovered relatively quickly. Ukraine was of course similar, you could tell that the companies had become more cautious about what else they were doing (Yordas, JF).

Queo experienced demand fluctuations from MNEs which were not that serious.

Not that much actually happened. International customers make up a certain proportion of our turnover, and we have always noticed fluctuations there. [...] It's not just corona and Ukraine that have an impact, but also things like the diesel scandal (Queo, LB).

4.2.8.2. Demand Increase

Sales increases on the other hand were accounted for by customers that wanted to increase their stocks.

Our customers or many of our customers reacted in exactly the same way as we did. In other words, we have relatively high volumes and we also worked with consignment warehouses. [...] Our customers reacted in the same way as we did, building up stocks. So, we actually got through the coronavirus crisis relatively relaxed on the sales side (Creavac, PR).

During Covid, there was a boom in demand for health products which increased demand for services related to health products.

And then all the countries passed a law saying that they had to be a little less strict, but then every brewery suddenly started producing disinfectants, so a lot of things from the food sector were changed over and that was of course a bit of a deal for us, of course, that we also supported the fact that it was still done reasonably correctly, exactly (Yordas, JF)."

This boom was also present for products for the critical infrastructure.

We also manufacture products for critical infrastructure, which means that they suddenly exploded at the beginning of the coronavirus crisis. (Creavac, PR).

4.2.9. New Environment

The new environment also posed a challenge for the interviewees as there were government interventions and also general uncertainty.

4.2.9.1. Government interventions

The government interventions that were portrayed in the interviews were actually positive as they were the easement of the laws for disinfectants just mentioned.

All the countries passed a law saying that they had to be a little less strict (Yordas, JF).

4.2.9.2. Uncertainty

But the uncertainty gave the firms challenges as there was a lot of uncertainty in the market amongst customers with the customers being more cautious than during normal times.

At the very beginning [of the pandemic], because of course there was a bit of uncertainty among customers as to whether they would continue to export somewhere or not. [...] And then with Ukraine, it was more a case of basically seeing economic stagnation or a downturn, which of course doesn't pass without a trace, so everyone is simply more cautious and things like that (Yordas, JF).

The environment changed greatly through an unprecedented event like the pandemic leading to high uncertainty.

No one had ever experienced this before, things happened that no one had thought possible and that naturally caused extreme uncertainty for everyone (Queo, LB)."

4.2.10. Internal Challenges

The last impacts of external shocks on sales were internal challenges. These include financial distress as well as human resource challenges.

4.2.10.1. Human Resource Challenges

Employee fluctuation is part of the human resource challenges which can occur because of customer interactions.

So, of course there are also people who at some point say, well, you know, I've been working here somehow for four years with a customer who really only puts me down, to put it bluntly, I'd rather go somewhere else now because I don't feel like it, he just takes energy away from me, I don't get any energy, I'm just unhappy, I'll leave. So, everyone has the option. It's not as if there aren't any jobs (Queo, LB).

The second part of the human resource challenges are an inactive sales staff due to people being sick and with other reasons that could not be named.

All sales were stopped. KAMA was in a sleep mode. No activity in the market, not even salespeople because some were sick, some were, I don't know. It was like sleeping, KAMA, totally sleeping (KAMA, JG).

4.2.10.2. Financial Distress

The financial distress showed itself by liquidity bottlenecks that were experienced by KAMA through their sales problems.

The corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales (KAMA, RL).

4.2.11. Digitalisation

There are six aggregate dimensions in the reactive sales strategies phase. The first one is digitalisation. It consists of digital transformation and service transformation.

4.2.11.1. Digital Transformation

A company can be digitally transformed through setting up new IT tools.

I think we were also relatively quick and good at setting up IT tools, but yes, that was the area where we had to come up with something a bit different (Yordas, JF).

Communicating with customers digitally is also an aspect of digital transformation.

The advancement of digitalisation in any case, so that you can simply maintain communication with each other, has also improved over time. [...] Digitalisation, I think that simply goes both ways, that you can continue to maintain close contact with customers, that you are still there for them (Yordas, JF).

4.2.11.2. Service Digitalisation

Service digitalisation is the second big aspect of digitalisation found in the interviews. This means transforming training services that required face-to-face interactions into e-learning courses.

Well, we've reorganised a bit. One area is training, for example. We did quite a lot of face-to-face training. Then we started creating e-learning courses, so of course we've already done something there (Yordas, JF).

4.2.12. Collaboration

Collaboration as one of the most important reactive sales strategies consists of customer relationship management and cooperation.

4.2.12.1. Customer Relationship Management

Customer relationship management means the firm intensifies their account management and strengthens the customer relationships.

Of course, you try to build up account management in that sense and to shape the customer relationship, to see who at the customer I'm in contact with, who you might still need contact with, where you can strengthen relationships with the customer (Queo, LB).

A second aspect of customer relationship management is finding a better system of communication which was extremely important during Covid-19.

Of course, you have to find your way in somehow, especially how you communicate with customers, to find a better system (Yordas, JF).

Reactivating lost connections is also an option to improve customer relationship management.

Somehow this close relationship with the customers was lost because nobody did that. And I came to reactivate all these customer relationships. Yes, sure, there's always some room to improve. But I would say that since I brought my new approach to dealing with customers, the customer connection is much better (KAMA, JG).

For further customer relationship management, firms can try to strategically position themselves for other projects with their customers.

Of course, you try to build up account management in that sense and to shape the customer relationship, [...] what are the strategic opportunities there to position yourself for new projects (Queo, LB).

4.2.12.2. Cooperation

Cooperation on the other hand focuses more on working together to achieve something specific. This can be done through working together in networks and forming partnerships with other similar firms to get projects a firm would not have gotten on their own.

We are also working in a network of service providers, perhaps to intensify this, to look at joining forces with other smaller service providers in order to be able to manage larger projects together or to be able to manage projects that, let's say, involve a technology in a specific area in which we are not well versed, but where we can cover a large other area, so that we can do this together and build partnerships with other service providers (Queo, LB).

Also, communication with other companies in the same situation and sharing knowledge to learn about problems and possible solutions in the new situation is part of cooperation.

And also, to engage in dialogue, again, what problems do they have there? How do they deal with them? And also, to see, hey, can't we learn from each other? (Queo, LB)

Planning capacities and delivery schedules together with the customer helps in better mastering collaboration.

In the beginning, at least to some extent, there was more need for discussion and team meetings regarding supply chains and increasing the number of units. In the beginning, it was actually characterised by the fact that we had a lot of discussions about production capacities, how can we increase what, what do we have to produce in what period of time, et cetera, these were actually the topics. That was actually the beginning, and it actually went on for two years. So, the main discussion we had with our customers was capacities, capacities, capacities (Creavac, PR).

The last way of cooperating that was extracted from the interviews is to increase mutually beneficial partnerships and at the same time to decrease non-beneficial ones.

I'm reducing a little bit the level of partnership we have with this company in Israel, just to increase a little bit the relationship with some of their opponents (KAMA, JG).

4.2.13. Price Strategy

With a price strategy, customers tried to make up for losses or tried to sell more during the crises. The price strategies included increasing prices, keeping them stable as well as decreasing prices.

4.2.13.1. Price Increase

After the Ukraine crisis, the costs increased a lot so that firms had to increase their prices as well.

We reacted with rising prices. And raising prices is never easy, never good (KAMA, JG).

4.2.13.2. Price Stability

But sometimes you cannot just increase the prices. So, some have kept their prices stable.

I also have to say that I kept the prices at the same level in 2024. We had increased costs because we were paying our salespeople more. But because we were already quite expensive, I kept the prices at the same level, but in 2025 I have to raise them again (KAMA, JG).

Also sometimes cost increases needed to be swallowed.

Of course, costs have risen massively, but you can't always pass that on to the customers straight away, so you really have to pay a bit more attention to cash flow and internal costs for a while, so that you can absorb that and support your employees during that time (Yordas, JF).

4.2.13.3. Price Decrease

But some firms had to decrease their prices by giving discounts to sell more.

Just to sell more, we gave better discounts. (KAMA, JG)

4.2.14. Strategic Planning

4.2.14.1. Contingency Planning

Strategic planning means contingency planning. After the crises, firms were able to plan better.

I think we planned better in general. [...] I think that we've also become more resilient again. [...] Also, what happens if a pandemic somehow just appears or something like that just happens? (Yordas, JF).

Processes have been set up to be able to assess risk better

We've probably set up better processes so that we can see where we need to look, what we're allowed to do, what we can do, what we might not want to do? Is it somehow worth the risk or not? Yes, I think those are the two main points and simply that we are better prepared in terms of processes if colleagues are absent for a longer period of time (Yordas, JF).

This means that we consider risk or risk minimisation, both in sales and in purchasing, to be at least as important as the corresponding prices (Creavac, PR).

Better contract preparedness in case of a disruption is also part of contingency planning after the crises.

We're now better protected in terms of contracts. Of course, we've now also secured ourselves better on the contractual side (Yordas, JF).

4.2.15. Customer Diversification

Reactive customer diversification is also one of the most important measures that were taken in response to the crisis.

4.2.15.1. Internationalisation

There was internationalisation through opening a new office in Japan for Yordas.

We added Japan a year ago and new ones, actually this month, colleagues have started there (Yordas, JF).

They also had plans to further tap into the Turkish market which had to be stopped due to the Turkish economic crisis.

And of course, that's why it's what we would probably have hoped for, that we could perhaps tap into the Turkish market more (Yordas, JF).

4.2.15.2. Customer Segment Diversification

Customer segment diversification means which industries and which kinds of customers are targeted. A strategy to diversify a firm into different industries is to calculate dependencies and correlations between industries.

We will also analyse industry dependencies in relation to our products, create correlations, correlate industries in sales trends that seem to have nothing to do with each other. But we have done this before, we are doing it now. [...] However, this is a realisation that we have perhaps made a little more stringent since coronavirus. We are really looking at correlations over time in

terms of sectors. Not just saying that they don't have any dependencies, but also trying to substantiate this mathematically with our data (Creavac, PR).

The customer segment diversification is strictly followed by Creavac that tries to strategically move into sectors that are as independent from each other as possible. Also based on the data.

We are strategically trying to move into sectors that have little correlation with each other in terms of crises, sales and price trends, so that we are as broadly diversified as possible. [...] There is currently no customer that accounts for more than 5%. There is no sector that is more than 10% dependent (Creavac, PR).

Also moving from smaller customers to targeting larger global accounts helps to be as broadly diversified as possible.

We need to jump into the international, global accounts. In fact, we are not yet at 50/50 between small and large accounts. But the idea is that by the end of 2025, half of our sales will be to global accounts (KAMA, JG).

4.2.15.3. Geographical Diversification

The last part of reactive customer diversification is the geographical diversification of customers where the companies try to spread their customers more globally.

I think we only had one country accounting for a good 70% [of exports] in total and now it's better distributed (Yordas, JF).

Diversification is just when you can do it, not every company can do it, but diversification is a very solid tool for preventing crises in all areas (Creavac, PR).

Firms have also realised with companies from which countries they should better not work with and thus make more careful selections of which countries not to work with.

Another point that comes to mind is a bit of a contractual issue, but not just in terms of the pandemic, but also more in terms of sanctions lists, for example. Which countries can you do

business with? Of course there were before, but now it's become a bigger issue again (Yordas, JF).

4.2.16. Human Resource Management

The last reactive sales strategies are human resource strategies. They are split in supportive leadership, reorganisation and sales transformation.

4.2.16.1. Supportive Leadership

Supportive leadership means to give displeased employees space to express their negative emotions and to assign them to other, more motivating, topics.

We just give them space to be able to express these negative emotions and focus on perhaps giving them other motivating topics elsewhere (Queo, LB).

4.2.16.2. Reorganisation

Reorganisation means to reorganise the firm including new managers and sales staff

We are also going through a big reorganisation of the company with service and many other things. [...] What we actually have at KAMA is a kind of re-founding of the company. [...] I [Chief Business Officer] came to KAMA to change the way we sell machines (KAMA, JG).

Part of the reorganisation is also to change the sales network in Europe implement direct sales and direct service in European countries which should be organised in regions and not in single countries.

I would like to change that [having distributors] in Europe. I would like to have direct sales in Europe. And that is what we are changing now. My plan is to have direct sales and direct service in all European countries. At least in the biggest European countries. And then whatever is outside of Europe, at least for now, to have distributors. [...] I don't want to have one person per country, but also divide Europe into regions. So, the idea is that we have Central Europe, which is DACH, together with the North and Italy. And then we have Western Europe, everything to the left of Central Europe, and Eastern Europe, everything to the right (KAMA, JG).

Not only in the European countries, the sales network should be switched out for direct sales, but also in the big markets, which for KAMA are China and the US, the sales network should be switched out through installing sales subsidiaries there.

And then long-term subsidiaries in China and the USA (KAMA, JG).

Another strategy in reorganisation is to change the way the sales network works to not have people focus on single countries but to have them focus on entire regions to gain efficiency.

I also want to put more effort on the distributors to sell in regions and not in countries. For example, since I came, we have cancelled all contacts with distributors in many countries in Africa, just to have one for 40 countries there. And the same in the Middle East (KAMA, JG).

4.2.16.3. Sales Transformation

The third aspect of human resource management is the sales transformation which means nearly everything about the way of selling is changed. This is closely related to the reorganisation of the company and includes changing the sales team, the sales approach from waiting for customers to pushing products onto the market very actively as well as approaching customers proactively, changing the sales tools with presentations, videos, customer testimonials, samples, going more to trade shows, being active in social media and in magazines, increasing the market presence, changing the message they have in the market through e.g. explaining benefits more, approaching different markets and customers like the global accounts and utilise being eco-friendly for sales more than before.

I'm changing the sales team, I'm changing the sales approach, I'm changing the sales tools, I'm changing the presence that we have in the market, I'm changing the message that we have in the market. [...] Now we're very pushy. [...] It consists of, like I said, having new people, having new tools, and by tools I mean presentations, videos, customer testimonials, samples, going to a lot more trade shows, being active on a lot of different social media, being active in a lot of magazines. [...] we want to be much more aggressive. [...] But we are also using this to try to sell

more. Because one of our main advantages is that we are not so good when it comes to being environmentally friendly. We are very eco-friendly, but in the sense of less waste, less energy consumption and all that. That's something we utilise a lot more than we did before (KAMA, JG).

4.3. A Grounded Model of Resilience and Reactions to external shocks on the Sales side of SMEs in GVCs

The 1st-order analysis resulted in 64 1st-order concepts which could be condensed to 31 2nd-order themes. These were aggregated into 16 aggregate dimensions. The data structure that was explained in the last chapter showed the nature of the business as an independent factor that embeds the context for everything. Five of the aggregate dimensions are in the phase of proactive sales strategies, four are in the impacts of external shocks and six are in the reactive sales strategies phase This is shown in the data structure in Table 3.

The grounded model of resilience and reactions to external shocks on the sales side of SMEs in GVCs in For the sales side, the findings are depicted in the data following data structure in Table 3. This abducted structure is then brought into a grounded model of resilience and reactions to external shocks on the sales side of SMEs in GVCs which is depicted in **Error! Not a valid bookmark self-reference..** consists of the just named nature of the business and the three types or phases of elements proactive sales strategies, impacts of external shocks and reactive sales strategies that were mentioned before. This mimics the process a firm goes through when an external shock appears.

Before the shock, the firm only has proactive sales strategies implemented because it does not know that a shock will occur, and it tries to be prepared for what is to come. Then the shock occurs through the impacts of external shocks on SMEs and their sales side. After the shock appears, the firm tries to mitigate the impacts on the supply chain through reactive strategies.

The interviews for the sales side also revealed what was found for the supply chain side. Not all strategies work for every firm, every firm experiences impacts and shocks differently and

every firm has different resources and capabilities that give the frame how it can act. This means, the nature of the business determines the context what strategies are viable. Like above, the nature of the firm can also directly influence specific elements. The proactive sales strategies try to mitigate the impacts of the external shock. The impacts of the external shocks are events or circumstances that happen because of the external shock which are mitigated or tried to be mitigated by the reactional sales strategies after the occurrence of the impacts. There are relationships between the impacts and the ex-ante as well as the ex-post phase and also relationships between aggregate dimensions of one phase, respectively impacts, which can also influence other dimensions in the same phase, respectively impacts.

There are two specific links between the nature of business to an impact of external shocks. There are four links between impacts of external shocks and two links between reactive sales strategies. Six links are present between proactive sales strategies that try to mitigate impacts of external shocks and ten links from impacts of external shocks to reactive sales strategies. In total, 24 links, connections and relationships have been extracted from the interviews.

The nature of the businesses of the interviewees and their proactive strategies are shortly summarised here in order to give context so the reader can better understand the impacts and strategies of the interviewed firms.

Creavac is a German mechanical engineering firm that produces machines for coating materials in vacuum, but also provides coating services with their own machines. The company has 105 employees. They tried to keep stocks. They proactively tried to diversify their customers strongly with. Geographically, they export 30 to 40% of their goods and sell 20 to 30% to German MNEs. The rest was supplied to smaller German firms. (Creavac, PR).

KAMA is a German manufacturer of machines for print finishing with 115 employees. Geographically, they were strongly diversified with their sales as two thirds of their sales were internationally, and the third third was sold in Germany, Austria and Switzerland. They

originally sold mostly to smaller firms. They had a large distributor network that had a contact person for every country of the world. Their customer relationships were not that well maintained and they had a rather passive sales approach before the crises (KAMA, RL).

Queo is a German company that develops customised software and has 150 employees. They are rather diversified in terms of industry variety in Germany. They have around 30 to 40% MNEs as customers. They have a culture that embraces change readiness and they practice a lot of change management (Queo, LB).

Yordas is a British firm that supports other companies, mostly MNEs, in their import and export practices in complying with chemical regulations, categorising chemical products and advising on requirements, hazard communication and on sustainability strategies as well as chemicals management through software. Their customer base is heavily diversified in terms of industries as well as in geography, with 70% of sales being exports. The company made contingency plans for different impacts (Yordas, JF).

Proactive inventory redundancy through an inventory strategy with high stocks can benefit from impacts of demand disruptions, especially if it is a demand surge. Creavac could take advantage of the demand surge for their services due to their customers also wanting to build up stock through their stockpiling strategy. Because of their inventory strategy, they were always able to deliver in full.

We had an average stock level of around 6 months before the crisis [...] We also manufacture products for critical infrastructure, which means that they suddenly exploded at the beginning of the coronavirus crisis. Our customers reacted in the same way as we did, building up stocks. [...] In contrast to other potential competitors, we were always able to deliver in full, and that was more important than the amount of capital tied up in stock (Creavac, PR).

Strategic planning can mitigate disruptions in demand through business continuity plans. Queo had contingency plans figured out for the case of disruptions in demand. But they did not need them.

During corona, we were basically prepared for everything, but not that much actually happened (Queo, LB).

Also, Yordas had some contingency plans in place, but they went into a different direction (Yordas, JF).

Proactive customer collaboration in terms of the relationship a firm has with its suppliers can worsen disruptions in demand. KAMA had no strong relationships to customers and partners before the pandemic. This did not help with selling more machines.

Somehow this close relationship with the customers was lost because nobody did that. [...] All sales were stopped. [...] No activity in the market (KAMA, JG).

A proactively diversified customer base in numbers, segments and in geography can mitigate the risks of being affected by disruptions in demand, especially if it is a demand decrease. Creavac is a good example here as they could mitigate the impacts especially well through their proactive diversification.

So, the crisis in particular had no influence at all. Corona and Ukraine had no influence at all, because we actually decided that in 2017, we were already dependent on the automotive sector and we have consistently pushed that back. [...] In principle, however, this is our business policy regardless of the crisis, so neither coronavirus nor Ukraine had any influence on our strategic direction in sales (Creavac, PR).

The pandemic confirmed their way of building resilience is good for dealing with disruptions.

Diversification is a very solid tool for preventing crises in all areas (Creavac, PR).

KAMA on the other hand had a large distributor network worldwide which did not cushion the impacts of the crises (KAMA, JG). Queo was well diversified in customer segments which mitigated the demand fluctuations of MNEs.

As I said, many of our customers tend to be in the public sector, the health insurance sector, which of course helped us a lot and gave us stability. International customers such as VW do make up a certain proportion of our turnover, and we have noticed fluctuations there. But not in such a way that it really knocked us for good, but rather in such a way that we were able to balance it out with other aspects (Queo, LB).

In case of a demand increase, diversification can help in being affected and generating higher sales which was the case for Yordas. They had demand decreases in certain areas which could be compensated through this diversification.

So, Corona, I would say that it hasn't really affected us, or at least not negatively. [...] And we actually had relatively few Russian customers. And of course, we also had to stop that, but yes, it was more the case that European or Western companies could no longer go to Russia. [...] What has actually been a bit positive for us, you wouldn't dare say it, but of course the boom in disinfectants (Yordas, JF).

The diversification can also mitigate the uncertainty in a new environment as it spreads risks. Creavac uses diversification as a tool to do exactly this.

But we are relatively conservative. This means that we consider risk or risk minimisation, both in sales and in purchasing, to be at least as important as the corresponding prices. In case of doubt, more important than that. So, if you like, we are actually traditional and always keep an eye on it or make sure that we are diversified (Creavac, PR).

Proactive human resource management can mitigate the impacts of both uncertainty and government interventions in a new environment, especially with change readiness. Queo has a

high change readiness as they work in an industry that changes often, their employees are willing to change, and they have a good change management.

We are also a company that has a lot to do with change. So, we are generally exposed to a very dynamic environment and that's why the topic of resilience or willingness to change plays a role anyway and enables us to deal with it, to react accordingly to Corona, which was a major challenge for most companies. And in this situation, giving employees a feeling of how uncertain the situation really is, how things are actually going to continue, i.e. providing orientation in times of crisis, that is actually the biggest challenge you have in phases where even the management cannot foresee what will happen. Of course, that was extremely difficult with corona. You didn't know what would happen next week, what would happen tomorrow. No one had ever experienced this before. [...] We do quite a lot in the area of change management and supporting change, and in recent years we have focussed a lot on what actually happens during change (Queo, LB).

The nature of the business and its products and services have a strong impact on how the firm is affected by and adapts to a new environment, especially with new government interventions.

So, the resilience of organisations comes, among other things, from having people who are also able to accept change and because we change frequently anyway, we wouldn't attract people who can't do that at all, right. So that also has a lot to do with our industry. Of course, software and communication is also an industry that is developing very quickly [...], and that's why these are usually people who have a certain willingness to change and who also experience this with us (Queo, LB).

The nature of the business and especially the nature of their products and services also determines how a disruption in demand affects the firm. Yordas supports firms in their import and export practices which did not really stop. Since they had a necessary service for this, their sales did not decrease.

Maybe at the very beginning, because of course there was a bit of uncertainty among customers as to whether they would continue to export somewhere or not and so perhaps that also declined

a bit, but it recovered relatively quickly, because a lot of things are simply moved by deadlines, whether they have to do something or not, and if they were still there, then they had to continue to do it (Yordas, JF).

If a company produces products that are deemed necessary for the new needs during the crisis, the demand rises. This was the case for Creavac.

We also manufacture products for critical infrastructure, which means that they [sales] suddenly exploded at the beginning of the coronavirus crisis (Creavac, PR).

Customer collaboration challenges in form of highly demanding customers pushing the company hard can be induced due to a disruption in demand, especially due to a surge in demand. When there is a demand surge and MNEs want to increase their stock in a crisis, they often pass pressure on to their suppliers.

Our customers reacted in the same way as we did, building up stocks. [...] In other words, we have relatively high volumes and we also worked with consignment warehouses. [...] [MNE] got involved very quickly in March, when the full extent was not yet clear, and they pushed us extremely hard (Creavac, PR).

Customer collaboration challenges can also influence employees and lead to internal human resource challenges like employee fluctuation. If a project with an MNE only feels bad for employees because they get shifted all the pressure and the bad mood, it could lead to them leaving the company.

So, there's a lot of frustration in the projects that we have to deal with and where we have to see how we can actually motivate our employees to work on these projects. [...] So, of course there are also people who at some point say, well, you know, I've been working here somehow for four years with a customer who really only puts me down, to put it bluntly, I'd rather go somewhere else now because I don't feel like it, he just takes energy away from me, I don't get any energy, I'm just unhappy, I'll leave. So, everyone has the option. It's not as if there aren't any jobs (Queo, LB).

Disruptions in demand, especially reduced demand, can lead to internal challenges like financial distress in the form of illiquidity. In case the sales are not made in a regular time interval, or they stop completely, a firm experiences liquidity problems sooner or later. This happened at KAMA.

The Corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales (KAMA, RL).

Market uncertainty in a new environment can cause a decrease in demand as seen in the first weeks of the pandemic and of the Ukraine crisis for Yordas.

There was a bit of uncertainty among customers as to whether they would continue to export somewhere or not and so perhaps that also declined a bit. [...] Ukraine was of course similar, you could tell that the companies had become more cautious about what else they were doing. [...] That probably set us back a little bit and at that time the general uncertainty (Yordas, JF).

But government interventions in a new environment can lead to an increase in demand like the above-mentioned example from Yordas shows, where they experienced an increase in demand after the laws for disinfectants were eased (Yordas, JF).

Customer collaboration challenges through demanding customers that push hard can be solved by collaborating through cooperation and joint planning. Creavac did just that as they were pushed hard by MNEs.

They pushed us extremely hard. [...] That was actually the beginning, and it actually went on for two years. [...] In the beginning, there was more need for discussion and team meetings regarding supply chains and increasing the number of units. It was actually characterised by the fact that we had a lot of discussions about production capacities, how can we increase what, what do we have to produce in what period of time, et cetera, these were actually the topics. So it was essentially about the capacities that we were building up or that we had available for certain

product lines. So, the main discussion we had with our customers was capacities, capacities, capacities (Creavac, PR).

Customer collaboration challenges because of bad service provider mentality and employee frustration can be eased by human resource management strategies. In the aforementioned example of Queo having to deal with MNEs that pass on their problems to their service providers, they have tried to resolve the issues they had with their employees by providing supportive leadership and giving employees space to express negative feelings as well as give other motivating topics.

It's often the case that we realise that there are employees who really don't want to work with customers anymore and say, no, the deadlines just feel crap and they're so top-down and no, I want to work with someone on an equal footing and not have someone tell me what I have to do and if I give my opinion, they think it's stupid or something. [...] We just give them space to be able to express these negative emotions and focus on perhaps giving them other motivating topics elsewhere, to say that they are not just doing these projects but are also doing others (Queo, LB).

Disruptions in demand through increased demand can be taken advantage of by customer collaboration through cooperation in planning capacities. This is shown by the just mentioned case of Creavac, where they could benefit from the increased demand for products for critical infrastructure and the increased demand because of their customers stocking up. They planned jointly with their customers and worked with consignment warehouses to be able to supply the demanded products.

Well, our customers or many of our customers reacted in exactly the same way as we did. In other words, we have relatively high volumes and we also worked with consignment warehouses. We also manufacture products for critical infrastructure, which means that they suddenly exploded at the beginning of the coronavirus crisis. There was more need for discussion and team meetings regarding supply chains and increasing the number of units. We had a lot of discussions about

production capacities, how can we increase what, what do we have to produce in what period of time, et cetera (Creavac, PR).

Also decreased demand can be mitigated by cooperation. KAMA experienced a decreased demand as one of their main sales partners who was from Israel stopped working with them. They cooperated with other partners instead.

One of our main partners in the industry is in Israel. If they don't sell, we sell less. I would say, from a market perspective, that the war in Israel and Gaza has a much bigger impact than the war in Ukraine. [...] And what they really did was to stop the relationship with many partners. [...] I'm showing a lot more interest in other companies. I'm reducing a little bit the level of partnership we have with this company in Israel, just to increase a little bit the relationship with some of their opponents (KAMA, JG).

For Queo, a strategy to mitigate dropping demand was collaborating with other service providers through work in networks to join forces to get projects and sales that a company would not have gotten on its own. Also here, increasing partnerships could be beneficial.

And the other thing is, for example, we are also working in a network of service providers, perhaps to intensify this, to look at joining forces with other smaller service providers in order to be able to manage larger projects together or to be able to manage projects that, let's say, involve a technology in a specific area in which we are not well versed, but where we can cover a large other area, so that we can do this together and build partnerships with other service providers. That is certainly another measure that is actually geared towards sales and is about making other projects possible that you could not apply for on your own (Queo, LB).

A price strategy can mitigate demand decreases through lowering prices by giving discounts or even by keeping prices constant when all other prices are increasing. KAMA performed both of these strategies.

I also have to say that I kept the prices at the same level in 2024. We had increased costs because we were paying our salespeople more. But because we were already quite expensive, I kept the prices at the same level. [...] As suppliers, all the big companies come from Europe. We have customers worldwide. But it was a very difficult situation because as European suppliers we had to increase prices because we paid more money for things. But because of the situation, we sold fewer machines than in the past. So just to sell more, we gave better discounts (KAMA, JG).

Reactive strategic planning through contingency planning can help in easing disruptions in demand. Yordas added new contingency plans to their array of plans that concern new pandemics. They also added legal precautions in case of another disruption.

I think that we've also become more resilient again and that we're now better protected in terms of contracts. Also, what happens if a pandemic somehow just appears or something like that just happens? Of course, we've now also secured ourselves better on the contractual side (Yordas, JF).

Diversifying in numbers and customer segments as well as in domestic and global customers spreads the risks of experiencing demand disruptions. Yordas spread their risks accordingly.

I think we only had one country accounting for a good 70% in total and now it's better distributed (Yordas, JF).

So has Creavac which spread their customers even more since the start of the pandemic.

We consider risk or risk minimisation. [...] There is currently no customer that accounts for more than 5%. There is no sector that is more than 10% dependent. [...] We will continue to do so in the future. So, we won't reinvent it, but we will also analyse industry dependencies in relation to our products, create correlations, correlate industries in sales trends that seem to have nothing to do with each other. But we have done this before, we are doing it now, and we are strategically trying to move into sectors that have little correlation with each other in terms of crises, sales and price trends, so that we are as broadly diversified as possible. However, this is a realisation that we have perhaps made a little more stringent since coronavirus. We are really looking at

correlations over time in terms of sectors. Not just saying that they don't have any dependencies, but also trying to substantiate this mathematically with our data. And it has certainly proved its worth (Creavac, PR).

A new environment through government interventions and uncertainty could be mitigated by digitalisation through digital product adaptation and also digital transformation which makes their products and their communication less vulnerable to new environments.

Digitalisation, I think that simply goes both ways, that you can continue to maintain close contact with customers, that you are still there for them. [...] We've still tried to do our thing somehow, of course, to continue to be present. Well, we've reorganised a bit. One area is training, for example. We did quite a lot of face-to-face training. Then we started creating e-learning courses (Yordas, JF).

A high uncertainty in a new environment can influence a firm's decisions on further customer diversification in order to spread risks. Yordas wanted to further enter the Turkish market. But because of the economic crisis and the accompanying uncertainty, they refrained from further internationalisation in Turkey.

And of course that's what we would probably have hoped for, that we could perhaps tap into the Turkish market more, but it's difficult. It's difficult to open up the Turkish market per se (Yordas, JF).

A new environment with high uncertainty can be mitigated by human resource management strategies through reorganising the company to better cope with the new needs in this new environment. KAMA reorganised the company as already mentioned in the supply chain part. They appointed a new Chief Business Officer that changed the sales of the company drastically.

The owners decided to change the company to face the current situation in the market. With the crises, with the wars, let's say something that's maybe important is that what's happening with Israel is also having a big impact (KAMA, JG).

Internal human resource challenges like employee fluctuation can be mitigated by human resource management. Queo had the problem with displeased employees and through this employee fluctuation which they tried to solve through supportive leadership.

So, of course there are also people who at some point say, well, you know, I've been working here somehow for four years with a customer who really only puts me down, to put it bluntly, I'd rather go somewhere else now. [...] We just give them space to be able to express these negative emotions and focus on perhaps giving them other motivating topics elsewhere, to say that they are not just doing these projects but are also doing others (Queo, LB).

Digitalisation through digital transformation goes hand in hand with customer collaboration through finding new ways of communicating and thus keeping a good customer relationship.

Digitalisation, I think that simply goes both ways, that you can continue to maintain close contact with customers, that you are still there for them (Yordas, JF).

A human resource management strategy of transforming sales can lead to a company diversifying their customer segments. This was actually included in the reorganisation as the new Chief Business Officer of KAMA completely transformed sales.

The company was in big trouble. We're using that to renew the company. It's not about renewing the products because we produce the same products, it's about how we sell these products on the market. It's not about finding new sales models, it's about explaining the benefits and addressing different markets and different types of customers that we've never addressed before, like the global accounts I mentioned earlier. [...] But that's also a trend that we're trying to change now, because we need to jump into the international, global accounts. That's what we're trying to do right now. In fact, we are not yet at 50/50 between small and large accounts. But the idea is that by the end of 2025, half of our sales will be to global accounts (KAMA, JG).

5. Discussion

The research question of this master thesis was: How do SMEs within the GVC handle the impacts on their supply chain and the sales side caused by unforeseen external shocks?

This has been investigated by performing semi-structured interviews with six SMEs within the GVC by asking about their strategies that mitigated external shocks in the last four years, especially the Covid-19 pandemic and the Ukraine crisis. The obtained data has been analysed using the Gioia Method which brought forward 16 aggregate dimensions each for the supply chain and the sales side.

The study shows how SMEs handle the process of disruptions in the GVC by both building up resilience beforehand to proactively mitigate the impacts of external shocks and by reacting to the impacts of the external shocks once they occur. Creating the context for the three categories is the nature of business which determines the severity of the impacts and provides a frame in which the SMEs can strategize. It has been shown that the strategies often cannot work alone and there is always an interplay between the nature of the business, the impacts and the proactive and reactive strategies, also between strategies themselves. This interplay, especially between the nature of the business and the chosen strategies suggests that there is no one size fits all approach to build up resilience and to react to disruptions as every SME has to figure out for themselves which strategy works best for their specific nature of business.

On the supply chain side, the gravest impacts were the disruptions at the supplier, especially supply shortages, and the disruptions in transportation. The most important and effective proactive strategies were proactive supplier diversification, especially regarding the number of suppliers for one material and the geographical location, and, if possible for a firm, a proactive inventory redundancy strategy. Reactive supplier diversification as well as reactive supplier collaboration proved to be the most important reactive strategies for the interviewees.

On the sales side, the most severe impact was the disruption in demand, especially a demand decrease. Proactive customer diversification, especially the diversification in customer segments, so different industries and sizes, was the most critical proactive strategy. The most important reactive strategy was collaboration.

5.1. Diversification

Generally, diversification works well in both sourcing and sales. It seemed to be the most important strategy for most interviewees. On the supply chain side, three out of the four interviewed firms practiced multiple sourcing with backup suppliers that were geographically spread, either in Europe and in Asia or just in Europe. In case they were needed, they could be used. One firm performed a single sourcing strategy which was disrupted through especially transportation disruptions, so they diversified geographically and reshored their sourcing closer to the production facility. As diversification is proven to spread the risks of being impacted severely, firms might have tried to achieve this spreading of risks proactively. Through both sourcing in the domestic market and in foreign markets, firms might have tried to both achieve quick replenishment times in case they needed quick delivery as well as having cost advantages through sourcing in low-cost countries. Only one of the firms moved their sourcing completely back to Germany and into neighbouring countries with one firm already having most suppliers located in Europe to achieve quick delivery times. Another firm engaged in more foreign sourcing which is mostly done in other European countries and if there is a Chinese entity among new suppliers, they diversify numerically through also closing an agreement with a German entity. This could be due to them trying to prioritise resilience and shorter delivery times over efficiency and over saving costs as disruptions to transportation might not be that severe when transportation is shorter. This strategy worked for the most part as they could mitigate disruptions at the suppliers, disruptions in transportation, uncertainty as well as government interventions.

Supplier diversification is recognised as being a viable strategy to mitigate disruptions and increase resilience in the supply chain as it limits dependency on one firm or region (Cagri Gurbuz et al., 2023; Juergensen et al., 2020; Xu et al., 2020). Geographical diversification is agreed upon to mitigate regional disruptions (Cagri Gurbuz et al., 2023; Hendricks et al., 2009; Juergensen et al., 2020; Paul et al., 2021). A special importance is given to the strategy of having multiple suppliers that are split between the domestic market for staying agile and responsive and a foreign market to stay efficient and make use of low cost production (Xu et al., 2020). A firm engaging in supplier diversification is more flexible after a disruption occurs as they can perform easier supplier switching. This can be optimized by analysing weak spots in the supply chain and seeking alternative sourcing options increases this flexibility in the long-term (Bode et al., 2011; Hohenstein et al., 2015; Raj et al., 2022; Xu et al., 2020). This could include a new multiple sourcing strategy where suppliers are located close to the manufacturing facility and other suppliers in low cost country (Blackhurst et al., 2011; Hohenstein et al., 2015; Raj et al., 2022). Having backup suppliers ready may lead to lower search costs and easier access to alternative sources as already established connections lead to more trust, shared knowledge and collective insights which is more efficient for both the firm and the supplier than to search for other customers or suppliers (Oh & Oetzel, 2022). The trend of nearshoring was also identified here through KAMA who want to keep their supply chain closer to their production facilities. They want to keep it like this in the long-term and also further regionalise their supplier network. This trend was both noticed by Contractor (2022) who believes only in a short-term regionalisation of GVCs and Ciravegna and Michailova (2022) who believe in a lasting regionalisation. Zahra (2021) agrees with Ciravegna and Michailova (2022) and suggests that these reshoring practices will continue also after the pandemic as nationalism and populism is on the rise and was accelerated by the pandemic. The example of KAMA shows that they want to collaborate more with their regional suppliers and thus, stay in the long-term. Tricera on the

other hand sourced more domestically during the pandemic but internationalised their supply chain after the pandemic and thus showed that regionalisation for them worked in the short-term. Although firms want to build up resilience, it was shown that firms prioritise disaster readiness shortly after a disruption but as time passes, they focus more on organisational goals (Oh et al., 2020). The author argues that firms will try to keep regional value chains and try to decrease costs with these as much as possible while increasing efficiency after a severe crisis but will gradually resort to more geographical supply chain diversification as time passes, assuming that in the near future no disruption of this gravity will appear, as the pressure for more cost reduction, that cannot be realised with regional suppliers, increases and experiences fade. Due to the magnitude of the disruption, it is suggested that SMEs will increase the number of suppliers and still keep more domestic suppliers than before the crisis in the long-term, but the trend will move back to more offshoring. A good way for keeping the balance would be for SMEs to engage in multiple sourcing close to the production facility for reliable and quick delivery as well as in low-cost countries to decrease their sourcing prices. Thus, it is proposed:

Proposition 1a: SMEs within the GVC move towards more domestic sourcing during and shortly after a severe external shock but will gradually move towards more global sourcing as time passes.

On the sales side, three out of four interviewees diversified their sales geographically before the crises. The fourth firm had customers mainly in Germany but diversified over customer segments. This was also done by two other firms. One firm specifically tries to move into industries that are as widely diversified as possible. This diversification could have been implemented due to the firms wanting to achieve the spreading of risks.

Every interviewee has engaged in some form of diversification, mostly both proactively and reactively. Diversification was nearly always a core strategy and had direct influence on the impacts and the outcome. Through reactively diversifying geographically, they might have tried

to mitigate disruptions in heavily affected areas and to move to less affected regions. Sector and numerical diversification might have been motivated by the intention of spreading risks further to further protect themselves from impacts of disruptions.

This is proven by literature as through geographic but also customer segment diversification, resilience is increased and it is tried that not all customers are hit by the same disruption (Leung & Sun, 2021). Diversification does not just decrease risks but it also increases risk exposure to regional risks in all country markets (Czinkota et al., 2010; Oetzel & Oh, 2014). Pühr and Müllner (2022) argue that during normal times, geographic market diversification increases overall risks whereas in times with extreme external shocks, the geographic market diversification leads to a smaller negative impact due to the firm's higher flexibility (Bacchetta et al., 2007; Oh & Oetzel, 2022). The author argues that geographical and customer segment diversification will be further performed by SMEs in GVCs to mitigate large disruptions. SMEs will also enlarge their customer base in anticipation of new crises. It is argued that especially proactive diversification of the customer base has positive impacts as a proactive and long-term approach is crucial to pursue this strategy as building up a large and diversified supplier and also customer base takes time. Reactively, there can be made many adjustments, that are also crucial, but in order for diversification to work well in the long term, there have to be made adjustments that cannot be made during a short-term reaction.

Proposition 1b: SMEs in the GVC diversify their customer base after the pandemic in anticipation of new severe disruptions.

5.2. Inventory Redundancy

An inventory redundancy strategy with stockpiling can work when the firm can hold enough stock to bridge a crisis or at least until there is a good chance to restock without being affected by too many disruptions. But this stockkeeping strategy is very expensive as there is a lot of capital tied-up in stocks. This could lead to liquidity problems if the sales are not going as

planned. So, in order to engage in such a strategy, a firm has to have the storage capacity for it and enough cash at hand that they can endure a large amount of capital being tied-up over the time of crisis. This can be difficult for firms that are producing and have a high ratio of materials to total output as keeping stock would lead to an even larger portion of their capital being tied-up in stocks than with a company with a low ratio of materials to total output leading them to have liquidity issues and also being short on cash at hand to make possibly necessary investments. This was shown through the case of KAMA that performed this strategy but had to change it to an approach that resembles more a just-in-time delivery strategy as the stockpiling strategy was too expensive for them. For Creavac on the other hand, this strategy worked as they only have a ratio of materials to total output of only about 20% which meant the tied-up capital was still manageable and the issue of being able to deliver overweighed much more and thus, they could live off stocks during the crisis. The strategy could work because the easiest way to survive a crisis is to not be affected by the crisis. It can work well through bridging supply shortages and transportation issues through simply not having to procure as long as the disruptions persist.

Scientific literature is on par with the benefits of inventory redundancy (Blackhurst et al., 2011; Ciravegna & Michailova, 2022; Czinkota et al., 2010; Hohenstein et al., 2015; Wu et al., 2013) and its benefit in staying able to deliver while competitors might be unable to (Blackhurst et al., 2011). Although literature also sees inventory redundancy as an effective strategy that helps to quickly react to disruptions, it also recognises the long-term need to optimise stock levels due to flexibility and liquidity challenges such a strategy brings (Buckley, 2020; Craighead et al., 2007; Hohenstein et al., 2015; Oh & Oetzel, 2022; Raj et al., 2022). Buckley (2020) proposes that in highly uncertain situations, e.g. after a severe external shock, which is of uncertain duration, firms should engage in building up slack resources to build up slack to increase preparedness.

This suggests that although an inventory strategy with high stocks can work really well to bridge disruptions in times of crisis, the preconditions, so the nature of a firm, need to be there and that not every firm can engage in this strategy. Especially firms with a low ratio of material to total output that have enough cash at hand and a storage that is big enough should be able to engage in this strategy. The functioning of the strategy certainly also depends on the duration of the crisis and the amount of stocks being piled up as a firm could have too few stocks and at the end of their stock, they would have to rely on other strategies like other businesses that could not perform the stockpiling strategy. Thus, the author suggests that SMEs in the GVC will engage in building up slack resources proactively when their nature of business allows it as well as reactively when an external shock appears.

Proposition 2a: SMEs in the GVC proactively build up slack resources when their nature of business allows it.

Proposition 2b: SMEs in the GVC quickly build up slack resources when an external shock appears.

5.3. Collaboration

Collaboration worked well as both a proactive and a reactive strategy, but the interviewees especially used it reactively. Relationship management can positively influence suppliers' and customers' choices towards the firm. This is especially helpful if it is done proactively and then intensified reactively. But reacting to crises through information sharing can firstly greatly increase the awareness of the situation as well as the responsiveness of firms benefiting a quick reaction. Also, communicating and learning of competitors or similar firms can help a firm through getting second hand experience and solutions as to which strategies could work in mitigating a certain disruption. Collaborative planning like KAMA did with their new suppliers through sending forecasts and giving production and raw material releases can help in bringing

down prices as well as in decreasing the risks of supply shortages as the firm's demand is firmly planned at the supplier. Planning capacities with customers can greatly increase one's own planning and mitigates the risk of demand fluctuations as it gives a company security and a steady source of revenue for the planning duration. The same is true for long-term supplier agreements like framework contracts. Cooperation with suppliers brings this one step further as both participating firms benefit greatly from joint efforts. This could be helping suppliers so that they can stay in business and the helping firm can still get supplies in disrupted environments. Trying to contact suppliers in case of a disruption or difficulties and figuring out a way to handle it that suits both parties can greatly help the affected party and through this, they can stay in business, and both can benefit of each other in the long run. Partnerships and networks can also greatly improve the collaboration through getting cheaper supplies that are also more available as a supplier should focus more on their partner firm. Cooperation on the sales side can also work well in mitigating disruptions from crises as working together with other companies with different capabilities can greatly increase the range of projects a firm can handle which in turn means more demand.

Collaboration seems to be working because tackling a crisis could be difficult alone. Pooling knowledge, capabilities and resources or keeping an eye out and helping other firms seems to increase the ability to survive for all collaborating partners. Relationship management and increased communication work because firms with that are closer should help each other more as through more knowledge, risk mitigation in the own firm becomes easier. Through shared knowledge and an already existing connection, the supplying firm should already know what the buying firm needs and does not need to learn new production patterns. Reactive collaborative planning could work as when two or more firms that plan something together should get a sense of security from the other collaborators as the buying firm knows that it will be supplied, and the supplying firm will know that there will be someone that buys their

products which should greatly reduce uncertainty. Cooperating includes sharing resources which means that the firms have a greater pool of resources than before. Thus, it should become easier to mitigate a disruption together than doing it alone. This should work in jointly sourcing and achieving lower prices because of scaling effects and in sales partnerships through having a greater range of capabilities to offer which should broaden the potential customer base.

Relationship management is acknowledged to increase resilience. But literature suggests that a more proactive approach in collaboration could increase risk mitigation (Hohenstein et al., 2015; Pettit et al., 2013). Especially analysing weaknesses of the supply chain and monitoring potential disruptions together with suppliers as well as planning a joint mitigation strategy with critical suppliers could be a good addition (Xu et al., 2020). This goes hand in hand with the creation of supply chain visibility where the whole supply chain should work together to be mapped in order to gain efficiency and agility as well as to be responsive and to understand where disruptions are located in the supply chain (Dolgui et al., 2018; Oh & Oetzel, 2022; Xu et al., 2020). Both trying to achieve visibility and the communication between firms can be greatly assisted by digitalisation (Oh & Oetzel, 2022). Forming networks and partnerships with diverse firms and organisations before an external shock occurs to share knowledge and best practices or to engage in joint risk mitigation can greatly improve strategic planning and thus resilience (Oetzel & Oh, 2021; Oh & Oetzel, 2022). The information gathered from networks with other firms and organisations can be crucial for strategic planning as with more information, the plans can be more elaborate and precise, especially when the firms are diverse (Oh & Oetzel, 2022). Cooperating with other firms with pooling resources can help in formulating strategies that would be too expensive for one firm to pursue alone (Contractor, 2022). Reactive collaboration in the short-term including information sharing, supporting supply chain members, and collaboratively planning is also seen as beneficial to supply chains (Cai & Luo, 2020; Hohenstein et al., 2015; Raj et al., 2022; Xu et al., 2020). Information sharing

through close connections seems to be more important than the interviewees think as especially in a crisis situation, information is crucial to be able to effectively strategize and mitigate a disruption (Oh & Oetzel, 2022). Direct collaboration with logistics companies is also recognised as a way of ensuring risk mitigation in transportation (Raj et al., 2022). Pooling resources and thus offer a new and broader product and service portfolio to aim for more sales (Miklian & Hoelscher, 2022). Also, working together with the customer and being transparent about the state of a product can increase trustworthiness (Raj et al., 2022).

This suggests that various forms of collaboration greatly increase mitigation of disruptions. Keeping good supplier and customer relationships during normal times seems to be important to be able to effectively plan. This is also the case for post-crisis collaboration in order to form a plan for recovery. Thus, information sharing and keeping good relationships with not only suppliers and customers, but also with other partners that can provide useful information should increase resilience and lead to better crisis preparedness which in turn means they should recover quicker. Thus, it is proposed:

Proposition 3a: SMEs in GVCs that engage in more relationship management and information sharing recover quicker than firms that engage in less relationship management and information sharing.

Joint planning should decrease a firm's uncertainty which should result in these firms being less affected by an external shock as they should have a steady supply or steady sales. Thus, it is proposed:

Proposition 3b: SMEs in the GVC that engage in joint planning with their suppliers and/or customers are impacted less by external shocks.

Cooperating through pooling resources seems to lead to firms having stronger mitigation plans both proactively as well as reactively. Thus, they should be impacted less through proactive

cooperation and recover quicker through reactive cooperation. This leads to the following propositions:

Proposition 3c: SMEs in GVCs that engage in proactive cooperation strategies with resource pooling are impacted less by an external shock.

Proposition 3d: SMEs in GVCs that engage in reactive cooperation strategies with resource pooling recover quicker than other firms.

5.4. Strategic Planning

Planning strategies were also performed by some of the interviewees. This included mostly contingency planning in terms of proactively planning what specifically to do in terms of a crisis and reactively planning which security measures should be taken in the future to mitigate the risks of the current crisis and to prepare for the eventuality of another crisis which includes time, buffer and cash flow management as well as legal security measures in contracts. However, they could not plan for Covid-19 as it was an unexpected event that no one had experienced before. Strategically planning seems to work because having a plan prepares people for the eventuality of a shock happening and gives guidelines for what employees have to do in case of a disruption. This should greatly increase responsiveness and the speed of a reaction which could be critical in moments of uncertainty. Also, mistakes due to rash decisions that are not well thought through in a moment of haste could be reduced by having a clear plan lined up. Although this seems to be the case, some of the interviewees seem to not see the worth in trying to prepare for something that they do not know will happen for sure, so they refrain from engaging in strategic planning.

I would say that everyone in the world is saying that they want to prepare for the next crisis. But what will the next crisis be? At the moment, we're not in that phase. Trying to prepare for future crises is something that would be great if we knew what the crisis was going to be. But without knowing that (KAMA, JG).

The benefits of strategic planning are in line with literature as contingency planning decreases response time as well as the risk of making mistakes (Hohenstein et al., 2015; Knemeyer et al., 2009; Vargo & Seville, 2011). But before planning, the environment of the business as well as possible disruptions need to be thoroughly analysed which most businesses did not do (Ciravegna & Michailova, 2022; Czinkota et al., 2010; Vargo & Seville, 2011). It is also recognised in literature that after businesses overcome a crisis, they seem to focus more on growth and organisational objectives than on preparing for other shocks (Miklian & Hoelscher, 2022; Oh & Oetzel, 2022). Although some managers do prioritise crisis readiness after a major crisis hit their company, they tend to forget past experiences and downgrade the priority of crisis readiness over time (Oh & Oetzel, 2022). Reactive planning is also recognised in literature in a way as adapting business plans to the new normal and including risk mitigation strategies that are up to date (Blackhurst et al., 2011; Hohenstein et al., 2015; Raj et al., 2022). Reactive planning should include reviewing and adapting existing plans to fit the specific circumstances (Dittfeld et al., 2020). Digitalisation as well as information sharing with other organisations can help with the analysis as well as with the planning process (Cai & Luo, 2020).

This suggests that all firms should take some time to proactively make contingency plans for certain shocks and crises where a possibility of occurrence is given, or at least for the possibility of supply shortages, transportation disruptions and demand reductions. It should be clearly stated which measures have to be taken as a consequence of the shock and who should do what. But since most firms do not engage in specific planning and firms tend to focus on organisational goals after a crisis rather than preparing for new crises and managers tend to forget the importance of preparing for new crises, especially as the resources of SMEs are limited and need to be well divided, it is suggested that most SMEs will not engage in in-depth strategic planning to prepare for specific risks in the future. Thus, it is proposed:

Proposition 4a: SMEs do not engage in proactive strategic planning for future unexpected external shocks.

After a shock occurs, it seems to be beneficial for firms to take time to review what happened and which impacts could hit the firm and to plan and derive specific long-term security measures that could mitigate the impacts of the shock. The interviewees seemed to practice this as they derived plans and specific measures from impacts that hit them. This, it is suggested that SMEs will reactively plan after an external shock hit them.

Proposition 4b: SMEs engage in reactive strategic planning to plan for impacts of the current crisis.

5.5. Human Resource Management

Human resource management was both used as a proactive as well as a reactive strategy by the interviewees. Proactive strategies included change readiness through having a good change management and the firm as well as its employees being used to and willing to change. This proactive approach seems to greatly help to adapt a company and its employees to a new environment and to changes crises create. This seems to be particularly present in firms that work in industries that have to do with a lot of change anyways, e.g. the software industry. Firms in other industries could also benefit from a change ready culture. A good way to start this could be increasing digitalisation which in itself is a big change which also comes with a lot of benefits. Reactive strategies included a supportive leadership for displeased employees because of bad customer interactions as well a reorganisation of the company with a sales transformation. The supportive leadership could be a good strategy that can ease the dissatisfaction of displeased employees, especially when there are difficult and demanding customers which whom the employees have to work. Engaging in such a practice could be used to lighten up the mood in the firm which is important to keep a good work environment for

everyone and also to keep the affected employees from resigning. But favouring some employees through more motivating tasks on the side could lead to other employees being jealous and disgruntled which could also sour the work environment. So, a good balance without favouritism and a clear communication of this treatment could prevent this from happening. Reorganising the whole company including a sales transformation and a change in procurement strategy seems to be the last way for companies that already have been hit hard by a crisis and that is searching for a new way to approach the crisis in order to adapt to the new environment. This is a large step that should not be taken lightly. There should be a lot of consideration of which new structure and which new people the reorganisation should include as it is a far-reaching decision that completely alters the face of a company which could include taking a long time to get used to new processes. There is also no guarantee that the new strategy will work out, so it is a risky endeavour. All possible factors and consequences as well as all the strategies that will be implemented should be taken into account holistically before taking the final decision to reorganise a company. The decision how the reorganisation should look like needs to be an individual case for each firm and needs to be greatly reconsidered.

Literature on proactive human resource management agrees with the importance of increasing change readiness, but suggests to engage in the training of employees on how to react in case of a disruption (Blackhurst et al., 2011; Duchek, 2014). Having human resource capabilities that can react well to sudden changes and disruptions can greatly increase change readiness and resilience and thus lead to a higher likelihood of the business coping with a disruption (Duchek, 2014; Oh & Oetzel, 2022). Training and educating employees of what they have to do after a shock is also thought to be positive for decreasing uncertainty (Blackhurst et al., 2011). Literature has also recognised the opportunity of redesigning a firm to face the new environment after a shock occurred (Lin et al., 2006). In such a reorganisation, also a sales transformation can increase the functioning of the sales force during a crisis (Hartmann & Lussier, 2020). Not

only the needs of the crisis should be taken into account, but also the functioning of the new organisational structure in normal times needs to be ensured. A reorganisation needs to be thoroughly planned and business practices need to be adapted in order for the reorganisation to work (Lin et al., 2006).

This suggests that human resource management activities can greatly aid in adapting a firm to a new environment. It seems that it would benefit all firms to have a change ready culture and to slowly bring employees to accept and be willing to change through a good change management over time. Thus, it is suggested that SMEs that have a change ready culture will adapt better to external shocks.

Proposition 5a: SMEs in the GVC that have a change ready culture adapt better to external shocks than SMEs in the GVC without a change ready culture.

Supportive leadership should be taken into consideration by firms that have displeased employees so that the work environment does not turn sour. Engaging in a reorganisation of a firm should be one of the last options in a crisis as it is a risky strategy which on the other hand could pay off greatly. Firms that consider a reorganisation during a crisis need to consider it carefully and should be aware of all that is involved in such a reorganisation. It seems that the great risk of a drastic reorganisation thus is only taken up by firms that think they might not survive a crisis with the current structure. Thus, it is suggested:

Proposition 5b: SMEs in the GVC only engage in a reorganisation if they are struggling as a last way out of the crisis.

5.6. Digitalisation

Digitalisation was used only reactively in the interviews by digitalising the supply chain through interfaces to the suppliers, tracking goods and by digital transformation through setting up new IT tools and finding digital ways to communicate to keep in touch with customers and

partners. This was stated to be the most important benefit of digitalisation other than mobile work which is not discussed in this master thesis. Another way of digitalisation was to digitalise services. These measures are all long-term strategies and were meant to ease the impacts of the then present crises as well as to proactively mitigate future impacts. The advancement of digitalisation could be due to its nature. Digital tools, communication and collaboration are not dependent on a physical location or specific people coming together. They can be used from everywhere as long as there is a power and an internet connection which makes them suitable for the use in crises. The pandemic greatly accelerated the adoption of digital technology. But still most interviewees do not use its potential fully. This could be due to the cost of implementation which SMEs might not be able to handle, because they do not fully trust the new technology or, what is more likely, that it involves a lot of effort and change. As change is often hard to realise, both because of the stubbornness of employees as well as because of compatibility challenges with existing systems, the implementation of digital technology can take time for SMEs. As digital tools do not only perform well in crises but also bring efficiency in normal times, it should be beneficial to adopt IT technologies where it makes sense. A digital supply chain for example is more efficient and creates visibility and transparency along the supply chain as it exchanges real-time information which keeps everybody in the loop greatly benefiting responsiveness and an overview over the whole supply chain.

In literature, digitalisation is not only seen as a way to digitalise the supply chain, to increase visibility and for collaboration with customers and suppliers, but also as a tool to carry out in-depth analysis of the business' surroundings and to help in planning for the future to mitigate risks of disruption through the use of big data and simulations. This can also help in designing an agile supply chain and in reevaluating the current supply chain design (Cai & Luo, 2020; Raj et al., 2022). Digitalisation is a way of increasing connectivity and collaboration and through this information sharing which increases resilience and decrease transaction costs

(Buckley, 2020; Ciravegna & Michailova, 2022; Contractor, 2022). As technology can be expensive, SMEs may not be able to implement it (Ciravegna & Michailova, 2022). Also the digital transformation of services is recognised as a good way of mitigating disruptions (Rapaccini et al., 2020). Such an adaptation of a product or service to suit the needs of the crisis can increase demand during a drop in demand for the original product or service (Kalogiannidis, 2020).

This suggests that it makes sense to digitalise processes, communication and one's supply chain. Not only reactively to a shock or as a proactive mitigation strategy but also as a way in normal times to simply increase visibility and efficiency. As the implementation of digital tools can be expensive, but also decrease costs once implemented, and can lead to difficulties in compatibility, it is suggested that SMEs with their limited resources do not implement a lot of digital tools at once but rather over time to facilitate compatibility and to not strain the financial resources of the firm. Thus, it is proposed:

Proposition 6a: SMEs in the GVC gradually adopt more digital technologies over time after an external shock.

There is a dispute whether digitalisation deglobalizes GVCs through regional websites and digital platforms with barriers for foreign competition to enter a market (Ciravegna & Michailova, 2022) or if it further globalises GVCs through global interconnectedness and the facilitation of finding new partners and maintaining connections (Contractor, 2022; Dilyard et al., 2021). Although websites might be more regional than global, tools for communication and collaboration usually are not and this is why the author argues that that GVC participants will further try to build connections, also in foreign markets as one interviewee tries to digitalise their supply chain to stay closer connected with their global supply chain participants and another one stated that they adopted digital tools to help them in staying connected with their global customers. Thus, it is proposed:

Proposition 6b: Digitalised SMEs in the GVC are more engaged in international business.

5.7. Price Strategy

Price strategy is exclusively a strategy on the sales side. Increasing prices is common practice during crises when costs also increase. This could compensate for losses due to less sales. But also decreasing prices through discounts or keeping prices stable when prices of competitors rise can be a good strategy to increase sales due to being the cheaper. Firms seem to engage in price strategies when they need to compensate losses or increased costs. Increasing the price could be a good strategy when the firm has a high market power compared to the customer and when there are not many alternative products from which customers can choose. When costs rise too much, so that the original price cannot cover them anymore, the price also needs to be increased. A price decrease or price stability on the other hand is a good strategy when the market power of the firm is low, when the market power of the customer is high and when there are many alternatives to choose from. This lower price should still cover the costs of the product.

Charging a higher price has been recognised by literature as a way to compensate losses and an increase in costs. This can also be done by incorporating differential pricing by charging more money for preferential treatment (Haluk Köksal & Özgül, 2007; Raj et al., 2022). But this weakens their competitiveness which should lead to less sales. Price decreases in the face of a crisis can increase sales numbers when the quality of the product stays the same. Price stability tends to have no effect on sales during a crisis. (Haluk Köksal & Özgül, 2007). Loyalty decreases price sensitivity which means increasing prices if customers are loyal could work (Semerciöz et al., 2015).

As loyalty leads to customers always choosing the supplier which is similar to a customer having low market power and thus the pressure to stay loyal, this could mean that customers with low market power are less price sensitive. Costs often rise during crises, as seen by Covid-

19, the Ukraine Crisis and the Red Sea Crisis. This suggests that engaging in price strategies as a reaction to demand disruptions and cost increases can be a good way of either increasing revenue from sales through increasing the price, if the market power of the firm is high and there are few alternatives, or increasing sales through decreasing the price, if the market power of the selling firm is low and there are many alternatives to choose from. Thus, it is proposed:

Proposition 7a: SMEs engage in price increases after an external shock occurred if they have a high market power.

Proposition 7b: SMEs engage in price decreases after an external shock occurred if they have a low market power.

5.8. The Influence of the Nature of the Business

The study also shows that nature of the business influences how an external shock influences a business and how the business strategizes both proactively and reactively. In this study, there are plenty of examples of impacts that were influenced by the nature of the business and strategies that only work because of it. For Creavac, their inventory redundancy strategy only worked because their materials only make up about 20% of their total output and their business is deeply vertically integrated as they produce their own machines and perform the coating services with these machines. Through this, they could pursue an inventory redundancy strategy with high stock levels of about six months before the crises, about 12 to 18 months during the crises and about 8 to 12 months after the crises. Even though there was a lot of capital tied up in stocks, it was manageable as it was rather low in comparison to the total output. This inventory redundancy strategy meant they could endure all disruptions with essentially being completely unaffected from the disruptions in supply chains. But the inventory redundancy strategy did not work for KAMA. They only produce 12-20 machines of their main type a year, and they also had a stock-controlled procurement strategy at the start of the pandemic. However,

as they are a machine manufacturer without being vertically integrated and offering services, apart from their product related services, as a second income source, the ratio of materials to total output should be much higher as it was at Creavac. As their sales shifted, they were in financial distress, where the tied-up capital in stocks did not make it any easier. Because of this, they switched to a procurement strategy based on customer orders which again in turn led them to reshore their sourcing as they had to rely on fast and reliable delivery. The nature of business also helped Yordas during the crises. They engage in supporting other companies in their import and export practices in complying with chemical regulations, categorising chemical products and advising on requirements, hazard communication and on sustainability strategies as well as chemicals management. This means that importing and exporting firms need their services to be able to further pursue their foreign business which means they provide a necessary service that cannot be exchanged if they want to keep exporting or importing. This also means that it gives them the opportunity to broadly diversify their customer base over nearly all consumer goods industries. This is why they did not experience any significant negative impact, rather they experienced a demand growth. Creavac's industry as vacuum coaters also helped them in broadly diversifying their customer base as the range of industries that need metal coated plastic parts is very broad. Queo's industry in which they are working greatly helped them in adapting to the pandemic as the software industry is always changing and through this, the change ready culture helped them to adapt without great difficulties.

This influence of the nature of business on nearly every aspect of proactive mitigation strategies, the impacts external shocks have on them and the reactive strategies could be due to the context it provides. It defines the core characteristics, the resources and thus the constraints of a firm and thus provides a frame to how a firm operates. Its size could give a financial and resource frame which limit to what extent a firm can strategize. It also can give a frame to how the inventory strategy could be shaped and how diversified the sourcing could be. The products

and the industry could determine the gravity of certain impacts on a firm, especially by impacts on demand. These two could also give a frame to how diversified a firm's customer base can be. Also, when looking at the nature of a firm, it seems that some strategies could be predicted as a frame of feasible strategies is established.

Several important theories prove the influence of the nature of business on the strategies of firms. One of them is the Uppsala Internationalisation Process Model which states that a firm chooses its international market entry modes by analysing costs and risks based on market characteristics and their own resources and through this their nature of business (Johanson & Vahlne, 2009). Dunning's eclectic paradigm is another theory that incorporates the nature of business through its competitive advantage in their decision why and how firms internationalise (Stoian & Filippaios, 2008).

These widely accepted theories agree with the results in that the nature of the business matters greatly for strategizing. This suggests that through the analysis of a business' nature, one can determine how severe the impacts of a shock could be and how the frame, in which a firm could strategize and mitigate disruptions both proactively and reactively, could look like. Thus, it is proposed:

Proposition 8a: An SME in the GVC's proactive and reactive mitigation strategies can be predicted by analysing the nature of business.

Contrary, this means that for SMEs, it could make sense to analyse and clearly state everything in the nature of the business in order to estimate the impacts of different disruptions. This could help in drawing up a frame of strategies that could be taken. This analysis could greatly improve the self-awareness of businesses, help in drawing up future strategies and also improve contingency planning which would mean:

Proposition 8b: SMEs in the GVC that are aware of their nature of business strategize more effectively against crises than other firms.

5.9. Interdependent Strategies

The cases showed that no strategy works alone. There always has to be an interplay of different strategies, factors and elements for an SME to be able to get through a crisis well. Three out of the four interviewees on the supply chain side had a multi supplier strategy in place which worked well for most of them as they could rely on backup suppliers if they needed them. But one of the firms only had a single sourcing strategy in place which proved to be difficult to uphold in the state that the supply chain was at the start of the pandemic. The single supplier strategy is due to the nature of their business as they only sell low quantities per year and splitting the orders would result in no purchasing volume anymore. They originally had a strategy with stock levels but due to sales shifts, they had to swap it for a strategy based on customer orders. This required fast delivery times. Because the single sourcing strategy did not work as a lot of the suppliers were located in Asia and the production as well as the transportation was severely disturbed, they had to choose a mixture of other strategies to accompany this strategy. Again, due to the low quantities of machines sold, the disturbed suppliers were not that big of an issue as the low quantities could be provided even with a supply shortage. They tried to mitigate the flaws and the vulnerability of the single sourcing strategy by reshoring their supply chain firstly to Europe and then again, due to the Ukraine crisis, to Germany. Additionally, they engaged in intensive supplier collaboration through information sharing and collaborative planning, including forecasts as well as production and raw material releases, and cooperation through helping the single supplier if it is in need to assure a steady supply and finding partnerships and networks which can work together to assure a cheaper price and timelier delivery. This collaboration was supported by digitalisation which makes the process more efficient and transparent. Through this interplay of different strategies, they could upkeep their operations and have come out of the crises stronger than before. This shows the interplay of inventory redundancy, supplier diversification, collaboration and

digitalisation in the context and frame of the nature of the business. On the sales side, they work with a diversification strategy through a large worldwide network of distributors which was then altered through a human resource management strategy as the firm was reorganised and with it the sales and also the sales network is transformed. This included another diversification strategy of targeting other customer segments as well as a collaboration strategy by engaging more with customers and also sales partners. As sales were difficult to achieve, they had to engage in price strategies to increase sales numbers. So, the interplay of diversification, human resource management, collaboration as well as price strategies can be seen here.

Tricera engaged in a multi-supplier strategy which they set up both in Germany, in European countries as well as in Asia. They collaborated proactively by closing long-term supplier agreements with the suppliers whose products fit the best. Through disruptions at the suppliers and in transportation they diversified their suppliers geographically through reshoring to Europe and increasing the numbers of suppliers as well as engaged in contingency planning by trying to mitigate disruptions that are caused by transport disruptions from transport from Asian countries with more buffer time and legal security measures. When further disruptions occurred, they cooperated with suppliers and tried to achieve the best mutual solution as well as cooperate with logistics company to mitigate disruptions in transportation from Asian countries. This shows the interplay of supplier diversification, contingency planning and collaboration.

Creavac's main strategy on the supply chain side was an inventory redundancy strategy paired with a multi supplier strategy that was geographically diversified. Their inventory redundancy strategy worked as they could live off stocks during the disruptions. But the strategy is expensive and ties up capital. This is why the multi-supplier strategy, the inventory redundancy strategy and the collaboration strategy work together by giving them the opportunity to source without time pressure in order to wait for the cheapest price at one of the suppliers, from which the supplier with the framework agreement is a safe option with a stable price to back upon.

This also shows the interplay of inventory redundancy, diversification and collaboration strategies. In sales, Creavac's primary strategy is a diversification strategy which was paired with a collaboration strategy by working and planning together closely with customers during the crises.

Veldener practises a multi sourcing strategy with all suppliers being in Europe which led to lower delivery time. As the crises happened, they engaged in a collaboration strategy to have visibility over the transportation and to be responsive.

Yordas' main strategy was diversification of the customer base which they could keep up through digitalising their services. To stay in connection with the customers they paired communication with digitalisation as they to increase customer collaboration by enhancing the way to communicate. Also, they engaged in strategic planning activities with contingency planning showing the interplay of diversification, digitalisation, collaboration and strategic planning.

Queo was widely diversified in customer sectors, had a change ready culture and planned strategically for different disruptions. Their customer diversification caused customer collaboration challenges which they tried to mitigate through human resource management. As sales went down, they engaged in collaboration with other companies to form partnerships to gain access to new projects through an increased range of joint capabilities. The interplay of diversification, human resource management, strategic planning and collaboration can be seen from this case.

This interdependence could be accounted to the complexity of the business environment, e.g. factors like the nature of business, the market environment, the new environment due to an external shock, the competition, and that one strategy alone often cannot achieve desired outcomes. Thus, it seems there is a need for several strategies to be combined in order to optimise the functioning of one or several core strategies to mitigate problems or imperfections

that arise due to the implementation of a new strategy. Also, some strategies might be too expensive to pursue on its own, so other strategies have to be implemented to support the expensive strategies to make sure the goal is reached within the resource constraints of a firm. Another feature could be that strategies influence different factors over time which means other strategies have to be adapted to account for the change over time. Thus, different strategies need to be balanced in order to ensure an effective as well as efficient mitigation of disruptions.

There seem to be some core strategies and some strategies that act as support for the core strategies. Core supply chain strategies in the cases have been supplier diversification, both in terms of numbers and in terms of geography and an inventory redundancy strategy with stockpiling. The other strategies, so collaboration, strategic planning, digitalisation and human resource management seem to be supporting strategies to optimise core strategies or to eliminate flaws of the core strategy. In sales, the core strategy seems to be diversification in terms of customer segments. The supporting strategies are inventory redundancy, strategic planning, human resource management, collaboration, price strategy and digitalisation. It stands out, that core strategies only seem to be proactive strategies which are altered reactively and are supported both proactively as well as through reactive adaptations of proactive strategies and the implementation of new strategies. This could be due to core strategies being long-term strategies around which a firm builds its other strategies. Only having one core strategy could mean that firms want to pursue one strategy whole-heartedly of which it thinks yields the best results. It could also be due to the incompatibility of two core strategies for the supply chain side or for the sales side as two strategies that are deemed the main strategy could lead to conflicts which strategy should be prioritised if a decision has to be made. This scenario would be beneficial for one and detrimental to the other core strategy. Following two core strategies could also be too expensive and too hard to coordinate, especially for SMEs with their limited resources.

Complementing strategies are pursued in times of crisis when they provide each other with additional value. This is done by one core strategy that was pursued proactively and new strategies that complement the core strategy (Katsaliaki et al., 2022; Tomlin, 2006; Zhu & Sardana, 2020). They can be complementary both as only proactive strategies, as only reactive strategies and as proactive and reactive strategies (Katsaliaki et al., 2022; Zhu & Sardana, 2020).

This suggests that strategies are often interdependent and should be planned and managed holistically taking all strategies and the nature of business into account when implementing one strategy. Firms should engage in one strategy and build the other strategies in support around the core strategy to balance out flaws and risks. One could conclude that a firm that wants to alter or implement a strategy should first consider all other aspects and strategies of the firm to see which other strategies have to be implemented or adapted in order for the new strategy and the holistic set of strategies to still work. This could work proactively to protect one strategy from potential impacts of shocks or reactively through firms adapting strategies to complement their other strategies in the new environment. This should mean that firms that adapt their strategies proactively to complement each other mitigate risks more effectively and firms that adapt their strategies reactively to fit the new environment can better recover from shocks. This leads to following propositions:

Proposition 9a: SMEs in the GVC that engage in strategic complementarity proactively mitigate risks better than other firms.

Proposition 9b: SMEs in the GVC that engage in strategic complementarity reactively can better recover from external shocks than other firms.

5.10. Short-term and Long-term Strategies

All the proactive strategies are long-term strategies whereas the reactive strategies can be split into short-term and long-term strategies. But also here, it shows that most reactive strategies that were performed turned out to be long-term strategies, although some strategies also were used only in the short-term. These short-term strategies seem to be collaboration strategies and price strategies in particular. These short-term collaboration and price strategies seem to require substantially less resource commitment than all the long-term strategies. This could be due to SMEs having limited resources which they may not want to commit to expensive short-term strategies that will not be of service in the future. On the contrary, it could be that they only want to commit substantial resources to strategies that benefit them in the long-term. Another explanation of the prevalence of long-term strategies could be that most SMEs are also newer and they have not experienced severe disruptions before meaning they had no experience in how resilient their business is in the face of a real disruption. This could be why they engaged in more long-term strategies as they are still not rigid in which strategies they engage in and thus, the crises could have revealed their weak spots which they now tried to cover up and form their new long-term strategies around what they believe, after the crises, is the right set of strategies for their business making them resilient and efficient for future scenarios. This would mean, that severe crises lead to large organisational changes in short periods if time for SMEs that are newer and unexperienced.

Literature suggests that disaster readiness increases with past disaster experiences (Oetzel & Oh, 2021). Thus, the mitigation strategies of SMEs could not be in place at the time of the occurrence of a crisis. The punctuated equilibrium paradigm suggests that firms go through a long period of stability with only incremental change and once in a while engage in radical change. This radical change can be triggered by crises when the old strategies do not perform as well as before (Gersick, 1991; Plowman et al., 2007).

This suggests that the saying “what doesn’t kill you makes you stronger” could be true in the context of SMEs in the face of external shocks and that SMEs engage in significantly more drastic change during shocks and crises than in normal times to make the firm more resilient as the risk mitigation strategies can be better judged during an actual crisis. It also suggests that a crisis may be the best time for SMEs to find which strategies work, which should be abandoned, and which strategies could be adopted in order to make an SME more resilient. This suggests that SMEs are going through radical change in a smaller time frame during crises than in normal times. Thus, it is proposed:

Proposition 10: SMEs in GVCs are more likely to go through a short period of radical change during crises than in normal times.

5.11. Supply Chain and Sales Strategies

Supply chain strategies and sales strategies did not seem that closely related in the interviews. Nonetheless, there are some interplays which have to be taken into account when strategizing both for supply chains and sales. An inventory redundancy strategy like Creavac used, can lead to the company still being able to deliver in sales whereas many of their competitors could not deliver due to them being stocked out. Another, more intertwined example is that of Tricera who experience problems over different projects which had to do with the delay of delivery on their end causing payment delay which in turn causes cash flow and liquidity issues causing delays in procuring further materials for other projects delaying this other project as well.

Whenever you delay delivery then it delays the commissioning of the project. And then it delays the payment and then when the payment is delayed, you have a lower cash flow and so then you cannot buy something more for other projects. And when you cannot buy for other projects, then the project is also delayed (Tricera, AT).

Illiquidity was also a challenge for KAMA where shifts in sales as well as their inventory strategy with high stocks caused financial distress which in turn led to them changing their

inventory strategy and thus also their supplier diversification and supplier collaboration strategy.

It seems to be that the strategies lead to certain impacts that are amplified by a crisis which in turn lead to challenges that have to be resolved in a joint effort on the supply chain and the sales side. But it seems that also beneficial strategies could spill over from one side to the other. This suggests that not only the strategies on one side have to be taken into account holistically, but rather also the strategies of other parts of the organisation need to be taken into account when implementing another strategy.

This suggests again that a firm that wants to implement a strategy should holistically look at which strategies are already present, which impacts the new strategy would have on other strategies and thus, how a holistic mix of effective and efficient strategies should look like. This approach could also be useful when engaging in contingency planning as with this holistic approach, impacts of different crises on different parts and strategies of an organisation could be better understood and thus, plans should be made better. Thus, the data suggests that a firm that strategizes their supply chain and sales strategies holistically can better mitigate external shocks and better react to external shocks which in turn means it is impacted less and recovers quicker. This leads to the following proposition:

Proposition II: SMEs in GVCs that plan their supply chain and sales strategies holistically are impacted less by external shocks and recover quicker from them.

5.12. A resilient Set of Strategies

The best strategy for an SME within the GVC depends on its nature of business. So, there is no one-size-fits-all approach. But a promising set of strategies seems to be having a supplier diversification strategy with multiple suppliers that are geographically spread, with cheap suppliers in Asia and European suppliers that can react and deliver quickly, as a core strategy, that is supported by having a reasonable amount of inventory stock that does not lead to liquidity

challenges but that can ensure the company could live off stocks during the first impacts of a crisis and to bridge a possible supply shortage. Proactively ensuring a good supplier relationship and having framework agreements with the most important suppliers for a good portion of the materials, but not for everything to ensure flexibility, can help in being favoured in delivery as well as in securing prices. A reactive supplier diversification to move to areas which are not affected or not as badly affected, building up stocks at the start of the crisis in order to live off them during disruptions, collaborating with the different suppliers through close communication, keeping updated, collaboratively planning in case of a disruption, helping suppliers and forming partnerships in order to ensure business and supply chain continuity could be a good way of reacting to a crisis and to support the core strategy. Supporting the supplier collaboration through digitalising the supply chain to ensure visibility for a quick responsiveness and easier communication could lead to an even better outcome. Strategically planning business practices in the new environment could mitigate future uncertainties. This set of strategies could be the best way to tackle a crisis on the supply chain side.

On the sales side, a set of strategies that has customer diversification in terms of geographic and also sector diversification as its core strategy seems promising. Supporting this core strategy could be ensuring a change ready culture as well as a good change management, keeping good customer and partner relationships and having a proactive sales approach with a high market presence. Reactively, diversifying in terms of segments could be a way to ensure decreasing demand is mitigated, supporting the employees through the environment and market change could ensure a smooth continuing of the own operations, adapting the products to suit the needs of the crisis, if necessary, could ensure even an increase in demand. Collaboration through cooperation customers through planning jointly through the crisis and with similar firms to share knowledge of how to best tackle the crisis and to form partnerships to increase the opportunities of sales could help with the diversification of customers. Again, digitalisation

could aid in supporting collaboration and strategic planning could help in taking away future uncertainty. The price strategy could be adapted according to the market situation. These sets of strategies for the supply chain and the sales side could lead to a smooth survival of a crisis, but of course, it should always be decided on the individual case and upon taking into account the nature of business, the industry, the market situation, the nature of the crisis and all other factors that could affect the business environment.

5.13. Implications

This study has several implications for SME managers and researchers. For SME managers, the results highlight the critical need for both proactive and reactive strategies in order to mitigate external shocks through building up resilience both in the GVC and their own firm. It also shows the importance of implementing complementary strategies in order to achieve the most with the given nature of the business. Firms that implement complementary mitigation strategies are impacted less by external shocks and recover quicker from them. This approach can lead to increased resilience and thus to a better opportunity to survive a severe external shock.

In terms of future research, these findings show how German SMEs in GVCs handle external shocks on the supply chain and the sales side as well as how different types of shocks influence different types of SMEs, both in manufacturing as well as in service industries. Thus, it extends the already existing knowledge by providing data and new qualitative insights into the strategizing of German firms over several crises.

5.14. Limitations

Although this study provides valuable insights into the reactions of SMEs within the GVC to external shocks, it is important to recognise that the findings are not generalisable to all SMEs within GVCs. This is primarily due to the limited sample size of six interviewed firms, the

qualitative nature of the research, which means it lacks statistical inferences, and the focus on SMEs in Germany, with the exception of one British firm, where the interviewee however was the Managing Director EMEA which sits in Germany. As the study was based on semi-structured interviews with only six interviewees, the results reflect the perspectives and experiences of these interviewees and their firms and may not represent all perspectives and experiences across other SMEs within the GVC. The access to further data proved also difficult as many possible interview partners declined the request or did not answer.

5.15. Future Research

Future research involving a larger and more diverse sample in different countries and regions could broaden and complement the findings of this study. A larger sample size or quantitative methods would be needed to increase the generalisability of the findings. Future qualitative research could focus more on the interplay of different strategies to gain a holistic picture and understanding of how firms combine different strategies to mitigate external shocks and crises. Longitudinal case studies of SMEs and their strategies could reveal new insights in how SMEs are keeping their long-term reactive strategies and if they continue to build up resilience in the expectation of a new external shock or if they rather focus on other organisational goals and neglect crisis preparedness. For a generalisability of the results of this study, the models and propositions could be tested quantitatively in case of a new external shock. A last research suggestion would be to study which sets of different strategies are used by MNEs in the GVC and how the different strategies are combined with each other to get a clearer understanding of the interplay of different mitigation strategies.

6. Conclusion

SMEs within the GVC handle the impacts on their supply chain and the sales side caused by unforeseen external shocks by engaging in a mix of proactive and reactive strategies, that

contain elements of supplier and customer diversification, inventory redundancy, collaboration, strategic planning, human resource management, digitalisation and price strategy. The most important strategies are proactive and reactive supplier diversification, proactive and reactive collaboration, proactive customer diversification and proactive and reactive inventory redundancy. The strategies are planned complementarily with supporting strategies supporting the core strategy which is often diversification, and holistically in combining supply chain and sales strategies with each other.

This master thesis provides critical insights into the risk mitigation strategies, both proactive and reactive, of SMEs within the GVC by providing one grounded model on the supply chain side and one on the sales side. The findings suggest that SMEs that are engaging in diversification, inventory redundancy, collaboration, strategic planning, human resource management, digitalisation and price strategies are more resilient to external shocks. Furthermore, it suggests that the relationships among different strategies have a great influence on how crises are mitigated. This supports existing literature and extends it by providing additional evidence.

The results also offer valuable guidance for SME managers seeking strategies for mitigating external shocks proactively and reactively.

In the last 15 years, the world economy was hit by various crises after a long period of hyperglobalisation. With the war between Ukraine and Russia still continuing with no end in sight, the Israel-Hamas war still ongoing, the climate crisis and the many natural disasters it brings along as well as the political tensions between the US and China, the West and Russia and other protectionist behaviour, it seems that one cannot expect a near end to the period of slowbalisation and that the world economy, and along with it the SMEs in the GVC, will have to endure further external shocks, although they hopefully might not be as severe as the past Covid-19 pandemic. This means, the trend for firms of building resilience instead of looking

for low cost and efficiency seems to continue over the next years which means that SMEs in the GVC should build up further resilience.

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Appendix

Interview Creavac; Peter Rudolph (PR)

Jakob Thomas Stigler

Let's start with you. You are a member of the management team in the commercial area and in sales, which means you are responsible for sales. And also for purchasing or just for sales?

Peter Rudolph

You mean in relation to the Creavac? Yes, that's just one of my hobbies. I actually work for this Servind holding company. We have various industrial companies that we own and in which we have a stake. They are spread across Germany, the Czech Republic, Slovakia, Italy, Thailand and Taiwan. And that's why Creavac is such a hobby of mine. That's right, I'm responsible for sales and purchasing at Creavac.

Jakob Thomas Stigler

Okay, very interesting, then you are a very busy man in any case. OK, let's start with 2 general questions. Creavac, how many employees does Creavac have?

Peter Rudolph

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Jakob Thomas Stigler

OK, and is it in foreign ownership?

Peter Rudolph

No.

Jakob Thomas Stigler

OK, and does Creavac own parts of foreign companies?

Peter Rudolph

No.

Jakob Thomas Stigler

OK good, then I would say let's start with procurement. Do you have suppliers from abroad and if so, can you briefly describe them? How big are they, do they operate internationally, where are they located geographically? Something like that.

Peter Rudolph

Yes, we have. Well, we buy metals and raw materials specifically for Creavac. We are vacuum coaters, which means that we coat plastic parts with metal layers, which is usually copper, chrome or aluminium, so we buy the raw materials in Asia, China and South Korea. We also use tungsten coils for our technology, as we work a lot with resistance evaporators, which we design ourselves and then also buy in from Korea, and in some cases from India. So India, China and Korea are actually the markets where we procure these raw materials.

Jakob Thomas Stigler

OK, what about your machines? Well, you make your own vacuum coating machines, but surely you also need machines to manufacture them. Where are they made?

Peter Rudolph

It all comes from Germany.

Jakob Thomas Stigler

OK. What proportion of your raw materials and inputs do you procure internationally?

Peter Rudolph

Yes, you have to separate that out a bit. If we look at our production now, we actually have 2, so that's not true, I have to add that some of the plastic parts also come from China. Sometimes we buy them ourselves, but often they are also provided. I have no influence on the delivery, but they are still produced in China. But we also have customers like Siemens, for example, where we buy the raw parts from China. If we look at it that way, materials make up around 20% of the total output, about half of which we buy in Asia. Both plastic parts and somehow evaporator materials, i.e. copper, nickel, chrome and aluminium.

Jakob Thomas Stigler

OK, interesting. What is your supply strategy? So do you only have one supplier strategy per raw material or do you have two or more?

Peter Rudolph

Nope, that's always a backup. So we usually have between 2 and 5 suppliers, I would say as an average, which we then select according to price, delivery performance or readiness to deliver or delivery time.

Jakob Thomas Stigler

Mhm, do you have framework agreements or is it per order?

Peter Rudolph

We conclude framework agreements for certain suppliers. These are usually put out to tender every two years and then the framework agreements are concluded.

Jakob Thomas Stigler

OK, then I would say let's get straight to the crises. How has corona and the Ukraine crisis affected your supply chain, i.e. Germany and the international supply chain in particular?

Peter Rudolph

Yes, strictly speaking not at all. So, Ukraine. Not even Corona in that respect. We are relatively conservative, which means we have stock levels. From a business perspective, it's always a two-pronged sword. However, since we are not talking about huge volumes in relation to our turnover, especially for copper or the critical components that we buy in Asia, we had an average stock level of around 6 months before the crisis, and we then built it up to 12 - 18 months during the crisis, depending on which material we are talking about, so that corona has not disturbed us at all in the supply chains. So it hasn't had any impact on us at all, except of course that we had higher stocks. But otherwise, in terms of our delivery performance, it has had no impact at all. As I said, the only influence, which could also be a negative one, was that we had a relatively large amount of tied-up capital in the form of stock, but that wasn't all that important for us. In contrast to other potential competitors, we were always able to deliver in full, and that was more important than the amount of capital tied up in stock.

Jakob Thomas Stigler

Yes, but not only capital commitment, so that means that you didn't have a problem with your suppliers' ability to deliver because of your high stock levels? You had no transport problems? And the prices? What did that look like?

Peter Rudolph

They were also favourable for us because we had built up the stock at the beginning, so that we were ultimately cheaper on average than at peak times due to the crisis. So we didn't experience any of this turbulence, which also affected precious metals in particular. But a material that we actually buy in Germany, we make heat protection visors or infrared reflectors that are then coated with gold, of course we don't have a 6-month supply because that's expensive. We are talking about a 6-week supply, but we have actually doubled our stocks in this area. But gold is a different issue. It has less to do with supply chains. So if we're talking about supply chains and influence prices etc., then it's most likely to affect copper.

Jakob Thomas Stigler

OK, that also means that you were affected so little because you also have such low unit numbers, if I've understood that correctly.

Peter Rudolph

That's right, so let's say our value added ratio, i.e. the gross profit ratio compared to turnover, which describes the use of materials, is actually lower for us than in other areas. That's why it was no problem at all for us to stockpile for 12 or 18 months. Yes, so if you naturally only have a low gross profit ratio and therefore relatively low added value in the company, then you simply can't pursue this strategy.

Jakob Thomas Stigler

Yes, that's right, that's right. OK, very interesting. Have you changed your supplier relationships in any way, or have you had to fall back on your alternative suppliers that you didn't actually want to use?

Peter Rudolph

No. Not really.

Jakob Thomas Stigler

Not bad, but doesn't that mean more intensive support, more intensive communication?

Peter Rudolph

No

Jakob Thomas Stigler

OK, respect, you're the first I've heard, not bad.

Peter Rudolph

Yes, but it has to be said that, as we have a relatively high value-added ratio in the company, the issue of raw material procurement or the whole issue of purchasing is far less relevant in this area. Of course, if you have an 80% cost of goods sold, then the issue is completely different and you have to develop a different strategy. We haven't actually put that much brainpower into it, because it doesn't really matter and the decisive factor for us was ensuring our ability to deliver. For us, this also has something to do with production organisation, which is why we always have relatively high stock levels per se, because this gives us the opportunity to flexibly

organise our production ourselves. As I said, we are only representative to a limited extent. So for companies that have a high value-added ratio, the issue is actually far less critical. Of course, you could also say that I want to optimise my stock levels, I want to optimise my supply chain. Of course, this is certainly an issue in terms of liquidity and capital commitment. The problem is that if you optimise this, of course, you are extremely susceptible to any disruptions in the supply chain. As we are not a group and do not pay people to optimise our supply chain in the sense that it becomes extremely vulnerable, and we have seen with many that these optimised supply chains that run globally are extremely vulnerable to any kind of disruption. As I said, this is not really relevant for us due to the high level of vertical integration in the company. We then simply buffer this via the warehouse and the issue is over for us.

Jakob Thomas Stigler

Mhm OK, that means that apart from the increase in stocks, you didn't have to react to the problems.

Peter Rudolph

No. Other things, such as production restrictions due to corona measures, etc., have moved us far more than the issue of the corresponding procurement markets.

Jakob Thomas Stigler

OK yes, I'm happy to believe that.

Peter Rudolph

In this respect, corona has not affected us at all. We were in a position to grow relatively strongly because we were able to deliver extremely well, even during the coronavirus period, and it

didn't really have any impact on us in terms of procurement. Of course, we didn't experience every peak and every price drop on the market. That's just the way it is. You also commit to the price if you put it in stock accordingly, although due to the low material usage rate that we have in this area, the fluctuations are also negligible in terms of the end product, so this was not a point where we said we had to work on it in more detail.

Jakob Thomas Stigler

OK, that means you didn't have any problems during the Ukraine crisis either, because you source so much from Asia.

Peter Rudolph

Ukraine has of course had an impact, not so much on the procurement market in the broadest sense, but of course on energy prices. Of course, this is also a huge issue for us, but if you take it as a separate topic, purely in terms of the procurement of materials and raw materials or parts, the Ukraine crisis had no influence either.

Jakob Thomas Stigler

Not bad, not bad. In other words, if I now ask how the measures and strategies have worked, you say that the increase in stocks has worked well, right?

Peter Rudolph

Perfect.

Jakob Thomas Stigler

OK, very good. Perhaps you had implemented something before the crises that made the effects easier? You are probably saying now that you have such high stock levels.

Peter Rudolph

Yes, let's put it this way, before the crisis there was already the issue of how to tie myself to suppliers, framework agreements. We have never done it in such a way that we have now covered supply contracts, framework agreements to one hundred per cent capacity. We never did that. So there were always at least two suppliers, which were usually split geographically. So when we talk about raw materials, it was India, China and South Korea, either 3 or 2, so we never made ourselves dependent on one supplier or one regional market. That is also our basic philosophy. We are relatively diversified in both sales and purchasing. This means that we are not dependent on suppliers or customers. This is certainly more difficult in terms of Marshall optimisation. But we are relatively conservative. This means that we consider risk or risk minimisation, both in sales and in purchasing, to be at least as important as the corresponding prices. In case of doubt, more important than that. So if you like, we are actually traditional and always keep an eye on it or make sure that we are diversified in purchasing, that a failure in certain regions only affects us to a limited extent or, in the best case, not at all.

Jakob Thomas Stigler

OK, very interesting. And did you notice any differences between German and international or Asian suppliers during the crises?

Peter Rudolph

Well, when we talk about raw materials or certain parts, we have of course also seen in Germany that our suppliers have endeavoured to build up stocks accordingly. Some were relatively late,

so that they were temporarily unable to deliver, but overall it was the case that our Asian suppliers, we can't judge it in case of doubt, because we procured little at the time and lived off the stocks. But what we do know is that there were also delivery problems with the Asians, logistical problems, and availability was a huge issue with European suppliers because they simply didn't have them in stock. That was also the case at the beginning, when you talk about a Siemens control system, the hardware had a delivery time of 52 weeks at peak times. We were also able to work around this in this area. So I can't back it up with figures, but from what we know from conversations, there were delivery problems both in Asia and subsequently also in Europe.

Jakob Thomas Stigler

OK. So, what have you learnt from the crises for purchasing? And will you do anything differently in the future?

Peter Rudolph

Well, that's actually the case. It's relatively simple for us. Stock range is simply an issue. So what we do is what we didn't do during the crisis because it wasn't possible due to the supply situation, but otherwise we look at what our stock levels look like, what ranges do we have? We have defined minimum ranges in the individual raw materials so that we can use the time to see where we can now buy and how we can do so without time pressure. And then continue to stockpile accordingly, so we are now trying to prioritise the issue of prices again, but we still have a minimum stock level or stock range of one year between 8 and 12 months, which has of course now fallen a little in order to be able to take advantage of price effects when they occur. So we can buy on the spot market, buy in. So our procurement strategy is now somewhat more diversified. Due to the fact that we have a relatively high stock level, we have no time pressure.

This means that we can take our time and negotiate things accordingly or take advantage of setbacks in precious metals to buy at favourable prices.

Jakob Thomas Stigler

Does this mean that you also want to buy cheap when they are cheap and run up stocks?

Peter Rudolph

Exactly, exactly. So we don't have a just-in-time policy for our raw materials. Markets are simply too volatile for that and the risk is too great for us. This means that we have a certain base of 8 to 12 months, which we have in stock anyway, and then we can optimise the price if there are one or two days when there are setbacks on the commodity markets.

Jakob Thomas Stigler

OK, very interesting. Then I would say let's move on to distribution. Same game as before. Do you have international customers? I'm sure you do. If so, can you briefly describe them? Where are they? How big are they? Just describe them briefly.

Peter Rudolph

Yes, I think 3M will tell you something, they are one of our biggest customers for heat protection visors. Honeywell Safety Systems too. That goes to the USA, Mexico and Australia. Otherwise, we supply the automotive industry. That goes to the tier one suppliers. Grupo Antolin, Continental, Hella. In this area, it goes very strongly into the defence sector, Theon, Rheinmetall. Yes, these are also international customers. So there are parts where we deliver to suppliers or directly to the end customer.

Jakob Thomas Stigler

What proportion of your products would you say you export and what proportion do you supply to German but international customers?

Peter Rudolph

You mean companies that have their headquarters in Germany, such as Siemens, which we supply internationally? Would you count them out there?

Jakob Thomas Stigler

I would include them in the international ones, too, with something like Conti, which is simply part of the global value chain.

Peter Rudolph

Yes, 60% export.

Jakob Thomas Stigler

Mhm, OK. And direct export abroad, like to Mexico or the USA, as you mentioned earlier.

Peter Rudolph

Yes, that's roughly between 30 and 40 per cent, so it's already a large proportion.

Jakob Thomas Stigler

Mhm OK. So, same game. How have the crises affected exports and sales to your international customers?

Peter Rudolph

Well, our customers or many of our customers reacted in exactly the same way as we did. In other words, we have relatively high volumes and we also worked with consignment warehouses, for example at Siemens. We also manufacture products for critical infrastructure, which means that they suddenly exploded at the beginning of the coronavirus crisis. Our customers reacted in the same way as we did, building up stocks. So we actually got through the coronavirus crisis relatively relaxed on the sales side.

Jakob Thomas Stigler

That means you even had increased sales? Increased a lot, right?

Peter Rudolph

Yes, we're already in double figures, so somewhere in the region of 12% or so.

Jakob Thomas Stigler

Oh, that's quite something. And have your customer relationships changed as a result? So there was more contact?

Peter Rudolph

In the beginning, at least to some extent, there was more need for discussion and team meetings regarding supply chains and increasing the number of units. In the beginning, it was actually characterised by the fact that we had a lot of discussions about production capacities, how can we increase what, what do we have to produce in what period of time, et cetera, these were actually the topics. So it was essentially about the capacities that we were building up or that

we had available for certain product lines. I think Siemens got involved very quickly in March, when the full extent was not yet clear, and they pushed us extremely hard. There are figures relating to stockpiling, for us, for Siemens, et cetera. That was actually the beginning and it actually went on for two years. So the main discussion we had with our customers was capacities, capacities, capacities.

Jakob Thomas Stigler

OK, not bad. How did you react to the crises? You mentioned earlier that you have diversified a lot, including in sales.

Peter Rudolph

So the crisis in particular had no influence at all. Corona and Ukraine had no influence at all, because we actually decided that in 2017, we were already dependent on the automotive sector and we have consistently pushed that back. There is currently no customer that accounts for more than 5%. There is no sector that is more than 10% dependent. In principle, however, this is our business policy regardless of the crisis, so neither coronavirus nor Ukraine had any influence on our strategic direction in sales.

Jakob Thomas Stigler

OK, but does that mean not only sector-specific diversification, but also geographical diversification?

Peter Rudolph

Well, geographically within the framework of what makes sense for us. That means Europe, the USA and a bit of South East Asia and Australia. Relatively little in Eastern Europe, which is

growing, especially for Ukraine. But otherwise we are in the three major economic areas, with Europe being the largest single market.

Jakob Thomas Stigler

OK. Have you implemented any other precautions, other practices that made it easier or even helped significantly before, so now like diversification, that will probably have helped you a lot.

Peter Rudolph

Yes, diversification was independent of the crisis situations, we did it beforehand. From 2017 in particular, we were actually through with the topic of diversification in 2020 and that got us through these two crises very solidly, otherwise we didn't do anything else. As I said, diversification was actually what we focused on in purchasing and sales and what we had implemented anyway, regardless of the crises.

Jakob Thomas Stigler

OK, yes well, and I guess the high stock levels have of course also helped the ability to deliver, yes.

Peter Rudolph

Extremely yes.

Jakob Thomas Stigler

Okay then, have you noticed any differences between German and European or American or Southeast Asian customers?

Peter Rudolph

Well, what you can say is that German and European customers have reacted in a similar way, although there are a few small differences. They reacted very sensitively to the issue of availability of production capacities, securing unit capacities, and that was the reaction that came first from Germany, from our European customers, who reacted very sensitively. The issue came much later from the Asians and the Americans. That came later too. But somehow people in Europe were more sensitised to the issue, at least in our sectors. So it concerns cars, it concerns power plants, i.e. infrastructure, and it concerns defence, i.e. the military. Yes, they were extremely sensitive to the issue. Relatively soon after the start. In Asia, people were somehow a little more relaxed about it all, and in the USA too.

Jakob Thomas Stigler

OK, interesting. Have you learnt anything from this? Do you want to do something different in the future? Did you feel vindicated in what they are doing?

Peter Rudolph

So in the end, I have to say corona was really good for us. No, all in all, the crisis has actually confirmed that. Diversification is just when you can do it, not every company can do it, but diversification is a very solid tool for preventing crises in all areas. And we will continue to do so in the future. So we won't reinvent it, but we will also analyse industry dependencies in relation to our products, create correlations, correlate industries in sales trends that seem to have nothing to do with each other. But we have done this before, we are doing it now, and we are strategically trying to move into sectors that have little correlation with each other in terms of crises, sales and price trends, so that we are as broadly diversified as possible. However, this is

a realisation that we have perhaps made a little more stringent since coronavirus. We are really looking at correlations over time in terms of sectors. Not just saying that they don't have any dependencies, but also trying to substantiate this mathematically with our data. But in principle, dependencies are always difficult. Incidentally, this applies to all areas. It affects capital, distribution, sales, everything really. That's the basic principle we follow. And it has certainly proved its worth. It perhaps has the disadvantage that you don't generate huge growth rates in boom times. We don't really want to do that either, but we want to grow at a reasonable rate. We don't want to grow explosively, we can't do that either. This also has something to do with the issue of capital. We are partly equity-financed. You can also consider that. Of course, I don't utilise any leverage effects there, which I can of course generate with a sensible use of debt capital. But we don't want to. So, as I said, stable, solid growth, even if it is somewhat smaller, and that through diversification in most areas where it is possible.

Jakob Thomas Stigler

OK, that certainly sounds sensible. Diversification will also be a big part of my work, so it's very interesting to hear you break it down again. Exactly, and then we're actually through. Then I have to ask you, may I mention you and Creavac by name or should I anonymise you?

Peter Rudolph

You may.

Jakob Thomas Stigler

I may. All right. Thank you very, very much. Then we're through.

Peter Rudolph

Great, Mr Stigler, then I wish you all the best and every success in completing your work. Are you defending in Italy?

Jakob Thomas Stigler

I defend in Italy, exactly.

Peter Rudolph

Do it in Italian, don't you?

Jakob Thomas Stigler

No, I've learnt a bit of Italian, but it doesn't go that far. Fortunately, my degree is in English and I will write it in English and also defend it in English. I would just send you the paper, I would say. OK, sure, I'll do it. Of course, I wish you every success for the future. Good luck with your diversification activities and I hope that your growth continues to work out so well in the future.

Peter Rudolph

We'll do our best, Mr Stigler. Yes. OK then, good luck to you, Mr Stigler, I would be very pleased with your work.

Jakob Thomas Stigler

Of course, I'll send him over, thank you very much, bye.

Interview KAMA; Robert Löchel (RL), Jordi Giralt (JG)

Jakob Thomas Stigler

Okay, that's fine. Then I'd say let's just get started. Yes. So, to start with, how many employees does Kama have?

Robert Löchel

111.

Jakob Thomas Stigler

111, okay. And during the Corona times, something like that?

Robert Löchel

I think that was 115.

Jakob Thomas Stigler

Okay. Then I have to ask if Kama is in foreign ownership?

Robert Löchel

No.

Jakob Thomas Stigler

Okay, and does Kama own parts of foreign companies?

Robert Löchel

No.

Jakob Thomas Stigler

Okay, so let's just start with the procurement part. Very simply at the beginning, do you have suppliers from abroad?

Robert Löchel

Yes.

Jakob Thomas Stigler

If so, could you briefly outline and describe them, i.e. how big are they, are they themselves internationally active, where are they geographically distributed?

Robert Löchel

Yes, first of all, we are a machine manufacturer and our machines consist of over 10,000 parts. We have four types, so I assume there are around 30,000 different components that we buy. This means that our suppliers include everything from large international companies to the small blacksmith around the corner. So I can't give a generalised answer to that. There are all kinds of suppliers, domestic and foreign.

Jakob Thomas Stigler

Okay. What would you say, what proportion do you source from abroad?

Robert Löchel

Well, I can't tell you in Germany, but we source 90% of all parts in Europe. I would now have to estimate that that is probably 70 % actually in Germany, another 20 % in Europe and 10 % actually in Asia.

Jakob Thomas Stigler

Okay. Where in Asia and Europe are the other suppliers located?

Robert Löchel

In Asia, they are located in the metropolitan area, which I think is Shenzhen, above Hong Kong. That's where we have the suppliers that we still have in Asia. And in Europe, we are focussing on the Czech Republic, Poland and Slovakia. There are still a few Italians, but those are the four.

Jakob Thomas Stigler

Okay, interesting. Do you know whether these suppliers are supplied by suppliers from their country of origin or also from abroad?

Robert Löchel

Everything is there. Our biggest supplier is our electrical components, the company Omron. They are actually from Japan.

Jakob Thomas Stigler

Okay, very interesting. What is your supplier strategy? Do you pursue a one-supplier strategy, i.e. one supplier per component?

Robert Löchel

Yes, a supplier. This is simply due to the quantities. We sell 12 to 20 machines of our main type. And in that case, I only buy 12 to 20 units if the part is only filled once. And if you simply split the quantity again, then I have no more purchasing volume at all.

Jakob Thomas Stigler

Okay, of course that makes sense. So, let's take a look at the crises. How has the coronavirus pandemic and the Ukraine crisis affected your supply chain?

Robert Löchel

So the coronavirus pandemic in 2020 affected KAMA in the sense that we naturally had even more Asian suppliers at the time. And because of the problems that arose, on the one hand they were producing less because plants were closed in China, and on the other hand the logistics issue. That was a bit more serious for us because, let me say, with our small quantities, there were still parts in stock or they could be produced relatively quickly, in contrast to the automotive industry, where 10 or 100,000 are needed quickly, so that we then got them, sometimes at a higher price of course, in order to simply move up in the production schedule, we also paid them a lot of money. The biggest problem was the logistics, some ports were closed, everything was diverted to alternative ports, and then of course the goods arrived much later. I think we were at 16 weeks from plant to plant back then. We were used to eight. That was the main problem, that the Italians closed their harbours. That meant that I couldn't get any lorries from the port in the south, so everything went to Hamburg, and of course there were traffic jams for weeks before customs clearance. And there, of course, we had problems that we didn't lose any orders with such a long machine delivery time of up to six months, but of course we had to push back sales and deliver machines far too late. We then resolved this by simply procuring alternative components on the market. And these changes were also implemented permanently. In other words, we didn't go back to the Asian suppliers after the crisis. And then

later, and that was a problem, we didn't bring everything to Germany, but also went to some of the peripheral areas in Europe. If you look at the Czech Republic, Poland, the border areas where you can still produce cheaply. And of course there were also problems there during the war with Ukraine. Trains that didn't run at all, trains that had to be diverted. That was the somewhat crazier problem for us, because we had already reorganised our procurement system at the time. KAMA used to have a purely stock-controlled procurement system. In other words, I had a warehouse and if the stock ran out at some point and fell below a minimum level, the system would reorder. However, this is very expensive stock management. We now orientate ourselves on customer orders, and only when the customer orders from us do I actually trigger the requirement. Of course, I have to rely on short replenishment times so that I can still offer fast delivery times. I can no longer afford to say that a part will only come from Asia or the outskirts of Europe and the train won't run for three weeks. So these suppliers have actually died for us with the Ukraine crisis. Because I can only manufacture on demand to simply fuel liquidity. The corona crisis has already pushed the company to liquidity bottlenecks due to this shift in sales, to the point that the company was still a reorganisation case after this corona crisis and needed additional money from banks, and then with this reorganisation, this reorganisation report naturally also includes a stock transfer, reduction. And then I simply need the fastest possible replenishment times, and of course I prefer to have regional suppliers, and in all the development of these new supply chains, the focus has been on delivery capability, not price. That is of course a problem. I have to say that you might understand one or two things, I've also been with KAMA for six months. I know a bit about this crisis, how Kama got into the crisis, what problems there were, but I'm just getting started.

Jakob Thomas Stigler

But it's still very interesting, and you still provide good insights. Do you happen to know what the price rises were like back then? Because if you came to Europe from Asia, I can imagine that there were price rises, and commodity prices went through the roof, especially as a result of the Ukraine crisis.

Robert Löchel

Yes, we have seen a price increase of 15 per cent, mainly in the area of electrical components. As a rule, prices never go down again. That was first absorbed by the fact that, of course, logistics costs were so high at the time - that was a tenfold increase in container prices at the time - and I say, buy in Germany, a little more expensive, but no logistics costs. But when the logistics costs went down again, I could of course have bought cheaper in Asia, but we didn't do that. So now, of course, I buy more expensively compared to before. Back then, when I changed suppliers, it was exactly the same. I would actually have to go back now to get the more favourable purchase prices again. In a nutshell, you could say that supply capability has been better than price in recent years. But that will come to an end at some point. Now we have to see if we can get prices down again. These are increased logistics costs, increased production costs and, just so you understand, kickbacks. I'll pay double the price, as long as they send me the parts now and take them before someone else.

Jakob Thomas Stigler

Okay. Do you intend to change that again? Do you want to go back to China or somewhere else or do you intend to stay there?

Robert Löchel

Ideally here in Germany and then perhaps our border areas in the Czech Republic, for example, I can imagine that very well. Otherwise, everything should come from here regionally.

Jakob Thomas Stigler

Okay, so you stick to the idea of making sure that fast procurement stays there.

Robert Löchel

And now I have to make sure that it's even cheaper. But with these suppliers.

Jakob Thomas Stigler

Well, that should probably be feasible over a longer period of time.

Robert Löchel

Yes, so we're going to be there, I don't know how much detail you need now. I could talk about it for four hours or we could go further, you have to say that now.

Jakob Thomas Stigler

So I am happy about all the information.

Robert Löchel

I can show you something. I can only share my screen now. I'll have to have a look, I never do that on my tablet. So, let's do the note app. New note. Can you see my screen?

Jakob Thomas Stigler

I see it, yes.

Robert Löchel

I have now learnt about the strategy, how does it work? I display my parts list in the centre and then have lots of parts from a machine like this, thousands of course. And then order to the left, let's take another colour, green, my replenishment times. I have short and long replenishment times, lots of different ones. And on the right-hand side is my internal production and assembly. I also have operations there that I need here on day 1, of course. And another part that I only need here shortly before delivery. And now comes the demand-driven warehouse management. We have agreed with our sales department on a period of four weeks. I'll put that in here now. We have to be able to deliver within this period. This is common practice on the market and we write the order confirmation for these four months. Now you can see it clearly. Now, of course, I have parts on the left-hand side, which I still have to keep in stock, even if I run my procurement system according to demand. And everything within this framework can only be ordered from our supplier after the customer has placed an order. And of course I can then, now I'm going to reverse this here, this is also something that we at KAMA are now introducing relatively recently in our ERP system. I'm going to take this thing there, it's not working right now. And I'll push it back here. I'll use the time I have in production, because it won't be needed until later, and then I can order it here. That's how a modern procurement system works: I simply eliminate any buffer week that might exist somewhere, as was done in the past, and determine the latest possible order date. And now, of course, I have to get all these things into the framework somehow. So I have to shorten procurement times again so that everything falls within the black frame as far as possible. And on the left-hand side, of course, these are usually parts that either take an incredibly long time to produce, which can be large castings, or parts with a long supply chain, i.e. a long logistics route. But as a rule, these are simply processes that can be accelerated quite simply by planning together with the supplier. Because when I

order individual parts, we are not an automotive supplier with a delivery schedule, and I simply pass this on to my supplier and they know what I need. Instead, we receive an order for a machine from the customer and then I send an order to our supplier. Then he starts ordering raw materials and I wait four to six, eight weeks. Now we do the following, I'll show you a timeline here, for example a year. And now I work out a forecast with our sales department. A lot of machines, it's always a different type of machine. We sell the blue one quite often, the green one not so often and very rarely a red one. Three different machine types. That's a plan that we make with our sales department, one way or another, because we budget. For the banks, for example, we have to draw up a plan somewhere. And if I have a plan like this, knowing full well that it will of course be constantly changing from week to week, where I have customer information, I first have a plan that I can share with my supplier. And if I now say to the supplier, watch out, the first six weeks in our forecast, you'll get a production release from me. And for the next few weeks, for example 12 weeks, which we have to define together, I'll give you a raw material release. That means you can order material, but for the area in the back, that's just information for rough planning, such as capacities and personnel. When I do this with my major supplier, I simply do an ABC analysis, of course I don't do this with a screw, I just put it in the warehouse so that I always have it there. And this green area here on the left, which falls out of the black frame, is thus eliminated. But I can't do that with expensive parts. If I implement this in this way, I naturally ensure that my supplier looks six weeks into the future, starts production and I already have at least a semi-finished product with him, if not a finished product, when I need the part and he doesn't have to order material from his raw material release. And so I usually push all the green lines into this black box. That has to be the goal. And then the suppliers say, yes, we can do that for you, we have a bit of stock for you, it's just going to be a bit more expensive. That's exactly the point, it won't be more expensive, it will finally be cheaper for the supplier, because he is now in a position to plan with KAMA as a supplier or as

a customer, who doesn't always have to make a new production plan with our individual orders. And that is the approach we want to take to reduce costs with our suppliers. And that will work, I have already implemented it in other companies. It gives us a very clean production plan in our supplier's process. Most companies say, I'll order this and then I don't know what they'll do. Supporting the supplier even if they themselves have Asian suppliers and say it takes too long, I can't offer a better replenishment time, then we just have to get involved. That is the issue of supplier development. This is crucial if I want a better price in Europe. As a rule, we succeed. But we are still at the beginning here.

Jakob Thomas Stigler

Okay, very interesting. But that's a bit in the direction of the supplier relationship. So you would say you've changed a lot there now?

Robert Löchel

Yes.

Jakob Thomas Stigler

This means that you now work more closely together and share your forecasts.

Robert Löchel

Exactly. The issue of digitalisation also comes into play here. After all, I already have this information digitised in our ERP system. So I need an interface to the supplier, at least to the big ones, so that they can access our current data, so that I don't have to send my updated production plan by fax every week and then someone sits there and types it up. We even have to chip our goods at some point. If I have really expensive goods that I might want to trade as

just-in-time parts in mechanical engineering, then I should know where they are. Large companies in the automotive industry already do this. They can simply look at the map to see where their container is. I think that's where the future lies. And I can only achieve that by talking to the suppliers, by knowing each other. The next step is how do I reduce costs? I buy 12 pieces a year. There are now hundreds of machine manufacturers here in Dresden. We just have to find partnerships. And not in the sense of, we now have 100 people as suppliers, do you still want to sell to us? But together with them. Because he has an advantage if he produces a higher quantity, he actually saves costs. The keyword is portal partnerships. There are already portals where suppliers can join forces. Not very regional, though. I always like it regional. We will probably look again to see if we can't pioneer something of our own here in Dresden, like a small start-up for a new portal.

Jakob Thomas Stigler

Okay, very interesting. But does that mean that you want to work more closely with the suppliers or that you bring together different suppliers who then work together?

Robert Löchel

Both.

Jakob Thomas Stigler

Okay, very interesting. So you want entire supply chain networks, so to speak?

Robert Löchel

Yes, we now have a turnover of 12 million euros and at some point it will have to be over 20. In other words, we're talking about doubling our turnover and then the supply chain has to be

up and running. I can't start that when I'm already in the middle of growth, I have to prepare processes that I can also train so that people simply develop routines and then I grow. Well, I just wanted to sketch that out.

Jakob Thomas Stigler

Yes, it was very interesting. So, yes, I really like it. Maybe back to the crises perhaps. Do you know how KAMA reacted in terms of the supply chain and the international supply chain in particular? Well, you've already mentioned ...

Robert Löchel

Sorry, I pressed the wrong button because I was still moving around with the screen.

Jakob Thomas Stigler

All good, that happens. Exactly, during the crises, i.e. Corona and Ukraine, how did KAMA react in terms of the supply chain, especially the international supply chain? In other words, what short-term measures, long-term strategies? You already mentioned that you shifted most of everything from China to Europe.

Robert Löchel

Not everything, but we used to have a lot more. And now there are really only a few things left that we really buy our castings from there, because it's incredibly cheap compared to Europe. And now I've forgotten the initial question. What was that? Oh, what we did. Exactly. As a short-term measure, we placed developers there who, of course, knew our machine portfolio

and our components from the FF. They simply found alternatives via internet research. Because back then, our purchasing department was like a small ordering office. They had no technical expertise at all. When I took over here at KAMA. So that's what Development did. And then we made sure that we could get components here. You can find a lot of them online, on LinkedIn, these brokers, especially when it comes to printed circuit boards, which we have also installed in our company, with almost every component that is electrical somewhere. There's a circuit board in there. And yes, that was still Asian, of course. You also have to say that, as a rule, you're constantly being contacted by these Asian brokers. That's how we sourced them, and also via the developers here in the region, in Germany, who simply looked to see where we could get something. We actually received a lot of electrical components from Italy. Even though they were practically dead, yes. With the harbour closures. I don't know how they did it. But somehow the economy continued to run. I think they only had this shutdown for 14 days. I can't remember exactly.

Jakob Thomas Stigler

Okay, very interesting. And I don't know if you know this, but were there any precautions against the crises before the crisis? Or against any crises?

Robert Löchel

No.

Jakob Thomas Stigler

And were there any practices that were already in place that made the whole thing a little easier to tolerate?

Robert Löchel

Yes, actually, it wasn't just the practice, the only thing that really still worked during the coronavirus crisis was rail transport via the Silk Road. And a relatively large amount of material actually came via the trains. Even from areas like Israel, where we had suppliers. Because air transport is of course too expensive. Nobody wants to pay for that. Ship took too long. Or because of the shortage of containers, it wasn't even possible in some cases. Because a lot of it then went by train. But apart from that, there was nothing else to fall back on.

Jakob Thomas Stigler

Interesting. So, how would you say the measures and strategies worked? Were they effective? Did they achieve the desired result?

Robert Löchel

Perhaps one more thought. With the inventory-managed system that KAMA had back in the coronavirus era, it naturally also had relatively high stock levels. In contrast to automotive suppliers, who deliver just-in-time or just-in-sequence. We had a bit of a problem with that. Otherwise there was nothing. As with all companies. If the logistics didn't work, there were no lorries. There were border controls. The Poles stood there like that. Then they weren't allowed into the companies. Then we had the problem that when they drove back, lorry drivers were also quarantined for 14 days. That was also dead.

Jakob Thomas Stigler

That's right. You can't really do that.

Robert Löchel

And perhaps specifically about Ukraine. Ukraine is a very large supplier of neon. And this is needed for the production of printed circuit boards. It must have taken 1 ½ years for these supply chains for neon production out of Ukraine to function again. Otherwise, nothing was prepared. Everyone was hit cold. What do I want to do? I can already be digitalised. And have my entire supply chain completely digitalised. If the lorry doesn't drive, it doesn't drive. And then there was also the fact that at the time, many people wanted to fly, I come from an automotive company, so that was definitely a means by which you could fall back on it. But a relatively large number of flights were also booked through for medicine, vaccines and masks. You didn't even get a seat. So that was also difficult.

Jakob Thomas Stigler

How would you say the measures you took worked? Were they effective?

Robert Löchel

Sales shifts, not sales losses. Even though the losses at KAMA were so great that we had liquidity problems. If we look purely at the ability to deliver, the measures worked 100 per cent. In terms of time and price, only to a limited extent. But there are several problems here. KAMA is the market leader with its machines. But we are also the most expensive. So we have to keep

our costs down. And if a measure comes along and says we have 10 per cent higher costs, then just add them on top, then the customers just have to pay. As KAMA, which was already very expensive, we had a problem. And that just didn't work. You swallow them. That was very difficult because the internal strategy still had to be taken into account. That's right.

Jakob Thomas Stigler

Have you noticed any differences between German suppliers and international suppliers? So probably very much in terms of logistics? But did you notice anything else?

Robert Löchel

Depending on the situation. There were regional differences, where companies were really closed. That was particularly bad in China. They were rigorous there, what did they call it? I called it a shutdown again, that was Corona. Lockdown, I think. Lockdown, exactly. There was a lockdown and that was the end of it. They sealed off the whole city. So mainly the Asians then. Otherwise not really here in Europe.

Jakob Thomas Stigler

Okay, interesting. So, for the future. What are you planning to do so that you are no longer so vulnerable in future crises? You've already mentioned that you want to significantly strengthen cooperation with suppliers, create supplier networks and so on. Is there anything else you want to do? What do you think?

Robert Löchel

So of course we will improve our supply chain. We will digitalise the whole thing. But I don't think it's any safer for a crisis. If something like this happens again and the train doesn't go through Ukraine, it won't go through there. Is that digital? I have no idea. We don't know what kind of crisis is coming. Many people have been struggling with the Russia sanctions since the Ukraine war, but fortunately we're not. What do you want to do? You're not allowed to deliver. For us, it's just a few legalities that we have to observe, that our contracts state that our customers are not allowed to sell such a machine on to Russia. And that's it. I'm relatively painless about it. But if a crisis like this comes, then we will react and prepare for a crisis now. Which one? Is the sea level rising now?

Jakob Thomas Stigler

But otherwise we are now through with the procurement part. Many, many thanks for all the information. It was really interesting.

Robert Löchel

I hope you can now sort it out a bit, that I've told you everything. And if not, we'll be happy to call you again.

Jakob Thomas Stigler

With pleasure.

Robert Löchel

Mr Deike has all our contact details. Then I'll write to Jordi now.

Jakob Thomas Stigler

That's very sweet. Thank you very much.

Robert Löchel

We are ready.

Jakob Thomas Stigler

Ah, right, now I've remembered. The uncertainty, that was the general uncertainty as to whether anything would work, whether things would ever be the same again. Was there anything in particular that you did to somehow reduce that?

Robert Löchel

This could only be related to container costs, which are still high. They have fallen again and are now rising a little. But we won't get back to the old level of less than 2,000 euros per container. And by not going back to Asia, I could see that as preparation. But apart from that, not really.

Jakob Thomas Stigler

Thank you very, very much.

Robert Löchel

I could always say that this is a crisis measure, for example by standardising parts. We have different types of machines. Why does everyone have to have a different control cabinet? Of course we're working on that, but even without a crisis, because it's just more efficient.

Jakob Thomas Stigler

Thank you very much, Mr Löchel. Thank you very much.

Robert Löchel

Jordi, I'll pass it on to you.

Jordi Giralt

Okay, I'll do my best.

Jakob Thomas Stigler

Okay, see you later then. Okay, bye, have a nice day. Bye. Bye.

Jordi Giralt

Thank you very much. What is your name? Jakob or Jacob?

Jakob Thomas Stigler

In German Jakob, but you can also call me Jakob. As you like.

Jordi Giralt

No, no, just to say the right thing.

Jakob Thomas Stigler

Okay, so let's get started. Okay, thank you very much for taking part in this interview. So, first of all, a small question that you will probably answer 100 per cent in the affirmative. Do you

have international customers? And of course, you do. Could you maybe talk a little bit about the size? Are they internationally active, other than you? Yes, where are they geographically?

Jordi Giralt

So, before I give you an answer, don't forget that KAMA will be celebrating its 130th anniversary this year. We have been selling machines for many years. And yes, we have customers from all over the world. Even in countries where we're not even sure where the country is, especially in some places, like South Africa and stuff, we're not sure if the country is to the left or to the right of that other country. But let's say that our main market is Europe, especially DACH. And the second biggest markets for us are China and USA. To put it simply, we can say that the market is about one third DACH. The second third is China and USA together. And the third third is the rest of the world. Roughly.

Jakob Thomas Stigler

Okay, interesting. And what kind of customers are they? Are they large, international ones?

Jordi Giralt

So, historically, KAMA has always sold machines for small companies. So our competitors, what they typically offer is much bigger, faster, for different types of application. And our products historically have always been sold to the kind of dad and mum workshops. So to small businesses, in a garage. And in many cases, the KAMA machine was always the most expensive machine. But that's also a trend that we're trying to change now, because we need to jump into the international, global accounts. That's what we're trying to do right now. In fact, we are not yet at 50/50 between small and large accounts. But the idea is that by the end of 2025, half of our sales will be to global accounts. It's not easy to penetrate these large accounts because they

have to rely on us. They have to rely on our service. They have to rely on many things. But they're not buying a machine. That's the big thing. They are companies with the power to buy many, many machines a year.

Jakob Thomas Stigler

Yes, that makes sense. I did a bit of research on KAMA, of course. And I noticed your large network of sales partners. And I have to say, it's very, very impressive how many partners you have in different places. Could you perhaps talk a bit about how that came about, how you generated such a large sales network?

Jordi Giralt

I also have to tell you that next week is my first anniversary at KAMA. So I don't have the historical background of what has happened in the past. I also have to tell you that even though I'm fairly new to KAMA, I've known the company for at least 15 years or more because KAMA was one of my partners in the past. I worked for another company and KAMA was one of my partners. And that's why I got to know KAMA. I think the reason is pretty simple. So we are a small company. We are a German company, located in Germany with a lot of German employees. And it was not easy to expand our sales activities to other countries, because if you want to go to another country with sales, you need someone who lives in that country and only works in that country and who speaks the local language. And that's not easy for a small company like KAMA maybe in the past because if you have a sales person, just in one country, in the UK, so let's say we're talking about the UK, to have a sales person, even with service, even with another person doing service or whatever, just to work in the UK market, you need

to generate a sales volume to pay for that investment. And our markets have always evolved a lot. We've never had a very stable market other than DACH. We've always seen ups and downs in the US and China as well. And that's why it was difficult, as I understand it, for the previous management to build a KAMA network. But that's why we have so many distributors. The model for growth for KAMA has always been to find the right partner in each country and then use them for sales and service. From my point of view, this is right, especially when we talk about countries outside Europe. I would like to change that in Europe. I would like to have direct sales in Europe. And that is what we are changing now. My plan is to have direct sales and direct service in all European countries. At least in the biggest European countries. And then whatever is outside of Europe, at least for now, to have distributors. It makes sense to investigate later whether we should open our own sales outlets. But right now we can't do that.

Jakob Thomas Stigler

Okay. Why do you want to switch back to centralised sales and service in Europe?

Jordi Giralt

The reason is very simple. And just like I just told you, we've never had a very stable market outside of DACH. That's the reason why it wasn't easy to establish a permanent team in the UK or in France, for example. But what I want to change, and this is the second way I already mentioned, is that I don't want to have one person per country, but also divide Europe into regions. So the idea is that we have Central Europe, which is DACH, together with the North and Italy. And then we have Western Europe, everything to the left of Central Europe, and Eastern Europe, everything to the right. And then the idea is to have one or two salespeople covering many, many countries, working in English and then even having local service people covering several countries. So if we have this model where we can consolidate many countries

under one or two people, it's something that we can easily manage and pay for. Then it will even be a way to save money. Because when you have distributors, you have to pay commissions, which are usually very high. And that's also and you'll understand it very quickly, and let me use UK again, I have nothing against the British, but let's use UK again. Imagine that we have a seller in the UK and now we have a seller in the UK. If we pay a very high commission then maybe it will be okay for them to sell one or two machines a year because maybe it's enough for them. If we have a salesperson, a KAMA sales person who does not only UK, but UK, Benelux and France and I don't know what, he will be very eager to do much more because he is a KAMA employee and then the limit will be the one we decide. So we will not stop after selling two machines a year, if we see that it is possible to sell four, five machines, nobody will stop us. And that is the main goal, to have local salespeople in Europe. I would like to have direct salespeople all over the world, but we can't afford it.

Jakob Thomas Stigler

Motivation in a nutshell.

Jordi Giralt

It's not just motivation, because a distributor can be very motivated, but it's more about commitment. So if it's a KAMA employee, they only work for KAMA. A distributor might sell many brands, so we have no control over what they do and with what commitment they sell KAMA. So it's not motivation, because motivation is something we solve by paying more money, so as commission. But if you have a KAMA employee, he only sells KAMA products. Every day, every week, every month. A Distributor can maybe say, like I said, after selling two

machines, okay enough for this year, now let's sell another brand or another product. And then we have no power to change that. So it's commitment, motivation, it's kind of correct, but it's more about commitment and engagement. So it's getting people fully engaged with what they're doing.

Jakob Thomas Stigler

Okay, how does it work, maybe in a nutshell, with the distributors? Do they get an order and send it to you? You deliver the product and...

Jordi Giralt

So we have, not just us, I mean all companies in this world, we define distributors on two levels. One is the reseller. So they buy the machine from us and then they sell it to the customer. And then they do the service and everything because they are the one, the company that sells the product to the end customer. And we have agents. So the agents just get money to open the door. And most of the time the agents don't do any service and they don't do anything. We also have to pay for the trade fairs, in the case of the agents. In the case of resellers, they do everything. So in our world, just to help you understand us. In the US and in China, big markets, we have resellers. So they buy from us and then they sell to the customer. Which is good because it reduces complexity, but also bad because we don't control the selling prices in the market. So because they decide what the selling price is. In this case, our customer is our reseller. And in small markets, like I don't know, for example Greece, we have an agent. So it doesn't make sense to sell the machine because they can't offer service because they might sell a machine every five years. So that's how it works.

Jakob Thomas Stigler

Interesting, interesting. So maybe we'll go to the crises, to Corona or COVID and the Ukraine crisis. I hope you probably know what happened there because you've been with KAMA for 15 years, as you said. How has the crisis affected the export and the German customers?

Jordi Giralt

By crisis do you mean the pandemic or...?

Jakob Thomas Stigler

The pandemic and the Ukraine crisis. We can divide it into two.

Jordi Giralt

If I may, it's not just about KAMA. So we can talk about KAMA in particular, but basically, of course, it's something that had a big impact or still has a big impact in all industries. I would say that it was the same in the pandemic as in many other companies. Suddenly all companies were stopped. The big companies in the industry had the problem that big organisations with a lot of people were suddenly stopped, which was not easy. In our case, I thought it would be much easier because of the size of the company. But in reality, we were very slow to recover from the pandemic. That's why they hired me. So I came straight after the pandemic. But all sales were stopped. KAMA was in a sleep mode. No activity in the market, not even salespeople because some were sick, some were, I don't know. It was like sleeping, KAMA, totally sleeping. It was difficult for other companies in the industry to recover from the pandemic, but they did well. What we actually have at KAMA is a kind of re-founding of the company. We are totally changing the way we approach the market. We take advantage of the fact that we were almost

everywhere or we were in a very bad situation after the pandemic. The company was in big trouble. We're using that to renew the company. It's not about renewing the products because we produce the same products, it's about how we sell these products on the market. It's not about finding new sales models, it's about explaining the benefits and addressing different markets and different types of customers that we've never addressed before, like the global accounts I mentioned earlier. For KAMA, to put it briefly, it was difficult to come back after the pandemic. A lot of things happened at the company. I'm one of the things that happened. Robert is another thing after the pandemic. The owners decided to change the company to face the current situation in the market. With the crises, with the wars, let's say something that's maybe important is that what's happening with Israel is also having a big impact. One of our main partners in the industry is in Israel. It's a company that is in Israel. If they don't sell, we sell less. That also has an impact. I would say, from a market perspective, that the war in Israel and Gaza has a much bigger impact than the war in Ukraine. From a market perspective, but from a cost perspective, the war in Ukraine has a much greater impact. From a cost perspective, we are suffering just like everyone else. Everything is much more expensive. We have to raise prices. All the customers are complaining because we are raising prices. That's what's happening. Because we pay more just like everyone else. Our customers also pay more for many other things. They also demand more from their customers. That's what the war in Ukraine is doing, raising price levels. But we are also using this to try to sell more. Because one of our main advantages is that we are not so good when it comes to being environmentally friendly. We are very eco-friendly, but in the sense of less waste, less energy consumption and all that. That's something we utilise a lot more than we did before. When we talk to our customers, we say that the preparation time of our machines is much shorter than other machines. That's savings at the end of the year because you pay less energy and less material and other things.

That's something we try to use to our advantage. But yes, I don't know what the outcome is, but we try to do the best we can.

Jakob Thomas Stigler

Could you perhaps talk a bit more about how you reacted to the crisis and its impact?

Jordi Giralt

We reacted with rising prices. But it's not just KAMA. Everyone does the same thing. We've never been a company known for being cheap. The exact opposite. Everyone knows Kama because we are very expensive. And raising prices is never easy, never good. But because we had a reason, it was somehow accepted. I also have to say that I kept the prices at the same level in 2024. We had increased costs because we were paying our salespeople more. But because we were already quite expensive, I kept the prices at the same level, but in 2025 I have to raise them again. But Jakob, just so you understand, we sell a very small number of machines per year. Let's say we sell between 20 and 50 machines per year. All these effects, combined with the wars in Israel, Ukraine and so on, make our lives a bit more difficult. But that doesn't halve our sales performance or anything. The discussions we have with customers are a bit longer. But nothing else.

Jakob Thomas Stigler

Okay, okay. But you said you had to revitalise KAMA a bit after COVID. What exactly do you mean by that?

Jordi Giralt

Just to give you a very clear view. Robert came to KAMA to change production. The way we produce machines. And I came to KAMA to change the way we sell machines. What I'm doing, and I'm speaking from my side, is I'm changing the sales team, I'm changing the sales approach, I'm changing the sales tools, I'm changing the presence that we have in the market, I'm changing the message that we have in the market. And all of that is something that had to be done because we weren't smart enough to survive the pandemic. So, after the pandemic, the company was in a very bad situation. And with the introduction of all these new things, we are, it seems, heading in the direction of getting much better and growing.

Jakob Thomas Stigler

Interesting. But if you have more time and want to explain it in detail, it sounds very interesting.

Jordi Giralt

We need hours to tell you that. And also, to make it very, very short, in sales you can wait until someone buys a machine, or you can go to the market to sell your products. And that's the main change I introduced at KAMA. So, we waited a little bit to sell machines. So, the customers, we always thought that the customers come to buy what they need. And then we were very, you know, modest, always trying to have a very low level without being very pushy. And now we're very pushy. So now when you go to someone in this market, the comment is, wow, KAMA is really alive. We thought they'd been gone for a couple of years, and it still exists, and it's much more active than it's ever been. So, that's the impact, all the things that we're doing in the market. It consists of, like I said, having new people, having new tools, and by tools I mean presentations, videos, customer testimonials, samples, going to a lot more trade shows, being

active on a lot of different social media, being active in a lot of magazines. So, all of a sudden we had our main trade fair, which takes place once every four years in Düsseldorf, called Drupa. And for us, it's like the World Cup. So, that's the most important thing for us. And I've had a lot of people come up and say, wow, Jordi, we see you on LinkedIn or wherever, every day. So, it does get a bit exhausting, but that's the impression we want to have because we want to explain to the world what we do. And we don't want to be on the same level, we don't want to be as humble as we have been in the past. So we want to be much more aggressive.

Jakob Thomas Stigler

Okay, interesting, interesting. Would you say that the strategies and measures you have taken have been effective or are effective?

Jordi Giralt

At the moment I would say yes, because we have sold more. I would say we are selling more at the same time that we are changing our strategy and the type of customers. It's not easy. We're selling more and at the same time we're going from dad and mum workshops to big global accounts. We are also going through a big reorganisation of the company with service and many other things. And to have the ability to grow at the same time as we're making all these changes, it's a big challenge. We're doing well, I would say.

Jakob Thomas Stigler

Okay, interesting, that's good. How would you say your customer relationships have changed?

Jordi Giralt

From the past to today?

Jakob Thomas Stigler

Yes, exactly.

Jordi Giralt

Okay, that's also a big change that we're introducing now. In the past, one of my predecessors, one of the people who was one of the managers of the company, I had a very good relationship with and we still have a very good relationship. He was very well connected in the market. Very, very well connected. Always visiting customers, supporting customers and looking after them. He was a very good partner. When he left Kama, somehow this close relationship with the customers was lost because nobody did that. And I came to reactivate all these customer relationships. Yes, sure, there's always some room to improve. But I would say that since I brought my new approach to dealing with customers, the customer connection is much better. We have customers who are very happy to be our customers. Customers who are not happy, but with whom we just exchange things and at least they know that if they call KAMA now, they will have an answer and sooner or later a solution, which is very important. It's a journey. We just start the journey to show the customers that we are there to sell machines and support them after they have bought the machine. It's going well. It could be better. It's a question of having more people and more time. But at the moment it's going well.

Jakob Thomas Stigler

A quick question about the customer relationship with your client in Israel during the war. How did you handle that? Or how did you handle it?

Jordi Giralt

So it's not a customer, it's a partner. They sell the printing machines, and then we sell the machines to finish the products from the printing machines. It's a company in Israel that belongs to an American company. And because they are American and from Israel, it was not easy. Their sales figures are going down a lot. And what they really did was to stop the relationship with many partners. Not because they wanted to stop them, but because they wanted to kind of protect themselves, just focus on what they were doing. And it's not just KAMA. Many of the partners they had are suffering a bit with this situation. But yes, in Israel this is something that's not new. It's not the first time this has happened. I'm sure it will change what we do and also, since I've been here, I'm showing a lot more interest in other companies. I'm reducing a little bit the level of partnership we have with this company in Israel, just to increase a little bit the relationship with some of their opponents.

Jakob Thomas Stigler

Okay, interesting. Perhaps one more question about the past. Did you also notice any differences between the German or DACH customers and the other international groups during the crisis?

Jordi Giralt

That's a difficult question. Well, if I take the pandemic, then I would say that the whole world was in the same situation, including the Chinese and Americans. Of course, the crisis in Ukraine has had a greater impact on European companies than on other countries. As far as Ukraine is concerned, I don't see any differences between the DACH companies or the rest of the European companies. It's the same for all of us. The pandemic was the same for the whole world, so no differences. You have to be aware that KAMA is my third German company. I don't speak German, but I'm not new to German companies. I have worked in two German companies in the headquarters and not for subsidiaries in Spain or something. And I have a good overview of the market worldwide from a German perspective. As I say, the crisis in Ukraine has a big impact on all Europeans. I don't see any differences between DACH or the rest of the countries. The British are always a bit disconnected from everything. That's more because they are British and the Brexit stories and so on.

Jakob Thomas Stigler

Perhaps the differences between Europeans and the USA or Chinese customers?

Jordi Giralt

The crisis in Ukraine. What is the problem with the crisis in Ukraine? For our industry, it's the cost of energy and all that. But that's something that only has an impact in Europe. The Americans don't need anything from Russia or the same for the Chinese people. The main problem we have, the European companies, is that we had the risks of scarcity. Gas or whatever. Something that happens in all regions of the world and also the costs that were associated with it, so with the scarcity. We paid a lot more money for everything. But I also have to say that in our industry, the Europeans are the market leaders. So we don't have much competition outside Europe. As suppliers, all the big companies come from Europe. We have customers worldwide.

And it is certainly important for them to know what they are buying. But it was a very difficult situation because as European suppliers we had to increase prices because we paid more money for things. But because of the situation, we sold fewer machines than in the past. So just to sell more, we gave better discounts. So in the end we were the ones who suffered because of all these things, all these European suppliers. The customers were paying the same or less to have the same products. And even have more power to push us. They say, okay, we know you have to sell these two machines or these three machines or whatever. I don't give a shit about what you're telling me about Ukraine. That's something I don't even know where Ukraine is. So, if you want that order, give me a 10% discount. And then we have to survive with this situation. And that's the reason why some of the biggest German suppliers are suffering a lot. Especially in our industry.

Jakob Thomas Stigler

Okay, interesting. So, now to the future. You've already said a few things about the future, but could you maybe elaborate on how you're going to change the way you do distribution and exports after the crisis?

Jordi Giralt

So, this is just for you. And don't tell Robert that. No, I'm making a joke. No, no. So, I have some actions that I want to realise as soon as possible. As I said, I want direct sales in Europe. I need to strengthen the service team a lot because we only have a couple of engineers travelling around the world. And what I want to do is the same as I want to do with the salespeople in Europe, to strengthen the local people in different regions, I want to do the same with the service people. Also to have service in all countries. In the very distant future, I would like to have a

subsidiary in China and a subsidiary in the USA. Because as I said, this is a third of our market and I would like to have this big portion of our income in the hands of other companies. And as I said, we don't control the sales prices and we don't really control what happens to the products and the customers. And that's something that if you only sell two or three machines a year, that's okay, but if you want to sell ten or twenty machines a year, that's not acceptable. And as soon as I see that there is an opportunity to have our own subsidiaries, I will try it. Only in the USA and China. Other regions are not so important. So I don't see the need to have a subsidiary in Colombia, for example. I will keep the model of agents or resellers, depending on the countries. I also want to put more effort on the distributors to sell in regions and not in countries. For example, since I came, we have cancelled all contacts with distributors in many countries in Africa, just to have one for 40 countries there. And the same in the Middle East. That's the best way to achieve better results. Because then we don't have to explain the same thing to 20 different people. We just explain it to one person. Then it's clear. That's the model. I would like to summarise everything. Direct sales in Europe. Direct service in Europe. And then the long-term subsidiaries in China and the USA. And in the rest of the world, we try to have distributors that sell in the largest or furthest regions as possible, rather than just selling in one country.

Jakob Thomas Stigler

Very interesting. Sounds like a good strategy. Do you want to do something to mitigate the impact of future crises? Do you want to prepare for a new crisis?

Jordi Giralt

I would say that everyone in the world is saying that they want to prepare for the next crisis. But what will the next crisis be? At the moment, we're not in that phase. We are having a lot of fun and trying to survive and grow if possible. Trying to prepare for future crises is something

that would be great if we knew what the crisis was going to be. But without knowing that. I would say that this industry, the industry that we are in, we know that, everyone in this industry knows that it has an end. Sooner or later this industry will be different. The good news for me and for my company is that it's not going to happen in the next 10, 20, 30 years. Packaging and printing in general will still exist for many years to come. I foresee that artificial intelligence and things like that will have a big impact. But still, the need to have the same machines that we do will still be there. The only thing we're doing now is adapting our offerings to what we foresee will be the new trends in the market. We are doing a lot of things on automation and artificial intelligence and other things just to be prepared for the new technological crisis that will surely happen.

Jakob Thomas Stigler

That's true. Okay. Thank you very much.

Jordi Giralt

With pleasure. Let us know how everything goes with your thesis or whatever it is called. Are you from Dresden or what city are you from?

Jakob Thomas Stigler

I come from near Munich. It's a very, very small town. It's called Vilsbiburg. You probably don't know it. But I lived in Freiberg, if you know it. Exactly. And I want to move to Dresden and move in with my girlfriend.

Jordi Giralt

So, if you're looking for a job, let us know.

Jakob Thomas Stigler

Okay, I'll do it.

Jordi Giralt

You already have all the secrets of the company. Then it will be very easy for you. Good. Stay in touch and let us know how everything goes. Okay?

Jakob Thomas Stigler

I have one more question. Can I name you and KAMA or should I anonymise you?

Jordi Giralt

No, no. You can and name.

Jakob Thomas Stigler

Okay. Thank you for your time and information. Bye bye.

Jordi Giralt

Bye bye

Interview Queo Group; Lena Best (LB)

Jakob Thomas Stigler

OK, so you see this TL;DV

here, that's what it records?

That's an external programme.

I'll also record it again directly with Teams so that hopefully nothing gets lost.

Jakob Thomas Stigler

OK, let's start right away.

Lena Best

Seems to have a bit of an effect on the internet speed at the moment, but yes, I can see you now. You were just frozen, but let's see.

Jakob Thomas Stigler

OK, should I take it out again, then I'll just do it with teams?

Lena Best

Yes, we can try it first, it's working now.

Jakob Thomas Stigler

OK good, so first a few general questions about the company so that I can categorise it in my work.

Even if I can almost answer some of them myself. How many employees does your company or group have at the time of corona?

Lena Best

I think we have to look up these numbers first, because I don't have in mind what the exact numbers were during Corona, so certainly around 150 or so.

Jakob Thomas Stigler

OK, all right.

Exactly what industry is the company in?

Well, Queo has 6 different brands and most of them are software-related, but I've also seen that you offer a lot of training with Social Web macht Schule.

Exactly, and with Proconia you have financial consulting.

Lena Best

The companies in the group actually focus on customised software development and communication, i.e. classic agency business.

These are the main areas in which we operate and where Queo comes from.

The topic of financial consulting or M&A consulting is more of a support function for our market strategy, and customers are also involved here.

But that has nothing to do with our core business. You can actually leave it out.

Social Web macht Schule is a non-profit limited company that was founded by people from Queo GmbH, but it doesn't have much to do with our core business either. It's more of a social commitment, which is important to us.

Jakob Thomas Stigler

OK. Exactly. And then, is your company foreign-owned? It's not, but it owns parts of foreign companies, because you have the new Munich company, which is also based in Romania.

Exactly. And Solothurn is a distribution partnership, right?

Lena Best

Cluj, exactly.

That's right.

Jakob Thomas Stigler

OK. Right, let's

go straight into the other questions. Which parts of your value chain are internationalised?

Lena Best

Yes, a few parts are actually internationalised. We basically have employees in Poland who we have in our projects and employees from Cluj. These are the first steps we've taken in the last 2-3 years, and we've also had projects together with colleagues in Switzerland.

These are points where you could say that we have internationalised value creation.

In percentage terms, I don't know, it's between 2 and 3% somehow, so it's actually a rather small proportion and the first steps we're taking there too.

Jakob Thomas Stigler

OK.

As we've just said, international procurement is less of an issue, but I had a look at Intolight and you have your own exhibits and display pieces.

Do you rent them in Germany or do you have them or do you get them from abroad?

Lena Best

I can't say much about that.

Intolight is another small company that we have been involved in over the last few years.

I can't say for sure how many projects they've done abroad. I know that we definitely had a

project in Switzerland. I don't know where they procure the things there.

I can find out, but no idea?

Jakob Thomas Stigler

All good.

It was probably such a small part that it doesn't matter.

Lena Best

Yes, that's actually the case, it's more of a small service that we have integrated into our portfolio because it simply fits in well with our range of services.

Jakob Thomas Stigler

And it looks good too, I've seen it.

Lena Best

Yes, it's definitely good for external communication, yes.

Jakob Thomas Stigler

I can believe that. OK, let's skip the part about suppliers. Do you have international customers, or customers who export, i.e. are so international?

Lena Best

So we have customers who operate internationally, definitely a lot in the automotive sector.

VW, more recently BMW, but we already had VW during Corona.

Hanse Yachts is a brand that operates internationally, and we have also had various other

customers in the past, such as in the banking sector, the City or Société General.

Perhaps that is exactly the case. At first glance, there are customers who are international.

However, a large focus is actually on the healthcare sector, i.e. the insurance sector, health insurance companies and so on, and they are actually in the German market. We also have the Federal Office of Sport, where we are running a major project via the Queo Switzerland sales partnership, i.e. the Federal Office of Sport in Switzerland.

That's right, perhaps that's a very short answer.

Jakob Thomas Stigler

OK, what would you say roughly what proportion you supply to these large customers who operate internationally? Do you have an approximate figure?

Lena Best

Phew, that's a good question.

I would say maybe 40%. That also changes a lot.

But yes, somehow around 30-40% would be my first gut feeling. I'm really unsure what other of my colleagues would answer spontaneously.

Jakob Thomas Stigler

Yes, that fits, that fits. That's definitely a good part, that's good.

Right, then we come to the crisis. How have the crises affected your exports or your local German exporting customers?

So how has your order situation declined or been affected during the crises?

Lena Best

Yes, so during corona, the overall picture was that we were basically prepared for everything, but not that much actually happened.

So those were actually good years for us economically.

As I said, many of our customers tend to be in the public sector, the health insurance sector, which of course helped us a lot and gave us stability.

International customers such as VW do make up a certain proportion of our turnover, and we have always noticed fluctuations there.

But not in such a way that it really knocked us for good, but rather in such a way that we were able to balance it out with other aspects.

Of course, this is most noticeable with customers like VW, for example.

They realise that we have problems selling our vehicles in China.

We are reducing production there, there is an impact, for example, which is quite exciting, which we notice on the HR side, that when the situation is so tense at the groups, this logically has an impact on the employees there on site, because they say, well, we have to let so and so many employees go and this in turn leads to a very strange mood in the projects, also together with the service providers.

So there's a lot of frustration in the projects that we have to deal with and where we have to see how we can actually motivate our employees to work on these projects. That's a really exciting effect. I recently had a meeting with HR staff in the automotive service sector who all mirrored this and who really have a problem dealing with it.

This means that we are actually realising once again in a very concrete way that VW, for example, is in a tense situation.

In terms of the specific project situation, i.e. how many projects are we doing, how much

turnover are we generating, there are always fluctuations.

So there are always situations where, okay, we first have to see how much budget we can free up and then sometimes a budget that we actually thought would come to us is cancelled again.

But on the whole, these are the kind of fluctuations that we are familiar with, which are also triggered by all sorts of things, because the Group is so interconnected, so dependent on various factors and it's not just corona and Ukraine that have an impact, but also things like the diesel scandal.

So it's always a bit of a progression, so to speak, and it wasn't the case that we lost all our orders or anything like that and they said we can't go any further, neither during corona nor during the Ukraine crisis.

Jakob Thomas Stigler

Ok, you said earlier that you had safety mechanisms against crises. May I ask what they looked like?

Lena Best

So you mean what?

I'm not sure exactly what I said. Security mechanisms?

Jakob Thomas Stigler

You said that you were quite well protected against crises when corona came, so it didn't affect you that much.

Lena Best

No, not in the sense of security mechanisms. We were in a relatively good position because we had a lot of customers in this area who were not affected. There are companies operating in our industry that had a much more blatant impact because they simply had customers who, I don't know, were in the tourism sector or something like that, where entire industries no longer functioned and that of course also had an impact on the service providers who are linked to them.

That wasn't the case for us, which helped us.

We are also a company that has a lot to do with change.

So, we are generally exposed to a very dynamic environment and that's why the topic of resilience or willingness to change plays a role anyway and enables us to deal with it, to react accordingly to Corona, because the biggest issue for us now was to switch to home office and hybrid working, which was a major challenge for most companies. And in this situation, giving employees a feeling of how uncertain the situation really is, how things are actually going to continue, i.e. providing orientation in times of crisis, that is actually the biggest challenge you have in phases where even the management cannot foresee what will happen. Of course, that was extremely difficult with corona. You didn't know what would happen next week, what would happen tomorrow.

No one had ever experienced this before, things happened that no one had thought possible and that naturally caused extreme uncertainty for everyone and it's not trivial to provide any kind of guidance because you don't have any certainty yourself, so neither does the management.

But yes, at least according to the feedback we've received, that's something we've done well and has certainly helped us to get through it well and to adapt quickly to the changed situation in the collaboration. So you have to imagine that we were actually completely in the office before. You might think that we were already travelling a lot or working remotely. That wasn't

the case for us. That's why this was actually one of the biggest changes for us, which is of course very relevant for value creation, because our value creation comes from people working together.

And that suddenly had to be organised differently. And these are just effects that are having an impact all of a sudden, which you can't foresee at all, and which may not be noticeable until much later.

For example, in the context of software quality, when people no longer sit together in the office and hear things from each other because they can simply hear each other while working and quickly ask a question, remote working has led to an extreme reduction in this "I'll quickly ask something across the desk" and that can certainly have an impact on the quality of services.

This impact is not at all predictable or plannable or whatever.

Jakob Thomas Stigler

So you've already mentioned working from home as part of the measures. Have you implemented any other measures that had to be due to the crisis or corona or where you thought it would be a good step to mitigate the impact a little?

Lena Best

Well, one aspect that I have already mentioned a bit is internal communication, i.e. reorganising communication, focusing on the crisis, having new communication formats and generally looking at how leadership actually works now, what does that mean for the interaction between managers and employees if they no longer experience or see each other?

That was another aspect. I just had another thought. We work in self-organised teams.

And we introduced this at our company in 2018 and we are still in this development phase,

i.e. establishing this in the company in general, and of course you always need to support teams, i.e. you always have to accompany teams, to get to the point where they can also act as self-organised teams and autonomous teams.

And that takes strength and good support for the teams, and in times of crisis, the question for us was, does that actually go well together?

What does crisis and self-organised teams mean?

And now you could say that self-organised teams are actually predestined to act in crises because you have small units that function on their own and can deal with the dynamics that arise independently.

This is also the case with mature teams that are well able to do this.

What is more difficult, however, is that in a crisis you have to switch to stronger leadership in other contexts and look at, OK, how do you do that?

So how do you assess how well the team or individual teams can act in a crisis?

Are they able to deal with it or not?

And at what point, for example, does more leadership need to be provided in order to get through the crisis well and adapt to it again? A great deal of freedom is given, also with the aim of building up expertise and providing more leadership.

That is definitely a change that is needed.

And now I'm more in these times. I'm not even thinking about corona right now. As I said, it hasn't affected us that much economically. Of course, you have to look during corona, how do the teams act when they are suddenly hybrid or fully remote?

What does that mean? What does that mean for collaboration?

In other words, you have to monitor this on the HR and management side and see whether they are actually still getting on, whether they are adding value in a meaningful way or not?

Where might there be a problem?

What impact does it have on employee satisfaction and employee loyalty?

These were aspects that interested us at the time. Now we are in a rather difficult economic situation, now in the last 1 ½ - 2 years, and it's a different context again, in terms of guaranteeing profitability and getting projects in difficulties back into a functioning situation.

Jakob Thomas Stigler

You also mentioned earlier that you had problems with VW and international customers, especially in the automotive sector, and you said that the mood there was very bad and that you had to really motivate your employees.

What exactly did that look like?

So how did you manage to get your employees to want to work with you again or to continue working with you at all?

Lena Best

Yes, it's actually a topic that we've only become aware of in the last few months, well, how should I put it? As I said, I recently had a network meeting about it and that was the first time I personally made this connection myself.

We are already realising that there is always dissatisfaction in certain contexts, simply because cooperation with the corporations is difficult.

On the one hand, this has something to do with the general service provider mentality or the understanding of service providers. So do I have the understanding that this is someone I can replace at any time and who is simply an extended workbench for me, to whom you can push things over and then he has to do it and gets paid for it, or do I have the understanding that you can only achieve good results in a long-term, trusting partnership of equals?

These are initially different mindsets, which are also characterised differently within the Group and in this first understanding, which I described, where service providers were seen more as an extended workbench anyway, we notice that when many people are made redundant there, the atmosphere sometimes becomes even more difficult, even on the customer side, and those who work there, who are under pressure themselves to do a good job, pass this pressure on even more to the service provider teams. So that's what I've just heard from various service companies in the automotive sector that also develop software, and where I've also realised in the past that there are teams that don't get on well with their customers. That's everywhere, it's not industry-specific, it just depends on who I'm working with and what is the mentality of this company when it comes to working with service providers? But in the automotive sector, it's often the case that we realise that there are employees who really don't want to work with customers anymore and say, no, the deadlines just feel crap and they're so top-down and no, I want to work with someone on an equal footing and not have someone tell me what I have to do and if I give my opinion, they think it's stupid or something. Logically, that has an impact on it and is possibly amplified in crises by the effect I just described.

Exactly, and what you can do about it, yes. We have not yet filtered this out as a specific problem for us, where we have derived specific measures, I would say.

I know that other companies actually place a special focus on this and say, okay, well, the teams get more, I don't know, management attention. We just give them space to be able to express these negative emotions and focus on perhaps giving them other motivating topics elsewhere, to say that they are not just doing these projects, but are also doing others.

Yes, and apart from that, what you can of course try to do, but that's difficult or even hopeless in a corporate group, is to show an edge and say, wait a minute, that's not our understanding of collaboration, that's not our understanding of successful projects.

How well you can defend this position in a difficult economic situation is one thing, but at the end of the day, HR usually works in such a way that you talk to people a lot in management and give them the space to talk about it and somehow differentiate themselves.

But of course this also has an impact on value creation, because we have to direct more management capacity towards it.

This also makes the projects more expensive at this point. So it's a complex construct that can't be solved quite so easily, where you say, okay, you're going to do the measure somehow and then everyone will be happy, because of course I can talk to people somehow and that also helps them, but if they still have to work on a project every day where they feel no motivation, then it becomes difficult. And that again depends on many factors. How the customer acts there is only one aspect.

The other aspect is what kind of tasks do I have there?

Do they feel meaningful?

Do I have projects there where I think they're for the drawer anyway, they won't get anyone anywhere, or do I have the feeling that what I'm doing really adds value, do I feel competent in what I'm doing, do I feel under or overburdened?

These are so many things that play a role there and where you can of course also look at the levels and perhaps work a little harder for motivation, because obviously the customer relationship is not what gives strength.

It's different for others. So there are many customers where teams definitely get energy from the customer relationship because they realise that the customer wants to work with you, the customer gives you the feeling that what you are doing is really important.

You have the feeling that you're on an equal footing and that you're not just the customer and the service provider team, but a team that can make the best contribution together.

This can be an extreme source of energy and of course has an impact on value creation at that

moment as well as on employees, i.e. long-term employee motivation, employee satisfaction and therefore also on employee turnover.

So of course there are also people who at some point say, well, you know, I've been working here somehow for four years with a customer who really only puts me down, to put it bluntly, I'd rather go somewhere else now because I don't feel like it, he just takes energy away from me, I don't get any energy, I'm just unhappy, I'll leave. So everyone has the option. It's not as if there aren't any jobs.

Jakob Thomas Stigler

That's right, yes. And it would also be understandable.

Did you have any other measures in relation to these customers, the international customers like VW and so on, or did you just make sure that the customer relationship remained, that you got orders, albeit fewer?

Lena Best

Well, it's actually the classic measures that you also have in normal business, so of course you try to build up account management in that sense and to shape the customer relationship, to see who at the customer I'm in contact with, who you might still need contact with, where you can strengthen relationships with the customer, what are the strategic opportunities there to position yourself for new projects.

And the other thing is, for example, we are also working in a network of service providers, perhaps to intensify this, to look at joining forces with other smaller service providers in order to be able to manage larger projects together or to be able to manage projects that, let's say, involve a technology in a specific area in which we are not well versed, but where we can

cover a large other area, so that we can do this together and build partnerships with other service providers. That is certainly another measure that is actually geared towards sales and is about making other projects possible that you could not apply for on your own.

And also to engage in dialogue, again, what problems do they have there?

How do they deal with them?

And also to see, hey, can't we learn from each other?

Jakob Thomas Stigler

OK, interesting.

You mentioned resilience earlier.

What does that look like for you? Or rather, do you have any examples of this?

Lena Best

Well, I actually think it was very noticeable during corona that we really reacted well to this change in retrospect and also in the perception of the employees, and we also conducted various surveys on this, and we really managed it well.

So the resilience of organisations comes, among other things, from having people who are also able to accept change and because we change frequently anyway, we wouldn't attract people who can't do that at all, right. So that also has a lot to do with our industry.

Of course, software and communication is also an industry that is developing very quickly, where you have to keep up somehow and where you can't say, okay, I trained 20 years ago and I've been doing exactly the same thing every day for 20 years. That's not our job, it's not anyone's job, and that's why these are usually people who have a certain willingness to change and who also experience this with us.

We do quite a lot in the area of change management and supporting change, and in recent

years we have focussed a lot on what actually happens during change.

How does a person accept a change?

For example, you go through different emotional phases and the question is, what does that mean for the individual employees?

How do I deal with this as a manager?

How can I recognise where the employee is at the moment, in which emotion and how do I have to react as a manager in order to best support them in this phase? What impact does it have on communication?

How do I communicate in the context of change?

Where do I focus my communication? On the people who are opposed to the change or rather on the advantages that the change brings.

So a lot of communication in general, how do I communicate and change? What is important?

For example, appreciating what was there before and not saying that we're doing it this way now because it's simply much, much better than what we had before, but saying that what was there before was really important at the time we were there.

That's why we've grown and now the framework conditions have changed and that's why we have to change things now. And paying attention to such things in communication, for example, is something we have been working on and also building up a lot of emotional competence.

We are organising or have established a series of lectures, I'll call it that, during Corona. It's called Queo Balance, where we actually provide space for psychological topics that are a bit removed from the factual level. What does that do to you? How do you deal with it?

That's something where we make a great effort to support people, even now in the crisis we've been in for the last 1 ½ years.

We have now lost a major customer and have had to part ways with many people.

We also held sessions, for example, on what a crisis means.

How does a crisis affect you as a person?

Where can you get energy from, how do you deal with it psychologically?

What tactics are there to prevent it from knocking you down? We do a lot of that here. So it's a combination of, I think we already have people who have a resilient background and experience and who don't say that change doesn't work for me because everything always has to be the same for me.

We have and are already doing many things to actually support this. That all sounds like a picture book. That doesn't mean that we always manage change well. We also have many examples where you say, wow, that wasn't so picture-perfect and we should have made some adjustments here, unfortunately things don't always work out so well structured, but I think we are doing a lot more than others and I believe that this was a success factor for the change during corona and also now, as I said, with the crisis we are now facing and the loss of a relatively large customer while the market situation is tense. This is actually something that has been a huge concern for us in recent months and is also very tricky because, of course, if you make a lot of people redundant and people realise that things aren't going well at the moment, many other good people will also leave.

Jakob Thomas Stigler

Perhaps we should now take another look at this big customer that you lost.

What did you do to make up for that?

And well, you've already said that you unfortunately had to let a lot of people go, but did you do anything else in terms of acquiring new customers and so on?

Lena Best

Exactly, you have to start by saying that the economic crisis, as I called it earlier, is basically a situation where we didn't earn good money last year and are now in a market situation where it's difficult to sell projects. That's changing a bit at the moment, but that's what's happened.

And a lot of things have come together, for example the switch to self-organised teams and the fact that our projects have grown in size - we have significantly larger volumes in the projects that we have to handle - and this has meant, among other things, that we have not made positive contribution margins in all projects or made profits and been able to meet expectations.

And we also had to learn how to deal with larger customers who may have different purchasing conditions, where we are still far too naive because we haven't yet gained the experience.

And then the market slowly came to a head.

I can still remember last year in the summer we had a situation where we had a few Java developers who had nothing to do for a few weeks and we tried to sell them via the network and they would have been snatched out of your hands earlier and I started phoning people and they said, "Wow, we're laying people off ourselves right now, we don't have any projects ourselves and that was a moment when I said, OK, blatant programmers are being laid off. You'd never heard that before, that sentence, it was completely absurd to lay off a programmer, who would have done that, and at the same time you realised that there was suddenly a flood of freelancers, so many freelancers suddenly wanted to do projects with us, because of course they're the first to be let go.

All of a sudden we had initiative applications, where we thought, okay, that's amazing, before it was all about active sourcing, now we're suddenly getting applications again.

We realised that something was gradually changing here. We have noticed that there are

suddenly many more companies involved in the tendering situations. This means that the chances of winning there are significantly lower.

So there were so many things that came together that we realised, okay, the market situation is simply coming to a head.

We have a situation where we haven't worked well on the projects to make them commercially successful.

We realised that the market situation was coming to a head, and then there was this big customer that we had just lost, or part of the customer. We didn't lose the entire customer, but a large project that kept a lot of people busy for us, and this risk had been there for a long time, and now I'm coming to your question, I just wanted to categorise it briefly, we are in the tendering context and we know that the framework agreements only last for a certain period of time and are sometimes extended again, and that was the case with the customer.

It was always extended from time to time and then it was clear that they were going to put it out to tender at such and such a time, we've known that for quite a while, so several years, and of course we've also ramped up sales, taken part in more tenders and also made progress in the areas of marketing and positioning.

We have also acquired new customers, but that is of course very difficult in a project-based business where one project is over and then I take on a new project that requires exactly the same capacities, exactly the same expertise. So that's not really possible per se, which is why such fluctuations are normal at the moment. Because this was a very large project, we are of course massively affected, especially because the market situation is still tense and you don't get new customers so quickly and you tend to have a wait-and-see attitude and some projects simply don't get off the ground.

And sometimes crazy things happen, such as a project for Schloss Wackerbart, for example, which you may be familiar with. They had frost in April and that meant that a large part of the

harvest was probably in danger and they initially said we couldn't release the project now. If someone had told me that the weather was affecting our business, I would have said, Why? Exactly, so there were a lot of things that came together and in that respect, we pulled up sales beforehand, we also started communication beforehand, internal communication, so that everyone knows where they stand and what can happen, and that's a fine line between wanting to communicate clearly and not causing panic.

We've worked a lot on this and of course we've also thought very clearly about what this means.

So of course we hoped the whole time that we would keep the customer, that we would win the tender. We didn't, but we also prepared ourselves for the scenario and knew exactly what it meant. So the moment the decision was clear, we knew exactly what was going to happen.

Who would have to leave Queo, how we would communicate with the individual people, what we would do overall. These are things that we all prepared and that have now helped us to get through this.

Jakob Thomas Stigler

That sounds to me as if you do quite a lot in terms of employee management and communication, which I've also experienced differently.

Would you say that your measures, now in Corona and also in the current crisis, have worked, or to what extent they have worked, or was there something where you say, I don't know, maybe it should have been different.

Lena Best

Definitely.

For now, I would say that both the current crisis and the coronavirus crisis have worked

overall.

With the crisis now, I can't really say what will happen next and how. So let's assume we get Ukraine 2 in now and something completely unforeseen happens and the market doesn't pick up as predicted.

Yes, I don't know, I don't know whether we can get through it.

On the whole, I think the overall package is right. I think we would have had some communication potential in the communication between the first and first management level of the executive board and the managers who directly manage employees, which I think would have helped.

So I think we could have done a bit better in terms of communication. We're always good at intercepting the first wave of communication and then, I don't know. I don't know if you know the change curve that I described earlier with these emotions, so everyone goes through a change curve and it's often the case that management wants to communicate a change and the expectation is always, or with many changes, everyone reacts with enthusiasm.

And now the problem is that everyone goes through this curve, including managers. The managers are already at the back of the curve at the moment when they communicate, where the positive emotions come and those who are involved are still at the front, where the curve is at the bottom. And the managers think, I'll tell you this now and everyone will think, yes, of course, it's logical, I think it's good, that's how we do it, but they don't know it because they have to go through it first and that's often a problem, that the managers at the upper level, i.e. downwards in this hierarchy, management, employees, that when you're at an upper level, you always think that it's already clear, but you've been dealing with it for much longer and then you always forget what you might need to do explicitly.

You always think it's very implicit, it's logical and there's actually a lot that you think the other person knows, so you just interpret far too much in places and that's what we do. So the

first point is always good.

We prepare it well, we consider for which target group this change will have what impact.

That's always important. The change has a completely different meaning for each individual and to think about it and say, okay, it doesn't really matter for this and that business area.

In other words, we might have to put in a short piece of information, but that's all.

But it's extremely relevant for this team and that team, so we have to go in completely differently. We do this well, think about how we are going to do it, what we are going to communicate, what the messages are, what points, questions and so on can be, react to the questions and then I think at some point we lose the further procedure.

That's when the management gets back to doing things normally and says, well, now we have to move forward again, I can't spend all my time just dealing with this moment.

And the employees are still in this, well wait a minute, I still have to do this, I'm still missing the information or what does it look like now?

That's something that could definitely be done better, we can be clearer in our communication.

Um, I also think that it would help us from time to time to actually get an outside view. Of course, you don't do that much in situations where the economy is tight and you want to reduce external costs as much as possible.

I think that would help us sometimes. So every now and then you go round in circles, you just can't move forward, you're swimming in your own soup, where someone from the outside would say, "Wow guys, it's totally obvious, why are you still beating about the bush here? So someone who brings a certain level of expertise to the table and asks the right questions.

My thesis is, and I don't know whether everyone sees it this way, my subjective view of things is that this would help us at some points and that we could and should do this sometimes.

Jakob Thomas Stigler

Interesting. So that's more or less what you've learnt from the crisis? Or are there other things where you would say, yes, we've learnt that now?

Lena Best

Well, there are individual aspects.

I know that in the context of this customer that we lost, the question was always a bit like, by the way, is the AOK, that's no secret, the AOK that we've been looking after for a long time, the main side of them.

In retrospect, there was still a bit of a question because there were changes in the customer's support team because an employee wanted to move to another project area and we pulled him out and, in retrospect, it was perhaps not a good decision and that could have helped us to perhaps turn the decision around. I always say maybe, because of course nobody knows.

But that's a question that's a little bit in the air now in retrospect. At the time, it was a good decision in the phase we were in.

But these are small aspects that you can now look for at any point in the company in retrospect.

After all, you can only ever make a decision at the time of the decision with the information you have at the time and only with the options you have at the time.

That's why it's always easy to say in retrospect anyway.

Jakob Thomas Stigler

Yes, that's right.

Yeah, with all the changes that you've had, during the new crisis as well and during Corona

and Ukraine, are you going to change anything now or are you going to keep the changes that you've made during that time?

So I guess home office will probably continue to be the norm for you or, I don't know if it's the norm or hybrid?

Lena Best

Well, actually, everyone is free to decide whether they want to work more or less fully remotely, be completely in the office or drive a hybrid model.

We've kept it that way. Even in the market situation back then, if we had reversed that, I think we would have lost a lot of people, and that would still be the case today.

So you can't turn it back completely.

So here too, like many other companies, we are always thinking about whether we need to make adjustments and whether it makes sense to force people into the office at certain points. It's always a fine line between employee satisfaction and project success.

But on the whole, yes, that is of course the biggest change that has been maintained after corona and which has had a massive impact on us as a company and on our corporate culture.

We are a company that is very much focused on this sense of community.

That's one of the main benefits we have, that is, working together as equals between people, seeing people as a whole.

That only works to a limited extent in a remote model.

It's possible, but it loses some of its intensity and that's something we have to act relatively well and be sensitive to.

It's not just to do with corona, but also with the fact that we no longer have just one location in Dresden, but also in Berlin, Cluj and Munich.

No, so per se they can't all be in one office anymore and if you have hybrid teams where

some are in Berlin and others in Dresden. Logically, you have to find new opportunities, but that remains the case.

We've also retained the internal communication that we adapted back then, so that we're doing remote formats and basically offering a lot remotely, as I said, but we're always adjusting a bit in the direction of bringing people back to the office, at least in terms of time.

And now in the crisis?

Well, I think what remains is of course the experience that everyone gains with the crisis, every manager gains with the crisis and that enables them to deal better with future crises, for example these decisions to part with people, which is of course the thing where every manager would immediately say, that's the crappiest thing about my job and it's difficult.

It's often very, very difficult to make a good decision and then of course to communicate and deal with people, with the person concerned and also with the others in the team.

And we find it difficult to make such decisions, but I believe that they are just as necessary for companies, and not just in times of crisis, and I think it also helps us to become better or more professional, I'll call it that, and to make such decisions more professionally. I think that's something that everyone takes away for themselves individually and also the experience that it was simply good to think this through and say, OK, if we lose the customer now, then this will happen and this will happen, how do we then proceed.

Because that simply provided a great orientation for a time that was absolutely stupid and where all the managers said, I don't want to do this, but they just knew it had to be done. They had a plan. They knew that if we didn't win the tender, then I would have to do this, this, this and this, and that gave them security and the feeling that they could prepare something like this in order to shape it, so that they didn't just feel at the mercy of the crisis, but that they could shape it.

That is certainly something that we can take with us and where we can also become better in

such entrepreneurial decisions that play a role in crises. So in positive economic situations, none of that matters. You think to yourself, yes, the employee isn't doing such a good job at the moment, yes, it'll be fine. You don't care so much and now you suddenly have completely different economic conditions in which you have to make different decisions and actually make the right ones. Before, you actually shied away from the decision because you could. And now you're forced to make the decision and I think this feeling of really making the right decision consciously and not always just saying, oh come on, it'll work out somehow, I think we take this experience with us as an organisation and also each individual, and that's extremely important.

So I think that's why it's also important to have gone through a consolidation phase like this so that you can then make more professional decisions, faster decisions, even in good economic situations. That's one of my theories.

Jakob Thomas Stigler

Very, very exciting, yes, interesting.

Yes, then I had another question that just didn't fit in earlier, again about the customers. Have you noticed any differences between national customers, who are not internationalised, and German customers, who are internationalised?

Lena Best

I'm just wondering whether this has anything to do with internationalisation or not.

So yes, what we noticed at VW with these waves had something to do with the sales markets in China, among other things, to which they have to react.

And with AOK, for example, I don't know whether it's because they're not international, so they were stable for us and I'm just wondering whether it's because they're not international or

because they're in the public sector and have completely different financing. So it's probably more the latter. Yes, we have noticed differences, I just don't know whether the cause is internationalisation.

Jakob Thomas Stigler

The fluctuations, no. That's what you've noticed.

Lena Best

Exactly.

Jakob Thomas Stigler

Thank you very much.

Finally, I have to ask, may I mention you by name?

So you and queo or should I anonymise you?

For your information, the Master's thesis will only go to the professorship at our company, I will defend it at the end and there will be a few other students watching and it will go to you and the other companies I interview.

Lena Best

Yes, I'm just thinking about everything I've said and all the companies you've interviewed. I don't think that's actually something I would say you can't talk about. No, so in my eyes it fits.

Jakob Thomas Stigler

All right, then thank you very, very much I would finish the whole thing shortly.

Interview TRICERA; Assem Tarhini (AT)

Jakob Thomas Stigler

So, first off, a few general questions.

Jakob Thomas Stigler

I need to ask in which industry Tricera is operating.

Its battery storage systems, of course, right?

Assem Tarhini

Yes.

Jakob Thomas Stigler

OK.

And which goods do you produce? It is of course big battery storages.

Commercial & Industrial battery storages.

You have the project management, the maintenance and the battery lease, right?

Assem Tarhini

Engineering, procurement and construction basically, so we cover all the scope.

Jakob Thomas Stigler

Oh yeah, that's true.

Assem Tarhini

And we do the engineering as then as then for some customers, they ask us to propose for them a system, so we do the study and then we propose the system for them. This is 1.

Two, we also do the procurement and we don't buy a full product.

So we produce the product by ourself to say like because many of the suppliers also would buy a full container and just work as a system integrator.

So this is what is different about tricera compared to other suppliers like RWE for example.

Assem Tarhini

Or big companies. Yep.

Jakob Thomas Stigler

OK.

And how many employees does Tricera have?

Is it still around 80?

Assem Tarhini

Uh, you know, I would say it is 90 plus to 100.

Jakob Thomas Stigler

So umm, is Tricera foreign owned?

It's still only German owned, right?

Assem Tarhini

Yes. Yeah.

Jakob Thomas Stigler

OK.

And it doesn't own companies in other countries?

Assem Tarhini

Umm, no.

Jakob Thomas Stigler

OK.

But there's the Solegreen Deal, right?

Assem Tarhini

Yeah, Solegreen Deal is with the Project development Department basically.

So Solegreen is the investor for the projects that will be developed by TRICERA, as an example Schneeberg.

Maybe it is something nice for you to add a I know that all companies try to make themselves special, but what is special about tricera, is basically, you know there are about, let's say 20 companies that work the same as us in Germany, 5 from them, I can say, they are using NMC batteries or how to say batteries from from Electric vehicle manufacturers, but it is only Tricera that develops projects and also works as an EPC.

So, we do the two things.

Jakob Thomas Stigler

OK.

So then let's get into the value chain and internationalization.

So which parts of the value chain are internationalized?

Assem Tarhini

Umm, with the with the current market now, it is very unknowledgeable to say is that there is a product which is 100% coming from Germany.

So most of the products that you deal with in the market in some way or another is involved in the global supply chain.

So, would you like me to give you some examples?

Jakob Thomas Stigler

Yes, that would be great, yeah.

Assem Tarhini

So, like, let's say batteries as an example, E vehicle batteries, although it is produced in Germany or in Europe, but you find mostly cells are produced somewhere else and if not cells, then the raw materials are both from, let's say China, from Chile, lots of places, Congo, Australia, Indonesia, depends.

Depends on which kind of raw material we're talking about.

Jakob Thomas Stigler

Umm, OK, so let's dive deeper into the suppliers.

So your suppliers, of course you have foreign suppliers.

Assem Tarhini

Yes.

Jakob Thomas Stigler

Yeah.

Who are they and what do they do?

Are they small companies, big companies, medium sized companies?

Where are they geographically dispersed?

Are they getting supplied by domestic suppliers or international suppliers?

You just said with the value chain, they come from everywhere.

Assem Tarhini

Umm.

Yeah, OK.

So let's try to divide things.

So I would say first with batteries, we have mainly so suppliers as you know, battery producers, we have main producers in Germany.

And there is also in Hungary, so SK innovation.

Ohm, there are also some suppliers in Italy.

We are also in negotiation with.

Would you like names of suppliers?

Does it make difference?

Jakob Thomas Stigler

If you can give them to me, yes, if you can give them.

Assem Tarhini

Well, OK.

OK, so like in Germany as an example we we communicate with Mercedes, we communicate with Porsche, we communicate with Farasis.

Farasis is also a supplier of batteries to Mercedes.

Uh, we talked to BMW, we talk to S Volt.

S Volt is a Chinese company that is building some factories here in Germany, two also to produce EV modules for suppliers.

Also, we talk to North Volt.

Now I'm talking for the supply of only the battery module, OK.

Jakob Thomas Stigler

Yeah.

And you you have started a a strategic partnership with S Volt I think as well, right?

I've seen that on LinkedIn.

Assem Tarhini

Umm yeah.

So with with S Volt, we have signed a momentum of understanding to develop a module, a dedicated module for our application.

It would have been the first LFP module that we use because in most of our applications we

were using the NMC module, so Nickel, manganese, cobalt.

Which is, which is mostly used for E vehicles because it has a high, it can function on a variable C rate.

So 0.5 C, 1 C, 2 C, so it can be discharged or charged fast, not like LFP modules, let's say.

So with S Volt we signed this and I think maybe when we go further, I will tell you more in detail why this deal didn't work out in the end, yeah.

Jakob Thomas Stigler

OK, interesting.

Assem Tarhini

If you want whenever we can go into details about the development of prices and the market, then I would tell you why this didn't happen.

But S Volt is mainly so in China, S Volt is I would say Tier 2 in China.

So for them it was also a good publicity to be able to sign a contract to the German company.

This will give them a lot of publicity in China and in Europe.

And yeah, for us, we thought about it that they also produce the cells.

Basically they produce the module for E vehicles and they also have a containerized solution.

So they have the knowledge and all of the supply chain, let's say for battery production, yet eventually it didn't work out.

We can circle back to that later.

We have also been communicating with suppliers from France.

For example, Renault. Prices were high.

Because it was a different, different markets we are talking about.

So you know, from the point of view of quality, this is the Renault car, blah blah blah and the

battery while from our side it's a different application.

So the economy of scale is different.

We are also in communication with SK Innovation in Hungary. With OPEL, we have used second life batteries which was, I would say, this was the highest or the largest volume of second life batteries that have been implemented now in the market as a on a utility scale.

Jakob Thomas Stigler

Nice.

Assem Tarhini

Yeah.

And interesting is that these modules were retracted out from the market because they had production error.

Jakob Thomas Stigler

Oh, OK.

Assem Tarhini

So.

So they were dangerous, let's say the.

If mechanical stress was applied to it, then it would burn.

So we took these modules and rather than paying money for recycling it, we implemented it in one of our projects.

Jakob Thomas Stigler

And because there's no mechanical pressure in stationary battery systems, it won't burn.

Assem Tarhini

Exactly.

Jakob Thomas Stigler

Yeah.

OK, interesting.

And with non-battery suppliers, for example Transformers?

Assem Tarhini

So we have, let's say inverters and transformer. With inverters basically, we still stay and now try to focus on experienced suppliers, let's say, because this involves the IGBT, it involves sophisticated technology and this is basically what is directly connected to the grid.

So you cannot, how to say like, you cannot make mistakes there.

So our suppliers is so number one is the WS Tech.

WS Tech is a daughter company of Siemens, the main the main focus of WS Tech is this Scandinavian market.

But till now we have been in a good relation with them, I would say.

This is central inverters.

We have also been communicating with SMA.

Uh, this is also a German company.

SMA provides inverters and provides "Schaltanlage" and provides, so inverter plus

transformer and also inverter plus transformer plus the switch gear.

There are some interesting suppliers that are emerging in the, I wouldn't say emerging in the market, but at least they got the VDE certification so they can be, uh, they can be used in Germany.

So the VDE is the certificate that you should have in order to connect to the grid.

So the grid code in Germany.

Yeah, which is Power Electronics.

It is a Spanish company.

Uh, NG Team, which is also a Spanish company.

Umm, these two suppliers are basically going strong now in the German market and they are lowering the price compared to other suppliers.

So I would say in the next coming years they will be pretty competitive to the WS Tech and to SMA.

Jakob Thomas Stigler

OK. Interesting.

Uh, GE?

Assem Tarhini

GE and FEMA, these two suppliers have the same case.

Both of them have their factories in India.

And a lot of problems have emerged in the inverters.

GE was blacklisted by us because it had a lot of problems.

It's natural to have a problem with a product, but what is not accountable is that the after sales services is bad and this was the problem with GE.

With FEMA, the company, how to say, like got broke or like lost money?

I don't know how to say the word in English and then it was acquired by by another owner, 3 times already in two years.

No.

So it was a ABB and I think like before ABB it was FEMA only and then it was acquired by ABB and now it is acquired or it is under acquisition by a British company.

Uh, their product is good, I would say, but they did the same thing, like they outsourced some of the production to India, which is sometimes leading to a long lead time and sometimes that you cannot have good after sales services.

So This is why we prefer not working with them at the moment, because also it is scary with the warranty basically.

You have a project that should be functioning for 20 years, you know.

So whenever you sign a contract with the supplier, you should make sure that it is functioning for 20 years.

Then with string inverters we used to work with Ampner.

Ampner is a company in Finland, it got liquidated.

Then they relaunched their product.

Then it didn't work again.

So the inverter now has been acquired by Danfoss.

Danfoss is also a German company.

Umm, the interesting thing is that the product from Danfoss was very expensive, so I think they acquire the ampner inverter so that they can lower their price.

And we also work with KACO.

KACO is also a daughter company of Siemens. The product is good, I would say.

Ohm their development plan as what we were communicating before, we expected that there

is more development in the product since 2021 till now, but I see what is only developing is the price. So there is a price increase of I would say 12 to 13%, which is not bad, but.

And yeah, this is general for the for the inverters, the companies that we are dealing with and with the Transformers basically transformer is a straightforward product.

So it doesn't have any electronics inside.

Uh, so just two coils, Tuck, Tuck, and then two coils on the other side. Wandler.

So This is why we have many options for sourcing the Transformers.

So first option was in Germany.

Uh umm, we have companies like SGB and Westrafo and then you have suppliers in Italy and in Poland. In Italy, the prices is approximately 10% lower than in Germany.

Mostly, in Italy you can find cast resin Transformers, so Transformers are different depending on the yeah cooling technology they use.

So like there is oil cooled transformer, there is cast risen.

So it is air cooled.

And that is the hermetically sealed transformer which is like outside like dicht Trafo, let's say.

Uh, so in Italy the product is cheaper by 10% from Germany.

Umm, but what we're doing now is mostly we are sourcing from Turkey.

Uh, the Turkish production has been have been like for 4 years now have been evolving.

Uh, the product is very suitable for the European market and at the same time having the benefit of the deep inflation or the hyperinflation that is happening in Turkey.

So the value of the currency in Turkey is dropping compared to the euro.

So This is why the product from Turkey you can see at least the transformer is 30 to 40% cheaper than in Germany.

Of course we have the containers.

UM, the containers it is mainly, I would say the steel price.

Uh, so the raw material price and the container is about 60% from the whole price of the container, which is mostly steel, I wouldn't say electricity, mostly steel, some of the isolation panels, but mostly I would say steel.

What is interesting to say is that like, we all experienced an increase in the price of raw materials since the beginning of the war on Ukraine.

And that was like drastic.

But recently, I wouldn't say recently, like even like for this has been now for a considerable time.

Like I would say, since the end of 2023, the prices, the price of raw materials leveled back, I would say not to the same price before the war, but it has been decreasing.

UM, the problem mostly with the European suppliers is that they are not lowering their price. Although raw material mostly doesn't come from Europe, so you see and most of in most of the countries for most of the suppliers' prices are somewhat decreasing, let's say, for some components, but still in Europe it's not and recently the European suppliers have been realizing this problem.

If I'm talking too much, please cut me.

Jakob Thomas Stigler

No, it's good.

It's very interesting.

Assem Tarhini

So like things that have noticed, let's say, at the intersolar fair is that, let's say a company like SMA is now restructuring because before they used to push their whole product.

So the the DC container and the AC part.

Now they have two departments.

One is the DC and one is the AC.

Because the product is, the price of the product is very high in the market.

Hmm, maybe I can show you some price development if you'd like.

Jakob Thomas Stigler

Yeah, yeah, that would be good.

Do I need to name you something?

Assem Tarhini

No, I think you should allow me to share.

Jakob Thomas Stigler

Uh oh, OK.

Yes, you have.

Assem Tarhini

No. (Sharing his screen and showing me price increases)

So like here you can see.

Maybe this is not interesting.

This is not interesting.

So that just you can see like this is the capacity and this is the price and this is the time.

So, like in near 2021, approximately the price of the inverter was 41 euros €41.00 per KV/A

well, this I have to see.

Alright, sorry.

So and this is this inverter is 2 APU units.

Umm, because like so the price of the inverter is like euro per KV/A is more expensive whenever it is smaller.

OK, so look here and here, 2021.

This was the price of the inverter, so this umm, showing GE and WS Tech.

Was €41.00.

Let's see the price development in year 2022.

In year 2022, somewhat the same, it didn't increase that much.

So if you look at the inverters here, it is 2 APU units, it is 43.

And here also.

It's too AP units, so it is the regular increase I would say.

So from 41 to 43.

So if if we calculated so maybe these standard 10% increase between year 2021 to 22, while here look in the year 2023, 47€ yeah, so and one year here like you see the the increase 47.9.

So it is an increase of about €5 roughly.

Now you look at the prices here in the year 2024.

You see, for APU units, it is slightly decreasing.

And this is the problem.

This is why, like I sure like, as I told you, like power electronics might be taking over the market because so this is the Spanish product.

So power electronics are promoting for a price of €33 per KV/A.

While the price from German suppliers is 47.

So we experience, we experience the price increase in year 23.

Which was about to say 20% due to the war in Ukraine, but now it should have been lower because the price, like even if you check like the development of raw material price.

(Showing raw material price development)

See like 22?

Now there is a surge.

See here like 21.

This is start of the war.

And then it should be here somewhere.

So this is the copper price.

If we go to the steel price.

Steel price is decreasing.

Jakob Thomas Stigler

So that's for the containers, right?

Assem Tarhini

Yes.

Jakob Thomas Stigler

OK. Interesting.

So the structure of your suppliers.

It's a multi supplier structure, right?

Assem Tarhini

Yes.

Jakob Thomas Stigler

So can you maybe explain a bit why and how you choose which supply you take for one order?

Assem Tarhini

OK, so basically point 1 is, we have requirements.

So, first phase is we prepare an RFO, request for offer. With that RFO we specify what are the things we need and what are the standards that the supplier should abide by.

So for let's say for Transformers, it should be Tier 2 and this is considered the losses within the transformer.

So there is an EU directive requirements for each product, so we prepare an RFO and then we do like a market survey for different suppliers.

So let's say for Transformers.

We look first to wherever the supplier is from.

So I start doing it by country.

I change my Google browser for every country.

You can change this option to do the search and then look for suppliers.

From there I go to their portfolio to see first since when they are in business.

What is the size of the company?

Uh, what are the projects that they have done already and where?

Then what is their production capacity, as in what kind of Transformers they produce, blah blah blah blah and then we do the rating for the suppliers.

OK, uh, if they passed the initial state, then we start the second state, which is we send them the RFO. With this RFO we receive from them the offer and then we review this offer.

Uh, the first review will be technical to see what they, so we request

Like maybe I can show you something.

(Showing supplier comparison sheet) So like here when we were looking for different transformer suppliers.

We'll start with of course, subject responsible first person for contact and then the supplier, then the contact person, Which department, Email, mobile number if it is available, then website country and then we do these notes about every supplier.

So, like, let's say this is this is one of the suppliers we approached before.

So I look into their product.

I see.

OK, this is what we need.

We need a bio transformer because we need a biodegradable oil.

OK, we go inside this or we can't.

Ohh, we'll buy substation to do.

Let's look for another.

Jakob Thomas Stigler

Yeah, no problem.

So you check it if they have the right requirements, the technical requirements.

Assem Tarhini

Yes.

Jakob Thomas Stigler

OK.

And after that?

Assem Tarhini

And and then after that we go and we request offers.

So here you can see like we request offers from.

So let's say this is from this offer from SGB. It's not opening.

Someone changed the location of the folders. Anyway, so we request offers from different suppliers.

And then we we eat like how to say we we put this comparison matrix.

So what is the date?

What is the delivery time?

This is important.

And then what is the delivery conditions?

So what in incoterms they are, they are they are offering and then rating price, euro per kv/a of course.

And then supplier then some technical data.

So how many windings?

What is the core?

What is the cooling type?

And then here some remarks about every supplier.

So here see that don't comply eco standards.

So we cannot use it.

Or see here.

Also, this supplier doesn't comply to ECO standard.

And then like so we do, we do this for every supplier basically.

And then let's see.

So like something like what we did with the C&I. C&I were many rounds for many suppliers.

So here was the first round for suppliers.

Also we got offers.

And here also the comments from every supplier basically and then in the end we see, this is the last three, that are left from all of the requests.

So this is what they are offering and this is the price and we then do the last round.

Within the last round, we ask them again.

Hey, this is our target price.

If we had a target price and if we didn't have a target price, we calculate the target price using the coca (Cost Calculation) and then we start the negotiation with every supplier.

Uh, and this happens basically to every project until we sign a framework contract with the supplier.

Whenever we find we file, we sign a framework contract with the supplier, then we secure all of the technical requirements first and then the commercial requirements and then only we request regular offers from this supplier to see where is the price or what is the price development in the market.

Jakob Thomas Stigler

And with the batteries, is it a, I think it's a matter of availability as well, right?

Like if for example Mercedes has some batteries they could give away, then you take those, right.

Assem Tarhini

Yeah.

So in general for batteries.

So there are some interesting developments happening in the market right now.

So this when we go back to the discussion with S Volt.

When we were negotiating with S Volt, we were buying modules from Mercedes for about, let's say €120.00 per kWh, which was a good price in the market.

And what we experienced lately is the violent drop of prices of LFP modules.

So now the price of LFP, so DC container, a full DC container from a supplier in China including batteries, racks, switch gear, all of the component we are getting offers for €80 per kWh.

Yeah, while here, if we want to buy only the battery, the battery cost is about €80.

So this is the difference.

UM, so as I said, like the problem is that Europeans, or like we see that the price of LFP is decreasing while the price of NMC is also decreasing.

But it is not at the same speed.

So maybe one day they will meet, so we can go back to NMC batteries. But at least for now, LFP is the price is much better.

On the other hand, there are some challenges with LFP that we are trying to address which is basically, we have suppliers in China that we cannot reach if there is a problem that is happening or if the company is liquidated for a certain reason while our project or is for 20 years, so we go back to the same dilemma.

So what is cheaper? Money today or money after 20 years?

Jakob Thomas Stigler

Yeah, money after 20 years.

Assem Tarhini

Yes, net present value.

You know, €100 if I paid it after 20 years, yeah, so.

Umm, so now we're trying to adapt to what is happening in the market.

What we are experiencing, at least for now, the NMC is is not appealing in the market. Where it can be appealing, it depends on the use case.

So if we are talking about energy arbitrage, so 0.5 C or a 2 hour system, then in an innovation tender (Innovationsausschreibung), the easiest and fastest solution is to get LFP.

But, if we are talking about, frequency, frequency control, primary frequency response or secondary frequency response, then you require a fast reaction and the very very short time and you need a lot of energy.

So This is why we use NMC batteries.

So as an example, our project and Freiberg or in Schneeberg, we needed a high C rate and there NMC batteries are more suitable than LFP batteries because mostly LFP solutions are 0.5 C.

Jakob Thomas Stigler

And that's why I choose one supplier over another because of the availability of the specific battery type.

Assem Tarhini

Umm, so our first is that we should be adapting to the market.

If the market now is showing very low prices of modules or for containers, we should be able to integrate these containers.

So This is why for some of the projects that we are working on right now or that we will be signing.

So like for some projects that we are now that we are now working on LFP DC container seem to be the best solution or the most economical solution because also as you know investors don't like to pay money.

So they prefer they prefer cheap products, they prefer saving and CapEx and pay it later as OpEx.

Jakob Thomas Stigler

What ratio of sourcing would you say is international and what ratio comes from Germany? Like round about?

Assem Tarhini

For our previous projects, batteries Germany, inverters Germany.

Uhm, most of these small components are from Germany, so I would say 60%.

60 to 70%.

Yep, with the current situation now I would say it can be 50/50.

Jakob Thomas Stigler

OK.

Yeah, because it's Spanish.

Assem Tarhini

Yes.

And the containers from China.

Jakob Thomas Stigler

OK, then let's maybe get to Covid and the Ukraine crisis.

How did they impact the supply chain and in particular the international supply chain?

Assem Tarhini

First is the price of raw material.

It was affected very fast and it appeared very fast.

You can see that like we experienced an increase of 30 to 40% of the raw material price.

I would say from Ukraine used to come a lot of steel. Which was blocked, but not anymore, I would say. For now like the market has adapted to that.

Jakob Thomas Stigler

OK.

Yeah, as you showed the steel prices went down a bit.

Assem Tarhini

Yes

Jakob Thomas Stigler

OK and back in COVID that were a few shortages, right, we had the problem that we couldn't find any transformers and inverters I think, and there were a lot of delivery time problems, right?

Jakob Thomas Stigler

Yeah, that's crazy.

Assem Tarhini

Now it is 15 weeks.

Sometimes even with German suppliers, the delivery of Transformers was 52 weeks before.

Now it is dropping also, so that was that was very much affected.

And Corona, now I didn't work with tricera at that time, so I don't know how much I can talk about Corona.

Jakob Thomas Stigler

Didn't we work together in COVID here as well?

Like, not at the start point.

Assem Tarhini

Uh, yeah, OK, OK.

Jakob Thomas Stigler

Yeah.

Assem Tarhini

No, no.

I thought like the beginning when everything was closed.

Jakob Thomas Stigler

Oh yeah, no, the other time as well, yeah.

Assem Tarhini

Hmm. No.

OK, so like at least I would say I can say like.

After the corona Basically, yes, a lot of the supply chain became easier, things became easier, mostly regarding the like the availability of products, lots of the chips that we buy from China are available again. Also Transformers as you mentioned, because like inverters have small auxiliary Transformers inside them and this is mostly produced in India.

And that was severely affected during Corona.

So like This is why you see like some companies like WS Tech now move their supply or some of their production to Poland.

Now companies are going back to India again.

So it was the delivery like of an inverter at that time, double the time from now.

Jakob Thomas Stigler

OK.

So about third thirty weeks?

Assem Tarhini

No, way more.

So like now the delivery, let's say from power electronics, the delivery is 15 weeks of inverter only, also from SMA it is 15 weeks.

Before it was from SMA, so for Project Schneeberg, delivery was 52 weeks.

Yeah, there was a lot of uncertainty basically with the transport routes.

Jakob Thomas Stigler

Oh yeah, the port in China, we had the problem with the Hamburg port, I think, right? Yeah.

Assem Tarhini

Yes.

Jakob Thomas Stigler

Do you know of or did you have any other problems during the crisis other than the prices, delivery time and the shortages?

Assem Tarhini

Umm, I think mostly it was the uncertainty in the market.

Like I would say at least like here in Germany, the Government basically still supported the businesses.

So we still saw like for us innovation tenders (Innovationsausschreibungen), we still saw it and other company and other countries, it's not the same case.

Yeah, so this was reflected very bad.

So like in Turkey, a lot of lot of businesses went bankrupt, or even the production became slower. Even also after the earthquake in Turkey.

There was a time that most of the exports from Turkey were internalized.

So for us, like we ordered some Transformers and because of the earthquake, there was a delay of about like a 20 weeks in the delivery because the Turkish government forced companies to focus on delivering Transformers to the Turkish market.

Jakob Thomas Stigler

The problems with the GE products and FEMA, do you think they also have been because of the crises or do you think it's not connected?

Assem Tarhini

No, I think it is mostly connected with companies trying to save price, but in the in the wrong way you know.

Yeah, like there is a lot of production that is going on in India.

So it's not about that it is produced in India, it's about how it is produced there.

Jakob Thomas Stigler

And how did you react to these impacts on the supply chain in the sourcing department?

Which short term measures did you take and which strategies did you implement?

Assem Tarhini

OK, so things we experienced was, first, the earthquake in Turkey, then the flood that happened in Slovenia.

And recently, the blockade and the in the Mediterranean, in the Red Sea.

Where the Houthis are bombing.

So these I would say these are the major crises that we experienced.

So with the with the blockade in the and the Red Sea, the price of delivery from China increased drastically.

So I can give you an indicator for the delivery cost of S Volt module was 1.9€ per kWh then and I think it increased to 9.6 euros per kWh.

Then with the delivery, basically the delivery time drastically increased everywhere and even like now suppliers from China calculate for the sea freight two months.

Which is a very long time. Before it was four weeks maximum.

Just to have a buffer so that they don't have to pay penalties if something happens.

So a direct reaction to things that were happening is that whenever something happens, we go back to the contract, look for the force majeure clause and then contact the customer, contact the supplier and try to not pay penalties and also at the same time try to be nice to the suppliers and also at the same time trying to figure something out in the middle.

It worked out with container basically. Containers were delayed for three weeks, but

Transformers got delayed for a very long time and we were about to get penalties for that.

And yeah, and now like any offer that we receive from China for containers, it is 2 months.

So it's a long time even to consider that. And two months basically we couldn't do anything, like you can achieve a lot on site.

Jakob Thomas Stigler

What did you do about the prices?

Could you change suppliers, or did you just have to take it?

Assem Tarhini

With suppliers, basically we were linked with contracts, so they cannot change the price and we cannot change the price.

This is what is important about dealing with companies in the EU.

That there is always a binding contract between you and the company.

While with S Volt, when they saw like in the module production.

If you look at the prices, the prices division, so two thirds of the price is for the cell and one

thirds of the price is for the other components and the production cost. When the selling price decreased so much, the NFP price, as I told you before, then they realized that the price of the cell is much cheaper than the price of the production.

So This is why they decided to get out of the deal.

And we had a project that should have been delivered in two months.

It was the AboWind project.

So it was for our luck that we found available batteries by Mercedes at the time.

No, this is mainly the risk dealing with suppliers that are not linked to European law.

Jakob Thomas Stigler

What did you do about the uncertainty?

Did you try and find as many new suppliers as you can, or did you stick with the older ones?

Did you diversify geographically?

Assem Tarhini

Of course.

So like basically now we have like first as with the suppliers from Turkey.

So now after what happened with the Transformers, basically, we started looking again for new suppliers, and sorry, I'm going to be a bit political here, in countries that respect private business.

Because in the end also like for us, if we didn't have this buffer of two months in the order, then all of our projects would have been penalized.

Umm, so we started looking for suppliers that are closer.

In Hungary and in Romania.

We're still in discussion with these suppliers and then Italy, of course, we are still in

discussion with these suppliers.

And for other components, so like for battery suppliers, like with S Volt, they offered us also their containerized solution and we will not be dealing with them.

And one of the lessons learned is that if we are going to sign a contract with a Chinese company, we sign a contract with a European entity.

Jakob Thomas Stigler

OK, so you said that you tried to be nice to the suppliers during this time because of course they are not always responsible.

So how did the relationship with those suppliers change?

Assem Tarhini

Yeah, of course.

So like so like with container, basically they had the penalty if they didn't deliver on time, then it is a 5% penalty and we just had a call with them that hey, are you OK?

You know, like we have been working together for three years, so it was on the other side that we were worried about them.

Yeah, you know, like Marco, I've known him now for three years, so I was worried about him and about his family.

That something happened for them, and I would say this was reflected also, when we had problems in our cash flow that also container, DOO have gave us a buffer of time.

This is always, let's say, business practices. And with with BTB also the same thing.

So, like when the earthquake happened and in Turkey I've called the factory first.

So, like, I know some of the engineers there.

So hey, how are you guys?

Are you and your family OK?

Do you need any help?

And then also we delayed some payments when we were short on cash flow.

Jakob Thomas Stigler

Interesting, that's good.

What things that Tricera did before the crisis or that you know of that they did before the crisis have made the impacts off the crisis easier?

Has it been the multiple sourcing?

Or the good relationships or what do you think?

Assem Tarhini

I would say with multiple sourcing.

Yeah, it is possible for operative components, for small components, but when you talk about main components it is basically, you have paid already 50% of the price or even 60% before even receiving the product.

So even if we have other options, most of the payment have been already paid.

So I don't know how much it would work out.

Jakob Thomas Stigler

And all the strategies and measures you took during and after the crisis, do you think they worked?

Have they been effective or did some not work or could you have done something better?

Assem Tarhini

I would say with the buffer, I thought of a two month Buffer is a good is a good thing. Seems that we have to have a higher buffer.

The problem is that if you preorder something three months before it should be ordered because you are afraid that something might happen, this means also you have to pay three months before you get paid by the customer.

This is sometime is not good for the cash flow of the company.

So you should always balance it, you know, because we don't have a high working capital.

So we cannot pay that much before the customer pays us.

Jakob Thomas Stigler

Do you think you will handle sourcing or international sourcing differently in the future?

Assem Tarhini

Umm yeah, I think like the new thing is, I've work within these three years, I've learned a lot, especially with theses crises and more importantly, I would say it is from the how to say like from the legislative side. Like you know which laws are binding in the order.

So like how to manage your security as a customer if you paid money or if you invested time.

Or if there are some delays that might happen where it is our responsibility and where it is the suppliers responsibility.

So because like, Yep, like thinking that only a buffer would solve the problem, then, if a force majeure event happens somewhere, then there is a delay that you should be dealing with, then penalties are pretty much.

And like I've seen it now, whenever you delay delivery then it delays the commissioning of the project.

And then it delays the payment and then when the payment is delayed, you have a lower cash

flow and so then you cannot buy something more for other projects.

And when you cannot buy for other projects, then the project is also delayed.

So I'm looking for more binding techniques to be implemented in the conditional order because even just saying that there is a penalty, this doesn't mean that all problems are resolved.

So I think of interviewing the companies that will do the transport.

Taking live information from the transporters, whether it was in sea, whether it was on land transportation to be able to follow up basically.

Jakob Thomas Stigler

OK, interesting.

And did you observe a difference between local and international suppliers during the crisis?

Could you maybe give a short insight into that?

Assem Tarhini

Umm, I would say like whenever it is local, then the, and I think it's part of the German culture, basically it is that they don't hide what's happening.

Even if the situation was very bad, then the supplier will tell you that this is the situation you know with other suppliers, basically you have to become somewhat of a detective, you know, to understand what is happening, why this is wrong.

So yeah, at least I would say with the local suppliers, yes, we always experience some trouble, but then, you'll still be working with them.

Yeah, with international suppliers, you can just look for someone else.

Jakob Thomas Stigler

And during the crisis with availability, I can remember that German suppliers didn't have availability for, I think was it inverters?

And then we sourced internationally afterwards, right?

Assem Tarhini

Yes.

This is why we started working with GE.

Jakob Thomas Stigler

Yeah. OK.

Uh, that was the supplier part.

Do you think you still have a few minutes for?

Because I think you have worked on the project with Africa GreenTech, right?

Assem Tarhini

Yeah, on all projects.

Jakob Thomas Stigler

OK, it's now about the exports and like international customers, could you maybe say a bit about that?

Did you have international customers?

Assem Tarhini

International customers, international customers, can we consider Solegreen an international customer.

Jakob Thomas Stigler

I think so, yeah.

Assem Tarhini

So I would say it's Solegreen.

Jakob Thomas Stigler

OK umm so I could ask you what ratio of outputs were exported, but it's not a lot, I think, right?

Assem Tarhini

Yeah, not a lot.

Maybe less than 10% even.

Jakob Thomas Stigler

And how did the crisis impact the exporting?

Because I think Africa GreenTech got cancelled and it got shifted to another project in another country, right?

Assem Tarhini

But I think it was more from their side, not because of the supply, because we still have all of the components now here and we're waiting for them.

So maybe I can say like with international suppliers or international customers, so. Maybe

Willy can give you more information about this I think as the project development.

Jakob Thomas Stigler

Maybe I'll ask him about that, yeah.

Assem Tarhini

Because it's gonna be from me some assumptions, you know.

Jakob Thomas Stigler

OK, OK.

So then I'll probably ask him about this.

Now back to the suppliers.

OK, sorry, some things, some measures, some strategies you implemented during the crisis, do you think they will stick to the future or will you or did you go back to the practices from before?

Assem Tarhini

I would say no.

No, like at least with what we experienced, it should be always taken into consideration as in even like if we said that peace is going to happen in Ukraine or in Gaza, but then it's also natural disasters, this is something you cannot expect.

And this is something happening on a regular basis.

So like every year there is something happening every year there is something somewhere happening.

So with the supply chain, I think that more security measures should be taken into account.

Assem Tarhini

More direct communication with logistics.

Rather than depending on the supplier.

Providing how to say like more buffer for us within the ordering process and also with the relation with the customer.

Jakob Thomas Stigler

Thank you very much.

I think that's it.

I just have to ask you, can I name you and tricera or should I make you anonymous?

Assem Tarhini

Umm.

As you wish, I have no problem.

I'm maybe, maybe just a just to tell you something like now.

Now, as in some of the things that that I've learned is that like, OK, so we used to depend on the customer to say like, OK, so incoterms are the DAP, OK, they have to measure to manage the logistics.

Now I'm asking also the communication, direct communication with the logistics company.

So to be always included in the communication in case something happens.

Jakob Thomas Stigler

OK, that's good as well.

You are OK, so bit tighter control maybe.

Assem Tarhini

Yeah.

And The thing is like if we had a like a bigger forecast, let's say, from different companies than to manage these logistics by ourselves.

Like to to get the incoterms as EXWorks, so from factory and then from there we manage everything by ourselves.

So this is something that can be in the future, but now we're still too small for that.

Jakob Thomas Stigler

OK. Interesting.

So thank you very, very much for the very detailed insights.

Very good and very interesting.

I can use a lot of it, I think.

Umm yeah, so I would end the transcription now.

Interview Veldener Präzisionstechnik; Helmut Bachmayr (HB)

Jakob Thomas Stigler

Then I would just get started.

Then I would need a few general things that I have already researched. What industry does the company operate in?

Well, you make precision turned parts primarily for the automotive and mobility industry, is that what I would call it?

Helmut Bachmayr

Exactly, we are an automotive supplier.

Jakob Thomas Stigler

OK.

Exactly how many employees does Veldener have? Their website says 200, is that still up to date?

Helmut Bachmayr

Rather 250.

Jakob Thomas Stigler

All right, OK then I have to ask whether your company is foreign-owned.

It belongs to the Ilmberger family.

Wholly or is there someone else?

Helmut Bachmayr

Yes, wholly. German owner.

Jakob Thomas Stigler

All clear. And owns Veldener shares in foreign companies?

Helmut Bachmayr

No.

Jakob Thomas Stigler

OK, all right.

Well, let's talk in general terms. Which parts of your value chain are internationalised?

Helmut Bachmayr

Yes, 30-40% of the raw material we buy comes from other Western European countries.

Jakob Thomas Stigler

OK, all right, who are these suppliers and what do they do, so just a rough description, are they small companies, medium-sized companies or rather larger ones? Do they also operate internationally and how are they distributed geographically?

Helmut Bachmayr

These are larger steelworks with more than 1,000 employees that operate internationally because they are located in Italy, France and Poland.

Jakob Thomas Stigler

OK, exactly, are these suppliers then also supplied from their home country or also from abroad?

Do you know that?

Helmut Bachmayr

They are supplied from their home country.

Jakob Thomas Stigler

OK.

Helmut Bachmayr

With the main product. These are electric steelworks that melt down scrap and they usually come from the home country.

And of course you need a lot of technology to melt steel, which can come from anywhere.

Jakob Thomas Stigler

Yes, that's right.

You just said that you procure 30 - 40% of your raw materials internationally.

I think Thalhammer Andreas told me that you meant 10%. So it's 30-40%?

Helmut Bachmayr

I haven't done the exact maths myself. We buy a lot from a German refiner, but he only makes bright steel from the Polish steel, i.e. he refines this Polish product. Is it then a German product or is it a Polish product?

You can argue about that.

Jakob Thomas Stigler That's right, that's right.

Helmut Bachmayr

So buying directly from abroad is perhaps 10%, but whatever primary material has been smelted somewhere at some point is probably more.

Jakob Thomas Stigler

OK, what about the machines you use to process everything?

Helmut Bachmayr

These are generally German machines.

We have a couple of Swiss machine manufacturers, but mainly German machines, machine tools.

Jakob Thomas Stigler

OK.

You mean that you were only peripherally affected by the disrupted supply chains caused by the coronavirus and Ukraine?

What does that mean exactly? And how exactly were you affected?

Helmut Bachmayr

We didn't feel any real bottlenecks directly, we were affected indirectly because our customers didn't receive deliveries of important products and they went on short-time working and reduced their orders with us accordingly, we were then affected again secondarily, but our own supply chains weren't broken.

Jakob Thomas Stigler

OK, there were definitely many, many supply bottlenecks, especially with some raw materials, which is what you hear from many others now.

Why wasn't that the case for you?

So did they take precautions or did they react well?

Helmut Bachmayr

Well, I didn't see it coming, so it would be presumptuous to say that I was clever enough to take precautions by filling our bright steel warehouse to the maximum.

We process around 5000 tonnes of bright steel and have a warehouse capacity of 1500 tonnes.

If we had known, we could of course have stored more.

I believe that we have very reliable and resilient suppliers who were able to cushion this very well.

Jakob Thomas Stigler

OK Does that mean that your supplier relationships were so good that you were favoured over other customers?

Or does it mean that they simply didn't have a problem because they were so well positioned?

Helmut Bachmayr

Probably both. Of course, I'm not going to ask in detail why I was delivered on time, as I had ordered, and why there wasn't a delay when things were quite tense everywhere?

Jakob Thomas Stigler

Yes, of course. OK. Were the supplier relationships somehow affected by the crisis, i.e. was the cooperation even stronger?

Helmut Bachmayr

No, it was actually quite normal, normal day-to-day business. It was also helpful that we don't usually buy from a single supplier, but that we should have at least two suppliers and if one had difficulties, the other should be able to step in.

Jakob Thomas Stigler

OK but that wasn't the case for the most part, you mean?

Helmut Bachmayr

Exactly right.

Jakob Thomas Stigler

Was there anything at all that you had to react to?

In terms of the supply chain or was it business as usual?

Helmut Bachmayr

Yes, a bit more communication, proactively keeping track of delivery dates in order to be informed, but... So the flow of information has already been intensified, what used to be normal in the standard process has been followed up even more.

That's what really happened, but it worked well.

Jakob Thomas Stigler

Okay good, yes.

The communication was probably also well received by the suppliers, I assume.

And have you noticed any differences between your international suppliers and your German suppliers?

Helmut Bachmayr

No.

Jakob Thomas Stigler

Nothing at all? OK, I have to say, respect. Your supply chain sounds really good.

That's why you probably won't, or haven't, or probably won't change anything in the way you handle your procurement, right?

Helmut Bachmayr

Yes, exactly.

I think the customers who bought more directly from India or China, who sourced, were more affected by the situation than I was.

Jakob Thomas Stigler

Okay, I believe that.

Now we're actually almost through with the supplier part.

I'd actually like to ask about exports, but of course you're probably the wrong person to ask, or do you get anything from that?

Helmut Bachmayr

Not much, let's put it that way.

I've read or heard about an export quota of I don't know, 30 or 40%, but I'm sure my colleagues in Sales will be happy to talk to you if you'd like to talk to them.

Jakob Thomas Stigler

That would be very good.

I had a look. Mr Schlichter is Team Leader Sales.

Helmut Bachmayr

Exactly.

Jakob Thomas Stigler

Do you think I could write to him?

Helmut Bachmayr

Exactly. Did you read his e-mail address? I can warn him that we've just spoken and that I recommended you write to him and then he won't say no.

Jakob Thomas Stigler

Oh, that was great, that would be super nice, thank you.

OK, one more question. Should you have done anything better, could you have done anything better? Would you have done anything differently in hindsight, or what have you learnt from the crisis?

Helmut Bachmayr

No, even with hindsight, we wouldn't have done anything differently.

Jakob Thomas Stigler

That was a quick number.

But very informative. That helps me a lot. Thank you very much.

Helmut Bachmayr

Gladly, Mr Stigler.

Jakob Thomas Stigler

So now I have to ask, may I mention you and the Veldener by name or should I anonymise them all?

Helmut Bachmayr

Nope, you can name us.

Jakob Thomas Stigler

All right.

Helmut Bachmayr

Who will read this, shall we say?

Jakob Thomas Stigler

My professorship will get to see it, then I'll defend it, a few other students will probably listen to it and it will go to the companies I interview. That would be you now, that would be an English chemical service provider.

A software company from Dresden, a battery storage manufacturer from Dresden, a surface finishing company from Dresden.

Helmut Bachmayr

Who is that?

That interests me.

Jakob Thomas Stigler

The surface refiner, do you know Kama?

Helmut Bachmayr

Yes.

No, if I were the lorry manufacturer from Russia.

Jakob Thomas Stigler

Nope, sorry.

Helmut Bachmayr

There's a kama.

Jakob Thomas Stigler

No, sorry, Kama is the other one. They make printed matter.

And what exactly are they called now?

Helmut Bachmayr

Nope, doesn't say anything.

Jakob Thomas Stigler

OK, all right?

Helmut Bachmayr

Good, good.

Jakob Thomas Stigler

Then thank you very much.

Helmut Bachmayr

Gladly and have a nice afternoon, Mr Stigler.

Jakob Thomas Stigler

Thank you also bye bye.

Helmut Bachmayr

Goodbye, bye.

Interview Yordas Group; Judith Friesl (JF)

Jakob Thomas Stigler

OK, let's just get started.

Judith Friesl

Good.

Jakob Thomas Stigler

OK exactly, so at the beginning, it's about small and medium-sized companies and therefore roughly how many employees did you have in the Corona period?

Judith Friesl

Is to clarify, are we referring to Yordas GmbH or to Yordas as a group.

Jakob Thomas Stigler

We can refer to the group, but you probably have a better overview of the GmbH.

Judith Friesl

It's probably easier with the group.

I think that during the corona period, I think that in 2020 we had around 60-70 employees worldwide, I would say.

Jakob Thomas Stigler

OK, then I need to clarify which sector you work in.

So you're in the support, well, I've had a look on the Internet, support for import and export companies in complying with chemical regulations, categorising chemical products and advising on requirements, hazard communication.

You also test chemicals, as far as I know, right?

Judith Friesl

No, not at all. We help to carry out the tests, but we don't test ourselves, we don't have a laboratory.

Jakob Thomas Stigler

OK, so you have your product stewardship programme with Yordas Hive or Jaras Helix now, right?

Judith Friesl

Mhm, exactly exactly with software, exactly.

Jakob Thomas Stigler

Exactly, and then advises on sustainability strategies, chemicals management and so on.

Exactly.

That's it, or do you have more?

Judith Friesl

Mhm, exactly, that fits.

Judith Friesl

Training a bit, but I think that's also part of the counselling in this case.

Jakob Thomas Stigler

OK, all right.

Then I have to ask about the categorisation of the company, are you foreign-owned?

Judith Friesl

Yes.

Jakob Thomas Stigler

Mhm and you also own parts of foreign companies, so quasi Yordas Group, owns the GmbH?

Judith Friesl

Exactly.

Jakob Thomas Stigler

OK, good. Then, which parts of your value chain are exactly internationalised?

Well, I'm mainly looking at international procurement and exports.

Exports naturally also include exports of services.

And I'm guessing that suppliers and international procurement play a smaller role for you now, right?

Judith Friesl

Yes, because of course we don't procure that much, if I were to look at it now for Germany, so yes, for example, there are things in the laboratory that are of course outsourced, depending on the standard, but then also abroad, exactly, and of course export is of course very international.

Jakob Thomas Stigler

Ok, well then I would just skip the supplier part because it's such a small part.

Judith Friesl

Yes.

Jakob Thomas Stigler

Most of the focus will now be on exports.

Exactly, so you have a lot of international customers.

Can you roughly outline them? In other words, characterise them?

Are they large companies that you help or are they smaller ones?

Judith Friesl

I would say it's a mixture. So we really do have something from the very small 2 or 3 man businesses to the really big ones that we do.

Depending on what kind of service it is, of course.

Exactly, so depending on what kind of service it is, in one category it might be the larger ones and in the other it's probably more of a mid-to-large size focus, but we also have some large enterprise customers.

Jakob Thomas Stigler

Mhm, OK.

You probably don't just have international customers, but also, well, now we can assume Germany for the GmbH and England or the UK for the Group.

What share do exports have and what share does the domestic market have?

Judith Friesl

Is it now, or not then?

Jakob Thomas Stigler

Happy to do both.

Judith Friesl

Because we more or less only started with internationalisation in 2019, so actually, no, no, that's not true.

We started with the locations there, exactly before that it was all UK, so I would say at the beginning of Corona was maybe, well, if you look mainly at the UK now, probably a good 70% export and because we now also have the locations in Turkey, Germany and Canada, of course, exports are declining a bit because we are no longer exporting, so yes, but I would still, probably still around 50-60%, I would still say.

Jakob Thomas Stigler

OK, but relatively much.

Judith Friesl

I would say that we have the 50%, yes, exactly, the majority of that is actually in Asia, we have a lot from Japan.

We had a little bit before Covid, also because we grew ourselves, nothing to do with Covid, but I think we only had one country accounting for a good 70% in total and now it's better distributed.

Jakob Thomas Stigler

OK, interesting, great.

Exactly and your local customers, i.e. the customers of the GmbH in Germany now and the customers of the Group in England, are they large customers who also export or are they customers who then only work locally?

Judith Friesl

No, they are also companies, a mixture in terms of size, but they all actually export, and that's why they come to us, because we help them in some way.

Jakob Thomas Stigler

Ah, yes, sure, that makes sense, that's right.

Judith Friesl

Yes, exactly, so theoretically there could be the odd one or two, but I would say 99% export.

Jakob Thomas Stigler

OK, so you only have chemical companies that are also producing, right?

Judith Friesl

No, it really is, chemistry is one area.

The chemical companies are usually not the really big ones, because BASF probably has a larger regulatory department than we have employees in total.

They tend to be the larger midsize companies, and then we have some very large, really manufacturing companies, a lot of automotive companies, for example, which we have, and then there are actually all the manufacturers that you know, or electronics companies, exactly, but then they take a different, a different part of the service.

Jakob Thomas Stigler

OK, I think I've also heard something about toy manufacturers.

Judith Friesl

Yes, toys are also included, I don't know about retail toys, theoretically, because everywhere that contains chemicals, and it's almost everywhere, is theoretically our customer, but that has crystallised a bit, especially in the automotive and aerospace sectors, where they always have a longer life cycle.

Yes, exactly, but theoretically it's also consumer goods.

It can really be anything.

Jakob Thomas Stigler

OK.

Then let's talk about the crises, because I'm writing about how small, medium-sized and medium-sized companies that are international have behaved during the crises.

How did the corona crisis and the Ukraine crisis affect your sales?

Judith Friesl

So Corona, I would say that it hasn't really affected us, or at least not negatively.

Maybe at the very beginning, because of course there was a bit of uncertainty among customers as to whether they would continue to export somewhere or not and so perhaps that also declined a bit, but it recovered relatively quickly, because a lot of things are simply moved by deadlines, whether they have to do something or not, and if they were still there, then they had to continue to do it, unless they had completely stopped their imports or exports, so there was still something.

What may even have had a slightly positive effect for us was that we were not always represented at the largest chemical sites and therefore, what others may have previously done a lot with, oh, I'll just pop across the road and so on, which built up a lot of relationships, which we never really did, nobody did anymore and if we now have our site a little further away, it didn't really matter in that case, so it may even have had a few positive effects.

Ukraine was of course similar, you could tell that the companies had become more cautious about what else they were doing. For a short time, we didn't have that much, but shortly before that, Russia had actually introduced chemicals legislation, where we actually had a few customers, where we were also active, and of course we had to stop that completely.

And we actually had relatively few Russian customers.

And of course we also had to stop that, but yes, it was more the case that European or Western companies could no longer go to Russia.

So of course we had planned for that, that a little more business would be permanent, because that had just started, exactly, so that probably set us back a little bit and at that time the general uncertainty, but I would say now, especially in the chemical industry, of course you notice, especially electricity prices, was not directly a point for us, but of course that customers have become more economical and then really thought about, yes, do you do that now or can you maybe sit it out a little longer.

So that was one of the things we noticed.

Jakob Thomas Stigler

Exactly, you're saying that you planned a little bit that something would break away during the Ukraine crisis. Had you implemented any precautions against the crises, even though you couldn't have known that the pandemic was coming?

But had you implemented anything against crises beforehand?

Judith Friesl

Not really for something like that, which we used to, we do have a business continuity plan, but that came out differently.

We once had a major power outage lasting 1-2 weeks in Lancaster when we were only in Lancaster.

So it was more a case of being able to access the computers, how is backup, how do you communicate internally, so we were prepared for that by now, but of course not for the others, so that was actually new, so we didn't have that in there, so we have now also included it in every contract, of course, under the force majeure is now of course also pandemic, so we have now learnt that.

Jakob Thomas Stigler

And how did you react to the crisis or crises?

When you said you had a cancellation, customers were a bit unsure whether they could afford it.

Did you do something about it or did you just carry on doing your thing?

Judith Friesl

Well, I think we've still tried to do our thing somehow, of course, to continue to be present.

Well, we've reorganised a bit. One area is training, for example.

We did quite a lot of face-to-face training.

Then we started creating e-learning courses, so of course we've already done something there.

I mean, before that, a lot of communication was done by email, so there wasn't that much change.

I think we were also relatively quick and good at setting up IT tools, but yes, that was the area where we had to come up with something a bit different. Exactly, I mean, we don't have any exports or anything that would have restricted us, so from that point of view. What has actually been a bit positive for us, you wouldn't dare say it, but of course the boom in disinfectants.

And then all the countries passed a law saying that they had to be a little less strict, but then every brewery suddenly started producing disinfectants, so a lot of things from the food sector were changed over and that was of course a bit of a deal for us, of course, that we also supported the fact that it was still done reasonably correctly, exactly. So it's not a bad thing, it's also a positive thing, so it's the same, so corona was now, except probably in the beginning, when it was really uncertain. So on the whole, I think we got through it relatively

well. And then with Ukraine, it was more a case of basically seeing economic stagnation or a downturn, which of course doesn't pass without a trace, so everyone is simply more cautious and things like that.

Jakob Thomas Stigler

Yes, in terms of communication with customers, has anything changed?

You said that you communicated quite a lot by email before, and then you switched from face-to-face training to e-learning, but everything else probably stayed the same, didn't it?

Judith Friesl

Well, of course there's a general trend away from a normal telephone towards somehow having other things, so you've already noticed that, where before there was more communication in this way, where you might have simply called, now you do something, clearly for one, of course that's changed.

Apart from that, not so much has changed, yes, perhaps, as I said, it has also improved a little for us, that we have, I think, received it positively. And the fact that customers now perhaps don't expect you to come round all the time and so on, so I think we've really benefited from the fact that we're spread out and the team is spread out. So I think it's rather positive.

Jakob Thomas Stigler

OK, good.

Exactly, did you notice any differences between national and international customers, or between different regions, i.e. customers in different regions? Were there any differences?

Not just in terms of communication, but also in terms of sales, how much has demand fallen, or where perhaps even more?

Judith Friesl

I'll have to think about it.

I can't think of anything off the top of my head now, so maybe that infers it wasn't so obvious.

Nope. Nothing very obvious now. For example, we didn't do much business with China or anything, those were the ones where nothing went out in terms of goods for a long time, but that's not the case, we didn't have much there, so there wasn't anything very obvious. I wouldn't say that now.

Jakob Thomas Stigler

OK, well the Russian business then, but there wasn't much there anyway.

Judith Friesl

Yes, but that was also relatively small in terms of total sales, so that's why.

Jakob Thomas Stigler

Were there other international aspects that influenced the crises for you?

Judith Friesl

Yes.

Well, not necessarily the crisis. What is a big issue for us is the inflation in Turkey.

But I don't know, that probably has nothing to do with the crises.

Jakob Thomas Stigler

Nevertheless, this is also a crisis, so I'm happy to hear it.

Judith Friesl

It's a national crisis, which is of course already a problem for us, yes, because of course we have the employees there, the salaries double every year, so of course in Turkish lira in the exchange rate, if you convert them into pounds or euros, it remains reasonably stable, but of course you have to make sure that you can still feed the employees and pay their rent and it's not always easy. And of course that's why it's what we would probably have hoped for, that we could perhaps tap into the Turkish market more, but it's difficult because when we have the costs in euros or pounds, it's simply not affordable.

Yes, so it's difficult to open up the Turkish market per se.

Exactly.

Jakob Thomas Stigler

OK. What would you say were the most important measures you took during the crises?

Judith Friesl

Well, the advancement of digitalisation in any case, so that you can simply maintain communication with each other, has also improved over time, I think.

I can still remember the international locations very well.

At the beginning in Germany, everyone was in one office.

I was on my own and there were no good conference facilities, so of course that has improved a lot, also internally, which is also very important.

What else do we have?

Yes, I think we planned better in general.

Yes, especially when the inflation, I mean, that was Turkey on the one hand, but of course

also in the other countries, so that was also in Germany, or elsewhere, inflation was now also reasonably high, now not one hundred per cent, but also reasonably high.

And we simply had to react to that somehow. Because, of course, costs have risen massively, but you can't always pass that on to the customers straight away, so you really have to pay a bit more attention to cash flow and internal costs for a while, so that you can absorb that and support your employees during that time.

Exactly, so that was probably mainly internal.

Yes, and as I said, digitalisation, I think that simply goes both ways, that you can continue to maintain close contact with customers, that you are still there for them.

Jakob Thomas Stigler

Yes, what about working from home? Did you have that before?

Judith Friesl

I don't even think about that any more.

Jakob Thomas Stigler

Yes, that's always the biggest thing, it's just become so normal, yes.

Judith Friesl

Exactly, yes, for me that was probably part of digitalisation, yes, of course we introduced it straight away and will probably never give it up again.

So I think that has actually turned out to be a bit of a positive thing for us, as I said, especially because of the communication among the team, that it has given us the opportunity to hire colleagues that we might otherwise never have been able to recruit because nobody would

have moved here and there and so we now simply have colleagues sitting in London who would no longer move up to Lancaster, or colleagues sitting here in Düsseldorf and so we can actually really just expand our talent pool.

We will continue to do so. So we're not introducing so and so many compulsory days or anything like that. I don't think a small company can afford that.

Jakob Thomas Stigler

Yes, that's right, and as long as it works, it's perfect.

Judith Friesl

Yes.

Jakob Thomas Stigler

Exactly, I'll come back to that in a moment. Did all the measures work or were there also some where you say or you say it wasn't so good?

Judith Friesl

I probably suppressed them, or we didn't do them anymore and then gave up, and then it's difficult to get back into it.

It certainly didn't all work straight away, so I'd be lying if I said that.

But I can't remember anything in particular.

Of course, you have to find your way in somehow, especially how you communicate with customers, to find a better system.

I can't think of anything now. We've also just learnt, as I said, about inflation in Turkey, for example, how do you deal with it?

How do you react with salary increases, or are they not salary increases, are they just inflation adjustments?

I think we have already learnt how to react better, how to react faster.

Exactly, so we've definitely learnt that, but I can't think of anything specific where I would say it hasn't worked at all, maybe we've given up on it straight away.

Jakob Thomas Stigler

Ok. Have you changed anything then and will you keep it the same? Perhaps to be able to cope better with a new crisis. So you've already said that you'll continue to work from home?

Judith Friesl

Exactly, working from home in any case. I think that we've also become more resilient again and that we're now better protected in terms of contracts. Also, what happens if a pandemic somehow just appears or something like that just happens?

Of course, we've now also secured ourselves better on the contractual side.

Yes, I think those are the two main points and simply that we are better prepared in terms of processes if colleagues are absent for a longer period of time. Another point that comes to mind is a bit of a contractual issue, but not just in terms of the pandemic, but also more in terms of sanctions lists, for example.

Which countries can you do business with?

Of course there were before, but now it's become a bigger issue again.

Because it may not have affected some countries so much before, but you just have to be more aware of it, because it's just very, you have to constantly sign something that our customers don't buy anything from Russia, for example, so about once a week I sign

something that no customer, because we then represent them as legal representatives, that somehow something from Russia doesn't come in somewhere, so that's something that you just really, it becomes a standard process now and you're a bit more prepared for it.

Jakob Thomas Stigler

OK, so that means you're now more selective about which regions you accept customers from?

Judith Friesl

Yes, well, we probably have better processes now that we can look at. So we don't just automatically rule things out.

But we've probably set up better processes so that we can see where we need to look, what we're allowed to do, what we can do, what we might not want to do?

Is it somehow worth the risk or not?

That you then say, "Ah, that's really in the grey area, let's just leave it, it's just not worth it for the other business to do that, and I think we've become more aware of that and then of course we've also learned how to manage it better.

Jakob Thomas Stigler

Mhm, that means that and communication is what you have now taken away from the crisis, what you will handle differently in the future in terms of exports or customer relationships.

Judith Friesl

Yes yes, I think so, yes. It's an ongoing process, of course, but yes.

Jakob Thomas Stigler

Very interesting and do you think the proportion of exports will increase again in the future, if you mean you started with the international locations in 2019, you now have the EMEA thing a bit, but where you said earlier, maybe not quite like that.

But do you think there will be further internationalisation?

More locations or not for now?

Judith Friesl

Yes, locations, we now have one person in the US, although that's a special setup, not in that way. We added Japan a year ago and new ones, actually this month, colleagues have started there, but now yes, it may be that one or the other standard will be added, but I don't think we're going to open 3-4 new locations within 2 years, I don't think so.

That has to make sense somehow. Maybe something will happen in South America, the USA is still like that, do you really need your own location? But I think that's probably it, I would see that as the most obvious, otherwise you will probably work with other systems with agents or something like that.

Jakob Thomas Stigler

Mhm, OK, interesting.

That's actually about it.

Judith Friesl

Yes, great, good.

Jakob Thomas Stigler

Yes, then I have to ask, may I mention you and Yordas by name or should I rather anonymise you?

Judith Friesl

I don't think there's anything too critical in there. I don't think I mentioned any big numbers or anything. So I think that's OK.

Jakob Thomas Stigler

I can also send it to you before I give out the final version somehow, it will go to the interview partners and to the professorship and there will be a few other students at the defence who will hear it.

I can also send you a summary of what I've used from you before I finalise it.

Judith Friesl

Yes.

Jakob Thomas Stigler

And of course you'll get the finished Master's thesis.

Judith Friesl

I'm curious.

Jakob Thomas Stigler

Mhm, it's probably a hundred pages long.

Let's see if you want to read it.

Judith Friesl

I'm not excited, super good.

I hope that there's something interesting and that you can pull something out of it.

Jakob Thomas Stigler

Yes, a lot.

Judith Friesl

If anything is still unclear, just let me know.

Jakob Thomas Stigler

OK.

Judith Friesl

Exactly good, then I wish you lots of fun writing.

Jakob Thomas Stigler

Thank you very much.

Thank you very, very, very much for taking part and.

Judith Friesl

OK, then no problem. We'll probably hear each other. Exactly, we'll probably hear each other somewhere or we'll always see each other.

Jakob Thomas Stigler

Definitely, man, she's still running around, then have a nice Friday and a nice weekend.

Judith Friesl

Thank you, you too. Bye.

Jakob Thomas Stigler

Thank you, bye.