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Port-related Conflict at Port of Gothenburg- Consequences from a Fashion Retailer's Perspective

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Abstract

Risk management of supply chains has received increasing attention from researchers, as disruptive events have become more challenging to manage. The 2016 port conflict at the major logistics hub in Scandinavia, Port of Gothenburg, caused severe consequences for companies operating in the region. Among the industries impacted by the port conflict, the fashion retail industry can be viewed as more vulnerable to supply chain disruption, owing to specific characteristics such as short product life-cycles and volatile demand. This paper aims to investigate the effects of the conflict in Port of Gothenburg from the perspective of retailers in the fashion industry, and how they managed the disruption. Four different companies within the fashion retail industry were analysed together with a contrasting case having a different transportation set-up, by the means of semi-structured interviews with key stakeholders. The findings indicate that the studied companies have experienced substantial consequences, in which disruption in transportation and increased logistics cost are the most prominent. Within the increased cost, transportation cost was estimated to occupy between 15% and 70%, depending on companies' different solutions to the port conflict. A calculation given a company with 500 TEU during a 3-month port disruption reveals that the loss may range from 750.000 SEK to 3.500.000 SEK. Although the companies conduct risk assessments, little attention has been paid to the mitigation of high impact/low frequent events like port conflicts. Instead, prevailing solutions were preferred and considered to be adequate in dealing with the disruption. Additionally, few alterations in the risk management strategies have been made after the port event. Taking into consideration of the negative effects faced by the companies during the investigated period, if any disruption would occur again for a longer period of time, the companies may face even more severe consequences and bear higher costs.

Keywords: Port Conflicts, Risk Management, Fashion Industry, Retailers, Supply Chain Disruption, Disruption Consequences.

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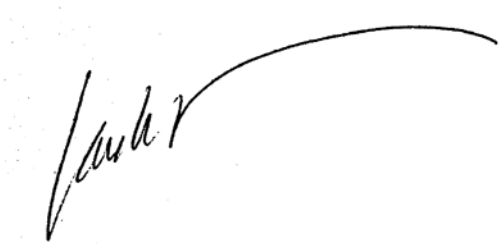

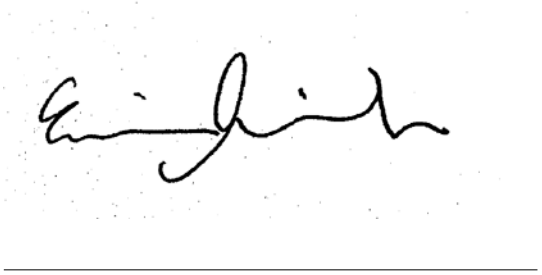

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Abbreviations

DC	Distribution Center
40ft	40-foot (container)
HP	Hewlett-Packard
IT	Information Technology
NUMMI	New United Motor Manufacturing
SEK	Swedish Krona
TEU	Twenty-Foot Equivalent Unit
U.S.	United States

1. Introduction

1.1 Background

The environment of manufacturing and supply chain operations has significantly changed in recent years. As such, supply chains have increasingly exposed to a variety of risks due to the integration of markets, the shorter life cycle of products and the urge for lean production. Disruptive events such as natural disasters, accidents and financial crisis have caused enormous losses in supply chains (Tang et al., 2012). Risk management thus has evolved into a critical part of supply chain management and received considerable attention from previous research. The 2016 port conflict at the major logistics port in Scandinavia, Port of Gothenburg, posed an opportunity to study risk management and strategies in the context of major port disruptions, in this case, a labour conflict. The conflict has since 2016 created uncertainty in one of Sweden's most important logistics node. It involves two trade unions which both represent dockworkers, and the employer APM terminals. The multi-national company APM terminals started operating the container terminal in Port of Gothenburg in 2012. From the beginning of their operation in Gothenburg, they signed a national collective agreement with the Transport Workers' Union. The Transport Workers' Union has approximately the same number of members on a national level as the Swedish Dockworkers' Union, but notably fewer locally in Port of Gothenburg (Ahlberg, 2017). Without a collective agreement, the Swedish Dockworkers' Union is entitled to take industrial action according to Swedish labour regulation. The Gothenburg chapter of the Swedish Dockworkers' Union (Hamnfyran) has expressed their dismay with the working conditions at the port, among others, the utilization of poor IT systems and an increasing number of grievances from queuing customers (Svenska Hamnarbetarförbundet, 2018). Despite representing most of the employees at the port, Hamnfyran raised several complaints of being excluded from decisions influencing their working environment (Helgesson, 2018; Svenska Hamnarbetarförbundet, 2018). As such, during April 2016 Hamnfyran took its members in a two-day long strike. APM terminal has questioned the Swedish Dockworkers' Union's right for representation at the cost of the company, referring to their existing agreement with the Transport Workers' Union. In response to the strike, APM has offered the Swedish Dockworkers' Union an identical agreement to their agreement with the Transport Workers' Union, which has been turned down (Ahlberg, 2017). Consequently, both Hamnfyran and APM terminals requested assistance with mediation from the national government in November 2016 (Bergsten & Makboul, 2018). However, these

mediations have not yet resulted in an agreement between Hamnfyran and APM. Measures such as employer blockades, downsizing and additional strikes have been used to undercut each other's influence at the port. The difficulty in finding an agreement between the parties is the backdrop behind the long-lasting conflict (Sveriges Skeppmäklarförening, 2017).

1.2 Problem discussion

During 2017, the container volumes at the port of Gothenburg decreased with 19 % (Port of Gothenburg, 2017). This decrease was most drastic during the summer, when APM closed the container terminal for six weeks during evenings and night-time, to undermine Hamnfyran's industrial actions. Many industries whose supply chains rely heavily on the smooth logistics operation could not avoid being negatively impacted. Companies using the port of Gothenburg across Sweden decided to re-route their shipments and the container volumes decreased by 60 % during the month of June alone (Bergsten & Makboul, 2018). A recent study by *Svenskt Näringsliv* estimated that 25 % of 478 studied companies have been affected by the port conflict, of which 51 % have taken measures to minimize the negative effects and 13 % have stopped using Port of Gothenburg completely. SKF, Volvo AB and Stora Enso are examples of large companies that have re-routed their shipments (Svenskt Näringsliv, 2017).

Supply chain disruptions can significantly interrupt materials, information and cash flows, leading to a decrease in sales or an increase in costs for companies. The severity of these impacts depends on the type of disruption and companies' degree of preparation (Chopra & Sodhi, 2004). The port conflict has resulted in high uncertainty in the movement of containers and cargoes at the container terminal at Port of Gothenburg, creating disturbances in the transportation flow for companies using the port. Some studies in the past have reported that most port related industries have implemented an additional inventory strategy for mitigating port disruption risks (Lewis et al., 2013; Chopra & Sodhi, 2004). However, for industries that have short life-cycle products and prefer a short lead time, using backup inventory is often inapplicable due to the risk of obsolete products (Chopra & Sodhi, 2004). Consequently, these industries are likely to have more severe consequences in the event of a port conflict and their strategies in dealing with supply chain disruptions may differ significantly from others. The fashion retail industry belongs to this category, with specific characteristics which makes it more vulnerable to supply chain disruption (Christopher et al., 2004). Some of these attributes include short life-cycles, impulsive purchasing behaviour and volatile demand. In detail, fashion products are normally seasonal and thus have a short life cycle, characterized by rapid sales growth to a peak followed by immediate decline, leading to the need for highly efficient

replenishment processes. Additionally, the purchasing behaviour of fashion products is impulsive as consumers make decision at the point of purchase, making the availability of products crucial. The demand is unpredictable and volatile since it is affected by phenomena such as weather and entertainment trends. Thus, it is vital for retailers in the fashion industry to obtain a short lead time. However, the growing trend to source products and raw materials from low cost countries has hampered this objective due to a more complicated supply chain (Christopher et al., 2004). Therefore, companies in the fashion industry may have suffered negative consequences and struggled finding appropriate strategies to deal with the delay caused by the port conflict.

1.3 Research gap

While previous researchers have distinguished the risks of supply chain disruptions (Norrman & Jansson, 2004; Kleindorfer & Saad, 2005; Chopra & Sodhi, 2004; Wakolbinger & Cruz, 2011) and the negative effect of supply chain disruption on operational performance in terms of sales, costs and inventory (Hendricks & Singhal, 2005; Wilson, 2007; Vilko & Hallikas 2011), few have studied supply chain risk management and strategies in relation to port conflicts. Gurning and Cahoon (2011) focused on the impoverished services related to port operation during disruption, although had limited analysis on the impact of companies using the port. Hall (2008) and Carvalho et al. (2018) have studied the effects of port disruption, Hall (2008) during the West Coast Port lockout in the U.S. in 2002 and Carvalho et al. (2018) during the strike at Port of Lisbon in 2012. Their research acknowledged some of the consequences faced by companies using the ports, however, none of the authors discussed how differences in strategies affected the severity of these consequences. Regarding the fashion retail industry, previous research in supply chain risk management has emphasized on managing uncertain demand (Masson et al. 2007), risks of high switching cost from dependence on key suppliers (Christopher et al. 2011) and increasing agility to manage short life-cycle products (Li et al. 2006; Masson et al. 2007). Considering the vulnerability of the supply chain of fashion retailers in terms of lead time and volatile demand (Christopher et al., 2004 & 2009), supply chain disruption and risk management of low frequent and high impact events such as the port conflict serve as interesting areas to investigate. It is apparent that there is room for further explorations of port related disruption, especially within the segment of fashion retailers.

1.4 Research purpose and questions

The purpose of this study is to investigate the effects of the conflict at Port of Gothenburg and how they were managed from a risk management perspective of retailers in the fashion industry, by conducting in-depth case analysis of five companies. Thus, the following research questions were formulated:

- What were the primary impacts of the conflict at Port of Gothenburg on retailers in the fashion retail industry during the summer 2017?
- What were the risk management strategies that the retailers in the fashion industry have used before and during the Gothenburg port conflict?
- To what extent have employed risk management strategies been successful?
- How have the retailers revised their risk management strategies in relation to future disturbances related to the Port of Gothenburg?

In order to answer these questions, a literature review on different categories of supply chain disruption consequences and risk management was performed, followed by empirical findings from interviews with case companies. Subsequently, an analysis was formed by comparing the results of the case studies with the literature, to provide insights on the consequences they have experienced and their applied risk management strategies.

1.5 Delimitations

This research focuses on the fashion retail industry and the conflict at Port of Gothenburg, which is considered as a significant disruption in the supply chains of the interviewed retailers. Therefore, the port conflict is assumed to be the main cause of the discussed consequences, and other events that happened during the studied time period serve only to amplify the effects of the disruption. Fashion retailers have received limited attention by previous researchers in the context of risk management and port conflicts, per the presented discussion in the research gap. Hence the selected cases were limited to the fashion retail industry with supply chains designed to rely on Port of Gothenburg. The investigated companies have distribution centers (DCs) strategically located in proximity to Port of Gothenburg, to shorten the inbound transportation needed to their DCs from the port. A contrasting case, which uses an intermodal transport solution in connection to a dry port for the transportation from Port of Gothenburg to their DCs was included to highlight differences. These design features of the supply chain were used to study the effect of the conflict, since the disruption caused by the conflict at Port of Gothenburg challenged this set-up.

In terms of investigated time frame, this study was limited to investigate the consequences faced by the case companies during the conflict at Port of Gothenburg and their risk management strategies applied before, during and after the disruption. The most recent and longest disturbance caused by the conflict at Port of Gothenburg occurred during the summer of 2017, it was therefore the main investigated period of time for this research. When discussing the risk management strategies applied by the companies before and after the conflict, the objective was to illustrate the effect of the port conflict on the companies and how they managed their logistics set-up. Emphasis was put on finding differences, to distinguish if the Port conflict had any effect. Particularly the effect on the management of transportation, distribution of goods and costs since all the companies relied on Port of Gothenburg in their supply chain design.

The literature review within supply chain disruption and risk management was not limited to Port related disruption. As highlighted previously, there is limited research available within supply chain risk management in relation to port conflicts. Therefore, attempts have been made to depict the main perspectives which have been researched previously within this field. The literature review is focused on supply chain disruption risks which are of low frequency and high impact, and not on recurrent operational risks since port conflicts have previously been classified as the former type of risks (Oke & Gopalakrishnan, 2009). Three subcategories within the literature review were created to fit the design of the research: consequences of supply chain disruption, risk mitigation strategies and contingency strategies. Literature within consequences of supply chain disruption was used to investigate the impact of the port conflict on the retailers. Since Tomlin (2006) and Tang (2007) suggested that risk mitigation can be used before disruption and contingency strategies during disruption, these two subcategories have been investigated to illustrate how the retailers could manage supply chain disruption before, during and after the Port conflict.

2. Literature review

The literature review consists of findings within the field of supply chain disruption- and risk management research. The keywords applied when searching for applicable literature were: supply chain disruption, risk management, port conflict, fashion industry. These keywords were chosen to enable comparisons of relevant literature with the empirical findings in order to answer the intended research questions. After the initial findings, thorough reading and further explorations of the collected references allowed the authors to identify the principal scholars and research within the focused fields.

2.1 Supply chain disruption

When categorizing the supply chain risks, operational or recurrent risks and disruptions are the two most researched risk categories in the literature (Norrman & Jansson, 2004; Kleindorfer & Saad, 2005; Chopra & Sodhi, 2004; Wakolbinger & Cruz, 2011), and the majority of risk events belong to one of these two types (Talluri et al., 2013). Operational risks, which are commonly high-likelihood, low-impact risks, arises from issues in coordinating supply and demand, deficient processes, people and systems (Kleindorfer & Saad, 2005; Lockamy & McCormack 2010, Sheffi & Rice; 2005). Meanwhile, disruption risks refer to high-impact and low-likelihood risks, arising from natural or man-made disasters such as earthquakes, floods, terrorist attacks, labour strike and fires and affecting companies in a major way (Kleindorfer & Saad, 2005; Chopra & Sodhi, 2004). Previous researchers have also defined supply chain disruption as a combination of unexpected and unintended events occurring upstream in the supply chain network, which threatens the business operation of the focal company (Bode & Macdonald, 2017; Bode et al., 2011). Specifically, supply chain disruption interrupts the material flows, resulting in a sudden stop in the movement of goods (Wilson, 2017). Hendricks and Singhal (2005) examined the reported shipping delays and several supply chain disruptions in the *Wall Street Journal* during the 1990s and came to the conclusion that the firms which suffered the disruptions under-performed their competitors dramatically in inventory and operational performance as reflected in costs, sales, and profits. Accordingly, based on a sample of 885 supply chain glitches announced by publicly traded firms, disruption-experienced firms were reported to have 6.92% lower sales growth, 10.66% higher growth in cost, and 13.88% higher growth in inventories (Hendricks & Shinghal, 2005).

2.2 Consequences of supply chain disruption

The consequences of supply chain disruption are not only challenging for managers to deal with, but also to calculate in quantifiable terms. Given the complexity of modern supply chains, the difficulty is high in estimating the impact of disruptions (Manners-Bell, 2017). Although the most common measure is phrased in terms of costs, not all consequences can be measured in financial terms. Some alternative measures relate to activity completion and aspects of timing (Waters, 2007). However, even when measures exist, they are not as straightforward as they appear. For instance, delay measures are viewed differently by different companies depending on their mission. If a company's mission is achieving the highest level of customer service, any delay that compromises this service level may lead to high costs. On the contrary, if a company's mission is to maximize profit, it is more likely that a delay will not affect the company as much. Therefore, the values given to consequences are generally approximation and depend on individual interpretations (Waters, 2007). Previous authors have discussed some consequences of significance during supply chain disruption (Hendricks & Singhal, 2005; Gurning & Cahoon, 2011, Wilson, 2007; Vilko & Hallikas, 2011; Christopher et al., 2004; Carvalho et al., 2018; Hall, 2004). These are presented in table 2.1 and discussed further in the upcoming sections, to provide a context and the authors' interpretation of the consequences.

Table 2.1: Categorization of consequences of supply chain disruption (Source: Author)

Consequences	**Description**	**Authors**
Transportation network	Longer distances of transportation Delay in transportation Change in logistics set-up (routing, location of warehouse, mode of transportation) Delayed handling of cargo	Hall (2004); Carvalho et al. (2018); Gurning & Cahoon (2011)
Logistics cost	Increase in logistics cost stemming from: - Change in transportation mode - Change in transportation routes - Expediting premium freight - Obsolete inventory - Additional management fees	Gurning & Cahoon (2011); Hendricks & Singhal (2005); Hall (2004); Carvalho et al. (2018); Vilko & Hallikas (2011)
Supply chain performance	Increase in lead time, Fluctuations in inventory Poor resource utilization: - Additional management - Negative effect on team stability - Inefficient decision making - Over-time	Hendricks & Singhal (2005); Wilson (2007); Vilko & Hallikas (2011); Christopher et al. (2004) MacDonald & Corsi, 2013)
Commercial aspects	Loss in sales Deteriorating business reputation Additional marketing Poor customer service Penalties to the customer	Hendricks & Singhal (2005); (Gurning & Cahoon (2011)

2.2.1 Consequences in transportation network

Disruption of transportation flow can occur as a result of a subgroup of drivers, such as labour disputes, natural disasters, infrastructure failures and terrorist activities (Chopra & Sodhi, 2004). When it comes to maritime related disruption, Gurning and Cahoon (2011) suggested a structure of maritime disruption event (as seen in Figure 2.1), including stimulators that may cause the disruptions, two-layer disruptions and their consequences on business firms.

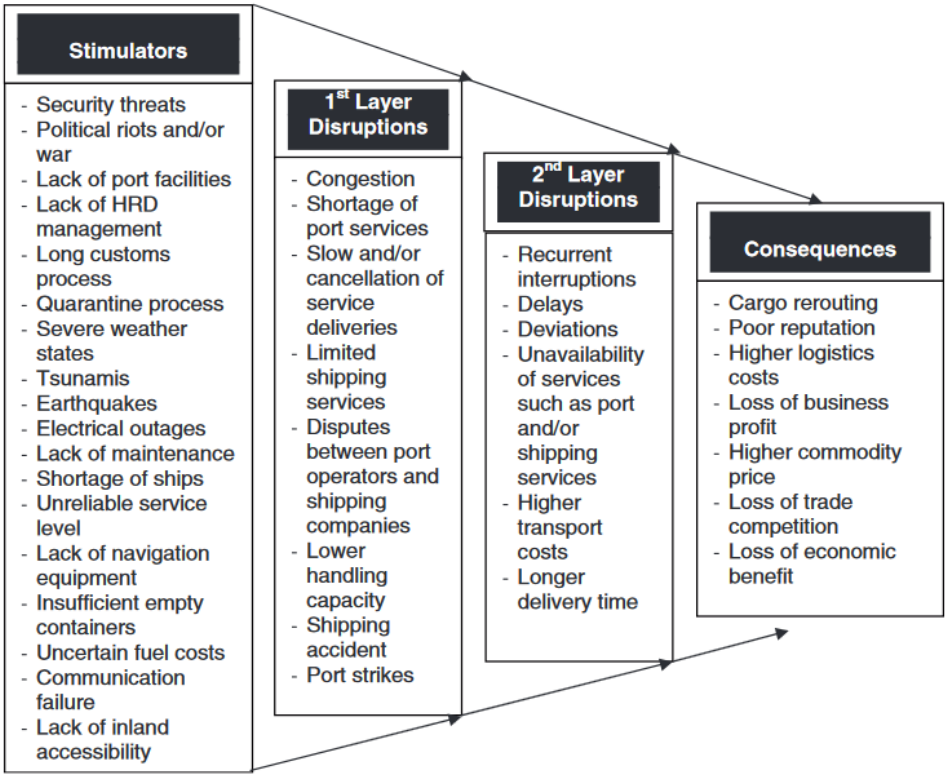

Figure 2.1: The structure of maritime disruption event (Gurning & Cahoon, 2011, p.253)

As such, the first layer disruptions arising as a result of the stimulators consist of events such as congestion, shortage of port services, limited shipping services and port strike. Subsequently, the second layer disruptions include delays, longer delivery time, deviations and the unavailability of maritime services due to port stoppages or no shipping services on specific routes.

A case study by Carvalho et al. (2018) mentioned the negative effects of the port of Lisbon's strike, caused by a law implemented in 2012 regulating labor in ports, on the operation of freight forwarders, ship-owners, cargo-owners and port operators. In details, a port strike impacted the maritime services, resulting in incapacity to containerize all cargoes, delaying the

handling and managing of cargo, which in turn severely disturbed the schedule planning of all the related actors. This situation was further stressed by the inability to load or unload the cargo in the scheduled period during the strike.

2.2.2 Consequences in logistics cost

A specific case regarding the increase in transportation cost and change in logistics set-up was investigated by Hall (2004). An 11-day shutdown of the West Coast ports in the fall of 2002 affected several industries, as the result of a lockout of potentially striking port workers. The six largest ports on the west coast of the United States, including Los Angeles, Long Beach, Oakland, Seattle, Tacoma, and Portland handled approximately more than 50% of all the foreign origin or destination containers going through the U.S. ports. The author distinguished that some companies were able to substitute their old set-up connected to the ports with new transportation routes. Others substituted transportation modes, leading to an increased popularity in air freight carriers as a result of the port lock-out. These new alternatives were without a doubt more expensive, resulting in a redistribution of income toward the carriers. However, these losses were not equal to the cargo value, which was suggested by other authors who tried to estimate the impact of port disruption (Hall, 2004). These findings are in line with Gurning and Cahoon (2011)'s suggested structure for disruption of maritime event, since their model suggested that firms whose transportation network involves maritime transportation may incur increasing logistics costs when disruption occurs at a port. Hendricks and Singhal (2005) also discussed the increasing costs stemming from mismatches between supply and demand caused by transportation interruption, specifically how disruption can inflate the costs due to expediting premium freight and obsolete inventory. Furthermore, as argued by Vilko and Hallikas (2011), additional management fees stem disrupted planning and management processes. These will add to the financial strain that companies experience during a supply chain disruption.

2.2.3 Consequences in supply chain performance

Leadtime

Several fashion retailers face "time-based competition", meaning that the capacity to respond to customer requirements on a timely manner is a crucial element of their business operation. Finding ways to reduce the time for product development, detecting market response, and product replenishment is an ongoing challenge. If the lead time is lengthened, it may negatively affect the fashion retailer's ability in responding to customer demand (Christopher et al., 2009).

According to Christopher et al. (2004), lead time in the fashion retail industry is currently likely to face two contrasting trends. The first trend regards the efforts of shortening the lead time due to the high competitiveness in the marketplace and the need for updating product ranges more frequently. The second trend refers to the growing tendency to source products offshore from low-cost countries in order to seek for cost advantage, leading to the significant longer lead time. The prolonged lead time is caused not only by the extra distance, but also by the delays and variability happened in between the movement of the goods. The authors also listed three crucial lead times that must be managed by the retailers in order to compete in fashion industry, including time-to-market, time-to-serve and time-to-react. Accordingly, time-to-market is the time the business realizes the market opportunities and converts it into products to bring to the market. Firms that have long time-to-market face the risk of missing a considerable unique sales opportunity and bearing the mark-downs due to the late arrivals of the products when the demand starts to reduce. Time-to-serve means the time it takes the retailers to receive the order and deliver products to the customers. This kind of lead time is often prolonged by issues such as preparing documentation, consolidating full container loads and transportation. Finally, time-to-react refers to the time the firms need to react to the fluctuation in demand, which is typically long if the retailers are slow in recognizing the changes in real market demand (Christopher et.al, 2004).

Vilko and Hallikas (2011) analysed supply chain risks in terms of their impact on the supply chain. Their final results were based on interviews with representatives from different parts of the supply chain. Three different types of risks were distinguished, including time, financial and quality. The time effects refer to delays or disrupt flow of goods in the supply chain. Employee strikes in ports have among the highest risk factors. The analysis also showed that time delay was perceived as the most serious impact of the risks, followed by the financial impact.

Inventory

The disruption in transportation may lead to the imbalance in inventory level at different points along the supply chain, incurring cost of obsolete stock of short-life cycle products (Hendricks & Singhal, 2005). Wilson (2007) investigated the relationship of transportation disruption and supply chain performance by using system dynamics simulation. The supply chain performance is measured in the number of unfulfilled customer orders, inventory performance fluctuations and the state of the goods in transit. The findings reveal the greatest impact of

transportation disruption between the first-tier supplier and the warehouse in a traditional supply chain structure, which consists of raw materials, first- and second tier suppliers, warehouse, retailer, and customers. Furthermore, the results show how the goods in transit increased dramatically when disruption occurred at this state of the supply chain, affecting customer order fulfilment, inventory performance and the state of the goods negatively (Wilson, 2007). Vilko and Hallikas (2011) stressed further the effect of supply chain risks such as port related conflicts, creating an immense impact on the distribution of goods.

Resource utilization

Hendricks and Singhal (2005) also discussed that a disruption may affect the productivity and utilization of a firm's assets as delay in movement of goods can create waiting time in some parts of the supply chain where equipment is underutilized.

Moreover, MacDonald and Corsi (2013) categorized the severity of managing disruption into seven categories, based on interview results from Logistics- and Supply Chain Managers. Worst of all consequences are those affecting the customers, stressed by the participants in the study. Though, these consequences stem from several challenges posed by supply chain disruption and affects multiple parts within the operation. Examples of managerial consequences of disruption are; the need for additional planning, the negative effect on team stability, inefficient decision-making and increased need for overtime (MacDonald & Corsi, 2013)

2.2.4 Consequences in commercial aspect

Regarding the commercial aspects, Gurning and Cahoon (2011) and Hendricks and Singhal (2005) mentioned loss of profit, loss of competitive advantage and deteriorating business reputation as the consequences of a disruption event. Specifically, prolonged lead time due to the disruption is detrimental to customers' satisfaction as they cannot get the desired products at the time of purchase. This will lead to not only short- and long-term loss in sales and market share, but also damage in the image of the companies. Furthermore, the disruption can lead to additional marketing and penalties paid to the customer due to the delay in the delivery of the goods.

2.3 Supply chain disruption risk management

In managing supply chain disruptions, firms can use several tactics, including mitigation tactics and contingency tactics (Tomlin, 2006; Tang, 2007). The mitigation tactics refer to the strategies that the firms implement in advance of a disruption, which thus may incur the cost of action regardless of the occurrence of the disruption. On the other hand, contingency tactics include the actions that the firms take when a disruption takes place (Tang, 2007).

As reported by several major case studies conducted by Closs and McGarrell (2004), Rice and Caniato (2003) and Zsidis et al. (2001, 2004), most companies are aware of the significance of risk assessment and employ different methods to evaluate supply chain risks. Nevertheless, most firms spent little time or resources for mitigation strategies. The estimates of the likelihood of the occurrence of specific disruptions and precise measure of potential impact of each disruption are difficult to acquire due to the lack of data. Therefore, firms find it difficult to conduct analysis regarding cost and benefit to assess risk mitigation or contingency plans. Furthermore, as discussed by Kunreuther (1976), many managers have a tendency to ignore possible occurrences that are very unlikely, meaning that compatible proactive actions to mitigate supply chain disruption risks are lacking. Figure 2.2 illustrates the summarized findings within risk management strategies.

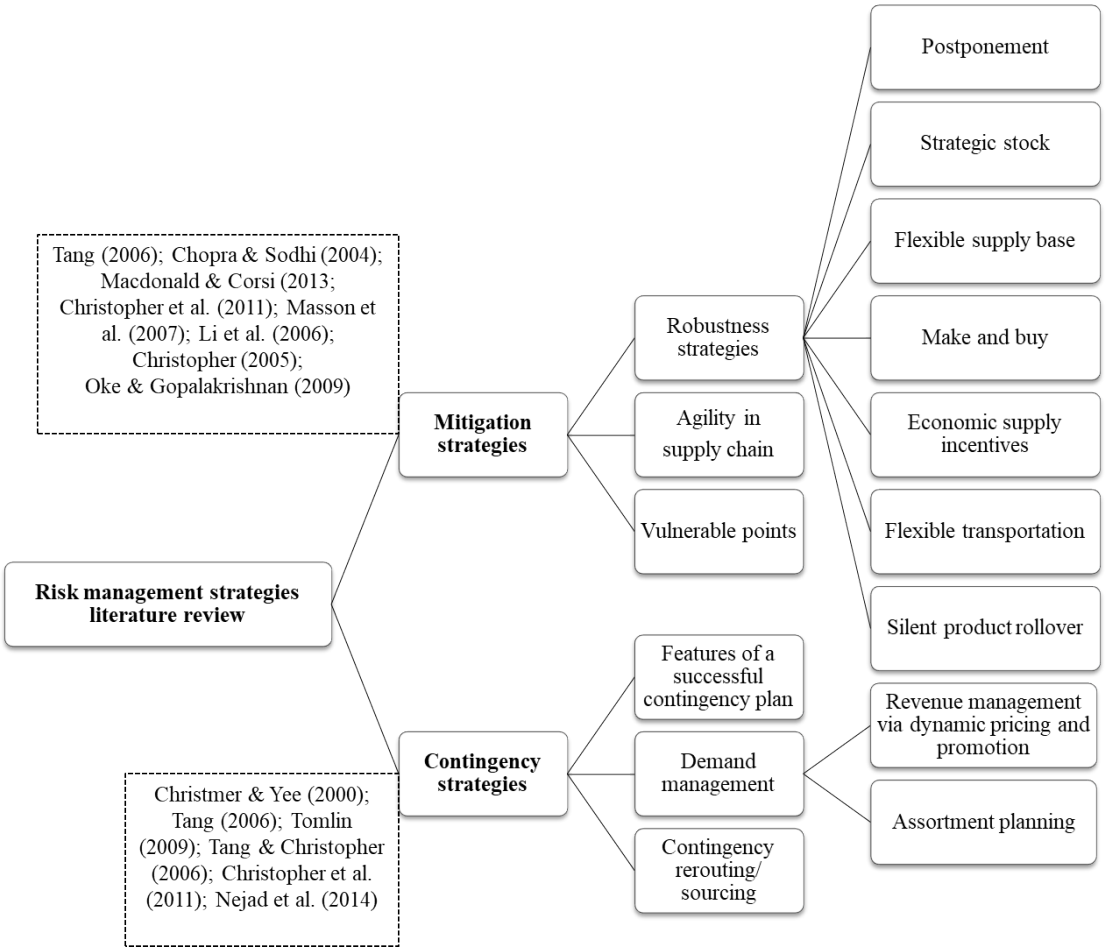

Figure 2.2: Summary of findings within risk management strategies (Source: Authors)

2.3.1 Mitigation strategies

Robustness strategies

When investigating the strategies to mitigate the supply chain disruptions, Tang (2006) suggested that robust strategies would help firms become more resilient, by enabling them to effectively manage the normal fluctuations and maintain their operations in the event of significant disruptions. As such, there are several robust supply chain strategies in managing and improving supply and demand as below:

Postponement

Postponement strategy enables the delay of product differentiation stage by utilizing the product design concept such as standardization and modular design. This strategy allows a firm to initially generate a quantity of generic products based on the combined demand before customizing them later on. Thus, if a disruption occurs, firms can have a cost-effective and

time-efficient back-up plan to immediately adapt the product to new circumstances. One example of this strategy is the case of Nokia when their supplier, Philips, was not able to deliver some components due to a factory fire. Using the postponement strategy, Nokia then managed to reconfigure their generic cell phone so that it was compatible with components from other suppliers in U.S. and Japan. Nokia could therefore weather the supply disruption without facing any significant problems.

Strategic stock

Before the just-in-time era, one might consider keeping additional stockpiles of important components in order to safeguard against eventual disruptions in the supply. However, due to shortened product life cycles and increasing variety of products, the cost of keeping a backup inventory and the cost of an obsolete product could prove enormous (Chopra & Sodhi, 2004). By replacing large amounts of additional safety stocks with strategically placed inventory at key locations, which is shared by many partners in the supply chain, a firm can avoid high inventory cost, while still being flexible in case of supply disruptions. An example of this is given by Toyota and Sears, both companies employ the strategy of keeping inventories of automobiles and appliances at specific locations which all nearby retailers can share. This approach allows them to reach a higher customer satisfaction level while maintaining a low inventory cost when tackling normal fluctuations in demand. In addition, in case of a disruption, these strategically located shared inventories enable a firm to rapidly deploy stock to affected regions. The Centre of Disease Control (CDC) provides an example of this since they keep significant quantities of medicine and supplies at specific strategic positions in USA, with the goal of protecting the American public in case of health emergencies where local supplies are insufficient (earthquakes, terrorist attacks, etc.).

Particularly among fashion retailers, it is common to apply a strategy with low levels of inventory. Scarcity of goods can contribute to perceived exclusivity, according to Macdonald and Corsi (2013). Even though additional sales can be achieved with a greater quantity of the products, changing the products frequently contributes to the perception of novelty and exclusivity in a store, which can promote impulse shopping. The risk of obsolete inventory is mitigated at the cost of the opportunity of selling more (Macdonald & Corsi, 2013).

Flexible supply base

Even though sourcing from a single supplier reduces cost, due to lower management cost, quantity discounts etc., it could become problematic when dealing with fluctuations in demand or significant disruptions. An example of how to minimize the risk related to the single source approach is given by Hewlett-Packard (HP) (Billington and Johnson (2002), which used their factories in Washington and Singapore as the supply base for inkjet printers. To tackle normal variance in demand, the plants in Singapore produced the base volume while excess volume was taken care of in Washington. This flexibility in the supply base allows a firm not only to deal with demand fluctuations, but also to maintain a steady supply of product should a significant disruption occur. Li and Fung, a Hong Kong trading and logistics company, provides another example, in which their 4000-supplier strong network offers immense flexibility in changing the production among suppliers located around the world to quickly deal with disruptions in a particular country. Furthermore, Chopra and Sodhi (2004) mentioned that adopting redundant suppliers strategy is suitable when the products have high holding costs and high risk of getting obsolete. For instance, Motorola Inc. sources several of its handset components from many vendors. Besides, Motorola decreases the cost of redundancy by having multiple suppliers for high-volume commodities and single supplier for low-volume commodities. In doing so, the company can mitigate the impact of the disruption when it happens without gaining fast depreciating inventory while maintaining economies of scale at its suppliers (Chopra & Sodhi, 2004). Additionally, supplier diversification can manifest itself in different forms if a company sells multiple goods (Tomlin, 2009). For example, if a firm single-sources products from different suppliers for each product, as a failure at one supplier occur, it does not disrupt the entire product portfolio. Instead, a firm may dual source individual products, which leads to only disruption in a portion of a product's supply when failure at one supplier occurs.

Moreover, Christopher et al. (2011) studied how managers assess global sourcing risks in different industries to understand which actions they take to mitigate supply chain risks. For the fashion retail and wholesale industry, supply risks include dependence on key suppliers to develop products and high switching costs due to single sourcing. The researched companies lacked formal strategies for risk mitigation in the global sourcing of fashion retailers. Therefore, the authors suggested a network re-engineering process to improve the risk management of global sourcing. The process consists of three components:

“1a. Re-evaluating sourcing criteria and decisions in the global context.

1b. Re-evaluating supply base network design

1c. Mapping and critical path analysis (Christopher et al., 2011, p.76).”

By mapping processes and identifying risks, key decision makers can easily identify critical points and their impact. This includes risks within sourcing products and transportation which can be mitigated (Christopher et al., 2011).

Make-and-buy: In dealing with eventual disruptions in the supply, resilience in the supply chain can be improved if particular products are manufactured in-house while others are outsourced. HP provides an example of this where the production of their DeskJet printers was partially done in their own factory in Singapore while the rest was outsourced to a contractor in Malaysia (Lee & Tang, 1996). Furthermore, both Brooks Brothers and Zara manufacture their fashion products in in-house factories while outsourcing basic items to suppliers in China (Ghemawat, 2003). The make-and-buy strategy offers firms greater flexibility in quickly shifting production in case of a supply disruption.

Economic supply incentives: Due to the limited numbers of suppliers available in a given market, the buyer does not always have the possibility of shifting the production among different suppliers. In order to gain flexibility in this regard, the buyer can attempt to attract more suppliers through economic incentives. For example, in 2004 the US government faced a massive shortage in flu shots due to the decreasing vaccine-makers, many having left the market, and major disruptions in the supply (Brown, 2004). In order to avoid these disastrous situations in the future, the US government could think about providing economic incentives to attract more suppliers to re-enter the flu vaccine market. Such incentives could be that the government shares the financial risk with the suppliers by committing to an order quantity in advance at a fixed price and buying back unsold stock at a lower price. With more potential suppliers available, there is a greater flexibility to quickly change to a different supplier during a major disruption. Furthermore, economic incentives can also provide other benefits such as preventing a single supplier from cornering the market and forming a “monopoly”. For instance, by incentivizing fresh suppliers to join the market, competition between suppliers will grow and this pressure can pressure them to keep their prices low.

Silent product rollover: According to Tang (2006), this strategy introduces new products in the market by slowly leaking them, without any formal announcement. Customers are therefore not entirely aware of the specific characteristics and features of each product and are thus more likely to choose products simply after their availability. For instance, by making old models obsolete as new ones are introduced, all products are made substitutable, replaceable, and this trait is very desirable for a product because it means that it can deal with fluctuations in demand, as well as supply or demand disruptions. This behaviour can be seen in Swatch, whose watches are regarded as collectibles by consumers due to each model only being made once (Billington et al., 1998; Moon, 2003). Also, Zara usually do not repeat the design of clothes, thus customers simply purchase what is available in the stores (Ghemawat, 2003).

Flexible transportation: Transportation is said to be a critical link in the supply chain, which holds everything together. It is therefore important to be proactive in adding more flexibility, and three examples are given below.

- *Multi-modal transportation:* A flexible logistics strategy which utilizes multiple modes of transportation allows companies to continue their operation in spite of disruptions in the ocean, the air or on the road. An example of the benefits of diversifying the modes of transportation is given by Seven-Eleven in Japan. By including trucks, motorbikes, bicycles, ships and helicopters were they able to deliver food to 64 000 earthquake victims in the late 1980s, even though many roads were destroyed (Lee, 2004).
- *Multi-carrier transportation:* In order to maintain a steady flow of materials, due to landing rights, labor strikes etc., many air cargo companies may choose to band together to form an alliance (an example being SkyTeam Cargo) which will enable them to quickly change carriers to accommodate any disruptions. These alliances can also provide low-cost deliveries on a global scale. Similar alliances also occur in shipping (World Freight Alliance).
- *Multiple routes:* In order to avoid total shutdown and keep material moving smoothly along supply chain, alternative routes of transportation can be taken into consideration. For instance, in the U.S., due to long delays at the ports located on the west coast and heavily trafficked highways, east coast companies are promoting new routes, in addition to traditional ones. For instance, in 2002 when the west coast ports were closed for 2 weeks, shippers considered shipping goods from Asia to the east coast visa the Panama Canal (Tang, 2006). Inditex is a prime example within fashion, however,

previous research put emphasis on cost rather than risk. Inditex's logistics department focuses on optimizing the transportation flow by investigating alternative routes for each brand within the group, to minimize the distribution cost (Escalona Orcao & Ramos Pérez, 2011).

It is evident that the aforementioned strategies are beneficial for companies, both during normal operations and major supply chain disruption. However, the implementation of these strategies also brings the following challenges:

- *Cost versus benefits:* These robust strategies have a required cost associated with them, which may give some companies cause for concern while others acknowledge the added benefits. These strategies would in theory enhance the competitiveness of a firm, especially when other firms do not take extra steps towards protecting their supply chains against disruptions. It is however difficult to measure the value of an improved competitive position. One point of view is that the costs for these proactive and robust strategies are insurance premiums which will protect the supply chains against significant disruptions (Sheffi, 2001). The drawback is that it is difficult to assess the return of investment for these insurances, especially when there is a lack of trustworthy data.
- *Strategic fit:* Although these robust strategies can improve the ability of a company to better deal with supply and demand, they might not have a place in the overarching business strategy of the company. For instance, if assuming that a firm has decided to lower the variety of products in order to make its product lines more rational, In this case the postponement strategy loses some value.
- *Proactive execution:* The viability of a robust strategy is dependent of whether the firm can proactively implement it. For instance, during the time of the renewal of the longshoreman contract in 2002, NUMMI, Ralph Lauren and Tommy Hilfiger planned different transportation strategies. The longshoreman union and the port authorities were fighting over the labor contract, rendering the port useless. While Ralph Lauren and Tommy Hilfiger successfully executed their backup plans in a timely fashion, rerouting their shipments, NUMMI decided to wait out the dispute by stockpiling additional inventory. Unfortunately, NUMMI ran out of stock before the negotiations were finished, and since it was too late to reroute shipments they were forced to shut down for days (Zsidisin et al., 2004). Moreover, readiness is an important aspect in the company's ability to respond to disruption, and it affects the severity of the impact.

According to research conducted by Macdonald and Corsi (2013), two primary factors influence managers' willingness to develop formal plans for supply chain disruption. These factors are; the manager's previous experiences and the available resources at the company. Among the investigated companies, some companies had formal planning procedures with written instructions for different scenarios. Others used checklists which were updated in the initial face of the disruption, to decide which resources were needed to manage it (Macdonald & Corsi, 2013).

Increasing agility of supply chain

A commonly discussed risk management method in the fashion industry is agile supply chains. Masson et al. (2007) distinguished how risk is managed among British fashion retailers and discussed unique features within their industry. Speed and flexibility are essential features for managing a complex supply chain and meeting market needs, while minimizing penalties for failing to meet market demand. However, the rapid changes in the demand make supplying it more risky and difficult. The short product life cycle increases the supply chain's exposure to risk. Figure 2.3 displays a proactive and reactive chain of events within the supply chain, this division allows fashion retailers to manage risk by pre-booking fabrics, production and logistics, while postponing the final product definition. This process shortens the lead time and provides a higher level of market certainty in the final product. Risk is further mitigated by sourcing small volumes while closely monitoring the demand (Masson et al., 2007).

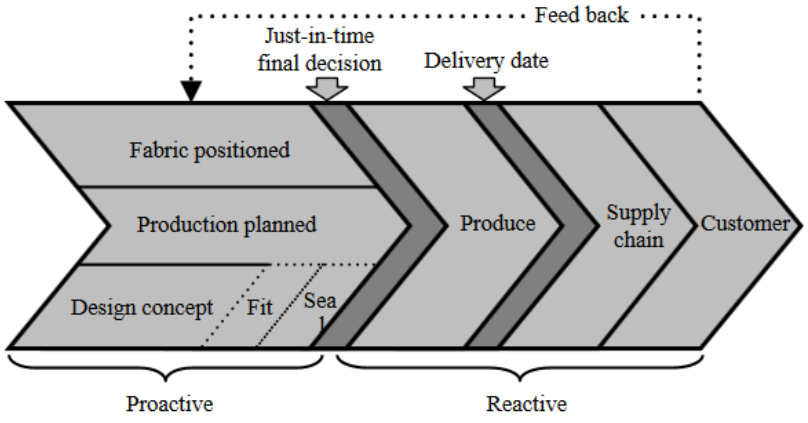

Figure 2.3: Design to Store Process Model (Masson et al., 2007, p.246)

Additionally, the network design is influenced by the wide range of products sold, leading to a wide network of apparel suppliers. The core competence of the retailer is to get the right product to the market, while intermediaries are used for the management of the low-cost supply

chain in the supplying countries. Increased agility is achieved with the use of intermediaries; their access to large supplier network allows immense flexibility in production capabilities and mitigates the risk of supply chain disruption. Furthermore, the industry overcapacity and quick utilization of spare manufacturing capacity create rapid lead times. The intermediaries auction the small batches requested by the retailer in their supplier network, creating competitive prices and lead times (Masson et al., 2007).

In addition, Li et al. (2006) suggested enhancing agility in the supply chain by timely sharing of supply information. As such, the event of a disruption or sudden changes at any point in the upstream of supply chain, such as unforeseen storage shortages or transportation disruptions, may affect the performance of the downstream activities through the change in the price, condition and delivery time of material flows. Therefore, it is important for a firm to be able to seize the supply information at the right time and the right place. By timely sharing of supply information, firms at downstream stages can be aware of a disruption at an upstream stage, then determine the time that a disruption impacts them and make appropriate decisions to counteract the effect of the disruption. Information sharing thus improves the agility of the companies while enhancing the security and performance of the entire supply chain. Macdonald and Corsi (2013)'s findings stressed further the importance of timely discovery of supply chain interruption. Thus, time plays an essential role in mitigating the effects of a disruption. Additionally, the recovery process is also influenced by the method of discovery and the discoverer's ability to communicate information about the disruption. One tool for disruption communication is Event Management Systems (EMS), where information about disruption can be communicated to different departments promptly (e.g. via IT programming, specific phone number) (Macdonald & Corsi, 2013).

Zara is a typical example of agile supply chain in the fashion industry. The company has established a highly responsive supply chain, allowing them to design, manufacture and deliver new lines of clothing to all the stores worldwide within only 15 days (Ferdows et al., 2004). This pace has been reached by a reinforcing system developed on the following three principles:

- Close the communication loop: Zara's supply chain is built to deliver information effectively from end user to the upstream operations of design, procurement, production and delivery, by a set-up enabling the real-time tracking of materials and products along the supply chain.

- Stick to the rhythm across the entire chain: Zara puts significant effort in improving and enforcing the speed and responsiveness of the chain as a whole. By carefully timing all the activities, Zara avoids the common issue of rushing and waiting among the steps. For example, in the retail shops, the order placement is carried out with a strict schedule. Orders in Spain and Southern Europe are submitted twice every week on Wednesday and Saturday, and the rest of the world on Tuesday and Friday. If a store misses one deadline, it has to wait until the next time to place the order. The strict rhythm requires the subsequent phases in order fulfillment such as shipment from the factories to central warehouses and stores to follow the certain disciplines.
- Leverage capital assets to increase supply chain flexibility: Zara has extensive investments in manufacturing and distribution facilities, allowing them to have a great control over the schedule and capacity. Therefore, the supply chain can quickly respond to the market's fluctuation. Complicated products like women's suits are created in-house in Zara's own factories such as La Coruna, Barcelona, Lithuania. Meanwhile the simple ones like basic sweaters are outsourced to suppliers in Europe, North Africa and Asia.

Identifying vulnerability points

Oke and Gopalakrishnan (2009) investigated the different types of risks faced by large U.S. retailers. Their research provides categorization of risks and appropriate risk mitigation strategies for dealing with risks within each category. The west coast port lockout falls within the same category as terrorist attacks in the man-made disaster category. These risks are low frequent events with high impacts on the supply chain of the retailer. According to the authors, mitigation strategies for manmade disaster should include an identification of the vulnerability points. After distinguishing the vulnerability points, contingency plans should be developed to address these points and cope with the impact of the man-made disasters. Examples of vulnerability points are bottlenecks, limited alternatives, geographic areas, insecure access points to infrastructure, and a high degree of concentration in suppliers, manufacturing locations, material or information flows (Christopher, 2005). In regard to geographic locations, vulnerability may arise from the fact that multinational fashion brands tend to cluster their diverse logistics operations, where the objective is to optimize product delivery in the served markets. One of the requirements for the set-up include a good location for the distribution centre in relation to suppliers and customers, to minimize the transportation. Table 2.2 shows how some fashion retailers locate their distribution centre near the markets which are served,

while others locate them in different markets. Furthermore, some fashion retailers prefer having all their distribution centres in the country of origin (Escalona Orcao & Ramos Pérez, 2011).

Table 2.2: Comparative data for geographic location of fashion retailers (Escalona Orcao & Ramos Pérez, 2011, p.116)

Company	Markets		Resources		Distribution (number of centres)
	Physical-presence (number of countries)	Shops (number)	Suppliers (number)	Countries	
H&M	38	2 206	700	16[a]	One in each of the sales markets
Gap	39[b]	3 263	n.a.	n.a.[c]	Chiba (Japan); Shanghai (China)
C&A	20	1 400	900	40	n.a.
Next	41	697[d]	n.a.	n.a.	n.a.
Liz Claiborne	n.a.	482[e]	500	30	n.a.
Benetton	120	6 500	n.a.	n.a.[f]	Castrette (Italy); Mexico City (Mexico); Shenzen (China)
Inditex	82	5 227	1 398	40	Eleven centres all in Spain (Table 6)

n.a.: data not available.

2.3.2 Contingency strategies

In the event of disruption, the effectiveness of a response strategy depends on the duration and magnitude of the disruption (Harrison et al., 2013). However, in regard to various contingency strategies, there are five important features of a good contingency plan (Christmer & Yee, 2000). These are:

- Workable, the contingency plan needs to be developed by supervisors
- Cost-effective, in relation to probability
- Flexible, the contingency plan can be used for different disaster scenarios
- Easy to maintain, simplicity is favourable
- Deals with guidelines, no detailed procedures are needed (Christmer & Yee, 2000)

Demand management

Revenue management via dynamic pricing and promotion

A common practice to sell off perishable products or services is to use dynamic pricing (Tang, 2006). In the case of airlines, selling limited seats on an airplane requires dynamic pricing due to uncertain demand. Adjusting prices dynamically in this manner can lead to greatly increased revenue, almost $1 billion annually in the case for American Airlines (Cook, 1998). Dynamic pricing and promotion are also effective in managing demand when the supply is disrupted. These initiatives are also mentioned as demand switching strategy by many authors, which aim at providing incentives for customers to purchase other products instead of the unavailable desired products due to disruption (Tomlin, 2009; Tang & Christopher, 2006). For example, in the event of a supply disruption of computer parts resulted from an earthquake in Taiwan, Dell had provided their online customers special price incentives to purchase computers that made use of components from other countries (Tang & Christopher, 2006). When dealing with e-commerce, clever online retailers take advantage of the customer's online profile, browsing history, and purchasing history to tailor promotion and pricing strategy to influence the customer.

Assortment planning

The strategy of assortment planning, which deals with the products on display, their location, and visibility, has been used successfully by brick and mortar retailers to influence consumer behavior (Tang, 2006). A study by Teck-Hua and Tang (2001) performed at five supermarkets in the USA, demonstrated that the consumer's choice and demand could be altered depending on the number of facings for each product and their location on the shelves. This suggested that retailers can use assortment planning to attract customers to certain products. This is useful during supply disruptions, where more widely available products can be made more attractive to the customers to mitigate temporary stock shortage (Tang, 2006).

Contingency sourcing/re-routing

Tomlin (2009) mentioned another strategy, contingency sourcing, as a tactic to deal with disruption. In this strategy, the firms, in the event of supply shortage, search for products from their back-up supplier pool. Nejad et al. (2014) also discussed this strategy under the name contingency rerouting, described as a dual sourcing strategy with volume flexibility to overcome supply uncertainty. The supply chain setting includes a primary supplier which is

cost-effective but prone to disruptions and a reliable but more costly volume-flexible backup supplier. In the case of the primary supplier's failure, the backup supplier could change its capacity to cover for the shortage due to disruption (Nejad et al., 2014). However, the downside of contingency rerouting is the challenge in shortening the response time to make the products available. Tomlin (2009) described the response time as the combination of the time when afirm places an additional product order with its backup supplier in response to a disruption and the time needed for the backup supplier to deliver the required product quantity. The response time is a vital characteristic of contingency rerouting as only a part of the needed capacity might be feasible within this period. Neglecting this aspect during the planning phase of the supply chain may result in the miscalculation of the available backup capacity, leading to product shortage in response time (Nejad et al.,2014).

2.4 Summary

Based on the literature review, the authors have categorized multiple consequences of supply chain disruptions pointed out by previous studies into four main categories, including; transportation network, logistics costs, supply chain performance and commercial aspects. However, the reasons leading to these consequences and their interrelationship have not been explored in detail in the past research, especially within the context of a port conflict. Substantial effort has been put into the investigation of risk management strategies for supply chain disruptions. Nevertheless, the adaptation of these strategies to different industries, especially fashion retail industry, was not discussed in depth. Therefore, this paper bridges the aforementioned research gaps by thoroughly studying the impacts of the conflict at the Port of Gothenburg on four fashion retailers and their strategies during this disruptive event.

3. Methodology

3.1 Research approach

The study adopted an interpretivism paradigm and case study methodology to gain in-depth knowledge about the cases in their specific context (Collis & Hussey, 2014). An exploratory case study involving five companies was conducted for three reasons; to analyse a specific context, to evaluate alternatives, and form new theories (Sreejesh et al., 2014). The researched phenomenon in this study was limited to a specific context. Per the discussion presented in the introduction, the conflict in Port of Gothenburg has created an uncertain and challenging environment for businesses to operate in. Specifically, during the summer of 2017, the operating hours of the container terminal were limited, and shipping lines refused to use the port. The companies which were the focus of this paper are retailers in the fashion industry. As fashion products have short life-cycle and follow the seasonal campaigns, any delay in the transportation may cause the products to become obsolete, which brings the retailers many negative consequences. Therefore, the fashion retail industry is likely to be among the most impacted industries during the port conflict. As such, analysing the strategies applied by retailers within this fashion industry in this environment is of interest for this study.

3.2 Case analysis

Case study analysis allows researchers to focus on a contemporary phenomenon and retain a holistic perspective when investigating organizational- and managerial processes (Gummesson, 1988; Yin, 2014). The purpose of this study is to investigate the impact of the port conflict on fashion retailers, while keeping a holistic view on how the companies deal with disruption in their supply chain. Cross-case analysis is a research method which enables comparison between commonalities and differences in the events which is the unit of analysis (Elsbach & Kramer, 2016). In this research, four fashion retailers were compared with a retail company having a different transportation set-up (Jula) to distinguish the impact of the Port conflict on retailers in the fashion industry, and how managers dealt with the disruptive events. When the research design contains two contrasting groups of cases and the findings support the hypothesized contrast, the results represent a strong foundation for theoretical replication (Yin, 2014). Researchers who use this method are able to (1) describe a combination of factors which may have resulted in outcomes of the studied case, (2) compose a theory of why one case is different from others, (3) suggest other theories and/or concepts which arise from the

comparison of different cases (Elsbach & Kramer, 2016). These research abilities were applicable for answering the research questions and fulfilling the research purpose. By describing the combination of consequences faced by the fashion retailers from the port conflict, commonalities and differences could be distinguished that highlight what the primary impacts of the conflict were. Moreover, comparing different companies' risk management strategies applied before, during and after the port conflict enabled theories of the port conflict's impact on the fashion retailers to be formed. Finally, the applied method allowed the chosen context to be studied in detail, where different impacts and management tools may be discovered among the companies (Elsbach & Kramer, 2016). Indeed, one of the most prominent strengths of case study research is particularization; the capability to study a phenomenon in-depth, distinguish its unique characteristics and how they combine to produce a particular outcome (Lee & Saunders, 2017). Capturing detailed concepts within supply chain disruption and risk management, allowed illustrations of how the fashion retailers managed the disruption more precisely, such as the success of their approach and how the port conflict changed their future strategies.

Regarding the limitations of case studies as a scientific research method, Gummesson (1988) highlighted three main areas: the lack of statistical validity, the low applicability for testing hypotheses, and generalization issues. The small number of cases investigated in this research required a different approach to generalization, compared to research which is quantitative and under the positivist paradigm. In terms of generalizable conclusions, Gummesson (1998) described two dimensions. In the first dimension, quantitative studies use a large number of observations to determine how many, how much and how often. The other dimension uses comprehensive investigations and analysis to identify mechanisms in a particular context, which is fitting in qualitative case study research. In the latter dimension, the possibility to generalize from a small number of cases is dependent on the comprehensiveness of the measurements, which contributes to an improved understanding of the structure, processes and driving forces. In contrast, the former dimension can make generalizations from superficial correlations or cause-effect relationships (Gummesson, 1998). Since the objective of this research is to contribute to improved understanding of the effect of the port conflict in the context of the fashion retailers, it was desirable to distinguish the underlying structure, process and mechanisms which described how the retailers have been affected and how they managed the supply chain disruption. To realise this objective, the use of literature was essential for this research to achieve a comprehensive framework when analysing the cases studied. However,

the conclusion's generalizability is limited to analytical generalizations due to the small sample. There are several ways in which case studies can contribute to analytical generalization. One of them is to extend and develop theory, by taking into account a particular context which may influence the applicability of a theory (Lee & Saunders, 2017). The specific context studied in this research (the port conflict), can illustrate where boundaries in existing theories and generalizations exist, and contributes to a greater understanding in supply chain disruption- and risk management research.

3.3 Description of the cases

In this study, four fashion retailers were chosen to investigate due to several reasons. Firstly, all of the four companies belong to the fashion retail industry, in which the products have short-life cycle and thus short lead time is an important factor in their supply chains. In addition, as these companies mostly have production in low cost countries such as Bangladesh, India, China, Turkey and Myanmar, the finished products are then transported by sea to Europe for onward transport to DCs. They have DCs located in regions close to Gothenburg as shown in figure 3.1. Therefore, these companies have a logical reason to use Port of Gothenburg as main gateway port. As the import activities of these companies rely much on the operation of the Port of Gothenburg, investigation into the five companies can provide in-depth understanding regarding the impact of the port conflict on fashion retail industry. However, the companies favored to not disclose their name in the paper.

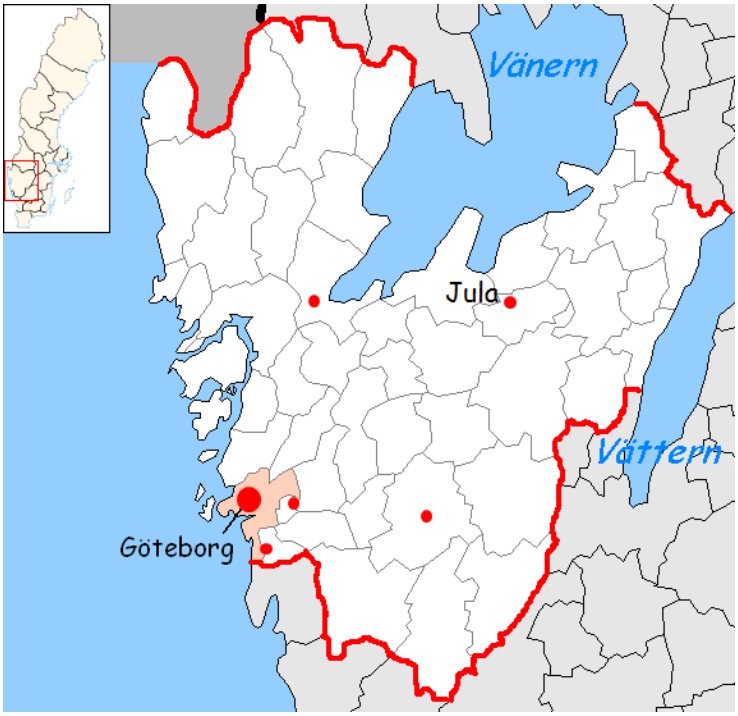

Figure 3.1: The location of distribution centers of the studied companies (Source: Authors)

Besides the four cases on the fashion retail industry, the case of Jula AB was added to allow comparison with the fashion retailers. The main reason for this particular case is that in 2013, Jula and Schenker established a virtual joint venture to facilitate the use of a hinterland intermodal transport solution and dry port enabling a strategy for mitigation of supply chain disturbances (Monios & Bergqvist, 2015). In detail, a rail shuttle between the port of Gothenburg and the inland terminal in Falköping was established to handle Jula's containers flow in a more efficient and environmentally friendly way. As the terminal in Falköping plays a role as a container depot, Jula's empty containers can be re-positioned to other exporting companies instead of being transported back to the port, allowing a more coordinated and consolidated container flows in the intermodal service (Monios & Bergqvist, 2015). Thus, it is interesting to identify whether Jula's special logistics set-up lead to any difference in the impact Jula bears from the port conflict and in their response to the situation, compared to the other cases. Furthermore, there is a possibility in which Schenker may use this intermodal service to solve part of the urgent shipments for their other customers, by transporting the containers to Falköping by rail and delivering them to final destinations by truck.

The details regarding the logistics set-up of all the cases are presented in the forthcoming passages.

Company A

Company A has more than 90 percent of its production in Asia, with the rest in Turkey and Europe. The company does not own any factory but purchases directly from its suppliers. Company A has two DCs, one in Sweden and one in the United Kingdom, in which the former one serves the majority of markets in Europe. Normally the goods are shipped from Asia to Port of Gothenburg and then on truck to the distribution centre, in which the sea leg takes around 30 to 35 days. The primary mode of transportation is by sea from Asia. In the event of a delay, the train solution is the most preferred from the cost and environmental perspectives, taking 20 to 22 days from terminal to terminal. From Turkey, the lead time is around ten days using a combination of rail and truck transport. The outbound lead time from the DC to the stores is one to two days depending on geographic location.

Company B

Company B also sources their products mainly from Asia, and the rest from Turkey and Italy. The company has two main DCs, one in Sweden and one in The Czech Republic, serving more than 450 stores in Europe. The products from Asia are delivered to Sweden within approximately 40 to 45 days by sea and 16 days by rail from China. Nevertheless, the rail service is more expensive and has smaller capacity in spite of faster speed. Once the products reach the Port of Gothenburg, they are transported by truck to the DC. The outbound lead time for new products to be available in stores before campaigns is about two weeks.

Company C

Similarly, Company C sources approximately 90 % of their products from Asian countries such as China, Bangladesh and India, and 10 % from Turkey. Before 2017, half of the volume of products was shipped to Norway, where the company has three warehouses, and the rest was shipped to Sweden. However, just prior to the summer of 2017, the company decided to have a centralized distribution centre north of Gothenburg in Sweden where they received 100 % of the imported products. This DC serves stores in 8 different countries, including Norway, Sweden, Finland, Denmark, Iceland, Poland, Germany and Austria. Additionally, the DC is newly built and highly automated, in which the company strives to maintain a stable flow of

products coming in and out. This set-up provides the most efficient operation for the company and good services for the stores according to the respondent. The containers are transported from Asia to Sweden by sea within 40 to 45 days and from Turkey by train. From Port of Gothenburg, the goods are transported by truck to the distribution centre. The products are available in the store around 2 weeks before a campaign starts. However, due to the volatility of the shipping services, the purchasing department tends to add additional time to the total delivery time.

Company D

Contrastingly, Company D sources approximately 50% of their products from Turkey and the rest from Asian countries such as China, Bangladesh, India and Pakistan. The company has one DC located in Sweden, which serves stores in five different countries, including Sweden, Norway, Finland, Denmark and Germany, and the e-commerce market in European countries. From Turkey, the goods are transported to Sweden using an intermodal service which takes around 8-9 days. Specifically, the containers are shipped by sea from Istanbul to Trieste in Italy, then by rail to Kiel in Germany, followed by the ferry to Gothenburg and truck to their DC. Meanwhile over 90% of the products from Asia are delivered by sea to Port of Gothenburg within approximately 34 to 38 days, and the rest is transported by rail from China or by air in some urgent occasions. When the containers arrive at the DC, they are normally delivered to the stores in 2 days in order to prepare for the campaigns. For the basic assortments, the products may be stored in the DC longer for replenishment at stores when needed.

Jula

Jula sources approximately 60% of their products from Asian countries, such as China, Vietnam, Indonesia and Malaysia, and the rest from Italy, Germany, the Netherlands and Sweden. The company has only one DC, located in Skara, Sweden and serving the stores in Norway and Poland. Jula has reduced the number of ports used in Asia within a couple of years, to improve the filling grade of their containers. From Asia, the goods are shipped mainly by sea to Port of Gothenburg, then by train to Falköping and by truck to the DC, which in total takes about 45 days. A small percentage of the containers are shipped to Germany and Rotterdam, then transported by feeders to Gothenburg. The company owns 22 wagons for the rail transportation from Port of Gothenburg to Falköping, which operates 6 days per week. Meanwhile, the products from Italy are transported by train directly to Falköping and the ones

sourced from Germany and the Netherlands are delivered by truck to the DC, with the estimated lead time of 5 to 7 days. Jula has an efficient road haulage through the exemption for long carriage (having two 40ft containers on the same truck). At the DC, the stock turnover is roughly 4-5 times a year.

3.4 Data collection

3.4.1 Data collection process

The qualitative data used in this study was collected from semi-structured interviews with representatives from the companies. When collecting qualitative data, the transient quality of data means that it is understood within a specific context. To retain the integrity of the data, it is important to conduct a systematic approach during the collection process (Collis & Hussey, 2013). Figure 3.2 illustrates the data collection process which is based on a model suggested by Collis and Hussey (2013) for a systematic approach when collecting qualitative data.

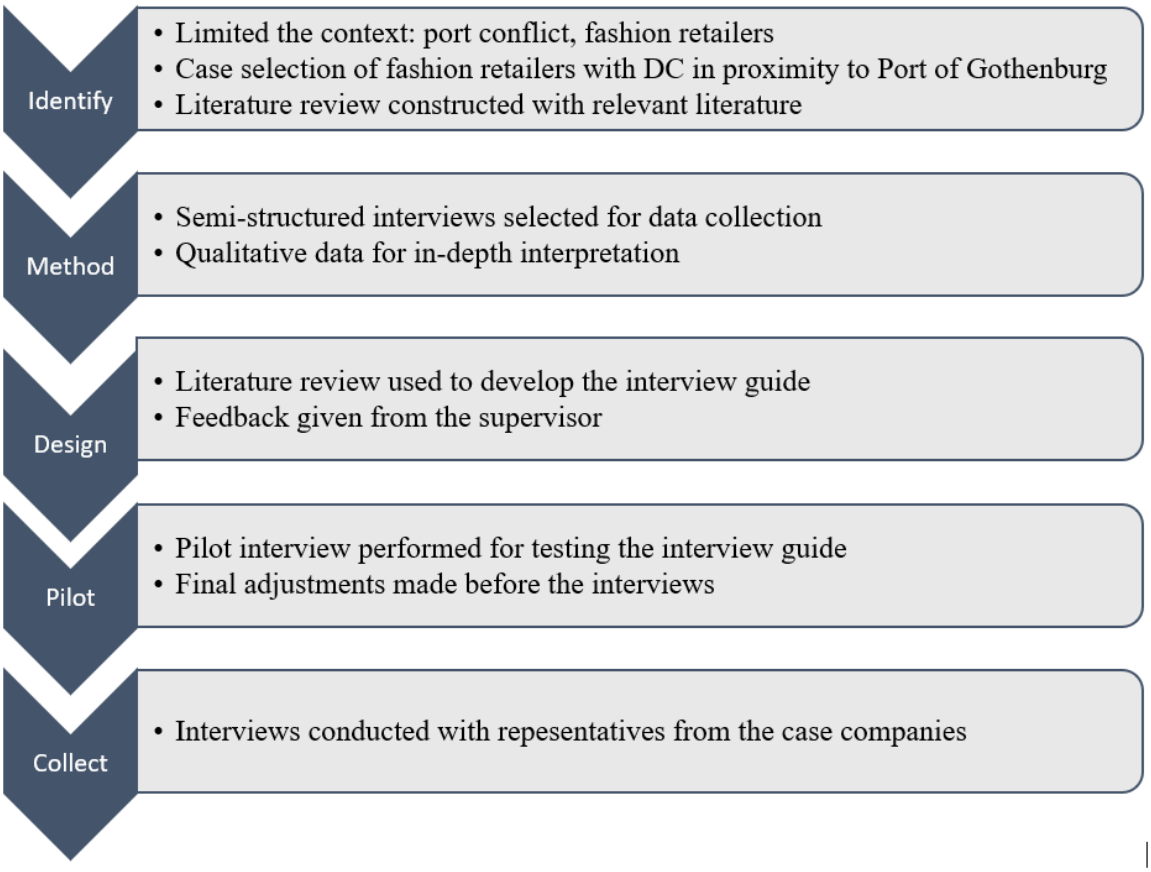

Figure 3.2: Flowchart of the data collection process

Like the proposed data collection method by Collis and Hussey (2013), the data collection process was conducted after limiting the context to a specific number of cases (see discussion in the previous section). The chosen data collection method was semi-structured interviews, allowing in-depth interpretation of a complex phenomenon within the studied context (this method is discussed further in section 3.4.2). Thereafter, the development of the interview guide was formed based on a literature review. Feedback was given on the initial draft of the interview guide from the thesis supervisor. As suggested by the model, the interview guide was tested in a pilot interview which allowed correction of any mistakes in the interview guide. The objective of the trial interview was to assess the ability of the interview questions to capture the studied phenomena. After making the adjustments, the final version of the interview guide was sent to the respondents, enabling them to prepare before the interview. The interview guide which was used during the interviews and sent to the respondents is displayed in table 3.1. Additionally, the respondents were informed about the purpose of the study and intended questions, to increase the transparency of the data collection process. This is in line with recommendations by Saunders et al. (2007), whom argued that informing the interviewee about the research objective prevents them from feeling deceived after sharing information.

Table 3.1: Interview guide for retailers (Source: Authors)

No.	Question	Sub-question	Purpose
1	How would you describe the transportation flow of goods in your company?	E.g. Transportation mode, locations (departure, destination, nodes), lead time, buffer-time	To get an overview of the transportation flow in normal set-up
2	How was your logistics set-up affected by the port conflict?	E.g. Transportation mode, locations (departure, destination, nodes), lead time, buffer-time	To compare the normal state to the state during the conflict.
3	What are the consequences of the port conflict on inventory management and sourcing?	E.g. Inventory levels, resource utilization, backorder, changes in suppliers	To investigate further the consequences of the port conflict
4	How were the costs of logistics affected by the port conflict?	E.g. Transportation costs (where they stem from and proportion), Inventory Management, Management costs	To investigate further the consequences of the port conflict
5	What are the consequences of the port conflict regarding the commercial aspects (sales revenue, customer service, competitive advantage)?	E.g. Specific figures of sales drop, the reaction of the customers and competitors	To investigate further the consequences of the port conflict
6	What are the company's strategies during the port conflict? Contacts with truck	E.g. Sourcing, Inventory Management, Demand Management, Other types of contingency planning?	To distinguish their contingency strategies during the port conflict
7	How have the company prepared for supply chain disruption events like the port conflict?	E.g. Inventory Management, Supplier Management, Risk Assessment, Agility in the Supply Chain, Recovery Strategies	To distinguish their risk management strategies before the port conflict
8	After the conflict, are there any changes in your company's strategies?	Are these strategies considered as a competitive advantage? Are there any permanent changes as a result of the port conflict?	To distinguish their risk management strategies after the port conflict

3.4.2 Semi-structured interviews

Interviews are commonly used in case studies for the collection of empirical findings (Yin, 2014). One of the data collection methods are semi-structured interviews, which are more structured than non-directive interviews. The purpose of applying this method was to allow some flexibility during the interview, but still ensure the respondents cover the intended topics studied by the researcher (Sreejesh et al. 2014). It was essential that the respondents cover the studied topic, since capturing the respondents' experiences with managing their business within the context of the port conflict was the objective of this study. Moreover, semi-structured interviews are often used by researchers when they are interviewing executives, leaders and experts within their field. Probing the respondents to answer specific questions requires the researcher to possess knowledge within the researched field (Sreejesh et al., 2014). Therefore, before conducting the interviews, a comprehensive literature review within the field of supply chain disruption and risk management was performed. These topics allowed a greater understanding of how previous researchers have explained similar phenomena.

Interviews with the respondents were arranged via contacts from their freight forwarder and direct contact with the companies. According to Lee and Saunders (2017), interview participants may inform researchers of other interviewee prospects which are relevant to the study. Once they assist with contact information which is of considerable use for the research, they are called key informants. The freight forwarder and the thesis supervisor were indeed key informants for this research, providing contact details of interviewee prospects in senior management positions within Supply Chain- and Logistics Management. Furthermore, the appropriateness of the respondents for this research was also discussed with the thesis supervisor. Criteria which were considered were the respondents' experience and job role. It was essential that the interviewee had sufficient experience in managing the company's logistics set-up during the port conflict, since their professional background and responsibilities determined their ability to answer questions about the studied phenomena. Hence, significant effort was put in the selection of respondents and design of the study, to ensure they were interrelated. Details of the conducted interviews are displayed in table 3.2.

Table 3.2: Details of the conducted interviews with companies

Respondent	**Role in the organization**	**Date of interview**	**Type of interview**	**Duration**	**Dates for follow-up emails**
Freight forwarder (pilot interview)	Key Account Manager	01/02/2018	Face-to-face	1 hour 28 min	02/02/2018 03/04/2018
Freight forwarder	Vertical Market Manager	02/02/2018	Face-to-face	1 hour	02/02/2018 03/04/2018
Company A	Inbound and Distribution Manager	14/02/2018	Face-to-face	52 min	23/02/2018
Company B	Transportation and Customs Manager	16/02/2018	Face-to-face	56 min	23/02/2018 26/02/2018
Company C	Customs and Transports Manager	18/02/2018	Face-to-face	1 hour 14 min	27/02/2018
Company D	Logistics Manager	06/03/2018	Face-to-face	49 min	14/03/2018
Jula	Freight Manager Logistics	14/03/2018	Phone	1 hour 11 min	20/03/2018 21/03/2018

During shorter case study interview (around one hour) the interviews can still remain open-ended, but closer attention is put on the case study protocol (Yin, 2014). In this instance, the purpose is corroborating explicit findings. Specific questions are probed without affecting the respondents view about the phenomenon. To realize the corroboratory purpose, carefully worded questions are needed, since they allow the respondent to provide their view and commentary on the discussed matter (Yin, 2014). This was achieved through probing open-ended questions from the interview guide and avoiding questions which are biased. Notes were taken by one researcher while the other researcher was asking the prepared questions to the respondents. The objective was to record the answers in written text and appropriately interact with the respondents. However, the interviews were not recorded in any video or audio. Respondents which are recorded may feel less willing to share information (Sreejesh et al., 2014). Although this method increased the risk of interview errors where the researcher fails to record the data completely, it allowed a less restrictive setting. The respondents were offered to exclude sensitive information from the research, to further encourage an open conversation where the desired data could be collected. The pilot interview described in the data collection process was conducted first, along with a discussion with the thesis supervisor of the appropriateness of the interview guide. Due to restrictions in time and availability, the last interview was conducted over the phone. The authors were aware of the limitations of a phone interview compared to a face-to-face meeting. Therefore, increased emphasis was put on sharing information with the respondent before and after the scheduled interview. After the arranged interviews, the written interview manuscripts and supplementary follow-up questions were sent to the respondents via email. This contact allowed the interviewees to comment on the written manuscript and provide their perspective on respective interview.

3.5 Research quality

A traditional approach to research quality within case study research methodology includes measures of validity (construct and internal), reliability and generalizability (also called external validity) (Farquhar, 2012; Yin, 2014).

3.5.1 Validity

Validity refers to the degree in which the study measures the intended phenomena (Collis & Hussey, 2013). In regard to case studies, construct validity is critical to create a sufficient set of operational measures (Yin, 2014). There are two preconditions which enable higher

construct validity. Firstly, defining the researched consequences and management strategies of supply chain disruption in terms of specific concepts allows a clearer interpretation of the researched phenomenon. Secondly, the applied operational measures need to be identified and preferably cited by other published studies that also relate the measures to the same phenomenon (Yin, 2014). The definitions of the consequences of supply chain disruption and risk management concepts for this research were found in the literature review. These concepts were the foundation of the interview guide and formed the basis of analysis when interpreting the findings.

Internal validity refers to the relationship between the studied variables and the research purpose and applies to the data collection- and analysis stage. The objective with internal validity is to achieve results which are based on critical investigations (Farquhar, 2012). Regarding the data collection, there are risks of not covering the studied phenomenon fully with interviews. Preconceptions may affect the researchers' ability to record the studied variables and it could be confined to both the interviewer and the interviewee (Adams et al., 2007). Even though effort had been put on avoiding biases in this report, the authors were aware of the possible limitations. Furthermore, it was noticeable during the data collection process that the respondents were not inclined sharing negative experiences which were caused by the organization itself. This aspect related to the interviewee's willingness of sharing sensitive information. The authors tried to overcome this issue by offering anonymity, however, limitations of the results were noted during the interviews and in the analysis stage. One method of increasing internal validity is through comparing the emerging theories from the case studies with the existing literature. If there are any conflicts between the results from the case studies and the literature, additional explorations of these deviations provide a deeper insight within the research (Farquhar, 2012). According to Cook (2010), inconsistencies stemming from the interviewee's censorship of critical events could be traced in longer interviews. Thus, this research had explored deviations of the empirical results and the literature review and emphasized a thorough interpretation of these deviations, by asking follow-up questions during the interview and distinguishing deviations in the analysis stage.

Moreover, when researchers use more than one case to describe a phenomenon, they must manage an exponentially increasing volume of information per case. The increasing volume of information may lead to biases in the interpretation of the data and low validity (Elsbach & Kramer, 2016). There are several techniques that address the validity of qualitative research;

these can generate a richer set of explanations in the data. Two techniques discussed by Gibbs (2007) are; respondent validation and constant comparison.

Respondent validation tackles the issue of incorrect transcription (Gibbs, 2007). The transcription process is a form of translation between one medium to another, which requires some interpretation. To ensure a high level of validity in the interpretation, the researcher may send parts of their transcript to the respondent for validation. A word-by-word transcription is not necessary for high validity; however, any misunderstandings of the main topics discussed can be clarified with this method (Gibbs, 2007). Sometimes the respondent will disagree with the transcript. Then, the researcher has two options; either to treat their statement as new data (any changes in opinion may be interesting for some research) or remove the previous statement completely. If the respondent requests to remove a statement, it is their privilege which should be respected. A respondent may not want to disclose some parts of what has been said in a private conversation in a public document (Gibbs, 2007). As discussed in the data collection process, no audio- or video recording were performed during the interviews. Therefore, to establish interpretations with high validity of the interviews, the written manuscript of respective respondent's interview was sent to them. Any misinterpretations were corrected in this process, and the respondents could remove statements from the final manuscripts which are presented in the empirical findings.

To achieve high clarity in the interpretation of the data, thorough descriptions of used concepts are needed. Constant comparison addresses the interpretation of data in the analysis (Gibbs, 2007). Continuity is necessary for developing theories and ensuring a correct interpretation of the data from the interviews. Additionally, replication logic is necessary for multiple case studies to achieve external validity (Yin, 2014). There are two important aspects to the constant comparison method. Firstly, compare the application of theories and/or coding between cases to ensure consistency and accuracy in their interpretation. Secondly, take note of any differences and deviant cases. These two aspects are important to achieve high validity and applied in the analysis of this research, since they enable comprehensive data treatment (Gibbs, 2007). Based on the findings from the literature review, each case was analysed in terms of theoretical fit in different categories within supply chain disruption and risk management. Furthermore, any deviation in the analysis process was noted to ensure improved clarity in the analysis process. Thereafter, the result of the analysis in each case was compared with each

other. Previously noted deviations in the analysis process were taken into consideration to ensure continuity.

3.5.2 Reliability

Reliability refers to the accuracy of applied measurements and the consistent result if the research is repeated (Collis & Hussey, 2013). In the interpretivist paradigm, reliability is considered less important and the qualitative measures are not necessary to be reliable as in positivism approach. As the results of research following interpretivist paradigm are influenced by the researcher, it is difficult to obtain the same conclusion when conducting the research again (Collis & Hussey, 2013). However, transparency in the analytical and interpretative procedures enhances the reliability of research in the interpretivist paradigm (Farquhar, 2012; Yin, 2014; Lee & Saunders, 2017). Thus, the emphasis is on creating a research procedure that ensures the reliability of the findings. In case studies, this means documenting procedures in the research, such as the literature review, data collection and analysis (Travers, 2001; Yin, 2014). In this study, the focus was on the thoroughness of literature review, the precision of the information shared by the companies and the analytical process to generate results with high reliability.

3.5.3 Generalizability

Generalizability is concerned with whether the research's result can be applied to other situations (Collis & Hussey, 2013). Some phenomena are more challenging to generalize from, due to the vast number of elements which are specific to the studied object (Gillham, 2000). The specific context studied includes multiple elements which were challenging to isolate, the port conflict and each company studied in this research has its own unique features. As this research focuses on investigating how the conflict at Port of Gothenburg affected the fashion retail industry and how risk management strategies were used to cope with the disruption, the findings are generalizable to theoretical propositions and not to populations and universes. Like scientific experiments, case study generalizations are rarely based on a single study. Additionally, a case study does not represent a scientific sample, the goal of the applied method is to expand and generalize theories (analytical generalizations), not to anticipate probabilities (statistical generalization) (Yin, 2014). Consequently, the theoretical propositions in this research are generalizable to research within similar fields.

The number of cases selected represented different aspects of reality. By including five cases rather than one, greater evidence was given by the commonalities distinguished among companies. These commonalities were more fruitful for analytical generalizations, since similar process and outcomes could be studied within the context of the port conflict. Furthermore, this research included a contrasting case. Contrasting cases have been used by several authors to draw attention to differences and similarities (Gummesson, 1988; Yin, 2003; Elsbach & Kramer, 2016). For instance, contrasting cases have been used by: Lindman et al. (2008) for examining new product management practices by low-tech small- and medium-sized companies in three different countries; Fisher and Reuber (2011) while analyzing how interaction via social media affect the effectual thinking of students; and Albers and Klaas-Wissing (2012) to identify underlying mechanisms of multilateral alliances within less-than truckload transportation.

4. Empirical results

The empirical results are presented in the forthcoming sections, following the structure used in the literature review. Firstly, the consequences of the port conflict that the retailers experienced within their; transportation network, logistics cost, supply chain performance and commercial aspects. These consequences are summarized in table 4.1 at the end of section 4.1. Thereafter, the companies' risk management strategies are presented; strategies applied during the port conflict, before the conflict and any changes in their strategies after. A summary of all the strategies is provided in table 4.2 at the end of section 4.2.

4.1 Consequences of the conflict at Port of Gothenburg on the companies

4.1.1 Transportation network

During the summer of 2017, when there was a lock-out at Port of Gothenburg, some shipping lines refused to enter Port of Gothenburg and there was a disruption in the operation at the port. Each of the interviewed companies managed the challenges posed by the port conflict in different ways. Figure 4.1 presents the alternative ports that have been used by the interviewed companies during the summer lockout at Port of Gothenburg.

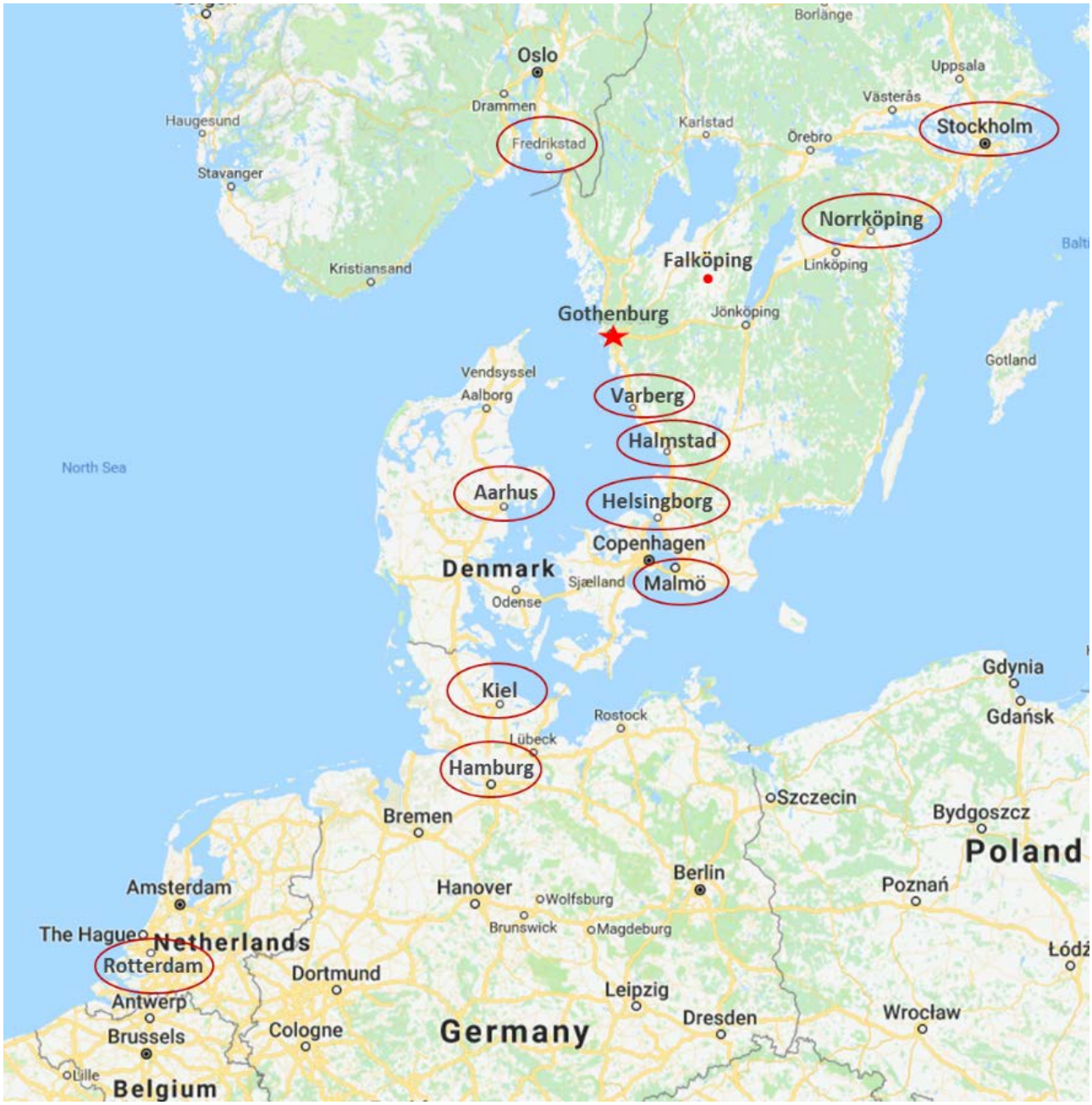

Figure 4.1: The alternative ports used by the companies during the lock-out of Port of Gothenburg in the summer of 2017 (Source: Authors)

Regarding Company A, due to proactive planning before the port event, they decided to use ports within Denmark and Germany instead of Port of Gothenburg. Thus, it led to an increase in road transportation due to longer distances from the alternative ports to the distribution centre. In addition, during the port conflict, Company A had to face other unforeseen issues from the shipping line, especially the IT attack on Maersk. This made the situation even worse due to disconnected communication regarding the status of the shipment, including the delivery time and location.

On the other hand, Company B did not choose to ship the containers to the other ports beforehand and relied on the carrier regarding the shipment of goods. During the conflict, the shipping lines refused to enter Port of Gothenburg and unloaded the containers in different ports such as Varberg, Malmö, Aarhus and Fredrikstad. In more severe cases, the shipping lines unloaded the containers in Germany, and longer distances were covered by truck in order to deliver the goods to their DC. As a result of the rerouted shipments, Company B had to use more road transportation compared to previously to pick up the containers in several ports. Besides, the respondent mentioned that there was a capacity restraint in both trucking and rail. Thus, it was challenging for Company B to plan for the transportation during this period. The IT attack on Maersk was also mentioned by the respondent of Company B, which made planning even more difficult due to lack of information regarding the status of the container.

Meanwhile, the two main alternative ports for the Company C during this time were Helsingborg and Aarhus using feeder vessels. As a result of switching the ports, the distance increased for the truck transportation. For the goods that were still delivered to Port of Gothenburg, the interviewee mentioned a delay due to the challenge of limited working hours at the port, which meant the service level decreased and fewer containers were shipped in a timely manner. However, the company did not experience much difficulty as they were prioritized owing to the size of the company. During the first two weeks, the respondent stressed that no one recognized the full effect of the port conflict and treated it as an ad-hoc situation. Thereafter, the difficulty increased in getting the trucks needed to transport the containers, due to the lack of capacity available. The containers were dropped off at different ports, causing the trucks to travel longer distances. The respondent mentioned that if the trucking companies had unlimited capacity, the problem would have been less serious. Additionally, this occurred during the peak season, making the situation even worse. The respondent also pointed out the IT attack on Maersk which caused an information disruption. It made it more challenging for the company to track the status of the containers in transportation. One of the difficulties was arranging the customs document in transit, due to the uncertainty of the delivery of the containers.

In regard to Company D, the respondent perceived the consequences of the port conflict as modest, owing to their proactive re-routing solutions. In details, the containers were shipped to other ports instead of Port of Gothenburg, including Halmstad and Varberg in Sweden and some ports in Germany and Norway, followed by truck transport to the DC. However, the

interviewee also mentioned the IT attack on Maersk, leading to the missing information regarding the status of the containers, which was considered as making the situation even worse. In addition, they also expressed the difficulty in getting truck transportation during one week due to limited capacity, which was perceived to be the overall issue of most of other companies.

As to Jula, during the port conflict, 80% of Jula's containers were still delivered to the Port of Gothenburg, and the rest were rerouted to other ports, including the Port of Stockholm, Malmö, Halmstad and Aarhus in Denmark. With the ability to reschedule the train operation, most of the containers were still delivered on rail to Falköping. However, truck transportation was used for some prioritized containers which contained products for the specific campaigns. Furthermore, Jula's rail transportation set-up also provided the solution for two other companies to get part of their containers out of Port of Gothenburg to Falköping, and then to their DCs by truck. The lack of capacity in trucking for the Port of Gothenburg area was mentioned as a major effect of the port conflict. Besides, there was no capacity problem mentioned for the trucking service from the alternative ports. Another consequence of the port conflict was the decreased service level at the port. Specifically, the employees of the terminal were only able to load some of their containers on the train during operating hours (sometimes around 20-35 containers). This meant that the other containers were left at the port, incurring additional costs. However, this issue was perceived as smaller than for those companies which simply relied on trucking as their only solution. Additionally, no overtime nor increased administration was mentioned as a consequence of the port conflict.

4.1.2 Logistics cost

All the interviewed retailers mentioned an increase in logistics cost during the port conflict yet could not provide any specific figure. However, an average estimation of the transportation cost was given by the freight forwarder. They suggested an increase of 70% from the original cost of 10000 SEK, which was equivalent to 7000 SEK, in transportation cost per TEU, delivered from Asia to Port of Gothenburg. The extra cost was said to arise not only from using truck for longer distances, but also from longer waiting times of large number of trucks at Port of Gothenburg during limited opening hours which caused big congestion. For Company A, the longer distance from other European port to distribution centre in Sweden incurred additional costs. However, the company perceived it as necessary, to make sure the products are delivered on time at the store in order not to affect sales. Overall, the transportation cost

does not make up a large proportion in the cost of product. Thus, re-routing and bearing additional costs in transportation were necessary in these circumstances. The increase in costs mostly stemmed from extra use of trucks and custom documentation. The uncertainty regarding the time of arrival also increased labour costs at the distribution centre due to poor work planning.

Moreover, Company B added that the lack of structured information about the location to return the containers caused rising costs in transporting the empty containers. Additionally, if the ships entered Port of Gothenburg, Company B had to bear a surcharge fee for underperformance at the port, which was added by the carrier. The respondent could not give any specific estimate on the increase of the cost, but she emphasized that the increase was high for the overall transportation cost. Additionally, the time consumption in tracking and arranging the transportation of the containers, plus the low resource utilization added to the overall cost.

According to the respondent of Company C, transportation costs increased by approximately 20-25 %. Specifically, the increase stemmed from additional trucking cost, detention cost for keeping the containers longer than the time allotted, fees at the port and feeder vessel cost.

Similarly, the interviewees from Company D indicated that the trucking cost as the biggest increase in the total logistics cost during the time of port conflict. Although, they regarded the increase in cost as manageable and could not give any specific figures for it.

However, the situation was quite different with Jula when 80% of the cost increase came from the container detention cost. Another 15% of the increase was attributed to the extra trucking cost for delivering the containers in some urgent cases. The rest of the cost increase stemmed from the demurrage fee (2%) for picking up the containers late from the shipping lines and feeder vessels fee (3%) from Hamburg, Rotterdam and Denmark. According to their respondent, the transportation cost went up by 2200 SEK per 40ft container, resulting in the total increase of 2.2M SEK. However, the rising cost was perceived as acceptable compared to the initial transportation cost of 14,700 SEK per 40ft container, taken into consideration that the goods need to be delivered to the market on time.

4.1.3 Supply chain performance

In terms of inventory management, the interviewed retailers apply a replenishment system where the goods are fulfilled directly after a purchase in store. For the Company A, the port conflict postponed the delivery of goods roughly 1 week, causing shortage in inventory levels and poor staff planning. Since every activity in the DC needs to be planned in advance, uncertainty in delivery affects the whole operation.

Regarding Company B, the containers were sometimes delivered more than 2 weeks late, leading to poor utilization of equipment and human resource in the DC. As the company plans the production based on the content of the containers, missing information regarding the arrival of the containers make them difficult to plan for the operation.

Meantime, Company C experienced a delay in transportation which added at least 1 week to the total delivery time of the containers to the DC. The worst case was a delay of 3-4 weeks due to a backlog caused by the lack of trucking capacity, which generated a high cost. When the port lock-out was over, part of the backlog remained for up to 3 weeks. The backlog resulted in the need for overtime work of at least one hour in the morning and one in the evening during six weeks, in the DC to deal with it. Despite the backlog, the company tried to maintain the stable flow of the goods in the DC, to make the operation more efficient and avoid peaks in handling cartons. In addition, the stores were informed about the backlog in order to adjust the planning.

Likewise, the respondents from Company D mentioned a small delay of around one week in the delivery of the products, without any problem in inventory management. Meanwhile Jula had a delay of 14 days in transporting the containers to the DC due to the rerouting. However, according to the interviewee, the postponement did not affect the operation of the DC because Jula has the backup inventory to deal with the unexpected shortage of goods.

4.1.4 Commercial impact

It is said to be difficult to measure the loss of sales by all the respondents; however, the respondent from Company A mentioned it was certainly more serious than the increase in logistics costs. Furthermore, he indicated that clothing products often are introduced under certain campaigns, which are marketed to the customers beforehand. Thus, it is highly important for all the items within a collection to be delivered on time before the campaign. Otherwise, the delay causes loss of revenue and incurs costs from obsolete products.

Regarding Company B, the respondent posed the possibility of loss of sales due to stockout in stores. Additionally, it was added that the conflict occurred during peak season and there were some missing products in certain collections at stores.

On the other hand, the respondent from Company C expressed the difficulty for stores to plan the retail operation. Meanwhile, no impact on the commercial aspects has been observed in Company D and Jula, with Company D even experiencing a successful summer regarding sales. The respondent from Jula explained that the company had extra inventory to prepare for disruptive events; and the important containers were prioritized during the port conflict.

Table 4.1: Summarized findings of the consequences experienced by the companies during the port conflict (Source: Authors)

Consequences	Company A	Company B	Company C	Company D	Jula
Transportation	Proactive planning before the port event to re-route to alternative ports Longer transportation distances to DC Increased usage of trucking Information disruption from the IT-attack	Ad-hoc solutions based on available information Longer transportation distances to DC Increased usage of trucking Information disruption from the IT-attack Capacity constraints in trucking Disrupted planning	Ad-hoc solutions based on available information Longer transportation distances to DC Increased usage of trucking Information disruption from the IT-attack Capacity constraints in trucking Disrupted planning, among others customs documentation	Proactive planning before the port event to re-route to alternative ports Information disruption from the IT-attack Longer transportation distances to DC Increased usage of trucking Capacity constraints in trucking	80 % of the containers still delivered to Port of Gothenburg, the rest re-routed to other ports No capacity issues with intermodal set-up Some capacity constraints in trucking Less containers loaded on the train due to limited operating hours at the port
Supply chain performance	1-week delay Shortage in inventory Poor staff planning Disconnected communication due to IT attack	2-week delay Poor utilization of equipment and human resource Difficulty in planning	Up to 4-week delay Backlog	1-week delay	2-week delay
Logistics costs	Increasing costs in: -trucking -customs documentation -labour cost at DC due to inefficient planning	Increasing costs in: -trucking -transporting empty containers -surcharge fee at the port -additional management -lower utilization of assets	20-25 % increase in transportation costs -trucking -container costs -detention and port fees -feeder vessel cost	Increasing costs in: -trucking	Increasing costs: -80% detention fees -15% additional trucking -feeder vessel cost 3 % -demurrage 2% Total cost increase was 2.2 M SEK
Commercial impact	Difficult to measure the loss	* Difficult to measure the loss * Some missing products at stores	* Difficult to measure the loss * Difficulty in store planning	Successful summer in sales	No commercial impact

4.2 Risk management strategies

4.2.1 Strategies during the port conflict

The main strategy that all the interviewed companies used during this period was rerouting to alternative ports and accepting the incurred logistics costs to protect the sales at stores, by cooperating closely with their freight forwarder to solve the issues efficiently. In addition, the respondents emphasized the importance of information sharing among the involved parties, as information allowed the company to plan and act.

Company A managed to get the products delivered despite the overall shortage of trucks and drivers, by having contacts with several road hauliers in Denmark and Germany beside the contacts from their primary freight forwarder. Meanwhile, Company B tried to actively communicate with the carriers, the ports (mentioned Malmö) to get the information regarding the status of the goods and come up with the solutions.

Company C changed the normal working procedures with their freight forwarder in order to prioritize the main issues. Therefore, instead of having several meetings to chase information regarding the status of the containers, the company decided to have meetings with their freight forwarder twice a week. Lists of prioritized containers were given to the freight forwarder, to receive the right quantity of cartons. Furthermore, the respondent expressed appreciation towards the coordination between different departments during the time of disruption. It was evidently stressful, but there was an understanding of the situation making it easier for the logistics department to focus on the big issues. This understanding was dependent on the successful information exchange, which is key to the success in maintaining good coordination between the departments according to the respondent.

Likewise, several options of routes were brought up and considered carefully by Company D. The logistics department informed other departments such as marketing, sales and purchasing about the delay of the transportation of the products. Therefore, the operation at stores and the marketing activities could be adjusted accordingly.

Regarding the sourcing, all the interviewees except the one from Company D, mentioned that the sourcing is planned ahead for a long time and vulnerable for major transportation disruption. Even though the production points in Europe have a shorter lead time compared to the Asian production points, the requests for production cannot change swiftly due to production planning. Furthermore, each sourcing region has different quality and expertise of

products, making it difficult to promptly produce extra orders. On the other hand, the purchasing department of Company D has actively changed the sourcing plan to have more production in Turkey, due to the long-lasting port conflict.

4.2.2 Strategies prepared before the port conflict

The respondent from Company A mentioned the uncertainty in the shipping industry, like the bankruptcy of the Hanjin Shipping line, and the difficulty in foreseeing events like the port conflict. However, Company A does conduct risk assessment for multiple types of supply chain disturbances, such as accidents with ships.

Meantime, Company B conducts a risk assessment every year for better planning on lead time. In the risk assessment, they distinguish vulnerable points along the supply chain, for example issues with air transportation from Bangladesh. Based on the vulnerability points, they try to come up with solutions such as rerouting or changing the mode of transportation. However, the risk assessment normally considers common events in transportation which arise from the close information exchange with APM terminals and freight forwarders. Furthermore, the logistics department corporated regularly with the purchasing department to review the possibility of disruption in their transportation. As a result of the corporation, the logistics department may suggest lengthening the lead time for the delivery of the products, or increasing the quantity of the upcoming orders, which may lead to additional inventory costs.

Company C also conducts risk assessments, for instance; the risks from the sourcing, transportation from Asia and accidents within the warehouse. However, they do not have an excessive contingency plan specific for port conflicts. Rather than having protocols for specific events, the company choose to have closed discussions when problems occur. Based on the experiences from the port conflict, the respondent expressed that there was always a way of transporting the goods to the DC. Furthermore, the sourcing department was informed about the risks of delay in transportation, allowing to extend the lead time.

Similarly, the respondent from Company D regarded risk assessment as part of their daily work, considering different routes and modes of transportation. For instance, an intermodal service is recognized as cost-neutral in comparison with trucking. However, due to environmental concerns, the former is favoured. But the logistics department may choose to use truck transportation instead of rail, based on the risk assessment, which includes disruptive events such as bad weather and congestions. In terms of the sourcing strategies, it was mentioned that

the main categories are sourced both from Turkey and Asian countries to avoid the risk of supply disruption.

With regards to Jula, the respondent considered air transportation as a backup for urgent deliveries. Although, this option is not preferred due to the high costs associated with it. Instead, a dynamic approach is favoured and applied to eliminate risks of stockouts. To realise this approach, careful thought is put on the sourcing. For example, after an order is placed, it can have a lead time of 6-8 months, providing the company with additional time to manage disruptions. The logistics- and supply chain department is responsible for delivering the goods in the right time to the right place. This process includes the prioritizing and sequencing of containers, to make sure the right articles arrive in the stores. Information sharing is considered key for an efficient supply chain. Therefore, the company has an integrated information system with their freight forwarder for their containers. The risk assessment does not include the investigation of alternative routes, which are considered as the responsibility of the freight forwarder and the shipping company.

4.2.3 Changes in strategies after the port conflict

All the respondents expressed that they saw no change in their strategies after the port conflict. Moreover, if a difficult situation like the port's lockout during the summer of 2017 happens again, they prefer to continue the adopted solutions as mentioned in section 4.2.1.

However, the respondent from Company A indicated that he is more open-minded to try other alternative solutions regarding the transportation of the products. In reviewing the response to the port conflict, Company A considered their decision to reroute and use other ports instead of Port of Gothenburg a successful solution.

With regards to Company B, the respondent indicated that if the port conflict escalates again, they will continue to use Port of Gothenburg, as it is important for their import flow. The solution for transportation during a disruption will still be based on the prevailing conditions and suggestions from the carriers. However, the respondent emphasized that learning from the previous port conflict enabled the start-up of arranging transportation to be shortened than before. Since the previous disruption contributed to a good routine and better knowledge in handling and prioritizing the orders. Yet, if the port conflict or similar disruption happens on a long-term basis, Company B may consider switching from Port of Gothenburg to another port, or the sourcing of the products, alternatively even changing the location of the DC. Although,

these decisions are strategic and not easy to make, and the respondent hopes that the conflict will end.

Meanwhile, the respondent from Company C mentioned that the port conflict has accelerated their intention to increase the use of Port of Uddevalla, in order to distribute the risk and deal with peak season. They see advantages to have the containers shipped closer to them from an environmental perspective, shortening the inland transportation by truck to the DC.

For Jula, Port of Gothenburg is the preferred port with their logistics set-up. Since this was the first time the respondent had experienced this type of disruption, the respondent considers himself to be better prepared if it happens again. They would still apply the same strategy that was perceived as good. One possible alteration is to employ a logistics coordinator, who would take full control of the container flow and make sure the prioritized containers arrive on time.

Table 4.2: Summarized findings of the strategies used by the companies (Source: Authors)

Strategies	Company A	Company B	Company C	Company D	Jula
Before the port conflict	Risk assessment	Risk assessment Information sharing among the parties involved in the supply chain	Risk assessment Close discussion when problem occurs	Risk assessment Balance of sourcing from Turkey and Asia	Back up by air transport Risk assessment Information sharing among the parties involved in the supply chain Additional stock
During the port conflict	Re-routing to alternative ports Information sharing Carrier network in Denmark and Germany No change in sourcing strategies	Re-routing to alternative ports Information sharing Communicated with authorities such as the port No change in sourcing strategies	Re-routing to alternative ports Information sharing Customized working procedures with the freight forwarder to fit the conditions during disruption No change in sourcing strategies	Re-routing to alternative ports Information sharing Increased sourcing in European production points with shorter lead time	Re-routing to alternative ports Information sharing No change in sourcing strategies
After the port conflict	No changes in applied strategies More open-minded to alternative routes	No changes in applied strategies Consider the disruption as a learning experience, improved coordination if it happens again If long-term, change port, sourcing or location of DC	No changes in applied strategies Increase usage of Port of Uddevalla	No changes in applied strategies	No changes in applied strategies Sees the disruption as a learning experience Would consider employing a logistics coordinator in charge of prioritized containers

5. Analysis

5.1 Consequences of the conflict at Port of Gothenburg

5.1.1 Consequences in transportation network

Several similarities can be seen between the literature and empirical findings. Foremost, regarding the transportation network, all of the respondents expressed the need to re-route, transport their goods in longer distances and increase the usage of trucking (change mode of transportation), as suggested in the model by Gurning and Cahoon (2011). Indeed, one of the primary challenges during the port conflict mentioned by the respondents within the fashion segment was arranging of transportation from the alternative ports to their distribution centre, compared to their set-up with Port of Gothenburg. The fashion retailers considered the lack of trucking capacity as an overall issue which required additional management and planning (mentioned by Company B & C). Jula, on the other hand, also experienced the lack of capacity in trucking, especially in the Port of Gothenburg area, but not to the same extent. Since their dependence on trucking is not as high owing to their intermodal set-up, in which they have the rail connections from the Port of Gothenburg and the alternative ports to Falköping without any capacity constraint. Therefore, the need for additional management was not perceived as high by Jula. Additionally, Jula's transportation set-up had sufficient capacity not only for their containers, but also for two other companies which needed to transport their goods from Port of Gothenburg during the conflict. Thus, in this specific context of port conflict, intermodal transport using rail directly from ports was proved to be greatly beneficial in releasing the containers out of the bottleneck caused by delay in port service and truck congestion. The increased usage of a different mode of transportation was also witnessed by Hall (2004) during the west coast port lockout in 2002. Although, in this instance, the alternative mode of transportation was mainly air rather than road. The mentioned bottleneck created by limited trucking capacity displays a vulnerability point in the fashion retailers' logistics set up. Albeit trucking is often considered a flexible and low-cost option for transportation, when the port conflict caused multiple shipments to re-route, the limited service level of trucking as a mode of transportation led to issues in other parts of the supply chain for the fashion retailers. Taking into account the characteristics of fashion retailers, which are in desperate need of transportation services to deliver time-sensitive goods in a timely manner, this consequence of the port conflict highlights the severity of limited transportation capacity. Unlike previous research, the findings from these interviews point to the exhaustion of one mode of

transportation by multiple actors during the disruption, which decreased its service level and affected the fashion retailers negatively.

Furthermore, the respondents of the fashion retailers expressed the difficulty in arranging transportation from the alternative ports due to lack of information regarding the location of the containers, disrupting their ability to plan. The IT attack on Maersk heightened the challenges imposed by the port conflict, when the disruption of information meant that the status of containers was uncertain. Company D expressed this aspect as the most difficult challenge (even worse than those caused by the port conflict). Additionally, interviews with their freight forwarder reveal how they also experienced difficulties during the IT attack, suggesting that the disruption caused by the IT attack affected the information flow. These are examples of disruptions affecting the planning process, which were similarly described by Carvalho et al. (2018) and MacDonald and Corsi (2013). Although the respondents of the fashion companies mentioned the need for additional time to plan and manage the disruption, none of them stressed the negative effect on team stability which is suggested by MacDonald and Corsi (2013). This aspect may not have been fully covered during the interviews due to the limited willingness of the respondents to share negative experiences within the company. However, the difficulty in coordinating with actors outside the focal company was mentioned by some fashion retailers (Company B and C), such as shipping lines and customs agencies. Considering the numerous external actors influencing global supply chains of fashion retailers, external communication during disruption is an interesting area to investigate. Specifically, how disruption creates inefficiencies in terms of coordination of information. The findings from these interviews highlight difficulties in coordinating the container flow during the port conflict due to low availability of information, affecting the communication and planning process. Coordination between different external actors of the focal company is another example of a vulnerability point within the supply chain during disruption found in this study, along with limited trucking capacity.

5.1.2 Consequences in logistics cost

The above discussed consequences did not only pose managerial challenges, it is evident that they incurred additional costs in the retailers' logistics set-up due to the disruption caused by the port conflict. Strong support exists for previous authors' theory of supply chain disruption increasing the costs of transportation (Hall, 2004; Gurning & Cahoon 2011; Hendricks & Singhal, 2005; Vilko & Hallikas, 2011; Carvalho et al., 2018). Particularly, the respondents

from the fashion retailers stressed the high costs increase in trucking, due to longer distances from rerouting and capacity shortage. Meanwhile, Jula perceived trucking cost as minor compared to the increase in detention cost. This contrast derives from the difference in their logistics set-up. As mentioned in the discussion above, Jula does not rely on trucking to the same extent compared to the others.

An estimate of the overall transportation cost increase as shown in figure 5.1 was made based on the figures provided by the studied companies. This serves as an illustrative example, modelling the cost consequences. To begin with, the freight forwarder indicated that the average cost to transport containers from Asian ports to DCs in Sweden via Port of Gothenburg was 10,000 SEK per TEU. During the port conflict, the percentage of increase in transportation cost ranged between 15% and 70%. The lowest point was taken from Jula, as they had the least severe impact due to intermodal transportation set-up. The latter point was brought up by the freight forwarder through their observation of the situation. Combing these numbers, the amount of rising cost fluctuated from 1,500 SEK to 7,000 SEK per TEU. Given an example of a company with an average of 500 TEU handled during the port conflict lasting for three months, the total transportation cost increase could be estimated to be between 750,000 SEK and 3,500,000 SEK. This is equivalent to an increase between 62,500 SEK and 291,667 SEK per week. If these numbers are regarded as generalizable for all companies using Port of Gothenburg for container transport with 644,000 TEU in 2017 (Port of Gothenburg, 2017), cost increase in direct transport cost alone could account for up to approximately 1.1 billion SEK during the 3-month period.

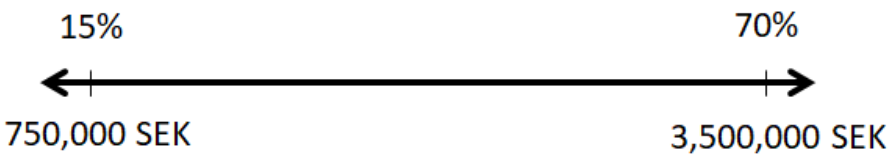

Figure 5.1: The range of estimated cost increase in the transportation cost of a company with 500 TEU during the port conflict summer 2017, in percentage and amount (Source: Authors)

The aforementioned calculation was for the transportation cost only, since it was challenging to estimate the increase of the whole logistics cost during the port conflict. However, given the consequences illustrated in the previous section, the total rising logistics cost is likely to be much higher than the escalation in transportation cost alone. The following sections present the

consequences in warehouse management and commercial aspects, which could incur additional costs that were not easily quantifiable.

5.1.3 Consequences in supply chain performance

Leadtime

All the interviewed companies source at least 50% of their products offshore from low cost countries. This strategy, according to Christopher et al. (2004), brings the companies the cost advantage but prolongs the lead time significantly. Indeed, the average time for transportation of products of the four companies by sea from Asian ports to Sweden is roughly 40-45 days, not including the time for other time-consuming phases such as design and purchasing decision making. Meanwhile, as mentioned before (Christopher et al., 2004), fashion products are of limited life cycle, thus making the lead time undoubtedly crucial. In fact, the replenishment system that all the interviewed companies use to manage their inventory on real time data can illustrate for the importance of the time factor in the fashion retail industry, affecting their ability to serve the end market as suggested by Christopher et al., 2004)

The delay in transportation from the port conflict led to a longer lead time in delivering the products to the DC, specifically at least one-week delay, which as mentioned by Vilko and Hallikas (2011), is the most serious impact of disruption. However, although previous research (Christopher et al., 2004; Vilko & Hallikas, 2011) focused on the importance of lead time and expressed delay as a consequence of supply chain disruption, few authors have, in detail, explained how the lead time could be extended when a disruption happened.

Through the interviews with the retailers, some practical reasons for the extension in lead time due to the port conflict were distinguished. These reasons include prolonged time for truck transportation and time to resolve the backlog of containers due to the lack of truck capacity during the peak of the port conflict. Furthermore, the solutions the companies chose for the port conflict also decides the significance of the delay. Specifically, Company A and D had the shortest delay of only one week, while other retailers experienced up to 3-4 weeks delay. The difference could be partly explained by the fact that Company A and D actively chose to ship their containers to other ports instead of Port of Gothenburg to avoid the peak of the conflict. Meanwhile the rest of the companies chose to adjust the transportation flexibly based on the actual unloading of the shipping lines, thus may lead to the difficulty in planning for the pick-up of the containers.

Moreover, there exist also external factors, which are not directly stem from the port conflict that can affect the lead time. Among them is, for example, the IT attack on Maersk, emphasized by all the interviewed respondents that interrupted the communication flow regarding the status of the containers among the companies and the transport service providers. In addition, the priority for the companies with larger size by the port can influence the speed and the order of picking up the containers at port, as revealed by interviewee from Company C.

Inventory and resource utilization

The significance of the delay in lead time as discussed above also impacts the inventory management of the companies differently. While Company D perceived their one-week delay as a minor impact, both Company A and B suffered the shortage in the inventory needed at the warehouse due to the delay. Many authors also emphasized this result before, including Hendricks and Singhal (2005) and Wilson (2007). Specifically, there are similarities about the indicated incurring impacts, which are the poor utilization of equipment and human resources, from the inventory imbalance between Hendricks and Singhal (2005) and the interviewees. For Company B, as staff schedule and equipment running are planned based on the amount of the upcoming goods, poor planning for the operation of the warehouse is unavoidable, as also expressed by the respondent from Company A. Furthermore, Wilson (2007) considered the increase in the amount of goods in transit as a result from supply disruption, which was also referred as the backlog in the case of Company C. However, the respondent did not point out the poor resource utilization as an impact from the port conflict, which could be explained by the automation in their warehouse and their effort to maintain a stable flow of goods, even in the period of disruption.

On the other hand, although Jula had a 2-week delay in their lead time, they barely experienced any change in the warehouse's operation. Since Jula uses additional inventory to back up the shortage of goods in case of disruption. This also highlights the difference in inventory strategies among the distinct industries. For retailers in fashion industry, inventory backup is not likely to be an applicable strategy due to the risk of obsolescence, as suggested by Chopra and Sodhi (2004). While for companies like Jula, most of their products can be stored for several months without the risk of being obsolete, thus the strategy of extra inventory can be adopted.

5.1.4 Consequences in commercial aspects

With regard to commercial aspect, all the respondents expressed the awareness about the possibilities of loss of sales and facing obsolete stocks. These possibilities have been suggested by Gurning and Cahoon (2011) and Hendricks and Singhal (2005) and can be explained by the seasonal characteristics of fashion products (Christopher et al., 2004). Furthermore, the companies stressed the importance of availability at stores of all the items within a collection or a specific campaign. The shortage of one item may affect not only its sales but also the success of the whole collection. Besides, the respondent from Company C pointed out the difficulty in planning for the stores due to the delay in delivery of products caused by the port conflict, which has not been touched upon in the reviewed literature.

However, none of the interviewees could provide any information regarding the actual loss in sales resulted from the port conflict. Indeed, there may exist several possible rationales behind a sales drop throughout a period. Thus, attributing sales loss to a specific reason like the port conflict is likely to be misleading. On the other hand, the decrease in sales might be insignificant to be recognized. In fact, during the disruption at port, the companies tried to prioritize to unload and pick up the most important containers in order to avoid the shortage of products at stores. These efforts in prioritizing containers also emphasize the companies' willingness of baring higher transportation costs instead of loss in sales. Furthermore, the synergy among the departments within each company in adjusting the delivery of the products to the stores also minimized the impact of the disruption on sales.

5.2 Risk management strategies

5.2.1 Mitigation strategies

Robustness strategies

Regarding strategic stock strategy, indeed all the companies choose to have only one central warehouse in Sweden to provide the products for their markets in Europe. This strategy, as discussed by Tang (2006), helps the companies minimize the inventory cost while still remain flexible in deploying quickly the stock in case of fluctuation in demand or disruption in the covered markets. However, the port conflict has depicted a drawback of applying this strategy when disruption happens at the DC. As the supply of the goods relies on one DC, any disturbance happening before the goods reach the DC can lead to severe impacts on the activities following the DC. In this case, the port conflict posed a delay in transportation of the

goods to the DC, forcing the companies to find alternative solutions in order to maintain the delivery of their products to all the markets.

Considering the sourcing of the companies, it can be stated that most of them do not have a flexible supply in terms of geography. As mentioned, the majority of the products are mainly sourced from Asia, and only a small portion from European countries such as Turkey and Italy. Moreover, there is almost no flexibility in switching the production among the regions due to the difference in capacity, quality, cost and expertise. Therefore, in this case of the port conflict, increasing the production percentage in Europe and decreasing the specialization level of products by regions are likely to be good mitigation strategies. Indeed, company D stands out from the cases to have a balance proportion in the production between Europe and Asia and thus did not experience much impact from the event of the port of Gothenburg. After acknowledging the risk from the port conflict, the company has even actively increased the production in Europe.

Likewise, the flexible transportation strategy is unlikely to be embraced by the interviewed companies to mitigate the disruption risks. For the transportation from Asia to Sweden, although rail and air have been mentioned, shipping is still considered as the preferred choice to deliver the goods from offshore. Despite being faster and considered as an alternative to sea transport, rail transportation has several limitations including the infrastructure incompatibility between the countries and the insufficient capacity. In addition, air transportation is rarely used due to high cost and negative environmental impact. Moreover, there are few available routes between the continents for the companies to choose from. Concerning the delivery of the containers from the port of Gothenburg to DCs, all the studied fashion retailers rely solely on trucks. Meanwhile, Jula employs both truck and rail, thus becomes more flexible when the port conflict occurred. This flexibility proved to be successful when there were capacity constraints in trucking, suggesting the high importance of transportation mitigation strategies for these types of disruptions. Furthermore, the companies are dependent on their freight forwarders who arrange all the transportation and suggest solutions when any disruption happens.

In addition, the limitation due to choosing the interviewees solely from the logistics departments led to a lack of information about the postponement strategy, make and buy strategy, economic supply incentives strategy and silent product rollover strategy.

Increasing agility of supply chain

The agility in the supply chain of the companies is achieved through the active communication among the involved parties, which was also suggested by Li et al. (2006). Earlier in the supply chain, the logistics and purchasing departments try to foresee possible scenarios and actively extend the lead time in the chain if needed, as reflected in the case of Company B. Although, extension of lead time is not a desired measure for fashion retailers in mitigating risks, since it impairs the fashion retailers' ability to meet market demand (Masson et al., 2007). Further down the supply chain, it is the constant information sharing, not only within the companies but also between them and their freight forwarders that helped mitigate the impact of the port conflict by rerouting or delaying product delivery at stores. As mentioned by Tang (2006), proactive execution and readiness in responding to a disruption decide the severity of impact. In addition, agility and flexibility within the supply chain are characteristics which are discussed by Masson et al. (2007), in terms of postponing the final product definition and using intermediaries for increased supplier flexibility. These measures were not discussed by the respondents, suggesting that they are not considered in their strategies. However, considering the success of Zara, which is well known for their agile supply chain created by extensive communication and great control over schedule and capacity, increased agility may improve the interviewed fashion retailer's ability to respond to disruption.

Identifying vulnerability points

All the studied companies perform risk assessment, but none of them involves the risk from port conflict. The lack of mitigation strategies from the interviews as analyzed above gives support to the study by Closs and McGarrell (2004), Rice and Caniato (2003) and Zsidis et al. (2001; 2004) that the companies actually conduct risk assessment yet have not paid attention to the mitigation strategies. The reason for this may include the difficulty of the companies in assessing the costs and benefits of the strategies due to inadequate data, or simply the mismatch between the mitigation strategies and the overall business strategy of the companies (Tang, 2006). This study distinguished vulnerability points of the fashion retailers' logistics set-up which were affected during the port conflict, such as the distribution centre due to its dependence on Port of Gothenburg. Escalona Orcao and Ramos Pérez (2011) illustrate that some large fashion retailers have several DCs located in different areas, with different strategies in terms of proximity to served market. Considering the dependence on a single distribution centre among the interviewed companies, it appears few mitigation strategies address this vulnerability point. Some respondents mentioned the possibility of changing the location of the

distribution and reliance of Port of Gothenburg if there was a long-term disruption occurring. Nevertheless, it is considered a highly strategic decision, which is not beneficial based on the events of the port conflict alone. Other vulnerability points were distinguished in the logistics set-up in this research: low flexibility in sourcing, transportation options and alternative means of communicating with external actors during disruption, which increased the costs and lengthened the lead time during the port conflict. In response to these weaknesses, there were merely a few indications of changing their current strategies among the companies, such as company C in terms of using another port and company D in terms of increasing the sourcing in Europe compared to Asia. This provides additional evidence for limited attention directed towards mitigation strategies. However, there is possibility that, due to the limitation of the research scope that only managers from logistics departments were involved, a holistic view on the companies' strategies were difficult to obtain.

5.2.2 Contingency strategies

Regarding contingency strategies for the port conflict, none of the demand management was mentioned in the interviews, which can also be explained by the limited scope of research. The interviewed representatives were mainly involved in the logistics and transportation related activities of the companies; hence these strategies may not be applicable for their role within the companies. On the other hand, the contingency sourcing strategy was not applicable in the studied cases as all the companies use offshore sourcing and could not order extra production in Europe due to the difference in capacity, quality, cost and expertise. Evidently, all the companies chose to act based on the prevailing conditions with a high dependence on the solutions provided by their logistics service providers. The success of this strategy was highly dependent on the possibility of sharing information between different actors within the supply chain. Company C described a coordination strategy with their freight forwarder which contains elements of successful contingency plans (Christmer & Yee, 2000). For example, it contained lists of prioritized containers which is more similar to guidelines rather than procedures. Moreover, the strategy contained flexibility in terms of the meetings; they were rearranged to fit the prevailing conditions. However, despite all the respondents' positivity towards their flexible strategies, they suggested that their ability to manage similar disruptions could be improved if it occurred again. Indeed, while they see Port of Gothenburg as the best option for their shipments, the re-routing solutions could be enhanced by learning from the past disruption. Examples were given of revised: coordination of prioritized containers, routing options and more prompt responses to the disruption. These improvement suggestions imply

drawbacks of their applied strategy during the port conflict. Since the respondents were not prone in sharing negative aspects regarding their strategies, it is difficult to estimate, with good precision, the success of their contingency strategies.

Additionally, Company C and D emphasized the importance of coordination among the different departments to adapt the marketing activities and operations at store, to reduce the impact of disruption. Creating synergy among the departments and having effective communication channels during the port disruption can be seen as contingency strategies for optimizing the outbound logistics in the event of disruption. As adjusting inbound activities may be limited due to the tight lead time, enhancing the outbound activities could become an alternative strategy in dealing with disruption happening inbound. Other authors have similarly discussed how strategies within demand management can be used in the outbound logistics during supply chain disruption, including revenue management (Tomlin, 2009; Tang & Christopher, 2006) and assortment planning (Tang, 2006; Chong et al. 2001). The division of inbound logistics and outbound logistics within risk management is another way to categorize strategies for fashion retailers, which have not been discovered in the literature review.

Furthermore, the respondents view the port conflict as a short-term disruption. Therefore, the re-routing strategy is preferred for future disruptions, since it is seen as the most flexible option despite the issues of lacking trucking capacity, delay and costs. Nevertheless, if the conflict continues on a long-term basis, the respondents would consider changing port, routes and sourcing strategies. As the companies have made few changes in their logistics set-up, it is likely they will face similar consequences if disruptions occur again. Any further disruptions may also result in additional costs, which illustrate the limitations of the short-term perspective applied by the fashion retailers.

6. Conclusion

The fashion retailers faced several consequences during the conflict in Port of Gothenburg. Among those, the significant increase in logistics cost, attributed mainly to rising trucking cost due to rerouting, is most apparent. A comparison between these retailers and Jula in terms of cost and transportation consequences has highlighted the advantage of Jula's intermodal transport set-up during the disruption in picking up the containers from ports and avoiding the shortage of truck. Although the port conflict was considered as a disruption risk that leaves high impact on the supply chain by previous researchers, little attention has been paid to develop mitigation strategies for these types of disruptions by the case companies. Instead, solutions based on prevailing situation such as re-routing, intensive communication, collaboration among the departments, and adjustments at stores were preferred by the investigated fashion retailers, despite of high incurred cost and severe delay affecting the time-sensitive goods. In relation to future disturbances, the current strategies are considered sufficient by the case companies. Several risk management alternatives discussed by previous authors were not applied in practice by the case companies. The limitations of applied risk management strategies may result in similar consequences if disruption happens again, and more severely if the disruption lasted during a longer period of time.

Based on the results of this research, the following propositions are proposed:

- The risk management strategies applied by fashion retailers within logistics fail to mitigate risks from high impact/low frequent events, making them more vulnerable to these kinds of disruptions.
- In the event of a port conflict, the companies using intermodal transport and dry ports experience less severe impacts in terms of logistics cost and transportation delay, compared to other companies.
- In the event of a port conflict, the companies having mitigation strategies experiences less severe impacts in terms of logistics cost, transportation, warehouse management and commercial aspects, compared to the companies without mitigation strategies.

Regarding future research, several gaps were found in the existing literature which may be explored further, for instance, capacity constraints of transportation during supply chain disruption. An interesting area of research based on the findings of this report is the relationship

of supply chain disruption and transportation congestion. In addition, the IT attack on Maersk can be investigated in depth as a major disruption in supply chain during summer 2017. Another discovery in this research which was not mentioned by previous authors is the effect of disruption on retailer's outbound activities. Planning store layout, information exchange and close coordination between departments were discussed by the respondents to reduce the effects of disruption on the demand side. Thus, risk mitigation strategies for the outbound logistics of fashion retailers could be investigated further, especially how to improve the coordinating mechanisms between the retail channels during disruption. As for the limitations of this research, future research can investigate the negative impact of disruption on coordination within a company by interviewing different people within an organization. By investigating the coordination of different departments when constructing risk management strategies, a more holistic perspective of companies' strategies could be given, compared to simply investigating the strategies applied within logistics. This approach would require comprehensive access to internal company communication and resources. Furthermore, this paper is limited to the studied cases during a certain time frame, as explained in the delimitations section. Therefore, considerations are needed when using the results in future research.

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