



Managing Demand Fluctuations: Distribution Strategies as Risk Mitigation Tools

An analysis of a case company's current risk mitigation strategies and two logistics postponement strategies

Master's thesis in Supply Chain Management

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An analysis of a case company's current risk mitigation strategies and two logistics postponement strategies tailored to the case company to increase their ability to manage demand uncertainty

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SUMMARY

Currently, the retail sector is experiencing fluctuating markets with high demand volatility and demand uncertainty. Therefore, companies within this sector need to implement distribution strategies which are tailored to dealing with mitigating the risks of demand volatility and uncertainty without incurring too much costs, which may negatively affect operations or compromise customer service levels.

In order to conduct this thesis and answer our research questions, we utilized a qualitative research method which included interviews and a literature review. The thesis entails an analysis of a case company's current risk mitigation strategies and two logistics postponement strategies tailored to the case company. Their current risk mitigation strategies include an omni channel and balancing inventory through lateral shipments. The analysis was based on benefits and limitations related to dealing with demand volatility and uncertainty. Furthermore, complementary operational, based on a scenario planning analysis, and strategic considerations of the two logistics postponement strategies are discussed.

In conclusion, the masterhouse strategy shows great robustness in dealing with demand volatility and uncertainty with centralizing safety stock closely lagging behind. However, further investigation of the centralizing safety stock strategy is recommended due to the associated lower implementation costs and scale. Additionally, expanding omni channel integration in conjunction with the centralizing safety stock will allow for enhanced operational efficiency and increased customer service.

However, if the case company decides to remain their decentralized set up, further integration and optimization of the omni channel and balancing inventories need to take place. Both their current strategies respectively deal with demand uncertainty and volatility in various ways, however, there are relevant limitations such as navigating compliances and regulations and lacking technical capabilities.

Keywords: Distribution Strategy, Omni channel, Balancing inventory, Logistics postponement, Centralization

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1. Introduction

The introduction provides background information regarding the focal company of our thesis, the case company. The case company will remain anonymous throughout the thesis as it may consist of sensitive information. The introduction consists of the case which we have been assigned to develop a solution for, the aim of the thesis along with our research questions, and finally the limitations for this thesis.

1.1 Background

Supply chain resilience has become a popular topic in recent years as there have been many events that have disrupted companies ability to produce and distribute their products. Many of the disruptions are caused by external factors, such as natural disasters, however, there are many other disruptions that take place within a supply chain which negatively affect the company. Consequently, it has become critical for firms to be able to manage and respond to supply chain risks in order to gain a competitive advantage (Tukamuhabwa et al., 2015). Moving away from an efficiency approach to designing supply chains towards a flexibility approach allows firms to quickly adapt to environmental and market changes (Christopher & Holweg, 2011).

This thesis contributes to both the case company and academics as it provides insight into an area that is not thoroughly explored. The case company benefits from this thesis as it provides an analysis of their current risk mitigation strategies, as well as provides a new risk mitigation strategy that could be considered for implementation. This is important because it is a way to handle risks associated with a high level of demand volatility and uncertainty, which improves different aspects of their organization. For academics, the thesis provides real life implementation that portrays theoretical strategies utilized in context.

1.2 Case study at the case company

The case company in this thesis is a subsidiary of a large manufacturing company and this thesis only deals with those minor product categories supplied by the subsidiary. Initially, during COVID-19 pandemic, the case company's most critical supply chain problem was understocking, however, as time has passed and market dynamics have changed, overstocking is currently the main challenge. This contradicts the problems that many companies faced during COVID-19, as their problems were associated with mainly overstocking. A reason that the case company was understocked includes that a lot of people spent more time at home, furnishing their homes and offices during lockdowns and quarantine. Currently, overstocking, along with demand volatility and uncertainty, has several negative consequences for the case company. It ties up capital and necessitates higher safety stock levels, a scenario further complicated by the rapid lifecycle of products due to ever changing fashion trends. See subchapter 4.2 on the case company's product range. These

factors not only impact financial stability of the case company but also negatively affect the supply chain efficiency.

Macroeconomic factors such as inflation, directly impact consumer purchasing power and thus impact demand for trend-driven products. In a market where consumers are influenced by various seasonal trends, overstocking subsequently leads to outdated stock which may be sold at a reduced price and thus reduced profitability. The problem is made more complex due to the evolving retail industry with customer expectations of quick lead times and access to any product at any given time. Hence, developing strategies to mitigate the risks associated with demand uncertainty is crucial to maintain and manage a profitable and efficient supply chain. Currently, two strategies employed by the case company, to deal with demand uncertainty, are omni channel and balancing inventory through lateral shipments strategy entails both benefits and limitations to dealing with demand uncertainty. Furthermore, an alternative strategy that is interesting to investigate is a logistics postponement strategy; an effective way to deal with an uncertain and volatile demand, along with other operational benefits due to its centralized nature.

1.3 Aim

This study aims to investigate and analyze the case company's current risk mitigation strategies, as well as develop a logistics postponement strategy as an alternative risk mitigation strategy for the case company. The current risk mitigation strategies that are investigated include an omni channel and a balancing inventory through lateral shipments. The strategies are related to dealing with demand uncertainty and volatility, as these factors have a large impact on inventory management. The outcome of the study includes an analysis of their current strategies, and the development of a logistics postponement strategy which are assessed on its benefits, limitations and suitability for the case company. For this purpose, an extensive amount of research needs to occur to identify various risk mitigation strategies that can reduce the negative impacts derived from demand volatility and uncertainty such as overstocking or stockout.

The research questions are as listed below:

1. What are the specific benefits and limitations of the case company's current omni channel and balancing inventory through lateral shipments strategies to mitigate risks associated with demand uncertainty?
2. How do logistics postponement strategies affect the case company's capabilities to address demand uncertainty and volatility, and how might the strategies impact the existing supply chain operations under normal and high demand volatility and uncertainty conditions?

1.4 Limitations

The case company is a global entity, however this study is limited to their European operations because the market is mature and developed. Furthermore, the thesis is limited to products from southeast Asia with a final destination in Sweden, as the various European markets are too diverse in different factors and complexities for assessing the viability of the strategy by scenario planning. Additionally, this thesis does not take in consideration the underlying factors which contribute to demand uncertainty, only acknowledging that it exists which is briefly mentioned in the literature review.

2. Methodology

This chapter outlines the utilized method for this research paper, which can be summarized as a literature review complemented with various interviews. To answer the first research question, it is critical to have an understanding of the case company's current supply chain structure and risk mitigation strategies and their performance. To do this, the supply chain needs to be mapped, and a greater understanding of the strategies' benefits and limitations are gained through interviews. Furthermore, to answer the second research question, two appropriate logistics postponement strategies need to be developed. Subsequently, collection of data on KPIs for accurate and uncertain demand scenarios, for the different strategies from the case company experts is crucial. The reason for this is that utilizing the KPIs for different scenarios allows us to get a high level perspective of how the strategies perform during both accurate and uncertain demand conditions. See subchapter 2.5 for data collection method for the scenario planning and 2.6 for validity concerns.

2.1 Qualitative research method

According to Tenny et al. (2017), "qualitative research gathers participant's experiences, perceptions and behavior", which is the chosen research method for this study. According to Bryman och Bell (2017), conducting a case study is a way to understand a more complex system by isolating a single case and finding insights for that particular case. Flick (2014) emphasizes that qualitative studies are predominantly useful when the research is of an explorative character and answers questions such as how and why. As this research paper deals with assessing the case company's current risk mitigation strategies and exploring a new strategy to mitigate risks for the case company, it is therefore suitable to utilize a qualitative case study approach.

2.2 Literature review

To understand the topic at a deeper level and to gain insights from research, the authors consequently deemed it suitable to conduct a literature review. Eriksson and Wiedersheim-Paul (2014) mentions that it is necessary to have an overview of literature associated with the area of research which the paper deals with. The act of collecting literature for the literature review was done through Google Scholar. Key search words that were used are as listed: demand volatility and uncertainty, risk mitigation strategies, omni channel strategy, balancing inventory strategy, and logistics postponement strategy.

2.3 Interviews

Eriksson and Wiedersheim-Paul (2014) emphasizes that interviews are a suitable way to collect data and information for the research paper. As Hennink et al. (2011) mentions, semi structured interviews are appropriate when the research is of exploratory character; as we wanted to investigate current and future risk mitigation strategies that the case company may utilize, interviews seem to be a way to explore different perspectives of the strategies. The

benefits of semi structured interviews according to Kallio et al. (2016) is that the method is versatile and flexible. The author continues by emphasizing that this is due to the fact that the interviewers can prepare thought provoking questions and subsequently follow up with unprepared questions when suitable. Semi structured interviews enable reciprocity between the interview and the interviewee(s) and can be utilized in both individual and group interviews.

To get insight into the case company's risk mitigation strategies, several interviews were conducted. Firstly, it was important to get an introduction to the case company's supply chain as well as different aspects of demand volatility and uncertainty. Moreover, insight to the risk mitigation strategies utilized by the case company was essential. The interview guide used for is attached in appendix A. After, further interviews were conducted to get deeper insight into the current as well as alternative risk mitigation strategies to initiate the development of risk mitigation strategies, see appendix B for interview guide. As the additional strategy that we developed was logistics postponement, specialized knowledge was crucial and thus collected through an expert interview with a professor at Chalmers University of Technology, see appendix C. The list of all the respondents can be seen in table 1.

The participants were chosen by snowball sampling, which means that each respondent suggested another person who they thought would be appropriate for the interview. To analyze the effect of the proposed logistics postponement strategy, a scenario planning interview and workshop was conducted. The structure of the scenario planning workshop is explained in the "Scenario planning" section below. As all the interviews were semi-structured, it gave the respondents the possibility to add insights that were not directly related to the questions, however, still ensuring that the topics are still related to the question. Furthermore, several follow-up questions were asked due to the nature of semi-structured interviews. If not sufficient information was detained from the respondent, they were emailed with questions to clarify.

All the respondents were asked whether recording the interview was allowed, and this provided the opportunity to go back and understand all information that may have been unclear or missed. Once the interview was over, the interviews were transcribed and ready for analysis.

Respondent Number	Role	Date	Interview Guide
1	Product Line Lead for supply chain for the case company	September 22nd, 2023	Appendix A
2	Supply Chain Specialist for the case company	September 22nd, 2023	Appendix A
3	Supply Chain Analytics Manager for the case company	September 27th, 2023	Appendix A
		October 11th, 2023	Appendix B
		November 3rd, 2023	Scenario Planning Workshop
		November 30th, 2023	Validation Interview
4	Associate professor, Chalmers University of Technology	October 12th, 2023	Appendix C
5	Business Analyst for the case company	November 3rd, 2023	Scenario Planning Workshop
		November 30th, 2023	Validation Interview

Table 1. Summary of all the respondents with their role and date of the conducted interview.

2.4 Data analysis

Firstly, the responses from the interviews were color coded with regards to the different quotes which were then thematized into different categories, such as benefits and limitations. Critical quotes that were not directly linked to specific research questions were also noted because they could still provide interesting insights for the discussion. To analyze the interviews, the different thematic quotes were aligned with different theoretical insights provided in the literature reviewed. If not sufficient information was retrieved from a specific interview, another respondent was interviewed to compensate for the lack of information regarding that topic.

2.5 Scenario planning workshop

To understand what scenario planning is, one must first grasp the concept of scenarios. Amer et al. (2013) quotes a definition from Herman Kahn, considered to be the father of scenario

planning, who defines scenarios as “a set of hypothetical events set in the future constructed to clarify a possible chain of causal events as well as their decision points.” Furthermore, Amer et al. (2013) mentions another definition “Scenarios are descriptions of a future situation and the course of events which allows one to move forward from the actual to the future situation.”

Scenario planning is a strategic tool, as Amer et al. (2013) emphasizes, “Scenario planning techniques are frequently used by managers to articulate their mental models about the future in order to make better decisions” while Schoemaker (1995) defines it as “A disciplined methodology for imagining possible futures in which organizational decisions may be played out.” According to Amer et al. (2013), there exists no single method to conduct scenario planning.

To investigate the effects a logistics postponement strategy has on the case company’s operations, a scenario planning was conducted. This process was similar to the way the case company investigates the effect potential strategies may have, and it took place in different steps that are explained next. Firstly, different ways to apply a logistics postponement were drafted and assessed in terms of their potential benefits and limitations. The case company was then asked to qualitatively rank the strategies based on different KPIs that we identified as relevant. For the simplicity of the analysis, in combination with the fact that the case company wants the outcome to be of a general high level nature, the changes were based on either an increase, decrease, or same level for each strategy compared to the current KPIs of the case company's strategies. After, the different scenarios could be compared and contrasted, in terms of the changes in KPIs under different demand conditions, more specifically, accurate demand and high demand volatility.

2.6 Reliability and validity

Ensuring that the collected data is reliable and valid is critical to accurately represent the real world. To ensure that there was limited risk of misunderstanding and misinterpretation during the interviews and transcription, the respondents got the opportunity to add information or explain if something was interpreted incorrectly. This is done by allowing, once the thesis is complete, all the respondents receive access to the complete material to provide feedback, resulting in improved data validity.

To enhance the validity of the literature review, we focused mainly on including research papers with a higher count of citations. According to Eriksson and Wiedersheim-Paul (2014), one of the criterias of increasing validity in a literature review is to try to use research papers done recently when possible as this ensures that the extracted knowledge is up to date. Therefore, we chose newer articles as well as articles with a high count of citations in the cases where multiple articles had been written on similar topics.

The validity of the empirical data was ensured due to interviewing professionals with different perspectives of the issue. To ensure quality of these various perspectives, interviewees were required to have expert knowledge within their area of expertise. Additionally, we decided to interview an academic expert, non-affiliated with the case company, to ensure an unbiased data collection. There were multiple interviews with employees at the case company, the benefits and limitations relating to the current strategies may be one sided and biased. To avoid company bias, insights from non-affiliated experts would be beneficial. For example, to obtain knowledge from another expert would ensure that the benefits and limitations are not twisted in a way to change the actual situation. Obtaining insights from a non-affiliated expert, was done for information regarding the logistics postponement strategies, however, was missing for the omni channel and the balancing inventory through lateral shipments strategies.

3. Literature review

This chapter is the theoretical background for the study, and it entails different sections: supply chain resilience, demand uncertainty and volatility, customer purchasing behavior, risk, risk mitigation, and risk mitigation strategies. In figure 1, an overview of the theoretical framework is presented, to illustrate the logical flow of the literature review.

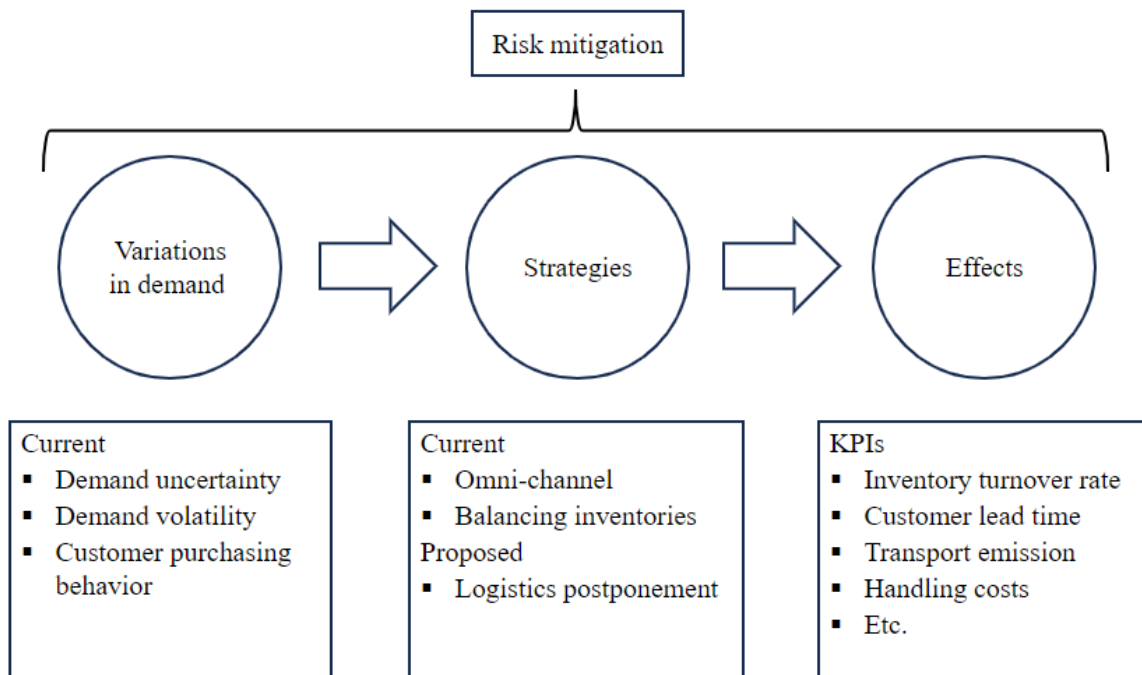


Figure 1. Overview of the content of the literature review.

3.1 Risk

A definition of risk by Abdel-Basset et al. (2018) is “Something occurs as a result of not knowing future’s events accurately”. It is a general statement which undermines the negative qualities inherent of risk, as risk is not deemed as something positive. A more suitable definition is given by Schoenherr & Tummala (2011), “risk is the probability of occurrence of realized hazard and volume of the occurrence.” This author emphasizes the stochastic nature of risk along with the hazard i.e., the negative impact which risks implies. These hazards are accompanied by a probability of them occurring which subsequently realizes a certain magnitude of impact.

While the topic of risk is broad, the context of this thesis is limited to risks within supply chains. In the context of supply chains, risk is predominantly referred to as supply chain risk (SCR). Expanding on the previously mentioned definition of risk, any realized hazards that affect the efficiency and profitability of the supply chain. According to March & Shapira (1987), SCR is defined as “divergence in the distribution of potential outcomes of supply chain, their probability and their subjective values”. Another author, Peck (2007), describes

SCR as “anything which disrupts the information, materials or the flow of product from original suppliers to end users.” Given the stochastic nature of risk, it is clear that there are certain characteristics of SCR which might not apply to other domains of risk. Within the realm of SCR, there exists categories of risks which are completely out of a company’s control as well as categories of risk which are within the control of a company. However, what these two subsets of risk have in common, is that there are various tools and strategies companies can utilize to reduce these risks. The authors Sodhi et al. (2011) mentions the increase of SCR in today’s business environment, “The supply chain risks and its management procedure increased in the last period in several surveys, practitioner conferences and consultancy reports”, hence reducing risks is more crucial than ever before.

3.2 Risk mitigation

Risk mitigation can be defined as a strategy that focuses on minimizing the consequences if an unfortunate event occurs (Manuj & Mentzer, 2011). According to Fan & Stevenson (2018), risk mitigation also entails reducing the consequences of a risk as well as the probability of such an event occurring. For example, if a company is experiencing recurring delivery issues, the importance of having a risk mitigation plan that focuses on how to find a back-up supplier increases. It should highlight how to develop a relationship with that supplier in order to replace the losses due to the delivery issues (Manuj & Mentzer, 2011). When considering implementing a risk mitigation strategy, it is critical that both the internal and external environment is considered as one strategy doesn’t fit all conditions (Talluri et al., 2013).

Before beginning the process of creating risk mitigation strategies, there are critical steps that need to be taken (Tummala & Schoenherr, 2011). Firstly, SCR needs to be identified, and it is important to highlight the affected areas and the consequences. The next important step is risk measurement, where the SCR magnitudes of impact and the determinization of consequences are realized. In order to prioritize what SCR to focus on, a risk assessment based on the likelihood of the SCR occurring. The risks can then be ranked, where both the likelihood of occurrence and the risk consequence are considered, which provides firm information regarding what risks need to be handled with risk mitigation strategies (Tummala & Schoenherr, 2011).

In general, there are two wide categories of supply chain risk mitigation strategies: flexibility and redundancy (Chang et al., 2014). The difference between these categories can simply be stated as how each of the approaches reduce uncertainty. More specifically, flexibility risk mitigation strategies include “building organizational and interorganizational capabilities to sense threats to supply continuity and to respond to them quickly” (Chang et al., 2014). The integration and collaboration between different departments encourages better communication and information sharing, which in turn results in an improved responsiveness. On the other hand, a redundancy risk mitigation strategy entails focusing on limiting the

possible negative effects of a risk by improving product availability. This can be done by creating a resource reserve that may be used in case of a supply chain disruption (Chang et al., 2014). Further examples of redundancy mitigation strategies are listed: “Increasing strategic inventory, holding safety stock, maintaining multiple suppliers, and adding capacity”. Talluri et al. (2013) explain that more efficient risk mitigation strategies tend to have a larger focus on flexibility solutions rather than on redundant solutions.

Chang et al. (2014) explain that the probability and the severity of a risk impacts whether the company should use a flexibility- or a redundancy-dominant strategy, and this implies that the context impacts the chosen strategy. More specifically, in contexts where the severity of a risk is high while the probability of a risk is low, a redundancy-dominant strategy should be used. In contrast, if the severity of a risk is low while the probability of a risk is high, a flexibility-dominant strategy achieves superior firm performance than a redundancy-dominant strategy. In some situations it may be beneficial to combine the two types of strategies, and situations with both high probability and severity of a risk prove to be handled better with a combination of flexibility and redundancy strategies. The last action to take to mitigate a risk is to do nothing, and this is when the context can be described as a low severity and probability of a risk. *Figure 2* visualizes the different strategies to be used in different risk context settings (Chang et al., 2014).

		Probability of Risk	
		High	Low
Severity of Risk	High	Combination of Flexibility and Redundancy strategies P3	Redundancy-dominant strategy P1
	Low	Flexibility-dominant strategy P2	No Action P4

Figure 2. The effect of risk context on the type of risk mitigation strategy to use.

Furthermore, it is important to consider that risks are often connected, and this implies that implementing one risk mitigation strategy may lead to affecting another risk by either aggravating or mitigating (Fan & Stevenson, 2018). Therefore, there should be a focus on implementing strategies that minimize contradicting effects as well as paying close attention to the risks that may have negative dependencies (when one risk increases another decreases).

According to Talluri et al. (2013), there are seven risk mitigation strategies that can be classified into flexibility or redundancy strategies. More specifically, flexibility strategies include “increasing responsiveness, increasing flexibility, aggregating demand, and increasing capability”. On the other hand, redundancy strategies entail “increasing capacity, redundant suppliers, and increasing inventory”.

Another way to categorize risk mitigation strategies is being either a proactive or reactive approach (Dehdar et al., 2018). Tukamuhabwa et al. (2015), explains that whether a strategy is proactive or reactive depends on when and why they are used. A proactive approach includes reducing the frequency of risk events, and these strategies are planned and executed ahead of time so that the risk is avoided (Dehdar et al., 2018). The authors further explain that an example of a proactive approach includes “supply chain integration” or “investment in development activities”. Overall, a proactive approach means that all approaches are created beforehand, in an attempt to reduce and prevent the possibility of a risk occurrence. On the other hand, a reactive approach can be described as making the supply chain react once a risk has appeared. There are two reactive approaches: flexibility and redundancy.

3.3 Demand uncertainty

Throughout this thesis, the term “demand uncertainty” is frequently used. As demand volatility is an underlying factor in creating demand uncertainty, it is important to clarify that from here on now when referring to demand uncertainty, that it encompasses both demand uncertainty and demand volatility i.e., the aggregate of these factors. Therefore, demand volatility is briefly defined in this chapter as it is crucial for the reader to understand that it is a large part of demand uncertainty.

According to Christopher & Holweg (2017), researchers and practitioners have repeatedly raised their concerns regarding an increase of threat to supply chains due to increases in demand volatility. This is further emphasized by Abolghasemi et al. (2020), who mentions the challenging risks coming from demand volatility and its concern for managers and practitioners. To understand the concept of demand volatility, it is integral to have a grasp of the concept of volatility. In finance, volatility is defined as “a measure of the variation in the price of an asset over time” according to De Silva et al. (2017). In the context of demand volatility, this definition could be adapted by replacing “price of an asset over time” with the “demand for products and services from consumers.”

Transitioning from a broader understanding of demand volatility, it is important to understand the underlying factors. As suggested by Zeng et al. (2023), there exists four major factors contributing to demand volatility: economic growth slows down, national energy structure adjustment, alternative energy in short supply, and economic recovery. For example, the factors regarding energy impacts production costs, subsequently increasing prices and thus lowering consumers purchasing power, which impacts the demand. According to

Abolghasemi et al. (2020), it is crucial for companies to have established strategies to reduce and control variability as, while demand volatility is susceptible to mitigation, it inevitably appears. The authors, Aizenman & Pinto (2009) writes about volatility in a general context, and mentions that volatility can be broken down into a predictable and an unpredictable component, which holds true regarding demand volatility as well. For example, as Abolghasemi et al. (2020) emphasizes in their article, factors such as promotion, weather, market trends and seasons have an impact on consumer behaviors and contribute to demand volatility. Furthermore, the authors mentions that promotions frequently influence demand volatility in the retail sector. The variable of promotion could be seen as a predictable component of volatility, as it is intended by the company to launch the promotion. However, the consumer response to the promotion contains both predictable and unpredictable components. It is important to understand that demand volatility can always be derived from consumers' behavior. As suggested by Abolghasemi et al. (2020) demand volatility exists due to the ever changing nature of consumer behavior.

Costs appear both before and as a result of implementing demand volatility mitigation strategies (Abolghasemi et al., 2020). As suggested by Christopher & Holweg (2011), the costs are for example, stock-outs, inventory and capacity utilization. This is further emphasized by Abolghasemi et al. (2020) who mentions that demand volatility reduces supply chain performance and creates costs in inventory, supply, and transportation. According to Papanagnou & Matthews-Amune (2017), demand volatility causes inaccuracies in forecasting, which predominantly affects products with a predetermined life span, which in a retail setting include, but not limited to, food products and products which are part of current trends. It is important to note that demand volatility which appear downstream in the supply chain, initiates a derived demand which is amplified upstream in the supply chain, which is frequently referred to as the "bullwhip-effect" and has detrimental effects on the performance of a supply chain, often leading to overstocking or stockouts (Papanagnou & Matthews-Amune, 2017).

Demand uncertainty refers to unknown information regarding the demand quantity, types, timing, and locations (Angkiriwang et al., 2014). It is an external uncertainty for the supply chain, where it arises from unforeseeable or hidden developments that can influence the timing and volume of demands, making it harder to fulfill customers' needs and requirements (Li et al., 2019).

Demand uncertainty can be caused by different aspects, for example, errors in the demand forecast, changes in customer orders, unknown information regarding the product mix that customers orders, and marketing promotion activities that competitors are doing. Demand uncertainty can lead to under- or over-production, resulting in an inability to meet customers' needs or an excess inventory. An inability to meet customer needs leads to loss of profit and potentially losing customers while having an excess inventory stands for high and

unnecessary holding costs (Jung et al., 2004). Furthermore, similarly to demand volatility, demand uncertainty may cause the “bullwhip effect”, which is problematic to many suppliers and manufacturers (Li et al., 2019).

There are different ways to deal with demand uncertainty, and according to Angkiriwang et al. (2014), flexibility in the supply chain is essential when coping with a dynamic demand where the uncertainty is high. Additionally, when the demand uncertainty is high, it is critical that manufacturers develop information sharing with their customers, in an attempt to better align operational and strategic factors (Li et al., 2019).

3.4 Customer purchasing behavior

There exists a plethora of models and frameworks which allows managers to understand the factors which influence customer's and subsequently their purchasing behavior. The author Roszkowska-Holysz (2013) mentions that one can break down customer purchasing behavior in three categories: psychological, sociocultural and economical. This is also emphasized by Papanagnou & Matthews-Amune (2017). Birtwistle & Tsim (2005), mentions the psychological aspects, such as perception and attitudes, impact decisions such as store choice and the general purchasing behaviors. Bucko et al. (2018), addresses the sociocultural aspects such as age and internet literacy which affects customer purchasing behavior, especially within the context of using e-commerce as a primary way of shopping. As for the economical factors, income levels and macroeconomic conditions such as inflation impacts consumer's purchasing power and thus, influence their consumption behavior and demand for certain types of goods (Roszkowska-Holysz, 2013).

3.5 Risk mitigation strategies

This section introduces different risk mitigation strategies that are studied in this thesis: omni channel, balancing inventory through lateral shipments, and logistics postponement.

3.5.1 Omni channel

According to Hubner et al. (2016b), a multi channel strategy can be described as multiple channels, such as brick-and-mortar and online, operating separately. This implies that store supply and shipments direct to customer are operated independently and parallelly. A multi channel strategy doesn't provide a seamless customer experience across all channels. On the other hand, an omni channel means that the different channels are connected and integrated to provide a seamless customer experience, where the customer cannot distinguish between the different channels (Hubner et al., 2016b; Lanzilotto et al., 2014). This implies that logistics systems and information exchange are integrated, for example, a customer can order a package to a store and then pick up the package at the store instead of a postal office. The distinction between online and physical stores disappears as more retailers adopt an

omni channel strategy (Hubner et al., 2016a). To transition from a multi channel to an omni channel, there are different requirements. For example, it may be required to have joint operations, information exchange, inventories and logistics across channels. Retailers that adopt a channel-integrated inventory from a separated inventory with multiple channels have a higher degree of flexibility as well as demand-driven inventory allocation (Hubner et al., 2016b).

There are two main enablers described by Hubner et al. (2016b): organization and IT systems. To have an integrated organizational structure is essential to enable channel integration with regards to logistics. If retailers merge their organizational units, a high logistics efficiency can be expected. A cross-channel coordination eventually results in an integrated, single omni channel unit instead of responsibility for operations within a channel being separated. Furthermore, initially, channels may have separate and different ERP systems, however, to adopt an omni channel strategy, it is critical to have a joint ERP system where channels are connected. This facilitates article tracking, customer communication, as well as inventory management across different channels (Hubner et al., 2016b). Creating an omni channel includes having integrated distribution centers, and investing in automated or flexible picking systems may also be necessary (Hubner et al., 2016a). Moreover, retailers with an omni channel strategy need to establish a connected flow of goods and operational structure across all the channels, without damaging the business model (Hubner et al., 2016a). The integration process is facilitated if the shipment size for store delivery packages are similar to those deliveries that are direct-to-customer (Hubner et al., 2016a).

Integrating the supply chain flows of both e-commerce and retail yields several benefits but also challenges. As a customer, the result of the integration of the two flows, leads to an increase of product availability, as the customers has access to products present in both channels, improving the overall customer experience (Hubner et al., 2016a). This is also mentioned in Hubner et al. (2016b), as the advantage for inventory pooling allows for broader assortments. The integration of the flow is particularly advantageous when the products are of rather homogenous shapes and forms, and they are suitable for semi automated and fully automated picking and sorting machines, as this allows for more efficient operations (Hubner et al., 2016a). Hubner et al. (2016a) continues to mention that by consolidating online and offline inventories, both inventory levels and logistics costs are reduced. The integrated distribution centers allows for leveraging the consolidated inventory pools and allows for allocation of products in a flexible manner in line with the demand. Establishing synergies across channels and utilizing one inventory control system, allows for better coordination with inbound logistics as well as increased rapidity with regards to the allocation of goods to the different flows. To mitigate the implications of a high demand uncertainty, it is critical to meet the demand in a more flexible manner. However, even the most basic variations of cross-channel fulfillment creates various challenges which need to be solved in order to

assure an efficient flow. Examples of these challenges are the location of inventory and the distribution centers as well as the product picking operations.

The implementation of integrating the e-commerce and retail flows results in an increase of costs. Lanzilotto et al. (2014) mentions costs such as implementing and upkeep a virtual inventory system, having to conduct more frequent deliveries and a higher accuracy in the picking process. Hubner et al. (2016b) mentions the challenge of integrated picking across channels, as order sizes in the e-commerce flow are significantly smaller than orders placed by retail stores. However, as supply chain management is concerned with profits, one has to look at the increased revenue in order to assess the profitability of the business case of integrating the flows. According to Hubner et al. (2016b), their results show a strong indication that the positives of integrated inventories and flows outweigh the additional costs which incur due to the added complexity.

3.5.2 Balancing inventory through lateral shipment

Inventory balances can have a large effect on an organization. More specifically, in a multiple-facility system that has to handle a variant demand, long replenishment lead times can lead to large inventory imbalances between different nodes (Bhatnagar & Teo, 2009). An inventory imbalance may be caused by disparity between the replenishment size and the actual quantity of the replenishment order. In turn, some facilities may face a surplus of inventories, while others may experience stock outs or low inventory levels. In supply chains that are global with long replenishment lead times, significant imbalances may occur as there may be large differences between the forecast and the actual demand during the lead time (Bhatnagar & Teo, 2009).

To tackle the problems that arise with an inventory balance, Bhatnagar & Teo (2009) highlights three different tactics: inventory allocation, transshipment, and joint transportation-inventory decisions. Inventory allocation includes re-locating shipments to the sea port, allowing for a higher level of flexibility to postpone decisions relating to allocation of inventories to the facilities, which in turn reduces the probability of stock-outs. Transshipment includes moving stock among different assembly plants to re-balance the inventories. Joint transportation-inventory decisions can be explained as "expediting shipments from the sea-port to the assembly plants that run low in stock. This involves the transportation decision of using trucks rather than rail to accelerate the freight transport based on the inventory status of the facilities." (Bhatnagar & Teo, 2009).

Agrawal et al. (2004) explain that utilizing a dynamic rebalancing of inventories, with up to date information regarding retailers inventories, reduces lost sales significantly. However, dynamic rebalancing can be less beneficial in cases where the demand volatility is high, as inventories may get out of balance fast.

Cheung & Lee (2002) explain that coordinated replenishments can reduce order and inventory costs. Stock rebalancing is an effective strategy when a supplier has many retailers in a geographical region and if there is a large number of retailers.

According to Banerjee et al. (2003), in some environments, balancing stock levels among different locations can lead to excessive transshipments, which has significant cost consequences. However, lateral stock transfers are associated with substantial cost reductions and improved service levels. The authors continue to explain that when there is a shortage of stock, choosing a lateral shipment approach is superior to an approach that doesn't include shipments at all. In order to deal with stock out incidents, an emergency transshipment approach seems to be more effective than a more systemic transshipment approach that is based on creating a stock balance. This means that a systematic transshipment technique that is based on stock equalization may not actually be as effective when dealing with severe shortages. If the additional delivery costs resulting from transshipment are larger than the benefits of avoiding retail level shortages, customer service can be improved significantly without any changes to the safety stocks.

According to Bhatnagar & Teo (2009), re-balancing inventories may be beneficial in terms of inventory management, however, there are important cost trade offs when implementing re-balancing approaches. For example, if the inventory allocation requires a facility, operating costs are incurred, as well as handling costs. Furthermore, to achieve an inventory management strategy, inventory status of the retailers need to be updated regularly, and this could mean large investments in the necessary information systems. Additionally, additional transportation costs may also occur. An aspect that needs to be considered when transporting inventory between facilities is the value:weight ratio. For products that have a high value:weight ratio, it may be preferable to use premium transportation to optimize supply chain costs. In contrast, products with a low value:weight ratio should use a slower non-premium transportation as well as higher inventory levels (Bhatnagar & Teo, 2009).

3.5.3 Logistics postponement

Postponement is a strategy that can be used to improve agility and flexibility in the supply chain. This is done by delaying the value adding process within the supply chain, allowing for more information to be collected, which improves decision making. As a concept, postponement is a broad term which can relate to both delaying activities related to the form of the product but also the place and distribution speed of the goods. With the additional information that the companies can exploit due to the utilization of postponement, a reduction or even elimination of risk regarding demand uncertainty occurs (Yang et al., 2004a).

The increase of utilizing postponement as a strategy reflects the increasing interests of integrating agility and flexibility into supply chains as it is essential in today's retail and e-commerce markets due to their competitive and rapidly changing nature. This is

particularly prevalent amongst companies that are active in the e-commerce space due to the time lag between fulfillment and order placement (Yang et al., 2004b). For example, companies utilizing postponement can stock basic components based on speculation along with forecasts, and then perform final configurations such as assembly, but also processes such as labeling and packaging, once orders have been made by the customers. Consequently, the strategy increases a company's flexibility in order to meet customers' demand for a larger product variety whilst avoiding having to stock all the various different product variations.

The most important aspect of postponement is the reduction of logistics costs which are a consequence of implementing the strategy. This is due to the company being able to delay operations and thus keep options open regarding the products final form and inventory locations. Subsequently, this greatly reduces the risk of the product being in the wrong place at the wrong time and/or having the wrong form (Yang et al., 2004b). Additionally, the authors mentions that postponement reduces inventory levels, freeing up capital for the company to be able to use in other parts of their business, whilst increasing responsiveness to customer demands (Yang et al., 2004b).

It is important to consider the disadvantages with postponement. Although postponement is an excellent strategy for managing demand risk, the supply risk increases. For example, implementing production postponement increases the reliance on the company's various suppliers and the degree of efficiency across the supply network (Yang & Yang, 2009). The authors mentions a survey which was conducted across industries, which showed that one of the most significant barriers to implementing postponement was supplier delivery performance, however this depends on the structure of the supply chain.

Logistics postponement is a combination of both time and place postponement (Yang et al., 2004a). The authors Pagh & Cooper (1998), mentions that the goal of logistics postponement is to "maintain a full line inventory at one or few strategic locations thus postponing changes in inventory location downstream in the supply chain to the latest possible point." Yang & Yang (2009), mention that the main purpose of logistics postponement is to "delaying changes in inventory locations until the final market destination and/or customer requirement is known and so avoiding shipments that become unnecessary or inappropriate as demand changes." The author continues to strengthen the point that logistics postponement helps to reduce the inherent risk of changes in customer demand, as well as enables companies to learn from the behavior of their customers and other environmental factors. Postponement of certain activities such as packaging and labeling for various markets can be considered a subset of logistics postponement when these activities are moved closer to the customers (Cheng et al., 2010).

Pagh & Cooper (1998), has a diagram which shows that logistics postponement is used with speculative and forecasted production along with centralized inventories, see figure 3. The author also mentions the implications of implementing logistics postponement which are

summarized in figure 4. The author continues that by delaying the logistics operations until final customer commitment is obtained, the risk of demand uncertainty can be reduced or completely avoided which is also mentioned above in the general context of postponement. However, according to Yang et al. (2004b), logistics postponement requires a fast and responsive transportation system in order to meet the lead time requirements of customers, which ultimately can lead to an increase in transportation costs. Yang et al. (2004a) mentions that logistics postponement is optimal for settings where the products are more sensitive to inventory costs rather than transport costs.

		Logistics	
		Speculation <i>Decentralized inventories</i>	Postponement <i>Centralized inventories and direct distribution</i>
Manufac- turing	Specul- ation <i>Make to inventory</i>	The full speculation strategy	The logistics postponement strategy
	Postpone- ment <i>Make to order</i>	The manufacturing postponement strategy	The full postponement strategy

Figure 3. The different postponement strategies depending on logistics and manufacturing criterias.

		Logistics	
		Speculation	Postponement
Manufac- turing	Specul- ation	<ul style="list-style-type: none"> • Low production costs • High inventory costs • Low distribution costs • High customer service 	<ul style="list-style-type: none"> • Low production costs • Low/mid. inventory costs • High distribution costs • Low/mid. customer service
	Postpone- ment	<ul style="list-style-type: none"> • Mid./high production costs • Mid./high inventory costs • Low distribution costs • Mid./high customer service 	<ul style="list-style-type: none"> • Mid./high production costs • Low inventory costs • High distribution costs • Low customer service

Figure 4. Overview of characteristics of using speculative and postponement within manufacturing and logistics.

There are relevant disadvantages that come with implementing a logistics postponement strategy. According to Cheng et al. (2010), one can not neglect the investment cost to re-engineer the supply chain structure in order to implement a logistics postponement strategy, as it requires new processes as well as new warehouses in some cases. Financial and human resources must be reallocated, as well as investments in technologies to manage the added complexities these strategies entails. In addition to this, Pagh & Cooper (1998) mentions an increase in transportation cost as there is a necessity to deploy smaller and more frequent shipments and potentially using faster and thus more expensive modes of transportation. Lastly, Cheng et al. (2010) explains that there is a risk of quality problems due to the decentralization of value adding activities. For instance, when value activities such as labeling and packaging are done on a local market basis, inconsistencies in quality can occur due to differences in processes.

In order for a firm to implement a logistics postponement strategy, there are relevant prerequisites that should be considered. According to Cheng et al. (2010), postponement has a significant effect when the supply chain operates on a global level, and the placement of inventories, distribution facilities, and production mode and structure become essential factors for both customer value creation and cost reductions. The authors continue to explain that responsiveness can be improved on a local level through customerization, while global efficiency can be enhanced through mass production. Another prerequisite is related to lead time. After the point of postponement, the lead time should be aligned with the customer expected waiting time, to avoid lost sales and backorders. Furthermore, partial postponement may be applied to reduce lead times under certain circumstances. Moreover, for a postponement strategy to work, it is important that a high level of supplier involvement and

information technology are achieved to streamline processes within the supply chain (Cheng et al., 2010).

3.5.4 Summary of benefits and limitations of the mitigation strategies

Figure 5 shows a brief summary of the benefits and limitations of utilizing an omni channel, balancing inventory through lateral shipment, and logistics postponement strategy. In this summary, selected key benefits and limitations are highlighted, however it does not encompass all of those mentioned in the literature review chapter. The purpose of this subchapter is highlighting the most integral aspects and impactful points for a concise overview.

Omni Channel	Balancing Inventories	Logistics Postponement
<p>Benefits</p> <ul style="list-style-type: none"> ▪ Increased product availability ▪ Seamless customer experience ▪ Reduced inventory levels ▪ Improved flexibility <p>Limitations</p> <ul style="list-style-type: none"> ▪ Large IT and organization investment ▪ Higher transportation costs ▪ Varying picking operations 	<p>Benefits</p> <ul style="list-style-type: none"> ▪ Flexible inventory allocation ▪ Increased service levels ▪ Reduced lost sales ▪ Minimizes risk for stock outs and overstocking <p>Limitations</p> <ul style="list-style-type: none"> ▪ Excessive transshipment ▪ Higher transportation costs ▪ Higher handling costs ▪ Decision making 	<p>Benefits</p> <ul style="list-style-type: none"> ▪ Decision making ▪ Increased flexibility ▪ Enhanced supply-demand alignment ▪ Cost reductions ▪ Lower inventory levels <p>Limitations</p> <ul style="list-style-type: none"> ▪ Higher transportation costs ▪ Implementation investment ▪ Requires supplier involvement and advanced IT-systems

Figure 5. The summarized benefits and limitations for each strategy.

3.6 KPIs for assessing logistics postponement strategies

This chapter identifies relevant KPIs that are used later in the thesis to evaluate the logistics postponement strategies under an accurate and uncertain demand situation.

3.6.1 Inventory turnover ratio

According to Koliass et al. (2011), inventory turnover ratio is an essential metric for stock keeping companies as it quantifies how often the company's inventory is sold and replenished within a certain time frame. Inventory turnover ratio is an indicator of a company's

capabilities within inventory management and tied up capital in relation to sales. Typically, a high inventory turnover ratio indicates the efficiency of sales in relation to stock keeping and thus providing insights into the level of liquidity of inventory assets and holding period of products in the inventory (Kolias et al., 2011).

3.6.2 Customer lead time

Lead time, or replenishment delay, is the gap between placing an order and receiving it. In this thesis, customer lead time refers to the time between a customer placing an online order and receiving it. Uncertainties in lead time can add complexity to a supply chain which can be due to various stochastic factors as well as distribution network's efficiency, product availability and geographical set up etc. (Li et al., 2019). Lead times for deliveries to customers can affect the perceived customer experience which can either positively or negatively affect satisfaction levels with the delivery service and thus customer retention rate.

3.6.3 Transport emission

Transport emission in a supply chain context, refers to the greenhouse gasses emitted from various types of transportation modes used to transport products from one destination to another. There exists different types of transportation modes, such as flight, rail, boats and trucks; all which have different levels of emission. Therefore, the supply chain structure heavily influences a company's transport emission as distance and weight held by the transports are main factors of emission along with the type of transport mode (Gurtu et al., 2017).

3.6.4 Shrinkage & Write Offs

Shrinkage and write offs in the retail sector primarily refers to loss of revenue due to inventory theft, misplacement or product obsolescence. Subsequently, these kinds of losses of inventory require write offs that affect indicators of the company's profit as well as inventory management efficiency (Grant et al., 2006).

3.6.5 Handling costs

Handling costs, also known as inventory carrying costs entails multiple different components, and typically, this category represents one of the highest costs in a distribution system. However, companies tend to underlook this aspect and exclude inventory carrying costs in decision making. Inventory carrying costs include costs that may vary with regards to the level of inventory a company has. Examples of costs that are included in inventory carrying costs include: storage space costs, inventory risk costs, capital costs, and inventory service costs. Inventory carrying costs are directly impacted by the number of distribution centers and types of distribution policies a company has. When a company reaches for a specific

service level, low inventory carrying costs may lead to the company maintaining multiple warehouses and the usage of slower transportation methods, for example, railroads. On the other hand, a high inventory carrying costs implies that the number of stock keeping facilities is minimized which may require fast transportation means, for example, truck transportation to minimize total costs (Londe & Lambert, 1975).

3.6.6 Transportation costs

There are different aspects that a company can consider to include in their transportation costs. More specially, vehicle ownership and operation are relevant to consider. Vehicle ownership includes expenses that aren't related to the distance a vehicle is driven, while vehicle operation considers expenses related to the vehicle use. An aspect that may be underlooked is the sustainability factors. More specifically, air pollution is included in transportation costs, and this is based on vehicle emission (Litman, 1999). Furthermore, the type of transportation mode can also drive the cost of transport. Moreover, transportation costs can decrease significantly if loads are completely filled, as a company can take advantage of economies of scale (Meixell & Norbis, 2008).

3.6.7 Initial investment

An initial investment can be defined as how much capital that is required to launch a specific project or a significant purchase. Established companies may invest in new technologies, such as machinery or softwares in an attempt to achieve a higher level of efficiency in their operations.

3.6.8 Product availability

Maintaining a high level of product availability requires significant effort and capital, and it is a very important aspect to consider to trigger sales. A product cannot be sold if it is not available to the customer; lacking product availability implies a lower indentation to buy the product, which implies that a company misses out on sales through not having the product available (Steinhart et al., 2013).

4. Empirical data

This chapter highlights insights from interviews with regards to an overview of supply chain, product range, omni channel, balancing inventory through lateral shipments, logistics postponement, and evaluation of the implementation of logistics postponement.

4.1 Overview of the supply chain

Respondent 2 explains that the production takes place mostly in South Asia, where India, China, and Bangladesh stand out. The overall supply chain can be simplified to the following: design and development of products, procurement process, manufacturing, packaging, shipping, consolidation, distributions, and stores/online. Currently, the flow of products to the store and the online channel are separate, with different warehousing options. The flow of the products depend on what type of containers that are sent from, for example, India.

Respondent 2 explains that *“If the container is full for the destination, then it goes directly to destination. If it is mixed with multiple destinations then it goes to a transit hub in Europe. Hamburg is a transit hub for Europe and Malaysia is for the South Asia or Southern Asia market.”*

Respondent 1 exemplifies the supply chain of the case company product from production to a store in Gothenburg, see figure 6. More specifically, the respondent highlights that *“If the container is coming directly to Gothenburg or via Hamburg, it goes to the distribution center for the store channel, which for the Nordics is located in Eskilstuna. So the next node would be Eskilstuna where we have the goods stored. If we take a new product for the first time, it is directly allocated, meaning there is already a set volume of what each store will get.”*

Eskilstuna, as described by Respondent 1, is *“More or less a cross docking within a warehouse. It cross-docks cartoons straight to the stores. There's also a volume that is kept for replenishment, so as soon as they sell out of those stocks, there's an automatic order request to the warehouse for that replenishment volume. The replenishment order is stored in the same facility, Eskilstuna. From there, it is shipped out from the stores, for example, in Gothenburg.”*

There are two types of stores where the case company products are sold, being a store in a store (SIS) and concept stores. SIS are when there is a smaller department in a store that is allocated to solely the case company products, while concept stores purely contain the case company product assortment. The process explained above is for SIS, and the supply chain for concept stores varies slightly. The difference is explained by Respondent 1, *“We don't have a concept store in Gothenburg, only a SIS. In Stockholm, we have at least 2, and there we have a centralized fulfillment for it. This means that if the production is in India, it goes to Hamburg and from Hamburg, it goes to a central warehouse that is located in the*

Netherlands, and there we have all the products that are used to fulfill the concept stores in Europe."

The online channel is slightly different from the store channel, as the locations of warehouses vary, see figure 7. Respondent 1 explains that *"The flow is quite similar. For example, from India, via Gothenburg or Hamburg, and then to Borås."* The difference between the flows is the location of the warehouse, for store, it's located in Eskilstuna, while the online warehouse is located in Borås.

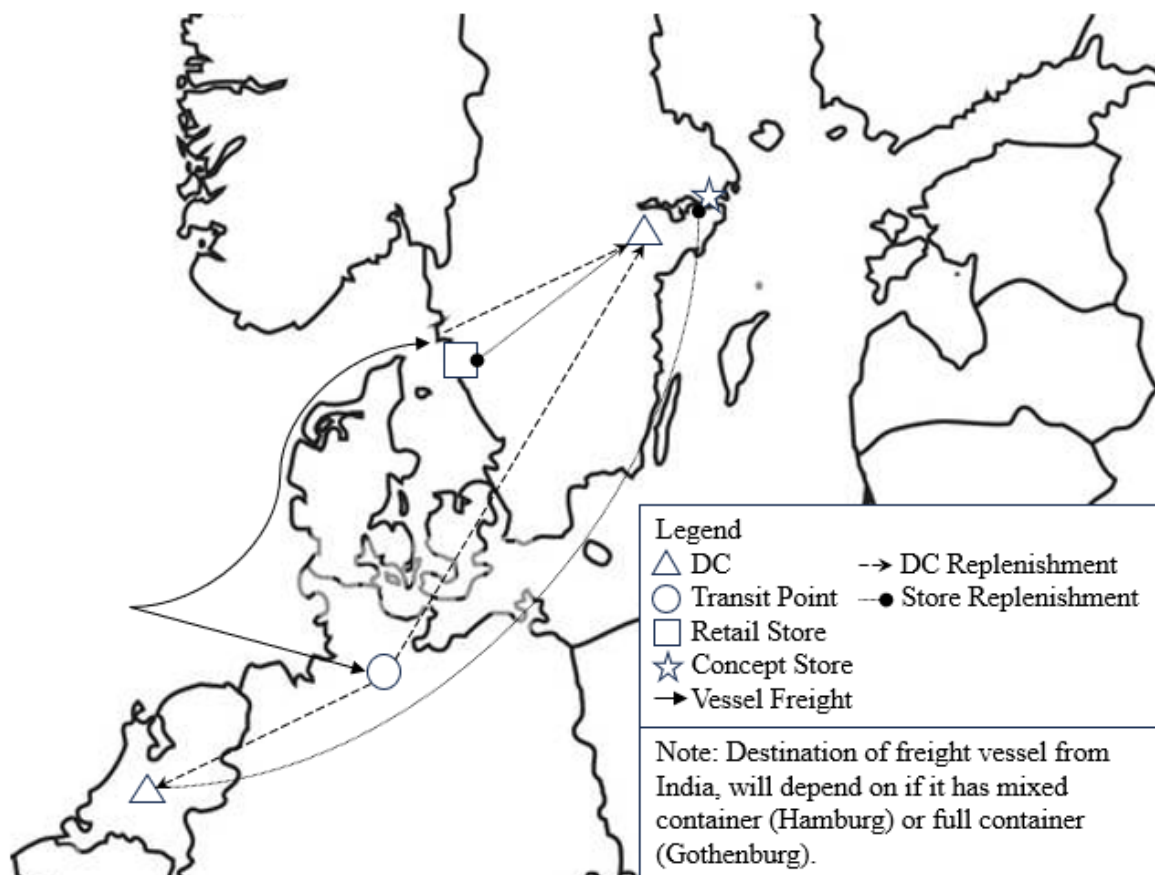


Figure 6. Overview of supply chain for the stores channel. The figure represents the flow of a product destined for a retail store in Gothenburg and concept store in Stockholm (DC: distribution center).

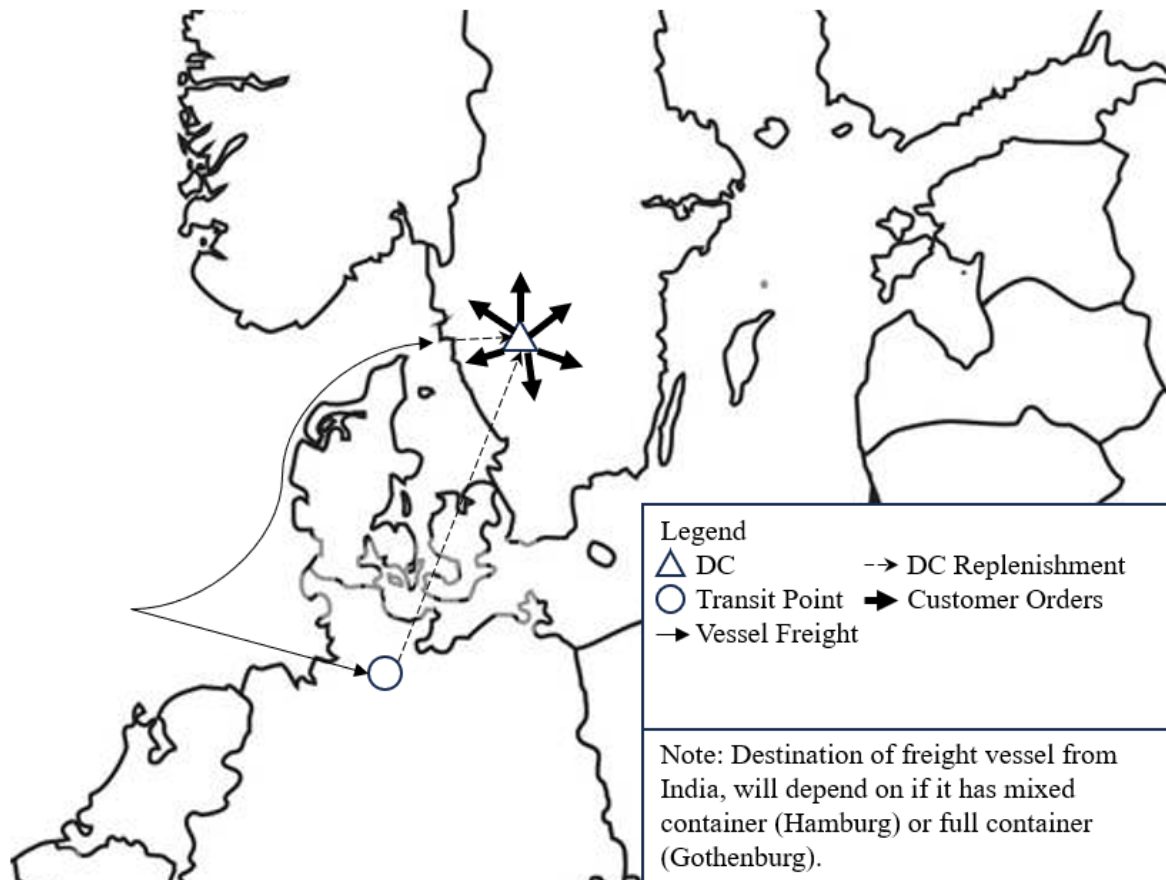


Figure 7. Overview of supply chain for the online channel. The figure represents the flow of a product destined for customers in Sweden.

4.2 Product range

The case company offers a wide range of home interior products. The product assortment ranges from bed linen to dinnerware as well as textiles, lighting and furniture. With such a broad product spectrum, it is critical to note the differences in dimension and weight of the products, compared to the more homogenous product range the case company offers which introduces complexities of having integrated supply chains for both the product assortments. Due to the functional nature of the case company's products, it demands thorough quality assurance which prolongs the lead time. Respondent 2 mentions *"Especially for home products, sometimes it's more complex because it's a functional product, so there are checks related to safety and also the overall use of that particular product in customers' homes. There may be kids around, for example, candles can involve a lot of testing related to fire hazards."*

4.3 Omni channel

This section deals with benefits and limitations of the case company's current risk mitigation strategy, omni channel. The data is collected through interviews with various professionals within the logistics function in the case company organization. It is worth noting that the case company has not yet fully implemented an omni channel strategy; rather, they are currently utilizing select elements of it. However, the case company has goals of transitioning towards a comprehensive omni channel approach.

4.3.1 Benefits

The case company has a unique approach to utilizing omni channels due to their retail store presence, not only with their geographical breadth and number of stores, but also their large customer reach through their online channel. Respondents 2 and 3 both agree that overpurchasing is a main issue and in response to that, respondent 3 mentions that *"An omni channel approach is often suitable when overpurchasing is a common occurrence."* This combination of factors allows for an interesting opportunity to increase product availability whilst lowering lead times. Respondent 3 mentions that the case company *"Have a competitive advantage of actually using the retail stores, not only with the purpose for traditional retail space, but also utilizing them as local fulfillment centers for online orders."*

The main benefit of this strategy includes allowing customers shopping online, to be able to see what products are available in the retail stores, even if they weren't available in the online channel. In turn, customers are able to have a seamless shopping experience across all the channels as well as access to a wider range of products. Respondent 3 continues by discussing how this approach is moving the case company in a direction towards omni channel. *"Opening up the in-store stock towards the online customers, is a step towards an integrated omni channel."* The respondent mentions Target in the US, as a prime example of utilizing this strategy. When asked about the differences in store size, as well as, constraints of parking space which are present in Sweden, but not in the US, respondent 3 mentions *"The physical space of the store is not a problem. We are also not interested in curb-side pick up like Target and IKEA are utilizing, due to the parking lot constraints. The main advantage we have is the strategic locations of our stores, as we benefit from the fact that our customers are in close proximity to a high density of stores."* The close distance of the various stores for the customers is not only beneficial to product availability but also lessens lead times for online customers, as respondent 3 mentions *"If we open up all the retail store stock for all customers who are within a 15 kilometer radius of that store, then it will create a good injection in product accessibility but also enables us to offer fast lead times."*

In general, flexibility downstream is one of the main goals of utilizing an omni channel strategy as it mitigates the effects of demand uncertainty. Respondent 3 mentions that *"By not restricting ourselves to one location, in terms of where we need to pick the various goods from, but instead having multiple options, will increase flexibility downstream which*

consequently will benefit mitigating higher demand volatility.” A transition to an integrated omni channel yields benefits towards inventory management and inventory turnover as well as increases revenue. These benefits ultimately impact brand reputation as mentioned by respondent 3. “We can keep less inventory, yet keep the same sales by utilizing one stock. As we lessen lead time and increase product availability, this translates to a better service offering and will positively impact our brand reputation. It will strengthen our brand reputation and it should increase our revenue.” As the product inventory moves more efficiently and thus the products are spending less time idle in an inventory, the inventory turnover ratio is positively affected as respondent 3 says “By being able to provide this service and superior customer experience, our inventory turnover will be positively impacted.”

The respondent continues by mentioning with regards to increased revenue, that the case company has found synergies with customers picking up online orders in the retail stores. *“Customers who go into a store to pick up something they ordered online, tend to make additional purchases. Everyone does not do it, however we can see that on average, in-store pickups result in higher total purchases compared to the online customers which utilizes the option of having the products delivered to them.”*

The concept of an omni channel is increasing in popularity within retailers, and there is a plethora of evidence showing the strategy’s effectiveness for retailers. The case company has already transitioned some of their channel specific warehouses into omni channel warehouses, which respondent 3 mentions has been successful, *“So far, in the locations where we have transitioned to an omni channel warehouse, it has been successful.”* This transition is also evident in the case company’s innovative approach with a *“buy online, pick up in store”* which respondent 3 explains is currently being rolled out in 300 of the US stores, where customers can order online and then pick up their order by themselves in the retail store. Companies such as Target are also seeing the benefits of utilizing a *“buy online, pick up in store”* strategy which has had great success, *“Target fulfills over 90% of their online demand in the retail stores.”*

4.3.2 Limitations

There are limitations that are relevant to consider when the case company attempts to adopt an omni channel approach. Firstly, there may be regulations and compliance issues when sending packages from different channels between countries. More specifically, as Respondent 1 describes, *“It is important to consider compliances in terms of pricing and labeling. We need to make sure we are compliant to sell products in different countries. For example, there may be some regulations to sell in Poland which a product’s characteristics need to follow, and these also need to align with regulations in Sweden. The products need to be compatible to be sold in more than one country.”*

Furthermore, an overreaching challenge includes that the supply chain for the case company as a whole needs to be considered. This is iterated by Respondent 1, as *“It’s very hard for a certain business unit, such as the case company, to go outside the regular case company’s processes. For example, if the case company introduced omni channels, every part of the supply chain needs to support that, and the case company follows the system that the case company has as a whole. If we choose to make that change, the whole full chain needs to be involved, we cannot do it separately just for the case company.”* This implies that for an omni channel to be used at the case company, the case company as a company also needs to implement the same process. This is related to another limitation that the case company has, lacking technical capabilities.

Respondent 3 comments on this, *“Today we only have technical capability to pick from the store side, that is from the store side to the online side.”* The case company lacks technical capabilities to pick from the online side to the store side, which an omni channel also entails. Respondent 3 explains that adopting an omni channel approach *“requires a lot of technical development and secondly, changes in the internal structures.”* More specifically, in order to determine which warehouse/store that a package is most profitable to deliver from, a lot of data needs to be considered, implying that softwares that can store and process and make decisions is critical. Respondent 3 explains that having a high level of complexity, with many warehouses and fewer stores, makes this even harder, *“It can be very demanding that we have a lot of data on it. What do we want to optimize? If we want to pick from the place that is most profitable for us, then we have to keep track of every cost. It makes quite big demands on which logics or AI models we apply, which in turn makes very big demands on data and and data infrastructure.”*

Related to limited technical capabilities is automation. Respondent 3 describes the case company’s picking process as unautomated and mainly manual picking. Challenges may arise connected to an non automated picking process for an omni channel, for example, as respondent 3 explains to have *“An omnistock for both channels and handle it in a cost-effective way and regardless of whether it’s manual or automated. Today’s automation can’t handle it. In fashion, there are parts of the process that are automated but today, robots can’t handle the picking process.”* The case company doesn’t have the technical capabilities to commit to an automated picking process due to the product characteristics and vast product range.

Another limitation related to the case company adopting an omni channel is that it requires large investments. Respondent 3 explains that most of their warehouses today are channel specific, and *“If we were to rebuild all of the channel-specific warehouses into omni houses, it would require huge investments to rebuild all of our warehouses.”* Therefore, it may be hard to change an entire system, however, there may be parts that can be adapted to fit an omni channel.

Further limitations that may hinder the case company from adopting an omni channel include complications related to how different the online and store channel picking process is. Firstly, the channels have different picking processes; respondent 3 mentions that *“Operations look different in the channels. For an online order, the package needs to be packed and then shipped to the customer. For a store, it has to be packed, shipped to the store, unpacked in the store, put on a display or out on the floor so that a customer can buy it.”* They further explain that *“What is cost-effective and time-efficient in one channel may be ineffective in another,”* implying that it may be hard to optimize the picking processes in an omni channel. Respondent 3 explains that this may be partly due to the differing order sizes, for example, *“In the online channel, if a customer orders three pieces, those three pieces are picked and sent off. However, in the store channel, the orders are larger with, for example, 100 pieces. This is quite a lot, and this may mean that creating cost-effective processes for both orders simultaneously can be hard.”*

4.4 Balancing inventory through lateral shipment

This section highlights benefits and limitations related to the case company utilizing a balancing inventory through lateral shipments strategy. It is important to note that this is a strategy that the case company is currently implementing, therefore, the benefits and limitations are based on the functionality of the strategy.

4.4.1 Benefits

Balancing inventory throughout the case company's warehouses is a vital aspect of managing an efficient supply chain. Respondent 1 mentions that *“If we can identify that we are understocked in for example, Germany compared to Eskilstuna, where we might be overstocked, we can make reactive moves of goods from the warehouse in Eskilstuna to the warehouse in Germany.”* However, it is important to note that this strategy is not only limited to addressing immediate stock imbalances. The case company uses forecasting in order to understand future demand and make informed decisions regarding moving products to different markets. Respondent 1 mentions that *“This allows us to move stock between markets to make sure that we have the right stock at the right place.”* Respondent 3 continues on the same topic, *“We can proactively move products when we have identified a demand using a forecast.”* As moving stock between warehouses can be utilized both proactively and reactively, it helps to ensure that inventory is optimized, hence reducing inventory costs and improving customer satisfaction as a consequence of the strategy is a less occurrence of product stock outs.

Utilizing a decentralized warehousing strategy has various advantages and challenges. Balancing inventory by moving goods between warehouses in different markets is a suitable strategy when using a decentralized set up as explained by respondent 3 *“This strategy is*

effective when we have a decentralized set up with department stores.” As mentioned earlier, it is the built in flexibility downstream which is the main strength whilst allowing for a decentralized set up. *“We can identify that we are over and under stocked on two different nodes and then we can adjust the stock by physically moving them.”* By introducing this flexibility in the supply chain, it can lead to potential cost savings in purchasing, as respondent 3 mentions *“You can possibly purchase less since you build in flexibility and we can move the goods around.”* Thus, by balancing inventory, companies can utilize a decentralized set up, and exploit its benefits whilst mitigating potential drawbacks.

4.4.2 Limitations

Similarly to the limitations of an omni channel strategy, regulations across countries may hinder the effectiveness of a move strategy, as it is important that packaging and labeling is compliant with different countries' standards. In addition, there is a lack of technical capability to move the online stock online to the store stock.

A proactive balancing strategy relies on a demand forecast, as moves are made according to the balance of over- and under-stock in the forecasted demand. Respondent 3 explains that *“A demand forecast will never be 100%, there is always a margin of error. Because of this, it can be more risky to act proactively and take a cost for it. In comparison to order orchestration, we pick a product once we have the real demand, which means a lower risk.”* Having a product at the right place the first time ensures that a product doesn't need to be moved, and therefore, unnecessary costs can be avoided. This is reiterated by Respondent 3, as *“there will be an extra cost to meet a demand through a moves strategy rather than if the product would have been in the right place initially.”* This is related to another limitation of utilizing a balancing strategy, as it can be quite costly. Respondent 3 mentions that *“We pay quite a lot for this strategy, as the consolidation and transportation costs a lot.”* However, if products are moved between countries or channels, value adding services are conducted, which means that the case company changes the price tag in order to compensate for some of the costs the moves created. The built- in flexibility that a balancing strategy entails comes with a price, and Respondent 3 explains that, *“To just use the moves strategy between different channels and then optimize the specific channel is not optimal.”*

It can also be relevant to consider whether it is worth implementing a balancing strategy on certain products. A limitation includes that it is not a strategy that should be used on every product. More specifically, Respondent 1 describes that *“If we have two products, for example, a napkin or a smaller piece of furniture with a higher value, it makes more sense to move that higher value item because of the cost of actually doing that specific activity and moving it is smaller compared to what the retail price is.”* The respondent further mentions that the case company Fashion has an algorithm that gives suggestions on which articles to move and in what quantity. However, this algorithm isn't adapted for the case company, which is a limitation to use the balancing strategy for the case company.

When utilizing a balancing strategy, products may be in transit, and this can be a limitation if there is a spike in demand that leads to lost sales due to a product not being available for sale. Respondent 3 explains that *“It takes time to make a move between two stocks, which means that during a certain period of time, the inventory is unsellable. We could potentially have a stock out and then we have the inventory between two warehouses instead of having it sellable at for example, a store.”* The respondent continues to mention that *“Generally, it is not often that a spike in demand occurs without any indication, however, to lock a stock, making it unsellable, is generally not a good idea.”*

4.5 Summary of the case company’s current strategies

Figure 8 includes the summarized benefits and limitations found through interviews with employees at the case company.

Omni Channel	Balancing Inventories
<p>Benefits</p> <ul style="list-style-type: none"> ▪ Increased product availability ▪ Lower lead times for customers ▪ Potential for utilizing retail stores as local fulfilment centers for online orders ▪ Flexible demand management ▪ Higher inventory turnover rate ▪ Enhanced brand reputation and revenue growth <p>Limitations</p> <ul style="list-style-type: none"> ▪ Regulatory and compliance ▪ Integration into supply chain ▪ Lack of technical capabilities ▪ Investment requirements ▪ Operational differences between channels 	<p>Benefits</p> <ul style="list-style-type: none"> ▪ Optimized inventory levels ▪ Reducing stock imbalances ▪ Reduced inventory costs ▪ Improved customer satisfaction ▪ Flexibility downstream <p>Limitations</p> <ul style="list-style-type: none"> ▪ Navigating regulations and compliances ▪ Relies on an "inaccurate" demand forecast ▪ Costly to move inventory ▪ No decision-making algorithm ▪ Cost of lost sales ▪ Lacking technical capability to move from online stock to store stock

Figure 8. Summarized benefits and limitations of the case company’s current strategies.

4.6 Logistics postponement

This section highlights benefits and limitations related to the case company utilizing a logistics postponement. As logistics postponement is not a strategy that the case company, the benefits and limitations are potential.

4.6.1 Benefits

Respondent 4 highlights different benefits regarding utilizing a logistics postponement strategy. Firstly, having a centralized warehouse where products are stored until the demand

is realized creates economies of scale. The respondent explains that *“Economies of scale are present as if you centralize and have a centralized business, you create efficient processes and you set it up in such a way that you want everything to go via the central warehouse. This means you adapt the entire transport system, the planning, and the lead time so that you can handle all the products.”* Furthermore, the learning effects present in centralized warehouse environments. Respondent 4 explains that if you have a centralized warehouse, a company *“Can achieve greater efficiency, and when you have economies of scale, you have a learning curve where you handle larger volumes. With a higher frequency, you can learn and build up a more efficient business.”*

Simplified demand management and planning and lower inventory levels are benefits associated with implementing a logistics postponement strategy. More specifically, Respondent 4 mentions that logistics postponement strategy is *“Expected to improve your planning ability as well that you can plan at the overall level, and if you centralize, you stabilize the demand or you simply reduce the variance as well as the variance from different markets will cancel each other out.”* In addition, *“reducing the variance and that means you would have less stock or a smaller number of products in stock.”* The respondent continues to explain that *“The fact that you get a very stable predictable flow both from and to the centralized unit makes it possible to improve efficiency with large volumes.”*

Respondent 4 reiterates that there are situations where *“You have 2 different countries, and you place the inventory where there was no demand. This means that you want to move it to the country where there is an actual demand. You move it, which is rarely worth it, as it is expensive with extra transport.”* However, with a logistics postponement strategy, *“You can wait to send a package, so you can reduce the extra transport.”* As explained by respondent 4, having *“Many local warehouses can lead to obsolete stock, more specially to clothing, it doesn’t have to mean that the product has gone bad, but more that the clothing has become out of fashion.”*

Moreover, having a centralized warehouse allows a company to improve their service offerings through product availability, however it could come at the cost of increasing the lead times. Respondent 4 mentions that *“An advantage is getting a fairly stable flow, you have everything centralized in the warehouse and from a service point of view, it will improve. However, if you can centralize it, you have a much greater probability of being able to deliver everything the customers want. It might take a few hours longer than against a local one, but on the other hand, in most cases, you can deliver directly and then you win a lot there and you can then remove your express transport and you win on the transport side as well.”*

4.6.2 Limitations

There are also limitations that relate to a logistics postponement strategy. As Respondent 4 mentions, *“A lot is required on the IT system side.”* However, the respondent continues to mention that technology shouldn't really be a hindering factor anymore, as there are solutions that eases the implementation of a logistics postponement strategy. Moreover, transport costs are an important aspect to highlight. The respondent further explains that *“The effects of transport costs can vary a lot with the circumstances and it is usually said to be the disadvantage. One may rather have a stock that you can have to replenish nearby stores.”* This would lead to a lower number of long transportations, which could either mean higher or lower transportation costs, depending on other factors.

4.7 Evaluation of the implementation of logistics postponement

It is important to understand problems that the case company has, and to understand how they can be solved with the various strategies. Respondent 1 mentions *“For interior products, especially the more bulkier the products are, the less the customers are expecting to get it fast.”* Respondent 3 further highlighting this point *“I think for products within home interior, there is probably even less demand for fast lead times. If I order a carpet, I do not expect it to come tomorrow, and I wouldn't order it because I need it for the weekend. However, this could be the case for example with a shirt.”* The respondent continues with *“It is probably more fine to have maybe a 5-day delivery on parts of the product range while allowing customers to receive products which are smaller and easier to handle quickly.”* This implies that the negative aspect of logistics postponement in regards to longer lead times, may not impact customer satisfaction significantly. Especially in the case of the company's assortment of interior products. This cushion for the case company, i.e., more patience amongst customers, allows for more cost effective logistics management without negatively affecting the customer shopping experience, which is something not present to the same extent for the case company.

Furthermore, respondent 1 continues by mentioning that *“The products are shipped as finished products from Asia and do not have several components such as products from companies like HP.”* This indicates that the nature of the products as well as delivery contracts with suppliers which the case company currently have, does not allow for postponement in regards to modification of components. However, it is important to note that application of form postponement is still viable as late changes to packaging and labeling is still considered form postponement. This is something the case company is already doing, as it is necessary for their logistics operations.

With regards to the expanding and complex product portfolio of the case company, respondent 1 mentions *“We have a wide and complex product portfolio and it is continuously increasing.”* To address this problem, strategies which include efficient inventory

management are necessary. The growing product portfolio adds complexity to inventory management and thus future implemented strategies should focus on solving the problem of making the inventory management less complex.

The current structure of the case company's downstream supply chain is vast and global which brings complexities along with it. Respondent 3 *"I think we have 50 warehouses and about 4300 retail stores across the world. These are all nodes which are holding stock."* If all the warehouses and retail stores are slightly overstocked, the aggregate sum of this can amount to a significant amount of tied up capital. Therefore, implementing a strategy which allows for better inventory management is crucial. In addition to this, the respondent continues by addressing the fact that split shipment, i.e., a customer's order comes in two or more shipments, is a common occurrence in some parts of the world. *"In some parts of the world, if you order online, you will receive a split shipment if one of the products which the customer orders is not available in a certain warehouse."* Subsequently, this obviously negatively affects transport costs and thus underscores the cruciality of implementing a strategy which could reduce split shipments and the accompanying transport costs.

Respondent 3 mentions that *"We would definitely be able to purchase less if we centralized our stock in Europe,"* and further elaborates on how this affects the ability to predict demand and thus necessitate less purchasing. *"We can replenish local warehouses when we have more data on how well a product is selling. We can then identify that we are closing in on a stock out and then we can send it from the centralized warehouse and it will only take a few days for it to arrive. We will stock the local warehouses with enough to meet the demand for two weeks. Then we will almost exactly be able to predict the demand and can send batches of the products to the local warehouses."* This shows the importance of logistics postponement and the gaps in demand accuracy the strategy can fill by being able to more precisely meet predicted demand with the required supply. Subsequently, this highly benefits their ability to mitigate the risks of demand volatility and uncertainty as well as optimize the accuracy of their purchasing operations. Utilizing logistics postponement buys the case company time so that they can gather the required data to be able to utilize a more data-driven approach and thus make more informed decisions.

4.7.1 Scenario Description and Assumptions

To handle these challenges, two strategies which both tie into logistics postponement are tested through scenario planning using assumptions provided by experts at the case company for various KPIs. They are compared to a third scenario which is doing nothing and thus retaining the current strategy, see section 4.1. Additionally, a scorecard consisting of the different KPIs has been created, which is developed in order to measure the effectiveness of the strategies on a high level. The scorecard is used in conjunction with the scenario planning which is based on estimations gathered from the case company employees using their professional knowledge.

Scenario 1: Centralization of safety stock with distribution centers

The first strategy entails centralizing the case company's safety stock in an European warehouse in Hamburg and establishing replenishment flows from the centralized warehouse to the distribution centers in the respective countries. The distribution center in Borås holds a two-week inventory. By utilizing this set up, it allows the case company to delay the product movement from the centralized warehouse, enabling a more accurate demand forecasting for replenishments. The enhanced accuracy in the demand forecasting is due to the fact that the case company can leverage the extended data collection period. Subsequently, this significantly increases their prediction accuracy, and thus negates the effects of demand volatility and uncertainty.

Figure 9 visualizes how a logistics postponement strategy with a centralized safety stock would look like. More specifically, all containers would come through vessels from Asia to the centralized warehouse in Hamburg. The safety stock is subsequently replenished by the respective markets' distribution center, consisting of both the online and retail store channel, once demand is known. Therefore, products are kept in the centralized warehouse for as long as possible, then products are sent to the distribution centers where labeling and packing of orders take place.

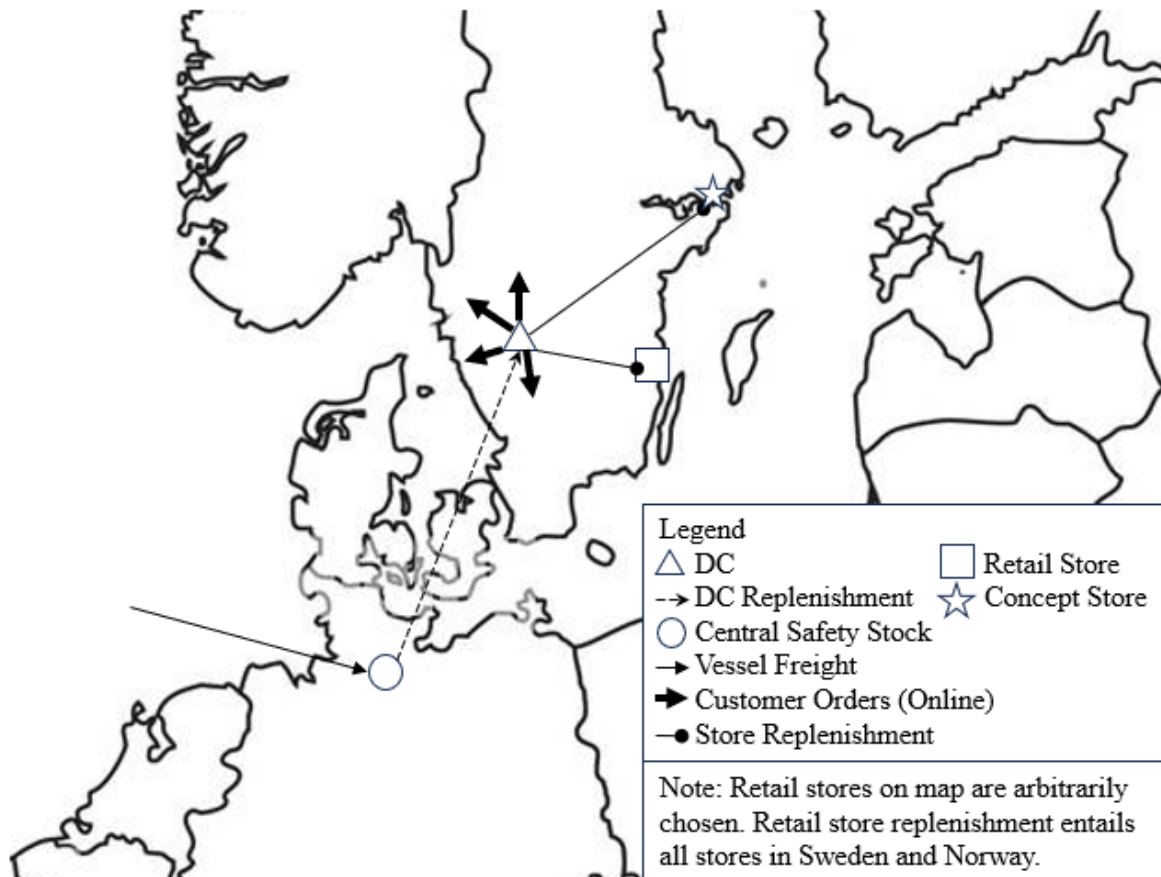


Figure 9. An overview of the supply chain with a centralizing safety stock strategy.

Scenario 2: Masterhouse

The last scenario entails a masterhouse which holds all of the case company's assortment for both online and store channels and thus a complete centralization of the supply chain structure. Keeping the inventory centralized is a way of implementing a logistics postponement strategy, as moving the products can be delayed until there is an actual demand. Orders are sent directly from the masterhouse, and customers and stores that are in closer proximity may get faster lead times, while the ones further away may experience a longer delivery time. An important benefit of centralizing the inventory is that it allows for better inventory management and planning.

Figure 10 visualizes the path of products from production in Asia to the end destination. All containers arrive at Hamburg, where the inventory for both the online and retail channel is kept centralized. When an order is placed by a customer/store, the products are sent towards the right location. Important to note that Hamburg is arbitrarily chosen due to the case company's existing presence there, however there exists cheaper alternative locations in eastern Europe which is worth investigating but outside the scope of this thesis.

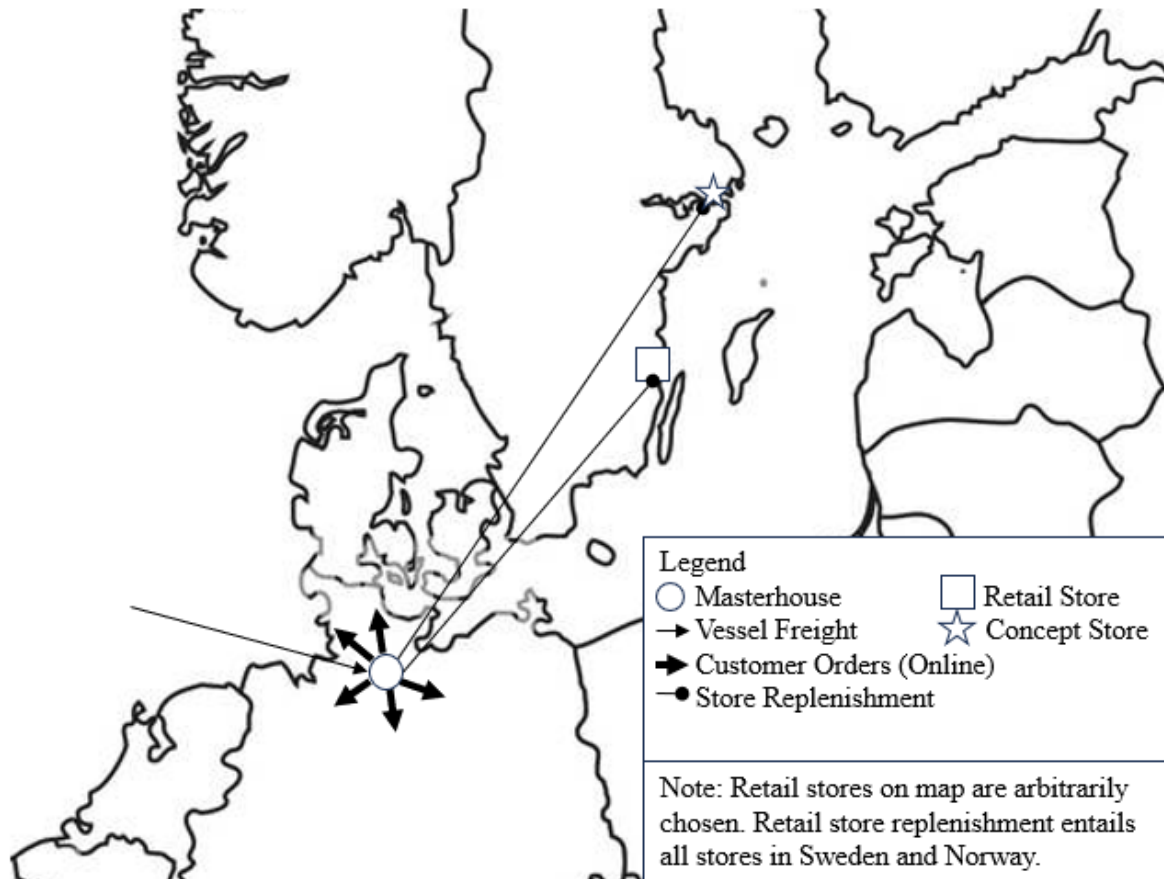


Figure 10. An overview of the supply chain with a masterhouse strategy.

4.7.2 Scorecard

These KPIs and the values have been developed in conjunction with our expert interviewee and employees at the case company. See table 2 and 3 for the summarized assumptions. The arrows indicate either an increase of the KPI compared to the current state (arrow up), decrease (arrow down), or no change (horizontal arrow). A thorough explanation and analysis of the effects of the KPIs in comparison to the current state are present in section 5.4.

KPI	Centralizing safety stock	Masterhouse
Inventory turnover ratio	↑	↑
Customer lead time	↔	↑
Transport emission	↑	↑
Shrinkage & Write Offs	↓	↓

Handling costs	↑	↓
Transportation costs	↑	↑
Initial Investment	↑	↑
Product availability	↑	↑

Table 2. Assumptions for accurate demand.

KPI	Centralizing safety stock	Masterhouse
Inventory turnover ratio	↑	↑
Customer lead time	↔	↑
Transport emission	↑	↑
Shrinkage & Write Offs	↓	↓
Handling costs	↑	↓
Transportation costs	↑	↑
Initial Investment	↑	↑
Product availability	↑	↑
Notes	For centralizing safety stock in this scenario, the case company determined that there are improvements with inventory turnover ratio and product availability. However, these KPIs experience a slight reduction in increase compared to the scenario with accurate demand.	

Table 3. Assumptions for a high demand volatility.

5. Analysis

This chapter entails an analysis of the two current risk mitigation strategies the case company employs, omni channel and balancing inventory through lateral shipment, as well as an analysis of logistics postponement and its application in scenario planning by comparing evidence found in both the theory chapter and in the empirical data. For the scenario planning, the analysis is conducted by evaluating the KPIs, analyzing their effects using the assumptions provided by experts at the case company.

5.1 Omni channel

Utilizing an omni channel strategy in order to mitigate the risks of demand volatility and uncertainty is a prominent approach. By consolidating both the offline and online channel and their respective inventories into one seamless channel, it significantly increases product availability, flexibility and customer service offer. Bucko et al. (2018), mentions the influence on sociocultural aspects on customer purchasing behavior and thus companies must take this into consideration when designing a supply chain to fulfill their customers' needs.

Hubner et al. (2016a) demonstrates that consolidation of both the online and offline channels enables a higher degree of product availability for customers as it allows them access to products which are present in both channels. Hubner et al. (2016b) continues this notion by further highlighting the fact that in order to allow customers to have access to a broader assortment of products, inventory pooling is a considerable advantage. This is in line with Respondent 3, who mentions that an advantage of the case company's dense strategic location of their retail stores, would increase product availability if online customers were able to have access to products which are in the retail stores. Additionally, due to the central locations of the retail stores, most customers have a case company retail store in close proximity to where they live, and thus lead times for online orders picked from retail stores would be shorter than if the orders were picked in a regional distribution center. This adaptation leverages the high accessibility of the case company retail stores, as they are usually situated in central areas or in shopping centers. Comparing this to the strategy implemented by Target, which capitalizes on the large parking areas outside the stores, in combination with that most of their customers drive a car to the store. As Respondent 3 mentions, Target fulfills 90% of their online demand in the retail stores, showing the high value this strategy adds for improving customer service levels. However, it is important to note that this strategy may not seamlessly transfer to Sweden due to sociocultural and infrastructural differences. Customers in Sweden do not use cars to the same extent as in the US as well as there exists a lower availability of parking areas, especially in city centers where a large portion of the case company retail stores are. Hence, by aligning the "buy online, pick up in store" model to accommodate the Swedish market, where customers can walk into the retail stores and pick up their orders, the case company should be able to emulate some of the success which Target has achieved.

Furthermore, continuing on the ideas of Hubner et al. (2016b) that consolidation of the inventories results in reduction of inventory levels, also impacts the ability to deal with demand uncertainty. It is by integrating a level of flexibility downstream that allocation of products can be done seamlessly and thus allow the case company to meet the fluctuating demand more efficiently. This notion is further highlighted by the comments of Respondent 3 who mentions that with a single stock. The case company can have the same level of sales with less inventory and thus increasing the operational efficiency as well as lowering tied up capital. In regards to revenue, Respondent 3 mentions that due to the better service offering, it results in better brand reputation and ultimately higher revenue. According to Birtwistle &

Tsim (2005), physiological aspects such as perception of a brand is crucial in a customer's purchasing behavior, hence improving brand reputation is vital. Hubner et al. (2016a), highlights the fact that a consequence of increasing product availability, also creates a better customer experience. By capitalizing on synergies which appear across the channels, the case company can for example, upsell additional products when a customer enters retail stores to pick up an online order. However, in order to establish these synergies, in line with Hubner et al. (2016b), the case company needs to utilize a single inventory control system in order to enable coordination of logistics across both channels, as this is integral for seamlessly consolidating the channels. It is important to note that it is the increased level of flexibility which directly mitigates the risks of demand uncertainty. An example of this notion is brought up by Respondent 3, who mentions that by not being restricted to one picking location for a certain product in a certain channel, but instead having multiple options. Consequently, this highly increases the picking flexibility and their capability to adapt to changes in demand which is a key component in order to mitigate the risks of demand volatility and uncertainty.

In terms of classifying an omni channel into either a flexibility- or redundancy risk mitigation strategy as Chang et al. (2014) and Taluri et al. (2013), the strategy is considered a flexible risk mitigation strategy. The reason being that an omni channel entails implementing interorganizational and organizational capabilities to continuously respond to and handle demand uncertainty. There is an increase in information sharing as integration of different departments, improving flexibility. Both downstream and upstream flexibility are positively impacted, as better there is a more efficient product allocation downstream as well as consolidated purchasing decisions.

Based on insights based on interviews as well as theory, there are specific limitations of an omni channel strategy employed by the case company to mitigate risks associated with demand uncertainty and volatility.

As acknowledged by Respondent 3, it is difficult for the case company as a single business unit to deviate from regular case company's processes, which implies potential resistance to change and integration of challenges. Therefore, a lot of organizational restructuring needs to take place to fully be able to implement an omni channel. This is in line with what theory states, as according to Hubner et al. (2016b), organizational structures are an enabler of an omni channel. In addition, the authors state that a merger of the retailers' organizational units can improve logistical efficiency. Currently, the case company doesn't have the organizational capability to fully implement an complete omni channel.

In relation to limited supporting organizational structures, the case company also lacks technical capabilities to endure an omni channel. More specifically, they can only pick from the store channel to the online channel. As Hubner et al. (2016a) explains that retailers with

an omni channel strategy have a connected flow of goods and operational structure across all channels. This contrasts the situation at the case company, since they are only capable of picking goods from one channel to another, not both ways. Another enabler of adopting an omni channel is IT systems, and there are large costs associated with creating an omni channel, more specifically, costs related to investing and maintaining a virtual inventory system, conducting more frequent deliveries (Hubner et al., 2016b; Lanzilotto et al., 2014). This is iterated by Respondent 3, as adopting an omni channel means large investments are necessary as all of the channel-specific channels need to be rebuilt.

The authors continue to explain that investing in flexible or automated picking systems may also be necessary to create an omni channel. Furthermore, when the products are rather similar, in terms of shapes and forms, automated picking systems are easier to implement, allowing efficient operations. As explained by Respondent 3, the case company does not have fully automated picking processes, the reason being the varying product characteristics and vast product range. This shows that the picking process has potential to be improved, but unfortunately, there are no current solutions on the market that can meet the required handling needs of the case company according to Respondent 3. Having manual picking processes takes more time than automated processes, therefore it may be hard to deal with large fluctuations in demand during volatile environments.

Another important aspect to consider when implementing an omni channel is the type of packages and the operations that belong to each channel. More specifically, Hubner et al. (2016a) explain that the integration process of channels is easier if the packaging for store and online orders are the same. However, this is not the case for the case company; as Respondent 3 explains, store orders are significantly larger than online orders, making it hard to create a cost effective picking process simultaneously. However, the authors also explain that the positives of integrated flows and inventories exceeds the negatives coming from the complexity.

An interesting aspect highlighted by Respondent 1 is related to regulation and compliance between different countries. When sending packages from different warehouses in different countries, it is necessary to consider what is required to send a product from a warehouse in Poland to Sweden, in terms of labeling and packaging. When adopting an omni channel, it is important that this rule is followed, otherwise there may be consequences. Literature supporting or contracting this domain is scarce, which is interesting because the case company highlighted this as being quite problematic. However, this is still a limitation of using an omni channel for the case company, as it is an extra obstacle to tackle when utilizing an omni channel.

All the limitations mentioned above contribute to hinders for the case company to successfully implement an omni channel. An omni channel would allow for risks within

demand uncertainty to be decreased, as it would allow a high level of flexibility. As these hindrances are associated with lacking capabilities that the case company has, an omni channel wouldn't function properly, ultimately leading to an unfunctional strategy unless large investments and changes take place.

5.2 Balancing inventory through lateral shipment

As Bhatnagar & Teo (2009) mentions, there is a difference between the forecasted and the actual demand. This can cause imbalances in inventories as some warehouses face an overstock whilst some warehouses can experience inventory levels which are lower than desired. Respondent 3 mentions the practical scenario of reactive and physical movement between warehouses in Eskilstuna and Germany shows the practical application of this strategy in order to correct imbalances in warehouses and mitigate the errors of the forecast. Forecasting is more complex with a higher degree of demand volatility and uncertainty, however this strategy allows for correcting imbalances caused by incorrect forecasting.

Furthermore, it is crucial to ensure that the right stock is at the right place at the right time, which is highlighted by Respondent 1. This aligns with the theory of Bhatnagar & Teo, (2009) regarding that the cause of inventory imbalances are the differences in replenishment size and the actual quantity of the replenishment order. As reactive lateral transshipments are a viable strategy for correcting errors in forecasting, it is important to understand that the same strategy can be utilized proactively. Respondent 3 mentions the proactive movement of products based on demand forecast, which aligns with the theory written by Agrawal et al. (2004) that utilizing real time information in order to rebalance inventory can reduce lost sales due to stockouts.

Cheung & Lee (2002) argues that coordinated replenishments through lateral shipments can reduce order costs and inventory. The authors mention that the reduction of orders costs and inventory is greater in supply chains where there exists a high number of retail stores and warehouses in a certain geographical area. This theory aligns with Respondent 3's thoughts on how balancing inventory through lateral shipments is the most effective in decentralized set ups which is why it is an integral part of the case company's current tools to mitigate the risks of demand volatility and uncertainty. However, it is important to utilize this strategy as a cost reducing measure to be used whenever an identification of an imbalance of inventory occurs, rather than a systematic routine. By having the capability of rebalancing inventory within an echelon, it results in an increase of flexibility downstream which mitigates the risks of demand volatility and uncertainty as Respondent 3 explained; therefore, in line with Chang et al. (2014) conclusions, this strategy can be classified as being a flexibility risk mitigation strategy. Furthermore, Respondent 3's practical insights correspond with the theoretical benefits stated by Cheung & Lee (2002), that inventory balancing can reduce costs and improve service levels.

Both literature and the case company explain that a balancing inventory strategy has different limitations. As explained by Bhatnagar & Teo (2009), there are important cost trade-offs that need to be considered when using this strategy; as explained by the case company, using their balancing inventory strategy is very expensive as consolidation and transportation costs increase. This is however compensated by the case company, through an increase in product retail price. This negatively impacts the customer, as products become more expensive, which then subsequently may affect the demand. Furthermore, as balancing stocks between different locations, excessive transshipments may occur, which also has significant cost consequences. As explained by the case company, there is always a margin of error as the demand is never completely correct. This implies that excessive transshipments can occur, and in result, unnecessary moving costs incur. Literature explains that having a way to prioritize which products to be moved between different facilities is critical, as it may not be worth it to move all products (Bhatnagar & Teo, 2009). The case company does not currently have a unique decision making algorithm that decides which products should be moved to another location, as there is for the case company Fashion. Therefore, deciding what product and quantity should be moved to another inventory is a complex task.

Other limitations that were highlighted by the case company but not found in literature relate to compliance and loss of sales during transportation. A balancing inventory strategy may mean that stock is moved from country to country, or warehouse to warehouse, and this implies that there may be critical regulations/compliances that need to be considered before transferring the stock. For example, there may be a safety consideration that is different between Poland and Sweden, and this means that to move a product from Poland to Sweden, a certain change to the packaging, labeling needs to occur. Furthermore, if there is a major increase in demand in Poland, it may take more time for the case company to figure out the requirements needed to transfer the stock, and therefore, may miss out on sales. Furthermore, loss of sales during transportation is not highlighted in literature, however, the case company considers this to be important to consider to decide whether moving a product should take place.

5.3 Logistics postponement

Delaying the displacement of products in combination with having a centralized warehousing set up are the fundamental aspects of logistics postponement. The logistics postponement strategy creates numerous benefits for companies that are utilizing the method; benefits which are supported by both theory and empirical data. Foremost, logistic postponement hinges on a centralization of inventory, which is shown in the matrix created by Pagh & Cooper (1998). In addition to this, the case company's manufacturing is based on a forecast due to the long lead times from Asia, hence it further proves that the matrix made by Pagh & Cooper (1998) profiles the case company as suitable for logistics postponement. The centralization allows companies to draw benefits from economies of scale which in turn makes operations more efficient as mentioned by Yang et al. (2004a). This is in line with

Respondent 4's notions of how centralization leads to more efficient processes and yields more value from learning effects due to the larger volume of products.

As Respondent 4 mentioned, the logistics postponement improves the planning ability of the company as the centralization aspect of it allows for a stable predictable inflow of goods. Subsequently, this reduces variance which is integral to dealing with demand volatility and uncertainty. Respondent 4 mentions how demand volatility originating from different markets cancels each other out in a centralized set up. A critical component of this is also how the inventory levels are lower compared to a decentralized set up as distribution centers do not need to hold any significant stock which is inline with the theory provided by Yang et al. (2004b) as well as Pagh & Cooper (1998). This is also mentioned by Respondent 3, who agrees with the notion that the case company can purchase less and hold less stock with this set up.

Waiting for demand to be realized before sending products to a specific market, allows for better decision making which ultimately should result in more accurate product allocation and thus reducing the transport costs. Respondent 4 mentions that this reduces the number of instances where companies need to utilize lateral shipment i.e., moving products within an echelon. This relates also to another fact mentioned by Respondent 4, that logistics postponement reduces the risk of product obsolescence which is a crucial matter within the fast fashion industry due to the ever changing trends.

Yang & Yang (2009) mentions that postponement allows for avoiding unnecessary movement of products and thus reducing transport costs. However, Pagh & Cooper (1998) mentions that in order to maintain a functional logistics postponement set up, it requires smaller transport modes and more frequent transports which ultimately could increase transport costs. Nevertheless, it is important to differ the two types of transport costs, as the costs mentioned by Pagh & Cooper (1998) are necessary for operational purposes and whilst the costs mentioned by Yang & Yang (2009) are unnecessary movement of products as they are the result of errors in forecasting.

Delaying the movement of products from the centralized inventory, can result in almost perfect demand accuracy as Respondent 3 explained. The respondent mentions that this is true if they carry about two weeks of demand locally, replenished by receiving batches from the centralized inventory once the demand is clear. To seamlessly transfer the required information to execute on this, which is mentioned by Cheng et al. (2010), who highlights the prerequisite of having information technology that is capable of handling the necessary information flow. This is also mentioned by Respondent 4, who explains that IT systems are an obstacle for implementing a logistics postponement strategy, however as technology has advanced so much, it is not a major barrier anymore.

As the logistics postponement strategies involve a high degree of centralization upstreams, it means that there is joint consolidation at an early stage in the supply chain extending downstream to the customer, which should allow for implementation of flexibility. In line with Taluri et al. (2013) perspective on risk mitigation, strategies which focus on flexibility rather than redundancy are more efficient. However, these strategies also incorporate elements of redundancy, which is in line with what is mentioned by Chang et al. (2014), illustrated in figure 2, where the author mentions that a combination of flexibility and redundancy is optimal for conditions of high probability of risk and high severity of risk. Redundancy strategies usually involve increasing capacity and inventories as mentioned by the author. Shifting supply chain structure from a decentralized to a centralized set up, may lead to reduced capacity and inventory. Due to achieving economies of scale and more efficient inventory utilization, the strategy will still effectively meet customers' needs and thus this suggests that even with the inventory reduction, the approach aligns with the redundancy principles stated by Chang et al. (2014).

5.4 Analysis of Logistics Postponement Scenario Planning

In this subchapter, the assumptions made by the case company are analyzed, to assess the viability of the various strategies, in two scenarios: accurate demand and high volatility demand. Each KPI is analyzed and the data is provided by the case company, see table 2 and 3 for the summarized data.

5.4.1 Inventory turnover ratio

Currently, the case company's inventory turnover ratio is considered to be reasonable but more on the low side, for a home interior retailer whose products are generally less susceptible to rapid trend shifts than those of its fast-fashion counterpart. The relatively low inventory turnover ratio, could indicate high tied up capital, however that was not mentioned in any interviews. According to the assumptions made by the case company, centralizing safety stock would increase the inventory turnover ratio both during periods of accurate demand and during periods of high demand volatility with a slightly higher increase during accurate demand, compared to the current state. However, the reduction of inventory turnover ratio between the accurate and high volatility demand scenarios, shows that it is less effective when the demand is unpredictable. Comparing this to the masterhouse strategy which both shows an additional increase of inventory turnover ratio as well as consistency during both accurate and high demand volatility which indicates that masterhouse in this aspect is a more robust strategy against demand volatility and uncertainty.

5.4.2 Customer lead time

The case company's current lead time is currently a couple of days which shows a balance between speed, customer satisfaction and cost. In the context of home interior products, these lead times should be considered competitive, especially due to the bulkier nature of the

products and longer life cycles in combination with the fact that customers are not expecting to get them as quickly as with fast fashion items. The same lead time is maintained with the centralizing safety stock strategy during periods of both accurate demand and high demand volatility, indicating a flexible and fast supply chain whilst mitigating additional risks. The equal lead time during both types of demand suggests that the centralization of safety stock strategy does not introduce additional risks in terms of customer satisfaction related to lead times; customers are already satisfied with the current lead time. However, the masterhouse strategy extends the potential lead time, which depends on the location of the customer from the masterhouse. While at a first glance, this might appear to compromise service levels, it could be a strategic move that could yield great cost savings and still maintain reasonable customer service levels. The reason for this is that customers are not expecting the same delivery lead time with interior products as they do with fast fashion items from the case company. Consequently, it may not be necessary for the case company to replicate the case company's supply chain structure, as doing so could incur unnecessary costs without corresponding benefits, given the divergent customer expectations.

5.4.3 Transport emission

Both strategies compared to the current strategy results in an increase of transport emission according to the case company experts. The underlying factor is due to having to rely more on land-based transport modes. Currently, a large percentage of products are transported from Asia by sea to Gothenburg where they subsequently are transported to the respective distribution centers by land based transport modes. As the centralized safety stock or masterhouse is located in Hamburg, the distance of having to use land-based transport modes increases and thus the emission as well. However, even if there is an increase, it is still lower for the centralization of safety stock compared to the masterhouse strategy. This could potentially be due to less consolidation opportunities, as products are shipped to customers and retail stores directly as well as having to dispatch more frequent transports. As sustainability is a main factor influencing brand reputation, it is integral that the case company take this KPI into consideration when choosing a distribution strategy, as it impacts both their immediate and long-term sustainability objectives. Additionally, there could exist hurdles with the increased transport emission as for example, companies can be penalized when emitting higher levels of emissions and policies in the EU restricting use of non-electric vehicles.

5.4.4 Shrinkage & Write Offs

Shrinkage and write offs typically refers to loss of inventory due to theft, damages and product obsolescence with the latter most likely being the largest contributor for this KPI. However, due to the less time sensitive nature of its inventory, the case company should not be as largely affected by product obsolescence write offs compared to the case company due to their fast fashion nature. It is suggested that both strategies result in reduced shrinkage and write offs, and noted by the case company that the reduction would be even larger with the

full centralization masterhouse strategy. The higher degree of centralization, results in a reduction in this KPI, which is reasonably the result of a more accurate inventory management as the inventory is at fewer locations than in a decentralized set up. Additionally, which is evident with the higher inventory turnover ratio, products spend less time in the inventories for both strategies, which could be a main factor in lowering product obsolescence.

5.4.5 Handling costs

As mentioned by theory, inventory carrying costs are a large part of the supply chain costs, as it's associated with all the expenses related to managing inventory within a warehouse. In both of the demand scenarios, the inventory carrying costs increases, suggesting that a centralizing safety stock strategy entails larger expenses related to warehousing, transportation, and labor in a warehouse. Managing a centralized safety stock may be more complex, as all the products are handled at the central warehouse and the distribution centers which increases the need for additional handling. Furthermore, an additional inventory node is added, as the products are kept in safety stock in Hamburg instead of simply being a transit point. In contrast, the masterhouse strategy entails a decrease of inventory carrying costs for both of the demand scenarios, which is a positive outcome. The reason could be that as the whole stock is centralized, inventory carrying costs may be reduced due to economies of scale. Furthermore, more efficient picking processes may be implemented, and the local handling of inventory that occurs at the distribution centers disappears. As mentioned by literature, low inventory carrying cost could lead to the usage of slower transportation methods, for example, railroads. However, this could come at the expense of a higher lead time. However, this may not be a significant factor as the distance between Hamburg and Sweden is not that big, and that customers are not extremely sensitive to fast lead times for the bulkier products. The fact that the centralized safety stock has a negative outcome on inventory carrying costs while the masterhouse strategy has a positive outcome in both demand scenarios portrays that the masterhouse strategy may be better in this field.

An implication of the consistency of the inventory carrying cost changes for both demand scenarios is that demand volatility and uncertainty may not have a large impact on the handling inventory and thus indicate robustness amongst the strategies within the context of demand uncertainty. As a lot of warehousing activities occur manually, to reduce the inventory carrying costs for the centralized safety stock, it could be beneficial to look into the potential of implementing technological investments as well as automation.

5.4.6 Transportation costs

For both demand scenarios, a centralizing safety stock increases the transportation costs. Although this approach allows the inventory to remain central for as long as possible (until the demand is realized), the transportation costs increase. One reason could be that it may be hard to have completely filled trucks, as products may have different replenishment points.

This would lead to more frequent and less filled truck transportation from the centralized warehouse to the distribution centers in Borås. Both of the demand scenarios for the masterhouse strategy also increases, however, a larger increase than the centralized safety stock strategy. An underlying factor causing this may be that there is a need for more frequency shipments between the three different destinations, the central warehouse, customers, and retail stores. As deliveries can be made from the central warehouse to customers, more frequent and not filled deliveries may arise, and it may be hard to consolidate transportations to customers. Since there is no difference between an accurate demand and a volatile demand, the transportation costs are not influenced by the dynamic environment, only by the type of strategy considered.

5.4.7 Initial investment

To implement a new strategy requires an investment, and this significantly influences the case company cash flow. Before an investment is made, it is important that the case company conducts an analysis that considers return on investment, as the invested capital needs to result in profitable returns in the future. Both of the strategies, centralizing safety stock and masterhouse, indicate a significant investment for facilities and technological requirements. However, the masterhouse strategy entails a much larger investment, and the implementation of this strategy included building a new warehouse that is big enough to handle all inventory and processes for the online and retail channel. It is important to highlight that the initial investment does not change from an accurate demand to a demand with high volatility. Furthermore, when market conditions are unpredictable, it can be risky in terms of redistricting their financial flexibility by making large investments.

5.4.8 Product availability

The product availability seems to increase in both cases of the two demand scenarios. More specifically, when the demand is accurate, a centralizing safety stock and masterhouse entails an increased product availability. Both strategies significantly increase in comparison to the current strategies, however, the masterhouse product availability increases more. The reason for the subtle difference between the two strategies may be because of the complete centralization of the inventory for the masterhouse. Overall, an increase in product availability is a positive outcome, as under normal conditions, these strategies include a higher product availability, which minimizes the probability of missing out on sales.

In an environment where the demand is volatile and uncertain, the product availability decreases solely for one strategy, the centralized safety stock. Both the current state and the masterhouse have the same performance as with an accurate demand. The product availability drops subtle when dealing with a volatile and uncertain demand, indicating that a centralized safety stock strategy may not be perfect when dealing with a fluctuating demand. Although a masterhouse continues to have the highest product availability during a volatile

demand, it is important to consider the other factors, such as increased transportation costs and a large initial investment.

5.5 Summary of the KPIs for each strategies

In this section, a summary of the various KPIs and their impact on an accurate demand and a demand with high uncertainty, compared to the current state. The summary is provided in figure 11. There are two KPIs that stand out, being inventory turnover rate and product availability, as they are unique in changing during uncertain demand conditions in comparison to accurate demand conditions. Additionally, handling cost will decrease with the masterhouse strategy, which indicates that a higher degree of centralization allows for lower handling cost. However, the centralizing safety stock increases handling costs whilst being more centralized than the current state, which is due to the strategy entailing an additional storage node in the supply chain.

KPI	Centralizing safety stock during accurate demand	Masterhouse during accurate demand	Why?	Impact on high demand uncertainty
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Inventory turnover rate	Increase	Further increase	More efficient inventory management	CSS less effective during uncertain demand conditions
Customer lead time	No change	Potential extension	CCS distribution centers have same distance to customers as before, MH longer distance	No change
Transport emission	Increase	Further increase	More land transport and more frequent shipments	No change
Shrinkage & write offs	Reduction	Further reduction	Less spoiled products due to better inventory management	No change

Handling costs	Increase	Decrease	Current transit node in Hamburg now safety stock in CSS. Economy of scale MH.	No change
Transportation cost	Increase	Further increase	More frequent transportations; MH brings further consolidation issues	No change
Initial Investment	Increase	Further increase	Investment of facilities and technology; MH new construction project required	No change
Product Availability	Increase	Further increase	Centralization of inventory	Less increase for CSS during uncertain demand conditions

Figure 11. Overview of how each KPI is influenced for each strategy and the reason for varying levels under different demand scenarios (CSS: centralizing safety stock, MH: masterhouse).

6. Discussion

This section provides a discussion regarding alternatives to implementing a risk mitigation. Furthermore, benefits and limitations related to an omni channel, balancing inventory through lateral shipments, and logistics postponement are discussed, focusing on the ability to deal with demand volatility and uncertainty. Furthermore, the operational and strategic implications of new distribution strategies at the case company are discussed.

6.1 Omni channel

Utilizing an omni channel strategy yields robust means of mitigating the risks of demand volatility and uncertainty. By consolidating online and offline channels into one channel which handles both flows simultaneously, the case company can draw several benefits from this such as increased product availability, reduced lead times and more. This chapter is about the different benefits of utilizing an omni channel and also how the benefits affect the case company's capability of mitigating the risks of demand volatility and uncertainty. In addition to this, several limitations of this strategy are mentioned, which complicates the implementation and utilization of an omni channel strategy.

A significant benefit yielding from an omni channel is the increased product availability. Consolidating the online and offline channels, which originally are considered two completely different channels, with different operational processes revolving them, facilitates a broader access to products for customers. In turn, this could potentially act as a buffer against demand volatility, since spikes in demand would be mitigated as the case company could provide their customers with products from both channels. During periods of high demand, having the capability of meeting the customers expectations with reduced lead times, would subsequently, increase service levels and brand reputation.

Shorter lead times are a direct positive consequence of using an omni channel strategy. Even though customers might not necessitate a lead time of same day delivery, being able to offer the option without creating high costs for the company is valuable for service levels and brand reputation. The shorter lead times stems from the increased flexibility downstreams by using an omni channel. In turn, the flexibility is derived from several sources, for example, allowing customers to order online and pick up their order by themselves in a nearby retail store. By reducing the lead time duration and increasing the flexibility in the inventory management, the case company can react to changes in demand, as it facilitates a better market responsiveness and thus increases their ability to mitigate the risks of demand volatility and uncertainty.

The benefits mentioned above, all correlate with improved customer service levels. Whilst customer service levels do not directly impact the case company's ability to deal with demand uncertainty and volatility, it does foster a positive brand reputation amongst the case company's customers. The improved brand reputation does not only increase revenue but the increased loyalty of customers creates a steady stream of purchases or at least creates a regularization of purchasing behavior. An increase of consistency of customer purchases simplifies forecasting and lowers the experienced volatility. This statement can be shown mathematically, using the definition of standard deviation, as the individual purchases are closer to the mean of all purchases and thus decreasing the volatility.

Consolidating two channels into one yields an improved resource utilization which facilitates reductions in cost. Combining this with the fact that the act of consolidating the respective channels' inventories into one also allows for a reduction of inventory levels and thus further reduces costs. These benefits do not directly impact demand volatility nor demand uncertainty, yet the increased liquidity the benefits provide, can be redirected towards strategic investments which impacts the case company's ability to deal with demand volatility and uncertainty, for example, an investment in cutting edge forecasting technologies.

Implementing an omni channel approach at the case company comes with its share of challenges, especially when it comes to addressing demand volatility and uncertainty. To fully integrate an omni channel strategy, the organization needs to undergo large changes, which is both resource and time consuming. This may potentially delay the ability to deal with the demand volatility and uncertainty, which can be problematic as the environment is currently a dynamic and ever-changing business environment.

Another hurdle that the case company faces is the lacking technical capabilities required to provide a seamless experience across the channels for the customer, and potentially leading to large consequences due to the effects of demand volatility and uncertainty. Synchronizing logistics processes between the online and retail channels may not always be cost beneficial, as the varying technological and operations capabilities and capacities may not always match. In the case of utilizing an omni channel, if there is a sudden spike in demand for a specific retail product, leading to a stock out in the retail warehouse, the product could still be delivered from the online stock. As the case company cannot fully implement this solution, the customers are not able to retrieve the wanted products through an online channel, as they are lacking technical capabilities. Consequently, the case company's ability to mitigate risks within demand volatility and uncertainty diminishes.

Investment costs are another important consideration. An omni channel is associated with substantial investment costs related to IT systems, and in turn, the case company could face financial challenges. As mentioned earlier, allocating capital and resources to these

investments can lead to less being issued to other strategies that may be used to deviate risks within demand volatility and uncertainty, for example, a balancing inventory strategy. A balancing inventory strategy could provide more short-term advantages to deal with demand uncertainty, but it is not sustainable. On the other hand, there are long-term benefits that the case company can grasp once the initial investments have been made.

Having to deal with the compliance and regulation issues when moving products between countries can complicate the transition towards an omni channel. It may take time to completely understand and align these factors, which may restrict the case company's ability to react to varying levels of demand volatility and uncertainty in different countries and markets. It is worth noting that there is limited literature regarding this issue, which exemplifies that this may be an aspect that is not fully known. Despite this, the case company still considers it a key factor to consider when implementing an omni channel.

In summary, most of the limitations act as a significant hurdle for the implementation of an omni channel, which in turn, delays the case company's ability to effectively handle high levels of demand volatility and uncertainty. Figure 12 summarizes the benefits and limitations related to dealing with demand uncertainty.

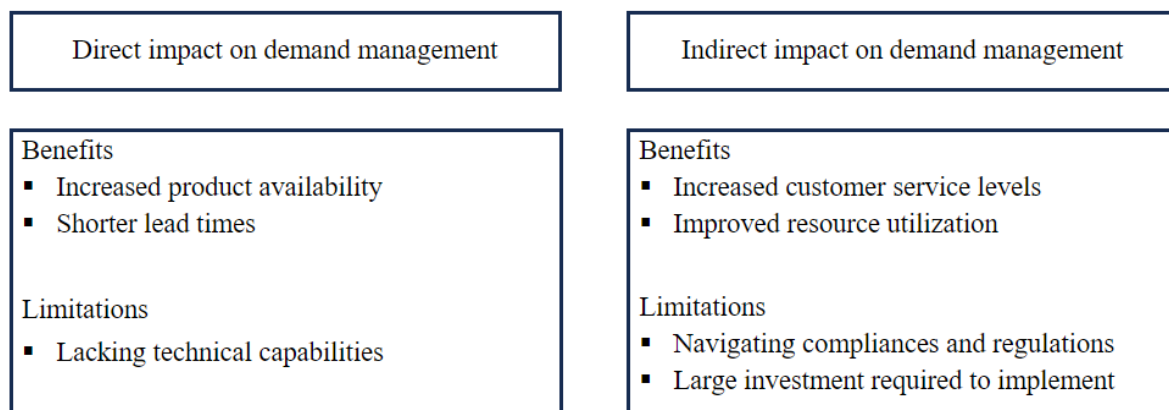


Figure 12. Benefits and limitations of an omni channel strategy dealing with demand uncertainty.

6.2 Balancing inventory through lateral shipments

Balancing inventories through lateral shipments comes with several benefits and limitations, which either directly or indirectly affect the case company's ability to deal with demand volatility and demand uncertainty. By moving stock reactively and proactively within an echelon, it allows the case company to rebalance their inventories across various geographical regions and markets. In turn, this reduces the risk of stockout or overstocking, which are the end results of experiencing demand volatility and uncertainty.

Correcting the inventorial imbalances, stemming from forecasting errors, are crucial in order to avoid the situation of stockouts and overstocking as previously mentioned. Stockouts lead to missed revenue, as customers do not have their desired products available, and overstocking increases holding costs and tied up capital. Having a strategy that allows the retailer to maintain balance amongst their decentralized inventories, in cases where forecasting has been erroneous, is important in order to maintain operational efficiency. This allows the case company to swiftly adapt inventory levels to meet fluctuations in demand, allowing them to stabilize inventory levels during volatile demand patterns. Not only does this positively affect the inventory turnover ratio, and decreases tied up capital; it also allows for increased product availability for the customers. Ensuring that the right product is available at the right place at the right time, creates a better brand reputation, improves service levels and retains customers' trust which facilitates its own benefits which are mentioned earlier in this discussion chapter. Additionally, sustainability factors which ties into brand reputation, such as lowered rate of product obsolescence, are positively affected through inventorial rebalancing.

Moving away from reactively balancing inventories to proactively balancing them, using forecasting technologies, allows for a great competitive advantage. By addressing the demand surges or drops proactively, it allows for the case company to preemptively buffer or lower inventory levels before the fluctuations materialize. In addition to this, it relieves strain on operational processes, as there is no need for rapid, reactive reallocations of inventories, which might not be as efficient as proactive rebalancing due to lack of planning and time constraints. While reactive rebalancing is a valuable tool for emergency situations, and it is important to have set up processes around it for efficient execution, it should not be systematically utilized as it is inferior to proactive rebalancing.

By having these tools, both proactive and reactive lateral reallocation of inventory, it greatly enhances the case company's downstream flexibility. Subsequently, this increases the case company's ability to swiftly deal with regionalized demand fluctuations. A main issue with this strategy is that, a close by region, must have an overstock in order to conduct the lateral shipment, for this strategy to be economically rational. However, if that is the case, the increased operational agility mitigates the risks of demand volatility and uncertainty. By having this option, the case company could potentially initiate promotions tailored to certain regional markets to accommodate unique preferences of these consumer segments. Given their ability to reallocate inventories, they have a safety net to fall back on if demand spikes derived from promotions results in a risk of stockout.

The current decentralized set up of the case company's distribution network is suitable for balancing inventory through lateral shipments, granting them the ability to manage regional demand fluctuations. However, this strategy becomes less relevant if the case company decides to pivot towards a logistic postponement strategy given its centralized nature.

Comparatively with an omni channel strategy, which can be combined with a logistics postponement strategy, balancing inventory through lateral shipment can not. Given that the case company's usage of inventory rebalancing has not reached its desired efficiency, it could influence their decision to adopt a logistics postponement strategy instead.

The case company use of balancing inventories through lateral shipments is associated with several limitations to dealing with demand volatility and uncertainty. For example, there are cost trade offs that will determine whether the strategy should be used or not. As moving inventory requires plentiful capital, it may not always be worth it. In this case, if the demand volatility and uncertainty is high during a time period, it may be useless to move inventory, as the inventory may be needed in the original destination the next day. This solution can provide short term benefits in terms of dealing with demand fluctuations, however, long term costs can become quite significant as the cumulation of unnecessary moves may increase during a volatile demand. The costs in question are related to transshipments and other associated costs. Transshipments are based on a demand forecast, which is rarely accurate. In an environment where the demand is uncertain and volatile, predicting the demand is complex and difficult. Therefore, relying solely on a balancing inventory strategy may be useless, as it may lead to moving inventory without use, as it may be needed the next day elsewhere. Consequently, relying solely on a balancing inventory through lateral shipments in an environment with high demand volatility and uncertainty can escalate costs, without generating further revenue. Moreover, an increased retail price is set if a product is transported from the result of utilizing a balancing inventory strategy; in result, the case company risks losing sales as customers are detained from purchasing, which further deteriorates the accuracy of the demand forecast.

As the case company doesn't have an adapted algorithm to decide what products and in what quantity products should be transported in the same way the case company Fashion has, utilizing this strategy can be resource and time consuming. This implies that it can take time to concretize the quantities of products to move, and during demand high levels of volatility and uncertainty, it is important that decisions can be made quickly to respond to the fluctuations in demand.

There are two limitations that are highlighted by the case company but not found in literature: compliances/regulations and loss of sales during transportation. If there are different compliances and regulations that the case company needs to consider before moving inventory between different regions or countries, the movement of goods can be slowed down. Consequently, it may be harder to respond to sudden changes in demand. Moreover, it is impossible to sell products in movement, and when products are moved between inventories, this chance of missing out on sales increases. More specifically, if the demand suddenly spikes because of a high level of demand volatility and uncertainty, having products

in transit leads to a major loss of sales, as the product cannot be sold or be made available to a customer, which is detrimental to a firm's revenue.

A trade-off that is relevant to consider is between product obsolescence and emissions. A benefit highlighting a rebalancing strategy entails decreasing product obsolescence, however, as an excess transportation may take place, there are sustainability factors to consider, such as increased emissions. Figure 13 highlights the main benefits and limitations related to dealing with demand uncertainty of a balancing inventory strategy.

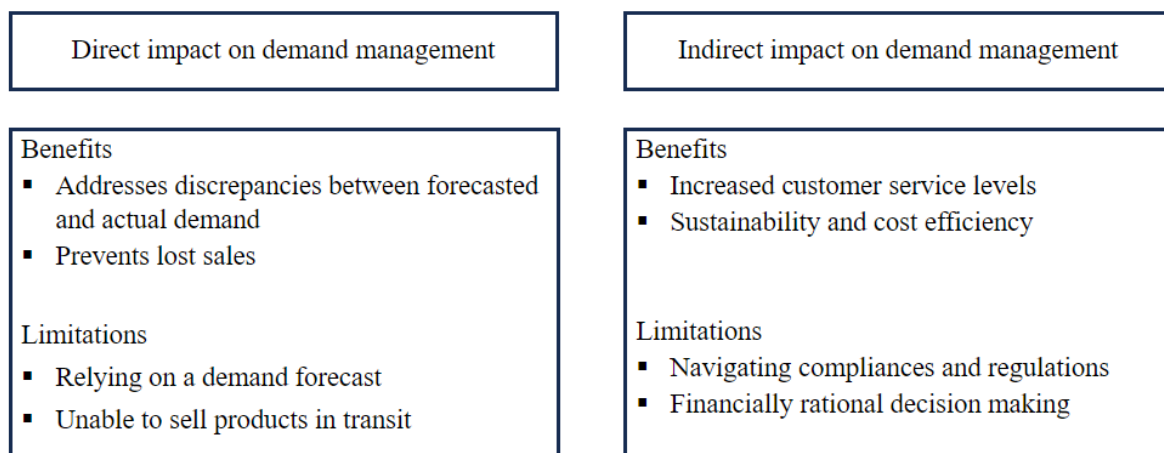


Figure 13. Benefits and limitations of a balancing inventory strategy dealing with demand uncertainty

6.3 Logistics postponement strategies' ability to manage demand volatility and uncertainty

Logistics postponement is a strategy which would suit the case company's needs well, and would increase their ability to mitigate the risks of demand uncertainty. Both the centralizing safety stock strategy and the masterhouse strategy falls under the umbrella of logistics postponement strategies as both strategies emphasize a delay of the movement of products, combined with a centralization of inventory. Consolidating the inventory to one or a few locations, depending on the level of centralization the strategy entails, would yield several advantages in terms of navigating the uncertainties of demand fluctuations but also advantages which affect their operational efficiency. Examples of these benefits are being able to take advantage of economies of scale, improved planning capabilities, and more.

Firstly, consolidating inventory and operational processes to one location, allows the case company to harness the benefits of economies of scale and centralizes decision making, which should increase the lead time of decisions. Combining these factors, would enable the case company to rapidly adjust for shifts in market demand in a cost-effective and efficiency manner. Essentially, this increases the buffer the case company has in order to deal with

fluctuations in demand as inventories can be distributed rapidly and optimally from the centralized warehouse to the connected markets.

As the inflow of goods to Europe is centralized as well, which results in improved planning capabilities and an increased predictability for the case company. This is due to the consolidated view of both demand, inventory and supply which are present in the centralized warehouse as well as the stable in-flow of goods to Europe. Subsequently, this enhances the case company's ability to forecast and plan accordingly. Additionally, utilizing the logistics postponement strategy to wait for demand to be materialized, or at least until forecasts are close to perfect, further increases the case company's planning capabilities. Leveraging the strategy and improving the planning capabilities, along with delaying distribution until the actualization of demand, greatly impacts the case company's risk mitigating capabilities in regards to demand volatility and uncertainty.

Additionally, the case company can maintain an equilibrium in their inventory levels as the centralized inventory is connected to several markets; which in theory should cancel out the respective market's demand uncertainty. This implies that the demand uncertainty is stabilized, and this has several effects. The safety stock and the risks for overstocking and stockouts are minimized, which ultimately reduces monetary and sustainability costs as well as potential revenue loss.

By design, logistics postponement reduces unnecessary transport costs such as lateral shipment. This is due to the fact that the case company can make more informed distribution decisions, and thus avoiding unpredictable costs such as reactive lateral shipments. Important to note is while the strategy entails more frequent transports with more expensive transport modes, from the centralized warehouse to the various markets, might increase transport costs. However, the difference is that the movement of products and thus the utilization of expensive transport, aligns closely with actual customer demand and thus increases the predictability of the costs. In terms of demand volatility and uncertainty, this could result in less reactive transports once the case company faces a sudden stockout, which usually comes at a premium cost.

In the fast paced nature of retailing with products with various designs, lies complexities regarding being able to accommodate customer's expectations regarding trends. The shifts in trends can result in large portions of the inventories becoming obsolescence, especially in cases where overstocking is an issue. Reducing product obsolescence not only directly affects the bottom line but also improves brand reputation amongst customers as it reduces the case company's sustainability footprint. The case company's inventory management can be changed drastically in a positive manner by achieving near-perfect demand accuracy by using logistics postponement. Not only does the strategies' entail lowering of waste, such as product obsolescence, it could potentially turn the challenges of demand uncertainty into a

competitive advantage for the case company. By nearly nullifying these risks with logistics postponement, it could advance them ahead of competitors unequipped to handle the complexities of demand fluctuations.

6.4 Operational and strategic implications of new distribution strategies at the case company

This section highlights important aspects regarding how the developed logistics postponement strategies influence the case company's current operations and additional strategic aspects.

6.4.1 Slight changes in KPIs between the demand scenarios

Between the two demand scenarios, there were only a few KPIs that changed. More specifically, the KPIs that were influenced by a volatile and uncertain demand were inventory turnover ratio and product availability. The ones that didn't change include transportation costs and emissions, shrinkage and write offs, handling costs, and customer lead time. The reason behind this is that the processes and operations don't really vary between the scenarios. For example, the transportation and warehousing costs are the same across both scenarios because the strategies don't include large changes to the operations under each demand condition. Since the only KPIs that change between the demand scenarios are product availability and inventory turnover ratio, the strategies have an effect on how the inventory is managed. In order to better reflect how the inventory is managed, other KPIs could be used to deep dive further into the strategies ability to handle inventory, for example, backorder or stock out rate.

6.4.2 Investment requirements and scalability

In a sense, the investment requirements are the deciding factor in the end as the financial implications of each of the strategies can not be overstated. Firstly, centralizing safety stock requires a lower initial investment due to being able to utilize existing facilities and thus making it an attractive option of moving towards a more centralized set up and still maintaining liquidity. On the other hand, the masterhouse strategy entails an investment in completely new facilities, implying that the strategy requires high upfront costs. This is critical as it is a significant commitment and trust in its long term strategic benefits. Both options still require substantial investments in order to conduct the transitions, hence it is recommended to make a financial analysis for both these strategies in order to assess their suitability.

It is important to consider the scalability of each strategy prior to implementation and what kind of investments it would require. Centralizing safety stock strategy would require distributed investments across markets as business expands, as the scaling up of the strategy necessitates not only expanding the central warehouse holding the safety stock, but also the

local distribution centers in each market. However, this allows for a more tailored expansion, as investments can be adapted to the needs of a certain market. Comparatively, with the masterhouse strategy, it requires a single substantial investment in order to expand on the fully centralized infrastructure. However, the process of scaling up, should be more streamlined as the operations are centralized within one facility.

6.4.3 Time perspective

Implementing new strategies takes time, as there are various changes and upgrades that need to take place, and the transition depends on the case company's readiness for change. Therefore, the time of development and implementation is essential to consider. As the masterhouse strategy requires a completely new centralized warehouse, it may take more time than adapting the current warehouses and DCs to a centralizing safety stock strategy. Moreover, if the implementation time for a masterhouse strategy is between 5-10 years, whilst centralizing safety stock strategy implementation is 3-4 years, the centralizing safety stock strategy may be more suitable as it provides a faster solution to the problems the case company is facing today. It is important that the case company considers these different aspects before choosing which to proceed with.

6.4.4 Environmental concerns

The case company strives toward decreasing their environmental impact, as it is vital in the retail sector where consumer perception heavily influences revenue, amongst other benefits. Both of the logistics postponement strategies, centralizing safety stock and masterhouse, entail an increase transportation emissions as the frequency of transportation and opportunity to consolidate transportation decreases. However, this is compensated as the write offs & shrinkage decreases and the fact that the strategies require less purchasing. It is common knowledge that the majority of a retail company's climate footprint is from the production and thus total net emission, even though transport emissions increase, could decrease. Comparing the two logistics postponement strategies, it seems that centralizing safety stock strategy outperforms masterhouse strategy when examining transportation emissions. This could mean that the centralizing safety stock strategy is a compromise between superior inventory management, transport emission and reducing climate footprint though lowered purchasing volumes.

Although environmental aspects are critical to consider, there are other dimensions that are often overlooked, for example, social aspects. More specifically, how the shift towards both strategies influences employees or potential employees; it may create more job opportunities and therefore stimulate workforce and opportunities, which is a positive outcome. However, due to the high level of centralization for both strategies, jobs may be reduced on an overall level, as efficient processes arising from economies of scale may limit the need for a large workforce. Moreover, this thesis only looks at transportation emissions and shrinkage & write offs, but there are many more factors that are critical to consider.

6.4.5 Risk profiles

As there are different levels of investment required for the strategies, it also makes their risk profiles differ. As the centralizing safety stock strategy is of a more incremental nature, it does allow for a more low risk profile as the case company can adjust certain aspects. This means fine-tuning operations and scale progressively, which is a main factor in their lower risk profile. The masterhouse strategy requires a total overhaul of current operations as well as being contingent on a substantial investment and thus increases its risk profile with higher potential of disruption during implementation. Therefore, the case company must assess their tolerance towards these different risk profiles and their current capabilities to successfully manage transitions to varying degrees of operational overhauls.

Additionally, due to the safety stock and masterhouse being centralized in one area, it does also centralize risk and potential disruptions which subsequently affects all markets. As the case company currently has a decentralized approach, which allows for a higher degree of autonomy per market, this is a major change as the potential for risk disruption moves from being on a local market level to a central node in the supply chain network.

6.4.6 Location

The location of the centralized safety stock and the masterhouse is critical because it has a great impact on the efficiency of the supply chain. In this thesis, the location chosen is Hamburg due to existing facilities, however there are other suitable alternatives in Europe, which should be assessed going forward. The location must be cost-effective, yet accessible for both in-flow of products from suppliers and in close proximity to customer and distribution centers for the outflow of products. By establishing the inventories in accessible areas, the risk of supply chain disruptions is reduced. However, it is still important that the location is in proximity to the customers, to provide short lead times. However, these factors must be assessed through a cost-benefit analysis by comparing different location's real estate prices. Therefore, it is suggested that an independent investment analysis for both strategies for various locations in Europe, considering factors such as proximity to key markets, transportation infrastructure and cost of real estate, amongst other, before choosing a suitable location.

6.4.7 Flexibility

In regards to how the two strategies respectively affect the flexibility of the operations, there are different caveats for each strategy. Centralizing the safety stock enhances downstream operational flexibility through its increased demand forecasting which allows for better market adaptation. Furthermore, there are still local distribution centers in each market even though the safety stock is kept centralized in a warehouse in Hamburg. The local distribution center is closer to the market, which improves knowledge about that market segment and decreases the distance between the supply and the demand. In turn, predicting the demand may be easier for the local distribution centers, as they are closer to the customers.

The masterhouse strategy allows for streamlined operations as well, yet the large-scale nature of the strategy may introduce rigidity and consequently affect the case company's ability to adapt to market fluctuations negatively. Moreover, as a masterhouse strategy entails one centralized warehouse with the whole assortment, it may be harder to handle changing demand in customers that are further away. The reason being that the distance between the supply and the demand increases, making it harder to react to sudden changes quickly. The customers who are close to the masterhouse are able to get a more flexible and agile distribution.

Therefore, the centralizing safety stock strategy may be better at handling the local changing demand than what a masterhouse strategy can. Moreover, it can also be easier for the centralized safety stock strategy to capitalize on quick changes to customer preferences because of the local presence. Due to the nature of centralization, upstream flexibility can be achieved. The reason being that all purchasing and production decisions are made at one location, making it easier to make more accurate decisions in relation to the whole perspective. Downstream flexibility is still achieved as the movement of products will take place once there is a demand.

6.4.8 Aligning lead time with customer expectation

The increase in lead time of the masterhouse is a significant factor, which can impact its suitability as the chosen distribution strategy. For the case company, customer expectations on lead time can vary depending on type of product but perhaps even for different markets. Aligning the distribution strategy and its receptive lead times to customer expectations on lead time is important. While interior products do not have the same expectations on lead time as fast fashion products, it is still an issue which needs to be communicated with the customers. An interesting aspect for further analysis includes the assessment of the feasibility of an "incentive program" that will motivate the customers to choose longer delivery lead times. For example, during online check out, customers can select an option with "slow delivery" which subsequently earns them points, flat out price reduction or a small donation to a good cause. Adding this kind of incentive would still be of interest in the centralizing safety stock strategy, even if it does not affect the current lead time, as extending the delay of product movement only increases the benefits yielded from a logistics postponement strategy.

6.4.9 Customer service

Deep diving into customer experience in both of the strategies plays a critical role to understanding how the strategies affect service levels. Lead time and product availability plays a crucial role in establishing a high level of customer service. Centralizing safety stock offers more rapid fulfillment compared to the masterhouse strategy; however, the slower lead times could indicate possibilities of cost reductions which subsequently could be passed onto the customers in the form of reduced price, and thus offering another type of customer value.

The case company must assess and understand what kind of customer service that they want to prioritize and their customer wants i.e., cost or speed, and whether they want to be on the extremes of the spectrum or find a suitable balance in between.

6.4.10 Feasibility of omnistock

Both the centralizing safety stock and the masterhouse strategies handle orders from both the online and retail channels. In comparison to the current situation, these channels have two separate supply chains with varying DCs. Before the implementation of the centralizing safety stock and the masterhouse strategies can take place, the development of a complete omni channel needs to take place. Development of a complete omni channel requires multiple changes to the organization, on an operational and strategic level. As a result, the case company first needs to lay focus on further developing and expanding their omni channel and then it is relevant to begin discussing how to implement either the centralizing safety stock or masterhouse strategy. The centralizing aspect of each of the strategies enforces the need to be able to handle both channels through the same warehouse.

6.4.11 Supplier Contracts

A part of implementing both centralizing the safety stock strategy and the masterhouse strategy affects the case company's supplier contracts and requires changes in them which subsequently impact their operations and ability to manage demand volatility and uncertainty. For example, products no longer go directly from Asia to the respective markets, but instead all products are shipped directly to the safety stock or masterhouse and thus altering lead times and logistics processes. The case company needs to negotiate established contracts in order to alter the terms for new routes, penalties for delays and more. Additionally, it could be beneficial to embed terms which allows for rapid adjustment in order to increase downstream flexibility and increase the ability to meet demand during fluctuations.

6.4.12 Form Postponement

An aspect of the centralizing safety stock strategy, that the masterhouse strategy lacks, is how it further capitalizes on postponement by integrating form postponement near the products' final destinations. In this case, form postponement entails delaying the act of packaging and labeling of products. In turn, this approach offers additional flexibility downstream as well as minimizing complexities with logistical compliance for certain countries and markets which would be necessary to deal with if sent from a centralized location which serves all markets. Instead, as the labeling and packaging happens on a local market level, this problem does not exist or at least to a lower extent.

6.4.13 Adding Specialized Warehouses to Masterhouse Strategy

An extension of the masterhouse strategy is implementing local specialized warehouses, strategically placed near customer hubs, and designed to hold small, high demand products

with high expectations of fast lead times. This set up allows the case company to more efficiently respond to fluctuations in demand as well as maintaining customer service levels by lowering lead times on certain products where it may be expected by the customers. The masterhouse holds the entire product range of the case company's assortment, ensuring available stock and replenishing the specialized warehouses with smaller products when needed. When a customer orders a small product, that product is shipped directly from the local specialized warehouse, significantly lowering lead time aligned with customer expectations. In the case of a customer ordering a large product, or a large product and a small product, the order is completely sent from the masterhouse, avoiding additional costs with split shipment.

The masterhouse strategy, even with the specialized warehouses, entails a longer lead time. The lead time is estimated by the case company experts to be around 2-6 days, depending on the product mix in the order or the distance to the customer from the masterhouse. While at a first glance, this might appear to compromise service levels, it is a strategic move that could potentially yield cost savings. By adjusting lead times based on the type of product that is ordered, the case company could increase the efficiency of their inventory management and reduce logistical costs. It is important to note that one of the main aspects of the masterhouse strategy is that it capitalizes on the differences of customer purchasing behavior between the case company's clothing and the case company's home interior. This means that the strategy entails differentiating the approach of delivery by recognizing that the customers have different expectations on lead times depending on the type of product.

6.4.14 Reverse Logistics

This thesis has purposely left out an important aspect, reverse logistics, in order to narrow the scope. However, it is an important factor worth briefly mentioning, and how the reverse logistics are affected, requires deep assessment before choosing a distribution strategy. It is reasonable to assume that the case company does not have to deal with the same frequency of returns as their fast fashion counterpart, however it is still an aspect contributing to a high level of customer service. Therefore, the case company must offer their customers smooth returns. By utilizing the omni channel strategy, customers should be able to return online orders in store as well as sending them back through 3PL services. Moving on from the customer aspect, it is integral to understand how the chosen strategy affects the reverse logistics operations. As this thesis does not investigate the impact of decentralization vs. centralization on reverse logistics efficiency, it is difficult to estimate the impact. However, it is reasonable that, due to the extensive reach and large scale of the masterhouse strategy, it could introduce complexities in tracking and processing returns from various markets, potentially impacting the reverse logistics efficiency. Nevertheless, whilst the masterhouse strategy with full centralization might add complexities, it could also allow for streamlining of management and process efficiency.

6.4.15 Summary

In this subchapter, the most critical strategic and operational implications of the logistics postponement strategies as they apply to the case company are summarized in figure 14.

All of these different implications are critical to examine, but a few have a larger weight. The first important aspect to consider is the KPIs didn't change a lot between the demand scenarios due to the strategies having a larger impact on inventory management rather than changing the processes.

The different strategies entail various degrees of investment requirements, with the masterhouse strategy requiring high investment compared to centralizing safety stock strategy due to the strategy necessitating new infrastructure and IT-systems etc. Additionally, the time horizon for implementation will be longest for the masterhouse strategy as it demands radical change of the current distribution network compared to the centralizing safety stock strategy, which allows for incremental changes.

Being close to the customer is a critical element to being able to increase flexibility. The two strategies contain different elements of flexibility, as the centralizing safety stock strategy is closer to the market, there is a higher level of flexibility compared to the masterhouse strategy. This is related to customer service, as better lead times can be provided with the centralizing safety stock strategy in comparison to the masterhose strategy, since the distance between the supply and the demand is less. Aligning this lead time with customer expectation is critical to satisfy the customers.

Few changes to KPIs <ul style="list-style-type: none"> ▪ Few KPI variations between demand scenarios ▪ Processes and operations don't vary a lot between demand scenarios 	Investment requirements <ul style="list-style-type: none"> ▪ MH entails larger investments due to new facility ▪ MH requires longer implementation time horizon
Environment concerns <ul style="list-style-type: none"> ▪ MH and CSS raise environmental concerns ▪ CSS compromises between inventory management and environment 	Risk profile <ul style="list-style-type: none"> ▪ CSS entails incremental changes; MH means radical changes ▪ Centralizing risks are important to consider
Flexibility <ul style="list-style-type: none"> ▪ High flexibility for CSS as it is closer to market ▪ Harder to ensure quick responses with distance 	Customer service <ul style="list-style-type: none"> ▪ Critical to align lead time with customer expectation ▪ Incentives for the customers to deal with additional lead times, "slow delivery"
Specialized warehouses <ul style="list-style-type: none"> ▪ Adding specialized warehouses to the MH setup 	Reverse logistics <ul style="list-style-type: none"> ▪ Integral aspect to explore ▪ MH could add complexities due to the large scale

Figure 14. Different implications that are critical to consider when analyzing the two logistic postponement strategies.

6.5 Downstream Flexibility Point of Initiation

To handle demand fluctuations, downstream flexibility is critical due to the difficulties of initial product allocations. In a broad sense, the execution of a supply chain consists of three sequential processes, purchasing of materials, components or products, allocation of the products to various nodes, and finally, the customer order fulfillment. These processes are executed at different instances of the supply chain, with purchasing being the most upstream process and fulfillment being the process closest to the customers, i.e., downstream. As product allocations are based on a forecast, implementing downstream flexibility will improve adaptability, which is essential when the demand is forever changing. The point in the supply chain where the downstream flexibility is implemented is referred to as the downstream flexibility point of initiation.

As demand uncertainty increases, the risks of maintaining a decentralized supply chain also increase. Although the case company's current strategy of balancing inventories through lateral shipments provides downstream flexibility, it is still critical that upstream flexibility exists. A centralized set up, which the two logistics postponement strategies entail, improves and facilitates more accurate upstream decision making, which is particularly important in volatile conditions. As both of the logistics postponement strategies improve downstream

flexibility and initiates the flexibility at an early stage of the supply chain, the case company can draw benefit from these aspects to mitigate demand uncertainty. Figure 15 portrays the connection between the downstream flexibility point of initiation to level of centralization for each strategy.

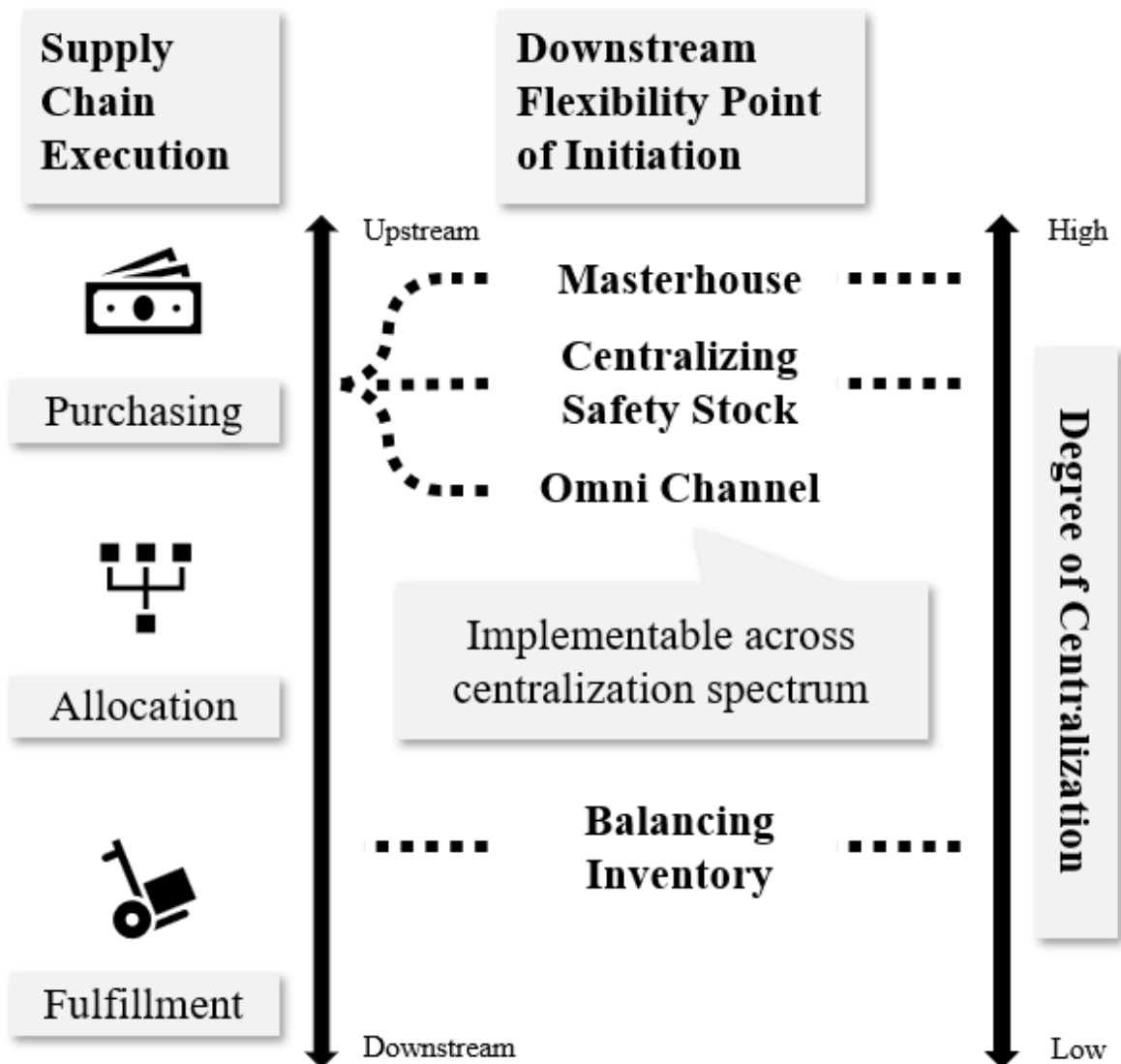


Figure 15. Model illustrating the strategies' relation to centralization, flexibility and the required processes for executing a supply chain.

7. Conclusion and Recommendations

This section outlines key conclusions that answer the research questions and recommendations for the case company to integrate into their organization. Further research as well as validation from the case company is explained.

7.1 Conclusion regarding the case company's current and logistics postponement strategies

In addressing the first research question, "What are the specific benefits and limitations of the strategies currently employed by the case company to mitigate risks associated with demand uncertainty and volatility?", this thesis has explored several aspects of the case company's current operational strategies used in order to mitigate the risks and effects of demand volatility and demand uncertainty.

Utilizing an omni channel offers several benefits for the case company, as well as some limitations. Examples of these benefits are increased product availability, increased customer service levels, shorter lead times and more. It is important to note that these benefits are significant in increasing the case company's capability of managing and dealing with demand volatility and uncertainty by enhancing their operational flexibility. However, utilizing an omni channel does bring challenges, as it requires significant investments to implement the operational, infrastructure and technological requirements.

Another aspect of the case company's current strategies for risk mitigation of demand volatility and uncertainty is balancing inventories through lateral shipments. This strategy is effective in distributing goods across markets and the respective inventories. Subsequently, this strategy allows the case company to manage market fluctuations and lowers the risks for overstocking and stockouts by creating a balance amongst the inventories. However, its level of cost-efficiency and effectiveness is dependent on forecasting accuracy. Balancing inventories through lateral shipments reactively, might be necessary in some cases, yet it is accompanied with higher costs and less efficient resource utilization due to the high level of urgency and unplanned nature of the product movement. In the case of using this strategy proactively, it does allow for the case company to supply the necessary products once an anticipation of demand fluctuations has been made, which subsequently reduces associated costs and minimizes the need for drastic emergency measures.

The second research question is "How do logistics postponement strategies affect the case company's capabilities to address demand uncertainty, and how might the strategies impact the existing supply chain operations under normal and high demand volatility and uncertainty conditions?" In conclusion, employing a logistics postponement strategy, in this case centralizing safety stock and masterhouse strategies, increases the case company's capabilities of managing demand volatility and uncertainty in several ways. The developed strategies increase the case company's ability to handle fluctuations in market demand as well

as streamline their operations due to the strategies' centralized nature. The case company benefits within inventory management as the inventories are consolidated which subsequently yields rewards due to economies of scale, enhanced decision making and more accurate demand forecasting. These strategies to a large extent positively impact the case company's supply chain operations during both normal demand conditions as well as during periods of high demand volatility and uncertainty. As the case company is better equipped to navigate volatile and uncertain market conditions by utilizing these strategies, it subsequently turns these impairing conditions into a competitive advantage as the case company is able to outperform other companies who are not prepared to deal with fluctuations in the markets. In turn, an improved customer service level and brand reputation can ultimately lead to increased market shares.

The chosen logistic postponement strategies extend beyond their effect on inventory management and the ability to deal with demand uncertainty. The strategies do have an impact on different KPIs, such as product availability and inventory turnover ratio, as well as significant impacts on broad operational and strategic considerations. These broad operational and strategic considerations have significant impact on which strategy is chosen as only looking at the KPIs is rather one dimensional, and thus this thesis has presented a broader view as complement to the KPIs. This includes a discussion on factors such as the strategies' respective level of flexibility, risk profile and more. As explained earlier, both the logistics postponement strategies enhance downstream and upstream flexibility, due to the nature of being centralized and postponing delivery decisions. These characteristics are critical in today's environment, as the demand is forever changing and uncertain.

To assess the suitability of a strategy, it requires a holistic view of the case company's operational dynamics, sustainability goals, strategic priorities and commitment to customer service excellence in addition to the KPIs. It is important to note that the objective of this thesis is to establish a high level foundation, which the case company can further develop, before a potential transition towards utilizing logistics postponement as their distribution strategy. Figure 16 visualizes the conclusions related to each research question.

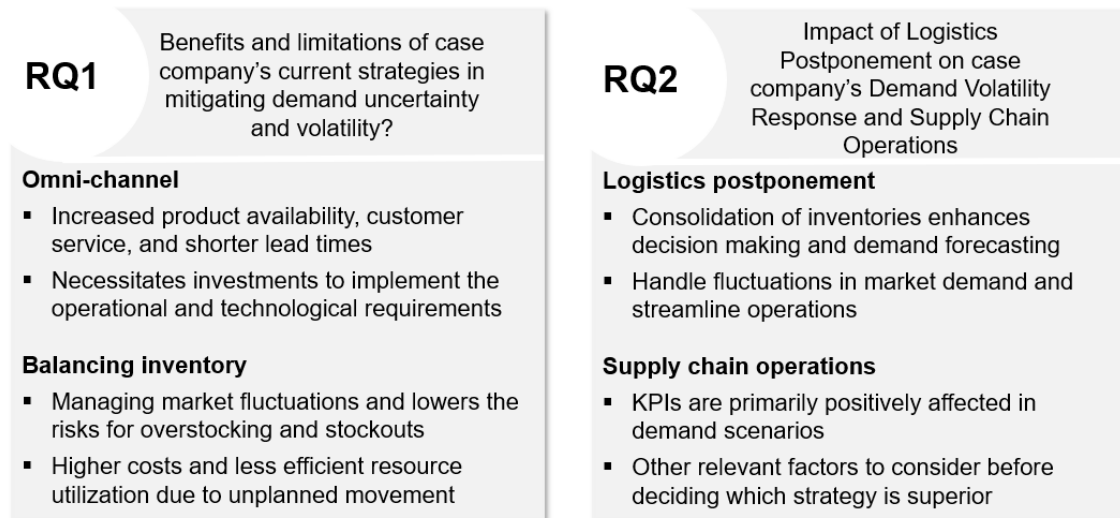


Figure 16. Overview of conclusion and answer to the research questions.

7.2 Recommendation

Product availability and inventory turnover ratio decreases for centralized safety stock strategy during volatile demand while the KPIs for the masterhouse strategy stays the same. It can be concluded that the masterhouse strategy is more robust against demand uncertainty, as this strategy outperforms the centralizing safety stock under volatile conditions. Although this may be a positive outcome, there are other relevant factors to consider before deciding which strategy is superior, which are mentioned earlier. It is recommended that a further analysis and exploration of the centralizing safety stock strategy occurs, due to its lower implementation requirements, smaller scale, lower transportation costs and emission compared to the masterhouse strategy. The reason for this is that the centralized safety stock strategy yields several crucial benefits for the case company within the domain of managing demand volatility and uncertainty as well as streamlining operational dynamics. It is also recommended discontinuing consideration of the masterhouse strategy, mainly due to its high investment requirements and elevated risk profile. Additionally, it is recommended that further integration of an omni channel should be increased and adoption rate should be accelerated as it increases product availability, lower lead times, ultimately increases customer service levels, and more.

If the case company's supply chain structure remains decentralized, it is still critical that the integration of an omni channel is prioritized, as many of the benefits still positively affect a supply chain with a decentralized structure. Gathering information regarding the successes of an omni channel in the US plays a critical role to motivate the expansion to Europe. In turn, omni channels can be further solidified into European operations. Furthermore, to take advantage of the case company's decentralized structure, it is recommended refining and improving upon the current approach to balancing inventory through lateral shipment.

Improvements could be done by for example investing in advanced forecasting technology to increase accuracy and enhance efficiency in product movement, but also creating policies in regards to when reactive and proactive use of lateral shipments should be conducted. However, if the case company decides to further explore a more centralized supply chain structure, the need for balancing inventories through lateral shipment becomes less useful, the more centralized the supply chain structure is. These new centralized strategies inherently address the problems which lateral shipments aim to solve. Figure 17 summarizes the key recommendations of the thesis.

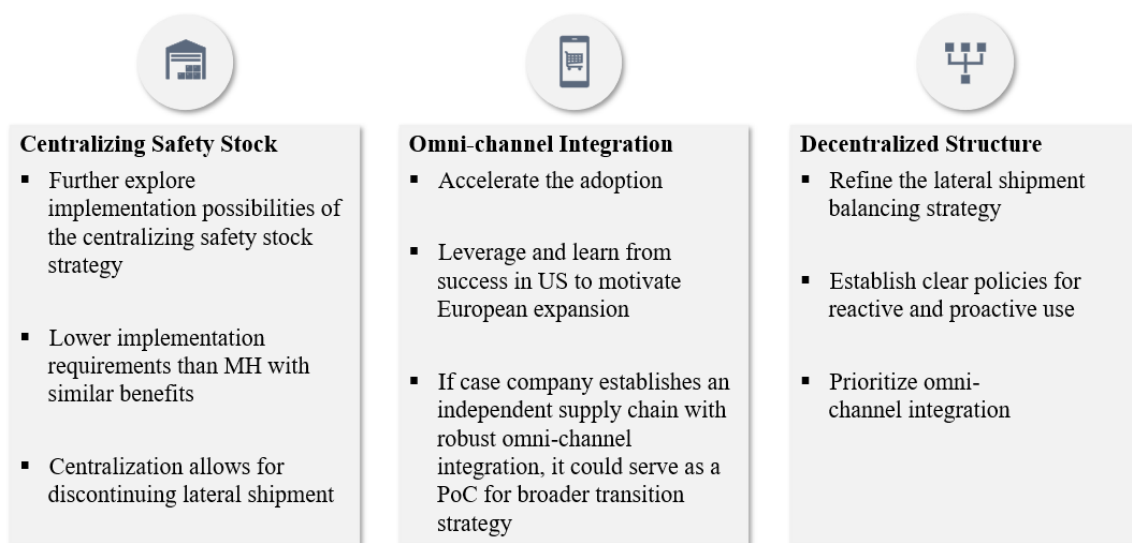


Figure 17. Overview of recommendations.

It is important to note that the case company does not have an independent supply chain, but is dependent on being a part of the case company Group's global supply chain. Therefore, implementing strategies that entail an own supply chain could prove to be difficult to argue for. However, an opportunity arises in allowing a small scale operation such as the case company, compared to the case company clothing, to serve as a proof of concept for utilization of an omni channel and a centralized distribution strategy.

7.3 Generalizability

The findings of this thesis may be hard to generalize to other industries because the thesis deals with one smaller industry with a certain type of products and customer expectations on lead times. The strategies that are concluded to be superior in the context of the case company may not be superior to another industry, such as the automotive industry. Additionally, the thesis is limited to the case company's European operations, which could impact the applicability of the thesis' results for other markets. There are other regions that are influenced by the strategies examined in the thesis, however, this aspect needs to be further researched before the implementation of a new strategy, as the limitations may exceed the benefits in other regions.

As many companies deal with demand uncertainty, logistics postponement seems to be a way to handle the consequences of an uncertain demand. The two logistics postponement strategies explained in this thesis may be applicable to other companies, as both the centralizing safety stock and masterhouse strategies entail several benefits to supply chain operations and customers. However, there are many ways to design a logistics postponement strategy, so these two strategies could be a starting point for companies to investigate. The centralizing safety stock strategy may be more applicable in cases where companies are not financially ready to make large investments, or already have extensive existing infrastructure that is reluctant to change. A masterhouse strategy may be applicable in cases where companies are planning expansion or in the initial phases of building their supply chain.

7.4 Further research

Although the centralization of safety stock embodies centralization with aspects of decentralization, it is just one of many strategies which entails combinations of both centralization and decentralization aspects. An example of combining a centralization strategy with elements of decentralization is adding specialized warehouses to the masterhouse strategy. Comparing this extension of the original strategy to the performance of the masterhouse strategy without the specialized warehouses would be interesting for further research. In this thesis, a large focus has been placed on logistics postponement primarily, however there exists other types of postponement strategies, along with combinations of the concepts.

Prolonging the lead time would simplify the complexities of managing demand uncertainty. Therefore, it would be interesting to research different incentives for customers to choose longer lead times, for example with companies introducing lower prices if the customer chooses to double the lead time. Subsequently, it would be an interesting approach to dealing with demand uncertainty as it allows companies to buy themselves more time to understand the realized demand. Furthermore, the thesis has assumed a smooth transition between the utilization of two distribution strategies, however in reality this would obviously not be the case. Thus, researching how the actual transition period between two distribution strategies can affect customers and operational performance, as well as optimal transition strategy, could provide beneficial insights to both academia and corporations.

The small subtle changes in KPIs in the different demand scenarios, could imply that the KPIs aren't specific enough or perhaps not relevant enough for different demand uncertainty scenarios. For further research, it may be beneficial to look at other KPIs that may have a larger impact when dealing with demand uncertainty. Furthermore, the limitations of the strategies are explained on a high level, whilst still being specific to the case company. For example, a limitation for the case company implementing an omni channel entails significant changes to the case company's organizational structures and IT systems. It would be

interesting to examine the changes that actually need to take place for the adaptation and implementation for the strategies. For example, by evaluating the case company's current IT systems in contrast with what IT systems a new strategy requires, one can get a more detailed grasp of the required aspects of the transition.

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Appendix

Appendix A.

Interview guide to get insight into the case company and its strategies

1. Can you talk about your background and your current role at the case company?
2. Can you explain the supply chain on a high level to give us an overview of it?
3. What are the primary markets for these products?
4. Are there any particular trends or external factors that significantly impact the demand for these products?
5. In your experience, for previous similar products as the one we have chosen, what impact did DV and DU have on the product's SC? Stockout or overstocking?
6. What are the current risk mitigation strategies in place for dealing with demand volatility and uncertainty?
7. What aspects of your current risk mitigation strategies have been most effective in dealing with demand volatility for these products?
8. Are there any limitations or challenges you've encountered with your current risk mitigation strategies?

Appendix B.

Interview guide used to gather more specific information to the case company's strategies

1. What are the key challenges to completely implement this strategy?
2. What are the advantages to using this strategy?
3. Do you have some examples of concrete implementations to facilitate this strategy?
4. How will this deal with demand volatility/uncertainty?
5. What are some challenges/bottlenecks to using this strategy?
6. Does the case company have the capabilities to implement this, software etc.?
7. Do you know of any examples of other companies which have used this strategy successfully?

Appendix C.

Interview guide used for the expert interview regarding logistics postponement

1. What are the benefits of utilizing a logistics postponement strategy?
2. What are the limitations of utilizing a logistics postponement strategy?
3. What capabilities are important to consider to implement this strategy?
4. What potential risks are associated with using a LP strategy?
5. What benefits do you see when implementing scenario 1?
6. What limitations do you see when implementing scenario 1?
7. What benefits do you see when implementing scenario 2?
8. What limitations do you see when implementing scenario 2?



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