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An Ordering Strategy for a Retail Supply Chain

Improving the Ordering Process between a Retail Brand Owning Company and its Distributors and Suppliers

Master's thesis in the Master's Programme Supply Chain Management

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ABSTRACT

The studied retail brand owning company has two problems related to the distributors' ordering process. The first problem is that many developed products are cancelled and never produced. The second problem is high material handling cost for distributors, due to many received mixed packaging. Therefore, the aim of the study is to propose an ordering strategy that differentiates products based on their ordering characteristics, for the ordering process between the retail brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products. Generally, more strategies, for retailers' ordering process than distributors' ordering process, are presented in literature. Hence, the ordering process is also interesting to study from a research point of view.

The process, to create a differentiated ordering strategy, was divided into four parts. Firstly, stakeholders' requirements were identified for segmentation, order quantity restrictions, and implementation, to detect what aspects of ordering that are most relevant for the study. Secondly, a segmentation of the product assortment was made, to identify product segments that are suitable for having different ordering strategies. The segmentation consisted of four segments. The dimensions of the segmentation matrix are distributors' risk and demand, which are areas primarily affecting the ordering. Each Ekldimension consisted of an underlying factor. The factor for risk is customer segment, and the factor for demand is first forecast on colour level. Thirdly, order quantity restrictions were examined. Order quantity restrictions, MOQs and multiples, were recommended for all four segments. Finally, the required changes to implement the differentiated ordering strategy were identified.

As a result of the differentiated ordering strategy, different product segments will have different order quantity restrictions. By implementing multiples, new packaging instructions, and a higher MOQ for 85 % of the products, the amount of mixed packaging are decreased. As a result of less mixed packaging, the material handling cost for distributors is reduced. Moreover, by a differentiated MOQ and a first forecast on colour level, the large amount of cancelled products will decrease.

Keywords: retail supply chain, differentiated ordering strategy, order quantity restriction, segmentation.

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1 INTRODUCTION

The introduction chapter presents the introduction of the study. Firstly, the background and the problem description are presented. Furthermore, the aim of the study and research questions to support the fulfilment of the aim are presented. The scope is explained to describe the focus of the study. Finally, the outline of the study is presented.

1.1 Background

The main constituent of the study is a brand owning company that design and sell garments. The brand owning company's retail supply chain consists of; fabric suppliers, suppliers, distributors, the brand owning company, retailers, and end consumers, see Figure 1. The focus of the brand owning company is on sales and growth, and therefore the logistics processes have not been of main interest for the company[1]. One such logistics process that has not been prioritized by the management is the ordering process, when distributors order products. The ordering process is in this study defined as, the process from when distributors place orders to the brand owning company until the products are delivered to the distributors.

The ordering process in this study primarily involves suppliers, distributors, and the brand owning company. The material flow of ordered products goes directly from the supplier to the distributor, and the information flow of the orders goes through the brand owning company[2]. The brand owning company collects the orders from the distributors and thereafter communicates the orders to the suppliers, see Figure 1. Hence, these three actors are of main interest to study.

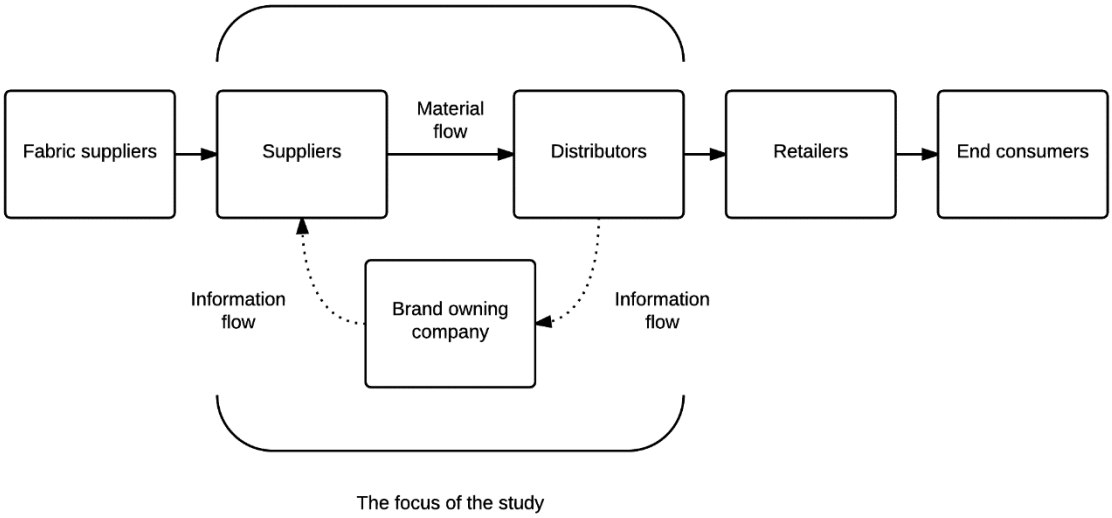

Figure 1: The retail supply chain of the brand owning company. The material flow of ordered products goes directly from suppliers to distributors, while the information flow of orders goes through the brand owning company.

[1] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[2] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

The ordering process when distributors order products, is also interesting from a research point of view. Van Weele (2010) presents several different strategies to manage retailers' ordering process, but, few strategies to manage distributors' ordering process, and this is an example of what is identified as a pattern in the literature. The identified strategies that include the ordering process when distributors order, are for the whole retail supply chain, for example collaborative planning, forecasting, and replenishment. No specific strategies for distributors' ordering process are identified by the authors in the literature.

Furthermore, there are differences between distributors' and retailers' ordering process. Normally, distributors order large quantities from suppliers, while retailers order small quantities continuously from distributors (Van Weele, 2010). The strategies for retailers' ordering process are therefore not applicable on distributors' ordering process. Due to the lack of literature for strategies of the distributors' ordering process, the ordering process, between the brand owning company and its suppliers and distributors, is also interesting to study from a research point of view.

1.2 Problem description

Currently, all products are managed in a standardized way in the ordering process, due to a standardized ordering strategy set by the brand owning company[3]. An ordering strategy in this study is defined as the quantities that restrict distributors order. The existing ordering strategy states a standardized order quantity restriction, common to all products and distributors, which is a minimum order quantity (MOQ) that distributors at least have to order of each product. The MOQ is standardized to 60 pieces for all products. Moreover, the current MOQ is not based on any data or facts[4].

To have a standardized ordering strategy in this retail supply chain causes negative effects, because the brand owning company has a broad and differentiated product assortment. It exists two seasons per year. A season is a product assortment that consists of approximately 1 500 - 2 000 products[5]. Two identified negative effects with a standardized ordering strategy are long material handling time of the products and that a large amount of products are cancelled[6]. The two effects and their underlying causes are described more in detail below.

Currently, the only restriction when distributors order products is the MOQ. Therefore, all quantities above the MOQ can be ordered, for example 61 and 62. A consequence of this order quantity restriction is that it is not possible to check that the ordered quantity of a product matches with the size of an available transport packaging. Transport packaging is further called packaging in this study. Therefore, the current ordering strategy results in many mixed packaging, packaging with different SKUs. An SKU is

[3] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[4] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[5] Commercial Manager (Brand owning company) Interviewed by the authors 2015-01-28
[6] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

defined as a garment in a specific size and colour in this study. Distributors complain that mixed packaging result in extra material handling time, because it is necessary to store each SKU at a unique picking location in the distribution warehouses. The distributors have therefore asked for the possibility to order packaging that only consists of one SKU to decrease the material handling time.

The brand owning company also has a problem with many cancelled products in the ordering process. Only the products that distributors order are produced, as no products are produced based on a sales forecast. Products that have an aggregated forecasted or ordered volume lower than the production minimum quantity are cancelled from production. Production minimum quantity is the lowest quantity of products that the brand owning company can order from suppliers. Currently, products are cancelled twice in the ordering process and totally 10-25 % of the products are cancelled each season[7]. It is time consuming and costly, for the brand owning company, to develop products that later are cancelled.

To decrease the cancellation of products, the brand owning company has recently increased the MOQ from 30 to 60 pieces per product. As a result of an increased MOQ the brand owning company hopes to reach production minimum quantity for a larger proportion of the products[8]. Yet, the brand owning company has not evaluated if the increased MOQ leads to less cancelled products. However, the supply chain manager at the brand owning company argues that an MOQ of 60 pieces still might be too low to decrease the cancellation of products. On the other hand, it is also assumed that the increased MOQ might be an obstacle for some products to reach the market. Due to the broad assortment and varying sizes of distributors, 60 pieces might be a too large quantity to order for some distributors, for some products, e.g. for brand building products. These products are often technically advanced and have a high price. Distributors might therefore not be willing to take the risk of ordering 60 pieces, but would perhaps order the products if the MOQ was lower.

The current ordering strategy is simple and standardized, only including an order quantity restriction, an MOQ of 60 pieces for all products. According to Olavson (2010) higher benefits of a supply chain can be reached if products with different characteristics have different supply chain strategies. An ordering strategy can be seen as one aspect of a supply chain strategy (Chopra and Meindl, 2013). Hence, an ordering strategy with different order quantity restrictions is of importance to investigate for the studied retail supply chain. The main focuses of a new ordering strategy should be to decrease the material handling cost for distributors and the large amount of cancelled products.

[7] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[8] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

1.3 Aim

The aim of the study is to propose an ordering strategy that differentiates products based on their ordering characteristics, for the ordering process between the retail brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products. This ordering strategy is hereafter labelled differentiated ordering strategy.

1.4 Research questions

Below, four areas that are of importance in order to fulfil the aim are described. Moreover, from these four areas, four research questions are formed.

Firstly, it is of importance to investigate the stakeholders' requirements, to gain knowledge about the studied retail supply chain (Keller and Jacka, 1999). Each retail supply chain is specific, and if the requirements are not identified, it is difficult to create a differentiated ordering strategy that is suitable for a specific supply chain.

Secondly, to be able to create a differentiated ordering strategy, the broad product assortment needs to be divided into different segments. It is of high importance to identify a segmentation method that divides products with same characteristics into the same segment. Otherwise products might get an ordering strategy that is not suitable for their characteristics (Padhi et al., 2012).

Thirdly, Croxton (2003) describes the ordering process as all activities required to outline customer requirements, design the logistics network, and filling customer orders. By studying the ordering process it is possible to identify which order quantity restrictions that are suitable for each segment.

Finally, to reach benefits of a strategy a successful implementation is needed (Chopra and Meindl, 2013). Hence, it is important to investigate which changes that are required to implement the differentiated ordering strategy. From these four described areas, four research questions have been formed:

1. What are the stakeholders' requirements on a differentiated ordering strategy?
2. How should the products be segmented from an ordering perspective?
3. What are suitable order quantity restrictions for each segment?
4. What changes are needed to implement the differentiated ordering strategy?

1.5 Scope

The studied supply chain is including the suppliers, the distributors, and the brand owning company, because these three actors primarily affect the ordering process. Two suppliers, one located in Europe and one located in Asia, are interviewed and visited. Three distributors, two large size distributors and one medium size distributor, are selected for observations and interviews. In total there are 44 suppliers and 26 distributors. Hence, all suppliers and distributors are not interviewed and visited.

The ordering process in this study is limited to the activities: distributors placing orders, brand owning company aggregating orders, suppliers receiving orders, suppliers delivering ordered products, and distributors receiving and storing ordered products. Moreover, an ordering process both has an operational and a strategic level (Croxton, 2013). The strategic level of the ordering process is evaluated, because the focus is to improve the ordering process. However, the main focus is not on the operational ordering process, and therefore the operational level is only investigated on a basic level.

Furthermore, the final step of the suggested differentiated ordering strategy is the implementation of it. However, the implementation of the differentiated ordering strategy only considers the required changes of existing activities. No detailed implementation plan is presented.

1.6 Outline of the report

The outline chapter describes the outline of the report.

Chapter 2 - Frame of reference
The frame of reference provides understanding, proof, and trustworthiness to the study. The frame of reference includes the areas; characteristics of a retail supply chain, aspects of an ordering process, and product segmentation framework. At last, an analysis model that emphasizes the most important parts from the frame of reference is presented.

Chapter 3 - Methodology
The methodology chapter presents the methodology used in order to reach the aim of the study. It presents the research approach and design, the research process, literature research, data collection, and data analysis. Finally, the trustworthiness of the study is discussed.

Chapter 4 – An overview of the brand owning company and its retail supply chain
A general description of the brand owning company and its retail supply chain are presented. Moreover, the information flow, the material flow, and the financial flow between distributors, suppliers, and the brand owning company are presented.

Chapter 5 - The process from products are developed until products are delivered to distributors

The process from the brand owning company's development of products until the products reach the distributors is described. Firstly, a general process map of the activities is presented. Secondly, the activities performed by the brand owning company are described. Thirdly, the activities performed by the distributors are presented and finally, the activities performed by the suppliers are described.

Chapter 6 - Analysis and results

The first part of the analysis and results chapter consists of stakeholders' requirements regarding the differentiated ordering strategy. The segmentation of products is analysed and presented after the stakeholders' requirements. Consequently, order quantity restrictions of each segment are discussed. Finally, the implementation of the differentiated ordering strategy is analysed and presented.

Chapter 7 – Discussion

The discussion chapter focuses on discussing the differentiated ordering strategy presented in the analysis and results. In this chapter, contributions, validity, and generalization of the differentiated ordering strategy are discussed. Moreover, future recommendations are presented.

Chapter 8 - Conclusion

The conclusion chapter summarizes and highlights the most important parts of the study.

2 FRAME OF REFERENCE

The frame of reference provides understanding, proof, and trustworthiness to the study. The frame of reference includes the areas; characteristics of a retail supply chain, aspects of an ordering process, and product segmentation framework. At last, an analysis model that emphasizes the most important parts from the frame of reference is presented.

2.1 Characteristics of a retail supply chain

A retail supply chain is primarily focusing on the exchange of products between different actors in the market, to bridge the gaps of time, quantity, and place (Van Weele, 2010). Accordingly it means, getting the right product to the right place at the right time, which is connected with ordering. A general overview of a retail supply chain facilitates what to investigate in this study's retail supply chain. Besides, a general overview of a retail supply chain enables an analysis of if the differentiated ordering strategy is suitable in other retail supply chains than the studied one. Moreover, process mapping is a suitable method to understand the relevant processes of the retail supply chain in this study. The chapters *2.1.1- 2.1.3* describe the actors in a retail supply chain, common characteristics of a garment retail market, and how to create a process map of a supply chain.

2.1.1 Actors in a retail supply chain

A generic description of a retail supply chain is depicted in Figure 2 (Inspired by Fernie and Sparks, 2014).

Figure 2: A generic retail supply chain (inspired by Fernie and Sparks, 2014).

Characteristics of the actors in a generic retail supply chain are further described. Raw material suppliers and finished product suppliers can be located close and further away from the brand owning company (Meindl and Chopra, 2013). If the suppliers are located close to the brand owning company it is mainly to get higher production flexibility. However, if suppliers are located further away from the brand owning company, it is often in a low-cost country to achieve production efficiency. The suppliers' locations are mainly selected based on the supply chain strategy. Doyle et al. (2006) state that many retail supply chain strategies focus on efficiency, hence suppliers in low-cost countries are often selected.

According to Fernie and Sparks (2014) the distributor can be the brand owning company or a sub-contractor. It is important for the brand owning company to establish good relationships with suppliers (Doyle et al., 2006). A good relationship can result in higher potential flexibility, but also a better collaboration regarding problems and changes. Generally, distributors order large volumes from a limited number of suppliers (Van Weele, 2010).

The retailers order small volumes from distributors, and frequent deliveries are often required, due to limited space for material handling and storage at retailers (Van Weele, 2010). Retailers' main purpose is to sell products to a large amount of end consumers, therefore the ordering process from distributors need to be as simple as possible. It exists many sophisticated ordering techniques for retailers to facilitate the ordering process, for example continuous replenishment and electronic data interchange (EDI) (Van Weele, 2010). According to Fernie and Sparks (2014) retailers' role in the supply chain has changed. Previously, retailers were a passive actor in the supply chain, just selling the products. This has changed, and currently the retailers often control, manage, and organize the supply chain.

2.1.2 Characteristics of a garment retail market

The garment retail market is often characterized by uncertainty and complexity (Fernie and Sparks, 2014). Van Weele (2010) is also pointing out that over time the complexity and uncertainty have increased. The garment retail market is characterized by products with short life-times, high volatility, low predictability, high degree of impulse purchases, long lead times (Christopher and Peck, 1997), and low margins (Van Weele, 2010).

The short product life-time is a result of products that are designed to capture the current trends, consequently, the period to sell the product is short (Christopher and Peck, 1997). High volatility is that the demand for the products is not stable or linear. The demand is also influenced by many different factors, for example advertising. Due to the high volatility of demand it is difficult to get an accurate forecast, which results in low predictability. A high impulse purchase is when end consumers buy from retailers, and the end consumers buying decision is made at the same point as purchase (Christopher and Peck, 1997).

Another characteristic of the garment retail supply chain is the increased numbers of suppliers in low-cost countries. It is cheaper to produce in low-cost countries, but it has resulted in longer lead times. The long lead time is not only a result of geographical distance, it is also caused by delays and variability caused by internal processes in the whole supply chain (Christopher and Peck, 1997). Moreover, a garment retail supply chain often has low margins and therefore it is important for retail supply chains to minimize the costs (Van Weele, 2010). When minimizing the cost it is important that all

supply chain costs are considered, not only the price of the product. For example, costs related to material handling, storage, and transportation also have to be considered.

2.1.3 Process mapping of a supply chain

A process map is useful to fully understand processes (Keller and Jacka, 1999) and to get a graphical representation of a flow (Damelio, 2011). Moreover, with a process map it is possible to evaluate if business goals are met, if customers' requirements are satisfied, and how and where reforms can be made to the process (Keller and Jacka, 1999).

Keller and Jacka (1999) describe a process mapping method, which consists of following five steps; establish process boundaries, develop the data gathering plan, interview the process participants, generate the process map, and analyse and use the map. When establishing the process boundaries it is important to state why certain sub-processes is reviewed and it is described as similar to defining a scope of an audit (Keller and Jacka, 1999). A data gathering plan involves; deciding what data is necessary, what people to interview, and which questions to ask (Keller and Jacka, 1999). The interviews serve as support for understanding the process and for starting to document the processes in a map. When a draft of the process map is accomplished it needs to be authorized by at least one employee with the right competence (Keller and Jacka, 1999). During and after the map is developed, it is analysed if there are any existing problems with the process, which can be managed (Keller and Jacka, 1999).

2.2 Aspects of an ordering process

The ordering process is used as a frame for improving the ordering process between suppliers, distributors, and the brand owning company. It also gives input for what parts of the brand owning's ordering process that is important to evaluate. The chapters *2.2.1-2.2.4* describe the strategic ordering process, identifies what factors a customer consider when ordering products, order quantities, and the role of packaging in the ordering process.

2.2.1 A strategic ordering process divided in five sub-processes

Croxton (2003) describes the ordering process as all activities required to outline customer requirements, design the logistics network, and filling customer orders. Croxton's framework for ordering processes is based on interviews with managers from a wide range of industries. Hence, the framework can be applicable also on the process that is investigated in this study.

Croxton (2003) further divides the ordering process in one strategic and one operational level. The strategic level focuses on improvements of the ordering process. On the contrary, the operational level focuses on the transactions of the ordering process. The framework of Croxton (2003) for the strategic ordering process is appropriate for this

study, to achieve comprehension of how to work with strategic improvement of an ordering process. The operational level is not the main focus of the study, but in the strategic framework a basic understanding of the operational level is of importance, to fully understand the ordering process. Hence, the strategic ordering process is described in detail and the operational ordering process is described on a basic level.

Croxton (2003) defines five sub-processes in the strategic ordering process. The first sub-process includes a review of marketing strategy, supply chain structure, and customer service goals. By reviewing these three areas, the company receives knowledge about customer requirements, supply chain capability, and customer service influence. It is of importance to design the ordering process from the customers' perspective. Nevertheless, customer requirements must be weighed against how much it is acceptable to spend on the operational order fulfilment, when for example a product need to be sent with express air shipment because it is delayed.

The second sub-process is to define requirements for the ordering process (Croxton, 2003). The requirements should be based on the findings about customer requirements and supply chain capabilities, from the first step. In order to be able to define requirements, an understanding of the operational ordering process is necessary.

The third sub-process considers evaluating the logistics network (Croxton, 2003). It is important to investigate if the supply chain can be redesigned to achieve a better ordering process, with basis in the defined requirements. When assessing the logistics network it is necessary to both evaluate internal and external parts of the supply chain. Data gathering from upstream and downstream actors of the logistics network is thereby necessary. If the examination later results in a change of the design of the network, it needs to be communicated and implemented in a suitable way.

The fourth sub-process determines the plan for the ordering process (Croxton, 2003). This sub-process involves deciding how orders will be received and fulfilled. The operational ordering process is determined in this sub-process. Payment terms and permitted order quantities are for instance assigned in this sub-process. When deciding about payment terms and permitted order quantities, the financial impact needs to be considered. Furthermore, customer requirements on picking and packing are necessary to consider.

Another important part of, the fourth sub-process, is to plan how the flow of ordering information is collected, managed, and communicated in the supply chain (Croxton, 2003). The information flow results in a need for data transfers between different companies and departments. The data transfer makes it necessary to investigate possible technologies to use as an aid for the ordering process. According to Croxton (2003) investing in technology for data transfer is a strategic decision, but it supports the operational ordering process.

The fifth and last sub-process considers a framework of metrics, to measure and monitor the performance of the operational ordering process frequently (Croxton, 2003). The metrics used must be connected with the firm's economic value added. The operational ordering process includes seven sub-processes. The sub-processes are, generate and communicate order, enter order, process order, handle documentation, fill order, deliver order and perform post-delivery activities, and measure performance.

2.2.2 Factors affecting ordering decisions

Below, factors that different authors have identified to influence the ordering process and the supply chain strategy are presented. A supply chain strategy is limited to an ordering strategy in this study. Many factors are reviewed to get a wide understanding and thereafter an analysis of which factors that primarily affects this study is conducted. However, some factors are excluded already in the frame of reference, because they are not relevant for the study's context. The identified factors from the literature are compared and analysed, in chapter *6 Analysis and results*, with data identified during interviews and direct observations.

This study will investigate the ordering process, which can be assumed to have corresponding characteristics to the purchasing process that is described by Van Weele (2010). The literature of the purchasing process is not industry specific and easy to adopt in different industries. Van Weele's literature is therefore used as a first foundation of factors affecting the ordering decision. Van Weele (2010) writes about different factors that influence the purchasing process, in this study the ordering process. The factors are divided into two groups; product complexity and commercial uncertainties.

The factors related to product complexity are; degree of customization, technical level, product life-time, new or repeat purchase, difficulty to use, and degree of after-sales services. Some of these factors are identified to not affect the ordering in a garment retail context. The factors which are irrelevant for a retail garment context are degree of customization, difficulty to use, and degree of after-sales service. The commercial uncertainty is evaluated based on the factors; price per product, demand, impact on financial results, organizational adaptation required, and long/short-term impact (Van Weele, 2010). Three factors which are concerned irrelevant for the study is, impact on financial result, long/short term impact, and organizational adaptation required, because only small volumes are ordered in garment retail.

To achieve a wide understanding and to complement the general purchasing perspective from Van Weele (2010), an article with industry specific perspective is reviewed. Fisher (1997) identifies which supply chain strategy a company should have, based on its products. The article is relevant for this study, because, retail products are constantly recurring in the article, and an ordering strategy is one part of a supply chain strategy.

Fisher (1997) divides products into two groups based on aspects of the demand; innovative and functional products. Fisher (1997) means that these two groups should have different supply chain strategies, because the characteristics of the products differ. Innovative products should have a flexible supply chain and functional products should have an efficient supply chain. Aspects considered to create the division between innovative and functional products are; product life-time, margin, product variety, forecast error, stock-out rate, markdown as percentage of full price, and required lead time for products.

Product life-time is mentioned both by Van Weele (2010) and Fisher (1997), hence it is merged to one factor. The other factors are only mentioned by one of the authors. Totally, there are eleven identified factors from the literature, see the factors in Table 1. To confirm the factors' importance in this study, data from direct observations and interviews are used for verification of the factors in chapter *6 Analysis and results*.

Table 1: Factors that are identified in the literature, and affect the ordering decision.

Factors identified in the literature	
Margin (Fisher, 1997)	Forecast error (Fisher, 1997)
Technical level (Van Weele, 2010)	Markdown (Fisher, 1997)
Price per product (Van Weele, 2010)	Stock out rate (Fisher, 1997)
Product variety (Fisher, 1997)	Demand (Van Weele, 2010)
Lead time (Fisher, 1997)	New or repeat ordering (Van Weele, 2010)
Product life-time (Van Weele, 2010) and (Fisher, 1997)	

2.2.3 Order quantity decisions in an ordering process

One part of the strategic ordering process is to decide order quantity restrictions (Croxton, 2003). A common method to decide an order quantity is to use the economic order quantity. However, this method requires constant and known demand per time unit and a fixed lead time during ordering (Jonsson and Mattsson, 2009). None of these requirements are valid in the brand owning company's context. However, Mattsson (2010) states that an economic order quantity normally cannot be applied to a specific situation without justification. The order quantity can be rounded off to match with a full packing quantity or a load carrier, for instance a pallet. Hence, even if the economic order quantity is not applicable in this case, there are other important aspects as full packaging and load carriers to consider when deciding an order quantity. According to Richardson (1999) packaging can add productivity to warehouse operations, if products are packed in order quantities so that the packaging does not need to be opened or split.

The only order quantity restriction used by the brand owning company today is a standard minimum order quantity for all products. A minimum order quantity restriction has primarily been viewed as a manner to control costs by reducing the costs related to small orders (Bennion, 1987). This literature review is used to support the decision of new order quantities of the ordering process.

2.2.4 The role of packaging in the ordering process

Croxton (2003) states that the activities picking and packing affects the ordering process. Moreover, distributors have asked for the possibility to order packaging with no mixed SKUs. Hence, to be able to include packaging as a part of the ordering strategy, the area needs to be investigated. Below, packaging costs, packaging sizes, and packaging modules, are presented.

Decisions about packaging are normally made to reduce costs (García-Arca and Carlos Prado Prado, 2008). What is not always considered is that packaging has both associated direct and indirect costs. The costs that are directly related to the design of the packaging are purchasing costs and waste management. The costs indirectly related to the design of the packaging are costs for packing, handling, storage, transport, and claims. It is more complex to understand how the indirect costs are affected by the packaging design. In a retail supply chain where the value of goods is low and the goods are managed by many parties, the costs of packaging correspond to a relatively large share of the supply chain costs (Hellström and Nilsson, 2011). Hence, the packaging decision in a retail supply chain is crucial.

To be able to optimally fill a container, pallet, or loading space in a warehouse, packaging needs to satisfy certain size and shape requirements (DHL, 2015). A coordinated modular packaging strategy is required to sustain efficiency when different companies are involved in the same supply chain. What a coordinated packaging system implies is that packaging and pallets matches with standard containers (DHL, 2015). To meet this requirement the packaging industry has developed a standard size for packaging, 400 x 600 mm, which matches both with 800 x 1 200 mm pallets and 1 000 x 1 200 mm pallets. From the standard packaging, modules of packaging can be received by dividing the standard size of 400 x 600 mm. This standard packaging and modules of it, is common in Europe. The concept of modular packaging guarantees the economical use of capacity and hence the efficiency of the affected operations. Richardson (1999) is also arguing for standard packaging dimensions and modules to encourage efficient operation.

2.3 Product segmentation framework

A segmentation is a strategy that divides products, consumers etc. into different groups. Each group is a segment, which has different needs, characteristics, or behaviours (Dannenberg and Zupancic, 2009). Three goals of segmentation are identified by Dannenberg and Zupancic (2009). Firstly, a segment should get a more adjusted

strategy for its special characteristics in a segmentation compared to a general approach. Secondly, a special strategy should be more efficient when it is focused on a specific segment. Thirdly, specified targets for each segment should generate better evaluation of the performance of a segment (Dannenberg and Zupancic, 2009).

The segmentation in this study aims at finding different segments. By segmenting the brand owning company's product assortment, from an ordering perspective, it is possible to identify different segments with different characteristics. Each segment can thereafter be provided with a differentiated ordering strategy. In this study a differentiated ordering strategy means a specific ordering strategy for each segment. Chapter *2.3.1* and chapter *2.3.2* include a product segmentation method and validation of the segmentation.

2.3.1 A product segmentation method

The chapter includes a description of a segmentation method that is used to divide the brand owning company's product assortment into segments. Many factors influence the brand owning company's ordering process, but the segmentation method has to be easy to understand and use. Segmentation based on a two-dimensional matrix is therefore advocated, because this matrix can still include many different underlying factors (Padhi et al., 2012). Therefore, in this study the matrix is delimited to have two dimensions. It is delimited in order to keep the result of the segmentation easy. Hence, the two dimensions of the segmentation matrix have to be identified.

Each dimension is also defined by a number of factors, where the number of factors depends on the context, see Figure 3 (inspired by Padhi et al., 2012). David (2011) means that even if it exists standard factors, it is important to identify factors that are most appropriate for the segmentation's application area. In this study the factors are related to the ordering decision. These factors are identified in the literature and from interviews and direct observations, see chapter *2.2.2 Factors affecting ordering decisions* and chapter *5.3 Activities performed by distributors*.

If a dimension includes more than one factor, the factors have to be weighed against each other. To weigh factors, each factor needs to be ranked from 0.0 to 1.0, where 0.0 is not important at all, and 1.0 is very important. The sum of the weights given to the factors, for each dimension, has to equal 1.0. Hence, if a dimension only includes one factor, the factor automatically has the weight 1.0. The factors are used to position products in the matrix (Padhi et al., 2012). Furthermore, each dimension has to be divided into different levels, i.e. a scale of the dimension (Padhi et al., 2012). The different levels of the dimensions generate the number of segments. For example, if the first dimension has three levels and the second dimension two levels, the result is a 2x3 matrix with six segments.

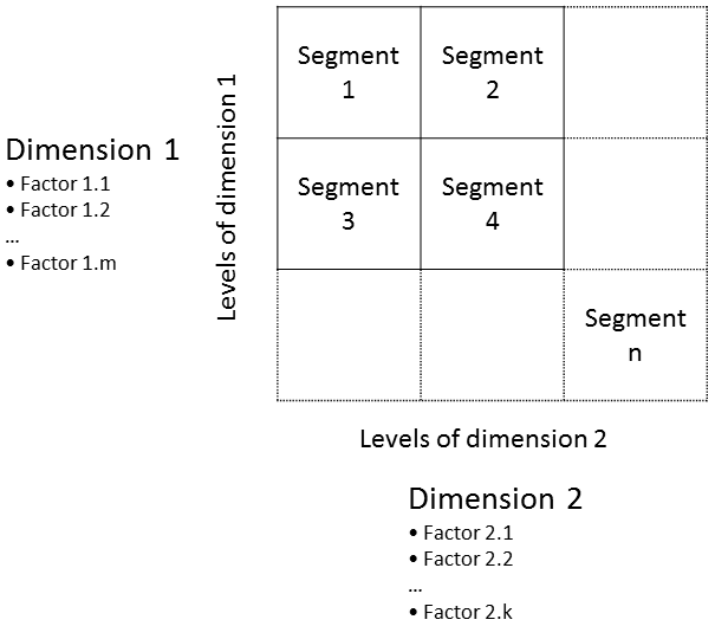

Figure 3: A matrix with two dimensions is selected for the segmentation. It is not identified how many segments and factors that are necessary. "Segment n", "factor 1.m", and "factor 2.k" indicate that it is no limited number of segments and factors (inspired by Padhi et al., 2012)

2.3.2 Validation of segmentation

After the segmentation is accomplished it is important to evaluate the segmentation. Two methods for validating the segmentation are identified. Firstly, four questions that are suitable to evaluate the segmentation are described and secondly, an additional method to evaluate the positioning of the products in the matrix is described.

Dannenberg and Zupancic (2009) write that questions are an easy method for testing if market segmentation is successful. Product segmentation is the focus in this study, not market segmentation. However, the main purpose of the questions, to see if the segmentation is successful, is suitable for both market and product segmentation. To make the questions directly suitable for product segmentation, the questions are to some extent changed, but the main content of the questions is kept. If the segmentation is successful the main part of the questions are answered positively (Dannenberg and Zupancic, 2009):

- Are the selected segmentation criteria really relevant from an ordering perspective?
- Are the characteristics within the identified segments as homogenous as possible, and as heterogeneous between the segments as possible?
- Does the segmentation correspond to the company's strategy and competences?
- Are the segments stable for a long time?

After the products are positioned in the matrix it is important to validate the positioning of the products (Padhi et al., 2012). Each segment has a different strategy. Hence, if a product is placed in the wrong segment the strategy will not be suitable for that product. Padhi et al. (2012) evaluated the result of the positioning of products together with experts. Experts can be people with high knowledge within the field or people that have great understanding of the product assortment. A product can manually be moved to another segment if the product is more suitable for that strategy. In addition, Wagner et al. (2013) also mentioned that in-depth discussion of the positioning is a valuable approach to validate the positioning.

2.4 Analysis model

The analysis model is used to break down the identified problem in a structured and understandable way. Moreover, the model shows a connection between the most important parts of the frame of reference and the overall working process, see Figure 4. The overall working process consists of five areas and these areas are investigated in sequence. The five areas are stakeholders' requirements, segmentation, order quantity restrictions, implementation, and differentiated ordering strategy. Each process also consists of sub-processes, which are the most important parts of the frame of reference, see Figure 4. By investigating each sub-process, the problem can be analysed in a structured way.

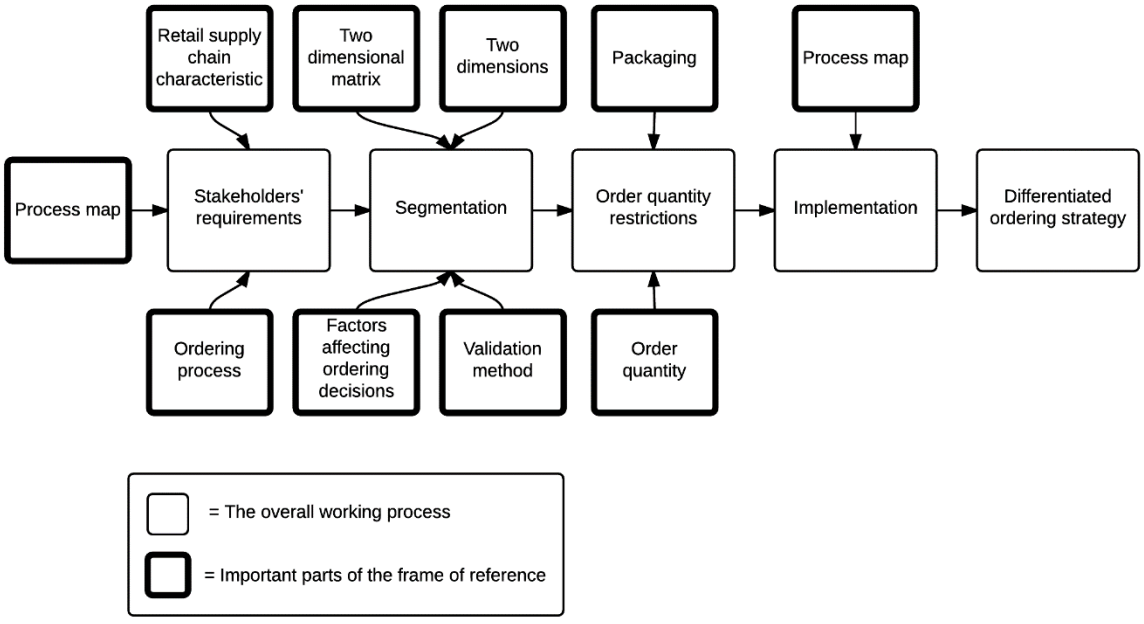

Figure 4: The analysis model shows a connection between the main working processes and the most important parts of the frame of reference.

3 METHODOLOGY

The methodology chapter presents the methodology used in order to reach the aim of the study. It presents the research approach and design, the research process, literature research, data collection, and data analysis. Finally, the trustworthiness of the study is discussed.

3.1 Research approach and research design

A research approach is a broad orientation of research strategies (Bryman and Bell, 2011). The choice of research approach depends on the aim of the study. According to Borrego et al. (2009) a qualitative research is characterized by collection and analysis of textual data e.g. interviews, observations, surveys, and focus groups, with specific focus on the study's context. In contrast, a quantitative research approach explains phenomena with numerical data, that are analysed with mathematical methods, in particular statistics (Yilmaz, 2013). A qualitative research was the primarily research approach in this study, because it emphasizes the possibility to describe and explore the investigated retail supply chain in its context. However, quantitative research was also used to some extent, to support the qualitative approach.

It is still difficult to conduct a research even after a research approach is selected (Bryman and Bell, 2011). It is also necessary to select a research design and research methods. A research design is a framework for data collection and data analysis (Bryman and Bell, 2011). A research method is a technique to collect data, for example a questionnaire or an interview. A single case study was selected as research design, because it emphasizes a detailed analysis of one single case. The single case was conducted on a single supply chain, the brand owning company and its distributors and suppliers. A case study is often using qualitative research methods to get a detailed investigation of a case, which was suitable in this study. The selected research methods are presented in chapter *3.3 Data collection*.

3.2 Research process

The chapter presents the overall research process of this case study. The research process of this study is visualized in Figure 5. It includes three phases, definition of the aim of the study, analysis of the current situation, and the development of the differentiated ordering strategy. The phases were overlapping and should not be seen as isolated phases.

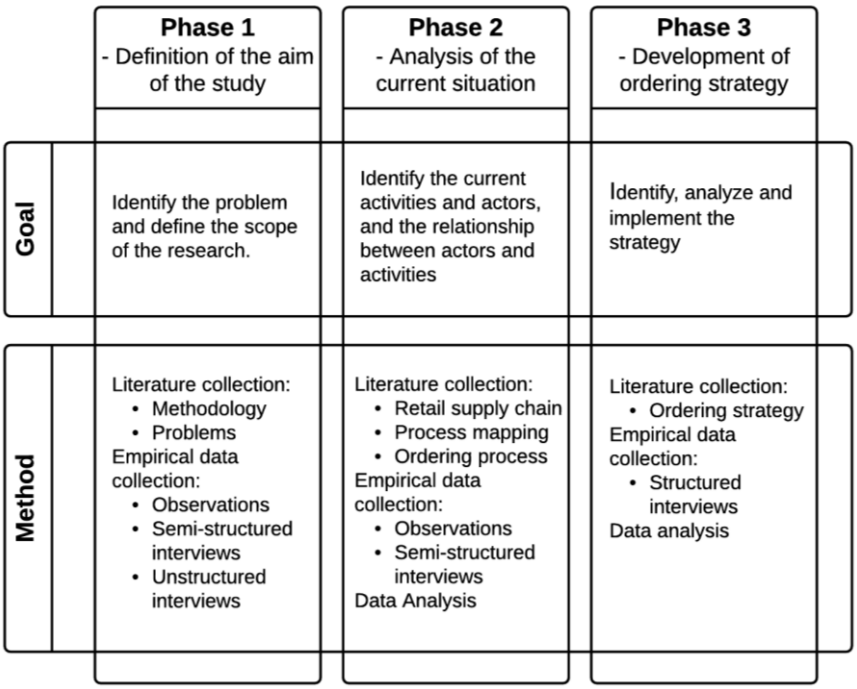

Figure 5: The research process of this case study.

During the first phase, the purpose was to identify the problem and set the aim of the study. A problem description was given by the brand owning company to the authors. However, the problem was broad and needed to be narrowed down. To narrow down the problem, empirical data of the current situation was collected, primarily by unstructured interviews, but also by semi-structured interviews and direct observations. The identified aim after analysing the problems was to propose a differentiated ordering strategy, for the ordering processes between the brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products. Furthermore, literature collection of the subjects, retail supply chains and ordering processes were conducted to collect knowledge about the identified problem. A literature collection of research methods to solve the problem was also conducted.

The second phase, aimed to identify the current activities and actors in the ordering process, as well as the relationship between the actors and the activities. To reach the aim of the second phase a process map of the actors and activities was conducted. The process map was based on empirical data, interviews, and direct observations. Supporting literature of retail supply chain, ordering process, and process mapping were also collected. Moreover, data from internal and external documents were analysed to get a deeper understanding and information about the activities. In the second phase, analysis of the collected data was conducted simultaneously as the data was collected.

The third phase was almost conducted in parallel with the second phase, because possible improvements were identified at the same time as the process map was conducted. Additional literature collection and empirical data collection were also

carried out during phase three. Literature directly related to the new strategy was collected and more structured interviews were carried out to support the new strategy. Analysis of the collected data was done during the whole third phase.

As visualized in the Figure 5, literature collection and empirical data collection were done during all three phases, and the data analysis was done during second and third phase. The literature collection and the data collection are presented in detail in the following chapter *3.3 Data collection* and the data analysis is presented in chapter *3.4 Data analysis*.

3.3 Data collection

The chapter presents the research methods of the data collection in this study. Firstly, the collection of literature is presented. Secondly, the data collection of the empirical data is described.

3.3.1 Collection of literature

To gain understanding, knowledge, and create trustworthiness a collection of literature was conducted. Further, the collection of literature was used to analyse and develop the differentiated ordering strategy during all phases of the research process. The main part of the literature was collected from Chalmers University of Technology's online library, lib.chalmers.se, a data base. Another data base used for collecting literature was Google scholar. Further, course literature from master degree courses within Supply Chain Management was used.

The main areas of the literature research were retail supply chain, ordering process, and segmentation. Hence, the key words for the literature research were "retail supply chain", "ordering process", "ordering factors", "process mapping", and "segmentation method". Moreover, a literature collection for the methodology was conducted to identify a suitable methodology for this study. Both books and articles were used for the literature research. Books were generally used to gain a first understanding of the investigated areas, while articles were used to get deeper knowledge within the investigated areas. Websites were generally avoided, due to the reason that the trustworthiness of websites is more difficult to investigate.

3.3.2 Collection of empirical data

The chapter presents the research methods of the empirical data collection of this study. Both qualitative and quantitative data were collected. Qualitative data is primarily described in text and quantitative data is primarily described numerically (Bryman and Bell, 2011). Qualitative data stood for the main part of the empirical data collection, and it was collected from both primary and secondary sources. Primary data is collected by the researcher for a specific research, while secondary data is collected by someone else

than the researcher (Bryman and Bell, 2011). The collected quantitative data only consisted of secondary data.

3.3.2.1 Qualitative methods of data collection

The qualitative data was used to form the aim of the study, to understand the current situation, and to identify a suitable differentiated ordering strategy. The main parts of the used qualitative methods consisted of interviews and direct observations from primary sources, see collected information from primary qualitative data in Table 2. The methods of the interviews and direct observations are explained next.

Table 2: Collected information from primary qualitative data.

Information	Type of data	Type of collection method
The brand owning company's activities (First draft, first forecast, sales meeting, create buying schedule, aggregate orders)	Primary data	Interviews and direct observations
Distributors' activities (Second forecast, ordering, sorting and storing)	Primary data	Interviews and direct observations
Suppliers' activities (Production planning, production, sorting and packing, shipping)	Primary data	Interviews and direct observations

Interviews

In total, over 20 people have been interviewed. People at all three identified actors, the brand owning company, distributor and suppliers, have been interviewed. The interviews were used to get a holistic perspective, an understanding of the current situation and support the forming of the differentiated ordering strategy. All interviews were carried out face-to-face, except the interview with the medium size distributor that was done via a telephone call.

The brand owning company has 26 distributors and three of the distributors have been interviewed to get a broader understanding of the distributors' role and activities. Two of the largest distributors were selected, because the largest distributors are of high importance for the brand owning company. By investigating two large distributors, it was also possible to identify if large distributors work in the same way, and hence secure that distributors with the same size have the same opportunities. Further, a medium size distributor was selected to get another perspective. The purpose was to also interview a small distributor, but the authors could not find a small size distributor that had time for interviews and observations. The effect of not interviewing a small size distributor is discussed in chapter *3.5.3 Discussion of the methodology*. For the interviews with distributors, people working as warehouse manager, blue-collar employees, sales manager, and key account manager were interviewed. By interviewing warehouse managers as well as blue-collar employees a broad understanding of the

warehouse activities were collected. Sales manager and key account manager are the people working directly with the ordering process. Therefore they were of high importance to interview.

The brand owning company has 44 suppliers, located in Asia and in Europe. Two suppliers were selected to be interviewed, one from Europe and one from Asia. Moreover, the suppliers are also producing different products of the brand owning company's product assortment. Due to that the interviewed suppliers have different location and production of different products, a broader supplier perspective was collected. Moreover, the selected suppliers are experienced suppliers. It is an advantage to study experienced suppliers, because both have collaborated with the brand owning company during a longer time and therefore work in a structured way with production. The activities sorting and packing was of main interest to investigate at the suppliers. Therefore people working directly with logistics and people responsible for the brand owning company's products were interviewed at the suppliers.

The brand owning company is located in Sweden and in Asia. The main parts of the operations are performed by the brand owning company in Sweden. The employees that were interviewed at the brand owning company in Sweden were selected based on their position in the company. The main part of the interviews was held with the commercial manager, the supply chain manager, and a supply chain planner. These three employees have a broad understanding of the supply chain and the product assortment. Further, the brand manager, the CEO, a product manager, the sales manager, the logistic manager at the parent company, and the retail coordinator have been interviewed at the brand owning company in Sweden to get a general understanding of the brand owning company and its supply chain. Moreover, the interviewed employees at the brand owning company in Asia were senior merchandiser, merchandiser, logistics controller, and buyer of trims. The employees in Asia work closely with the Asian suppliers. Hence, it was possible to gain an even deeper understanding of the brand owning company's supply chain by interviewing employees at the brand owning company in Asia.

Three types of interviews were used, unstructured interviews, semi-structured interviews, and structured interviews. The semi-structured interview templates are presented in Appendix I and the structured interview template in Appendix II. An unstructured interview is often used to gain insight of an area (Leech, 2002). Many unstructured interviews were conducted in the beginning of the study to gain insight about the brand owning company and the studied supply chain. Moreover, semi-structured interviews were carried out when the authors had a basic understanding of the studied subject. A semi-structured interview can provide depth, details, and insight, as well as quantitative analysis and hypothesis testing (Leech, 2002). A semi-structured interview also gives the respondent opportunity to be an expert that can inform the researcher.

Leech (2002) describes an open-ended semi-structured interview. The semi-structured interviews were carried out with grand tour questions, example questions, and prompts. Grand tour questions are that the respondents should give a verbal tour of something, for example a description of a typical ordering process (Leech, 2002). These questions are good, because it will give the respondent room for talking, but in a structured way. Example questions are a bit more specific and focus on a special area. Prompts are questions or just words that aim to keep the respondent talking and to control the direction of the interview. When a lot of information is known and the aim is to get specific answers to specific questions, structured interviews can be used (Leech, 2002). In this study, structured interviews were used to verify the basis of the segmentation.

Direct observations

To gain even deeper understanding of the activities in the supply chain, from development of the products at the brand owning company to the products are stored at the distributors warehouse, the activities were observed during visits at the suppliers, the distributors, and the brand owning company. The activities of both the Asian and the European supplier were observed. The two largest distributors were visited, but not the medium size distributor. Moreover, the authors have been working at the brand owning company in Sweden for 20 weeks and during these weeks direct observations have been done.

The authors studied when employees performed activities at the visited actors. Questions to clarify the activities were asked during the observations. The activities performed by the brand owning company were explained by the employees, due to the reason that these activities only are performed two times per years. Hence, it was not possible to observe these activities. Further, the authors were provided with documents with qualitative data to support the direct observations, see the documents in Table 3. After observations and interviews, the process map of the activities was conducted.

Table 3: Documents with qualitative data provided by a supplier, distributors, and the brand owning company to support the direct observations.

Documents with qualitative data	Created year
Parent company supplier handbook	2008
Activity description for the brand owning company in Asia	2014
Packaging instructions for Asian suppliers	Valid 2015
Shipping and payment terms	Valid 2015
Packing list for a medium and a large size distributor	Valid 2015

3.3.2.2 Quantitative methods of data collection

To further understand the current situation, interviews and direct observations can be complemented with existing quantitative data (Bryman and Bell, 2011). In this study quantitative data was primarily collected to support the qualitative data and to get more detailed information of selected parts. The quantitative data only consisted of secondary data and it was collected from the brand owning company and from distributors. The received documents are presented in Table 4. It is important to investigate the trustworthiness of secondary data (Bryman and Bell, 2011). Therefore the trustworthiness was analysed by identifying how the secondary data had been collected and if it existed any errors in the data files. The secondary data was collected from the brand owning company and distributors, and only a few errors were identified in the data, hence the secondary data was assumed to be trustworthy. The quantitative data has been the main input for the segmentation.

Table 4: Documents with quantitative data provided by the brand owning company. There are two seasons per year, autumn winter (AW) season and summer spring (SS) season.

Documents with quantitative data	Created year
Historical sales data	SS15 and AW15
First forecast	AW15
Line list for two product groups	AW15
Second forecast	SS15 and AW15
Margin	SS15 and AW15
Price level	SS15 and AW15
Customer segments	SS15 and AW15
Product life-time	SS15 and AW15
Size division for a product group	AW15
Size division for a medium size distributor's order	AW15

3.4. Data analysis

The data analysis chapter describes the main process of when the collected data was analysed. However, the detailed analysis of the data is directly explained in chapter *6 Analysis and results*. The data analysis and the data collection of qualitative data were conducted simultaneously, which is a common process when analysing qualitative data (Bryman and Bell, 2011). During the interviews the authors took notes, which directly after the data collection was summarized and analysed by the authors. The data from the interviews was analysed by comparing it with collected literature, thereby it was possible to identify important aspects. Furthermore, interviews were analysed by comparing the data from different interviews. Depending on if the analysis of an interview resulted in new important information, the interview template for the next interviews could be updated.

Moreover, the direct observations were also analysed directly after the visits. The data collected from the observations were analysed by comparing it with collected data from literature and interviews. The analysis of the observations made it possible to improve

the observation method for the following visits. Furthermore, the quantitative data was primarily analysed by studying relations and correlations between the data, as well as mean values.

3.5 Trustworthiness of the methodology

To identify the trustworthiness of the methodology used, validity and reliability of the methodology can be discussed (Bryman and Bell, 2011). Validity is if the research really presents what it should present, while reliability investigates if it is possible to replicate the study by using the same methodology. Firstly, validity and reliability are discussed and finally, a methodology discussion is presented.

3.5.1 Validity of the methodology

There is a distinction between internal validity and external validity (Bryman and Bell, 2011). Internal validity is whether there is a clear match between the researchers' observations and the theoretical ideas they develop. External validity is if the findings can be generalized for different contexts (Bryman and Bell, 2011). When new observations were found, the theoretical ideas were continuously discussed with the brand owning company. Further, the two authors discussed the observations and the potential theoretical ideas with each other. By frequently doing these two activities it was possible to reach a high internal validity.

External validity is, however low in this context. The research has been conducted as a single case study on a specific retail supply chain. As a result of the single case study on the selected retail supply chain, the research becomes less general and cannot be stated to represent other retail supply chains. However, it might be possible for other retail supply chains to get a general understanding of how a differentiated ordering strategy can be created, but the specific findings are not transferable. Therefore the external validity is lower than the internal validity.

3.5.2 Reliability of the methodology

Reliability is the degree to which a study can be replicated. According to Bryman and Bell (2011) reliability is difficult to reach in a qualitative research, since social settings and circumstances in an environment change. A higher reliability can be reached if the researcher has a similar role, as the original author (Bryman and Bell, 2011). In this context a similar role is hence that the researcher would act as a master thesis student. However, it would be difficult in this context, to repeat exactly the same research, because the social settings and environment change constantly.

It would be possible to replicate the interviews and the direct observations and get the main results similar, because interview templates, people interviewed, and visited actors are presented. However, it is not possible to get exactly the same answers from the interviews and the observations. If the methodology is followed and the researcher has a

similar role as the authors, it would be possible to almost reach the same result, even if small details would differ. The quantitative research is easier to recreate, because only secondary data was used. The secondary data for a specific period is not changed, hence it is easily collected again. The reliability is therefore higher for the quantitative research, than for the qualitative research.

3.5.3 Discussion of the methodology

The main methods used were qualitative data collection in terms of interviews and direct observations, which were seen as the most appropriate methods for this study. However, the chosen methods have some negative effects. In an interview a person often answers from a personal point-of-view, and it is difficult to know if the personal point-of-view represents the company's view. Furthermore there is a risk that people do not want to share all information about existing situation.

To handle the above mentioned problems, several people at the companies have been interviewed to achieve a more objective and general understanding. Moreover, direct observations complement the interviews, because during observations it was possible to observe the activities and identify problems. Direct observations, however, can differ from time to time. To handle this problem, the activities were observed several times and by each of the authors. The methods, direct observations and interviews, are therefore suitable to use together, because the methods complement each other.

Furthermore, the authors did not find a small size distributor that had time for interview and visit. Therefore, all different sizes of distributors are not represented in this study. However, the brand owning company is working closely with many distributors. By interviewing the brand owning company it was still possible to get a general understanding of the small size distributors' situation. However, this understanding is not complete. To get a complete picture of all distributors, a small size distributor is recommended to be interviewed and visited by the brand owning company.

4 AN OVERVIEW OF THE BRAND OWNING COMPANY AND ITS RETAIL SUPPLY CHAIN

A general description of the brand owning company and its retail supply chain are presented. Moreover, the information flow, the material flow, and the financial flow between distributors, suppliers, and the brand owning company are presented.

4.1 Description of the brand owning company

The brand owning company is a subsidiary to a parent company[9]. The parent company focuses on acquisition and development of companies. Moreover, the parent company is an entrepreneurial firm and it is focused on sales and growth. According to the Logistics manager of the parent company, logistics has not been prioritised by the company[10]. The lack of focus on logistics is also identified as a problem at the brand owning company.

The brand owning company is designing and developing garments to the retail market. The garments are sold in approximately 40 countries worldwide[11]. However, the main part of the business is related to north of Europe. The brand is quite small, especially outside north of Europe, but the main competitors are brands that are known worldwide. Hence, the competition on the market is tough. Yet, the vision for the brand owning company is to be the number one brand in its business, which should influence the whole company in their work[12].

4.2 Description of the retail supply chain

The studied retail supply chain is visualized in Figure 6, and it consist of fabrics suppliers, suppliers, distributors, the brand owning company, retailers, and end consumers[13].

The fabric suppliers are located worldwide, but primarily in Asia[14]. The suppliers are sourcing and purchasing fabrics directly from the fabrics suppliers. The brand owning company has 44 suppliers that manufacture the garments. The suppliers are located both in Asia and in Europe. All suppliers are external, hence not owned by the brand owning company. According to the supply chain manager at the brand owning company, the current time to market is 20 months and the production lead time is approximately 140 days. The brand owning company is focused on developing and designing the products. However, the brand owning company is also managing the information flow in the supply chain.

[9] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[10] Logistics Manager (Parent company) Interviewed by the authors 2015-01-26
[11] CEO (Brand owning company) Interviewed by the authors 2015-01-21
[12] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04
[13] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[14] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

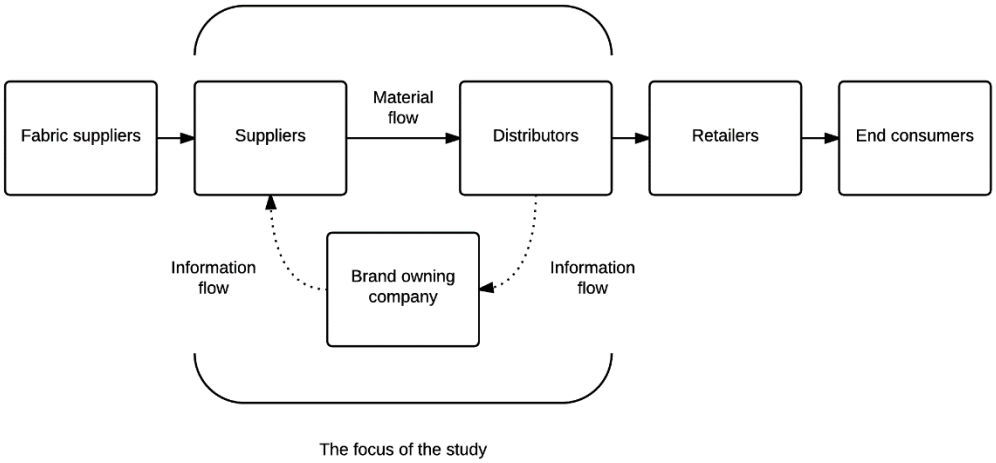

Figure 6: The studied retail supply chain and the related actors.

The distributors are both internal and external. Internal distributors are subsidiaries to the brand owning company and external distributors are external firms. The brand owning company has in total 26 distributors, and nine of these are subsidiaries to the brand owning company. According to the commercial manager at the brand owning company, 75 % of the brand owning company's turnover is related to the subsidiary distributors and the remaining part relates to external distributors[15]. Furthermore, the distributors are selling the products to retailers in approximately 40 different countries. Hence, some distributors are selling to retailers in more than one country. The retailers are thereafter selling the products to the end consumers. The supplier, the distributors, and the brand owning company are the three actors primarily affected by the distributors' ordering process. Hence the next paragraph only focuses on these three actors.

4.3 The material flow, the information flow, and the financial flow in the retail supply chain

The material flow, the information flow, and the financial flow between the suppliers, the distributors, and the brand owning company, do not follow the same path. The path is different depending on which business model that is applied, which is depicted in Figure 7.

The material flow, the products, always goes directly from suppliers to distributors[16]. The information flow always goes from distributors, through the brand owning company and to the suppliers. Firstly, the brand owning company design the products and communicate the design to the suppliers. Secondly, the brand owning company collects the order from distributors and communicates the orders to the suppliers. It exists two different financial flows, because the revenues for the brand owning

[15] Commercial Manager (Brand owning company) Interviewed by the authors 2015-01-28
[16] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

company are based on two different business models. The Asian model is used for suppliers located in Asia and the European model for suppliers located in Europe[17].

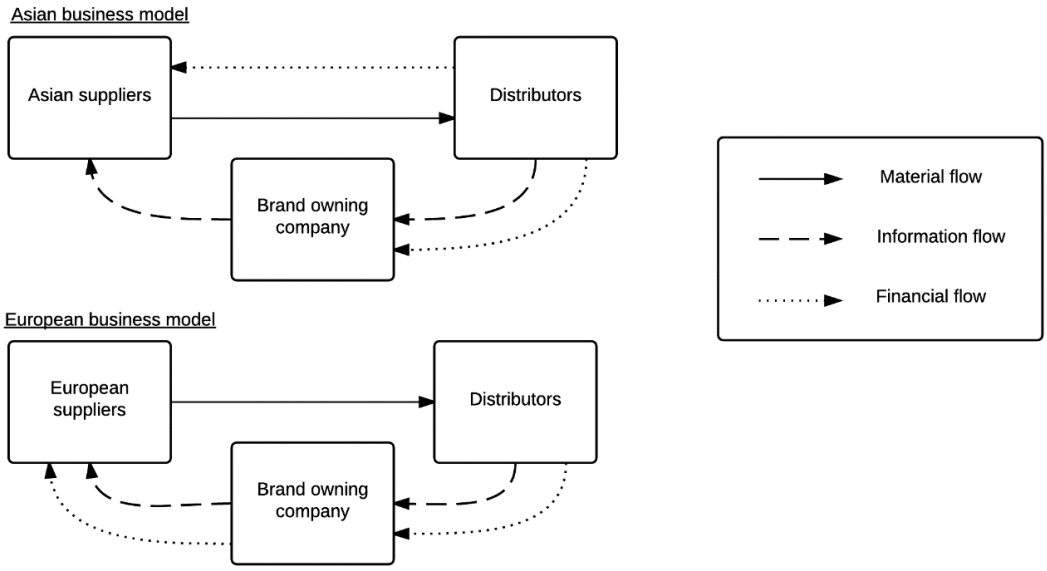

Figure 7: The material, information and financial flow in the two different business models.

For the Asian model distributors pay a free on board-price (FOB-price) directly to the suppliers, therefore the brand owning company never owns the product with this business model[18]. The brand owning company achieves revenues in two different ways in the Asian model. The external distributors pay a royalty to the brand owning company based on the FOB-price of the products and the subsidiary distributors pay a royalty to the brand owning company based on their turnover. The Asian model creates an income trade-off. For example, if the brand owning company negotiates a lower purchasing price, the royalty from the external distributors get lower, but the royalty from subsidiary distributors can get higher.

In the European model the financial flow goes through the brand owning company[19], see Figure 7. In this business model the brand owning company owns the products. In the European business model there is not a trade-off, if the brand owning company negotiates a lower purchasing price it will always result in increased margin for the brand owning company.

[17] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[18] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[19] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

5 THE PROCESS FROM PRODUCTS ARE DEVELOPED UNTIL PRODUCTS ARE DELIVERED TO DISTRIBUTORS

The process from the brand owning company's development of products until the products reach the distributors is described. Firstly, a general process map of the activities is presented. Secondly, the activities performed by the brand owning company are described. Thirdly, the activities performed by the distributors are presented and finally, the activities performed by the suppliers are described.

5.1 A process map of the brand owning company, distributors, and suppliers

This chapter explains the process from that the brand owning company develops the products until the products reach the distributors. The brand owning company, distributors, and suppliers are involved in this process and these three actors perform different activities. To fully understand the processes a process map is conducted, see Figure 8. Consequently, all five steps of process mapping described by Keller and Jacka (1999) were applied on this study. The five steps are; establish process boundaries, develop the data gathering plan, interview the process participants, generate the process map, and analyse and use the map.

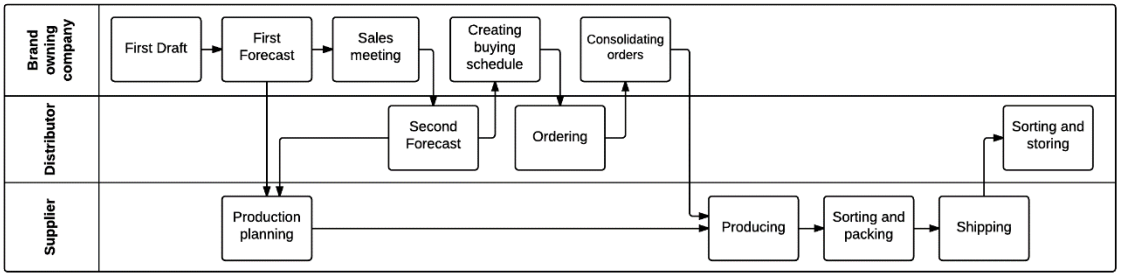

Figure 8: Process map of the brand owning company, distributors, and suppliers.

To be able to propose a differentiated ordering strategy for the studied retail supply chain the processes related to ordering need to be investigated, which also form the boundaries of the process map. The processes that are of interest to study is therefore all processes that are related to the ordering process between the brand owning company, the suppliers, and the distributors. To gain a holistic perspective the first studied process is when the products are created, even if it is only indirectly related to the ordering process. The last studied process is when products are sorted and stored at the distributors' warehouses. Hence, all processes in-between these two processes are studied and presented in sequential order.

The data gathering plan for the process map included interviews and direct observations to collect information about the processes, from products are created until products are stored and sorted at distributors. The people that were most relevant to interview are the one who worked directly with the ordering process at the brand owning company, suppliers, and distributors. The interviews aimed at collecting information about the

actors' perspective of the processes, hence interview questions considered how the processes are managed by the different actors. In addition to interviews, direct observations were used to get a better understanding. The process map was developed with help of the observations and the interviewees' answers as a starting point. A swim-lane design of the process map was used, because it is of importance to clarify which processes each actor performed. In this study the process mapping aimed at showing how the processes and the actors are related to the ordering process.

Each activity of the process map is described in detail in the three next coming sub-chapters. Firstly, activities performed by the brand owning company are described; first draft, first forecast, sales meeting, creating buying schedule, and aggregating orders. Secondly, activities done by distributors are described, second forecast, ordering, and sorting and storing. Finally the activities performed by the suppliers are presented; planning production, producing, sorting and packing, and shipping.

5.2 Activities performed by the brand owning company

The brand owning company's involvement in the process starts when the first draft of the products is created. Thereafter, four more activities are performed by the brand owning company; first forecast, sales meeting, creating buying schedule, and consolidating orders, see Figure 9. All five activities performed by the brand owning company are described in detail in the chapters *5.2.1 - 5.2.5*.

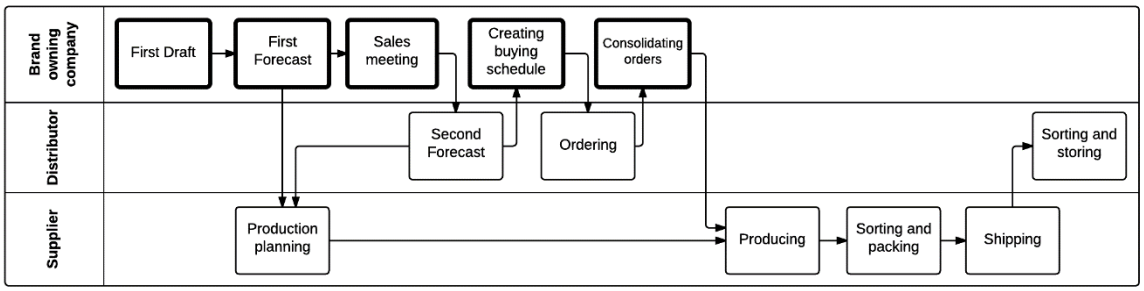

Figure 9: The highlighted activities are activities performed by the brand owning company.

5.2.1 The activity first draft, performed by the brand owning company

The first draft is the first activity of an upcoming season. There are two seasons per year, one autumn winter (AW) season and one spring summer (SS) season[20]. Each season has approximately 30 % new products and 70 % old products. The first draft is the starting point for new products. Old products already have a first draft and are therefore not included in the first draft. The first draft contains product design and product information, which is information such as product life-time and which customer segment the product is designed for[21]. The product life-time is based on how long time

[20] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[21] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04

each product is assumed to be attractive for customers on the market. Furthermore, the product life-time can be changed if a product is not sold as expected[22].

Customer segment is an internal product segmentation made by the brand owning company, where every segment corresponds to a type of customer. The customer segments have products with different complexity of design and different functional performance. Moreover, every segment is corresponding to one or two price levels. The brand owning company has three price levels, low, mid, and high[23]. It exists four different customer segments, easy, explore, endurance, and edge. The segment easy consists of simple and low price products. The segment endurance consists of medium advanced products with mid price. The segment explore consists of medium advanced products with mid to high price. The fourth and last segment edge consists of advanced and high price products[24].

To summarize, the first draft is the first activity of an upcoming season. In the first draft two important factors of a product are decided, the product life-time and the customer segment. It exists four customer segments; easy, endurance, explore, and edge. Each customer segment has products with different complexity of design, functional performance, and price level. All product information is collected in a document called line list.

5.2.2 The activity first forecast, performed by the brand owning company

When the first draft is set, a first forecast of the demand is created. The first forecast is done for a product model, not on colour or size level. The brand owning company has four product managers, each of them are responsible for a certain part of the total product assortment[25]. The product manager does the first forecast, which is based on historical sales data about products and communication with the largest distributors to get information about coming market trends[26]. For new products it does not exist historical data, therefore historical data of similar products is used to get indications of the demand. Similar products have a quite similar and stable demand from year to year.

The first forecast is made in the beginning of the work with the product assortment for a season, approximately 1.5 year before the product is sold on the market. The first forecast is sent to the brand owning company in Asia, where the work with sourcing fabrics, select suppliers, and negotiate prices starts[27]. The products are designed to reach different customer segment at different price levels. Therefore it is of high importance

[22] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04
[23] Commercial Manager (Brand owning company) Interviewed by the authors 2015-01-28
[24] Commercial Manager (Brand owning company) Interviewed by the authors 2015-01-28
[25] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04
[26] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04
[27] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17

to negotiate the price to the right price level for each product, and it is especially important for low price products that are expected to be sold in high volumes[28].

Important to highlight is that the first forecast is made for all product models, however not for each colour of a product model. Furthermore, the first forecast is used to source fabrics, select suppliers, and negotiate prices. Another important aspect is that the brand owning company needs to negotiate products to a suitable price level, especially low price products.

5.2.3 The activities sales meeting and create buying schedule, performed by the brand owning company

The brand owning company has a sales meeting every season, where the product assortment of the season is showed to representatives from the distributors[29]. After the sales meeting, distributors have time to show the product assortment to retailers, to get input about the retailers demand. Distributors make a forecast two weeks after the sales meeting, called second forecast. The second forecast is described in detail in chapter *5.3.1*.

The second forecast is analysed by the brand owning company to result in a buying schedule with four to six order windows per season[30]. Products with high forecasted volumes get several order windows to spread out the required production capacity at the suppliers. However, products with low forecasted volume will only have one order window, to reach higher volumes and economies of scale of the suppliers' production. Normally, the second and the third order window have the largest volume of orders. The decided buying schedule and the second forecast are sent to the brand owning company in Asia. The second forecast and the buying schedule are used to book production capacity at suppliers, and suppliers use the second forecast to buy fabrics[31].

5.2.4 The activity consolidating orders, performed by the brand owning company

The brand owning company receives orders in each order window from distributors[32]. The orders from distributors are manually received in excel files and consolidated in excel for each order window. The brand owning company is only ordering the products from suppliers that the distributors order. Hence, the brand owning company is not taking any risk when ordering. However, if the consolidated forecast or consolidated orders from the distributors do not reach production minimum quantity, the products are cancelled from production. The cancelled products result in a lot of unnecessary work with developing products for the brand owning company.

[28] Product Manager (Brand owning company) Interviewed by the authors 2015-03-04
[29] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[30] Key Account Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-02-19
[31] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[32] Supply Chain Planner (Brand owning company) Interviewed by the authors 2015-02-24

Currently, it is a large proportion of cancelled products[33]. The products can be cancelled both after the second forecast and after each order window is consolidated. Approximately, 10-20 % of the products are cancelled after the second forecast, and hence removed from that season's product assortment[34]. Additionally 3-6 % of the products were cancelled during each order window for season AW14. The main reasons for the large amount of cancelled products are; that the products are not commercial enough for the market, i.e. have a low demand and that the brand owning company has a broad assortment with low volumes. The company strives towards decreasing the number of cancelled products, having a higher demand per product and a smaller product assortment.

The orders that reach production minimum quantity is consolidated and sent to the brand owning company in Asia. All orders are manually registered in Infolog, an ordering system, by the brand owning company in Asia[35]. Afterwards the orders are sent to each supplier respectively. The brand owning company in Asia negotiates with the suppliers and the fabrics suppliers to get a sales confirmation of the orders. The sales confirmation includes price, quantity, delivery date, and payment terms. Approximately, three weeks after the brand owning company in Asia receive the orders from the brand owning company in Sweden, the sales confirmation is sent from the suppliers to the brand owning company in Asia[36].

Important to highlight is that a product has to reach production minimum quantity both for the second forecast and for each order window. However, a large amount of the products does not reach the production minimum quantity and are therefore cancelled from production. Moreover, cancelled products are seen as a problem for the brand owning company, because it results in a lot of unnecessary work with developing products. Currently, all orders are managed in excel by the brand owning company, the lack of system support results in time consuming manual work.

5.3 Activities performed by distributors

The activities that are performed by the distributors are; second forecast, ordering, sorting and storing, see Figure 10. All three activities are described in detail in the chapters *5.3.1-5.3.3*. Three different distributors' perspective of the activities is described in this chapter. Two large size distributors and one medium size distributor are described.

[33] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[34] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[35] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[36] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17

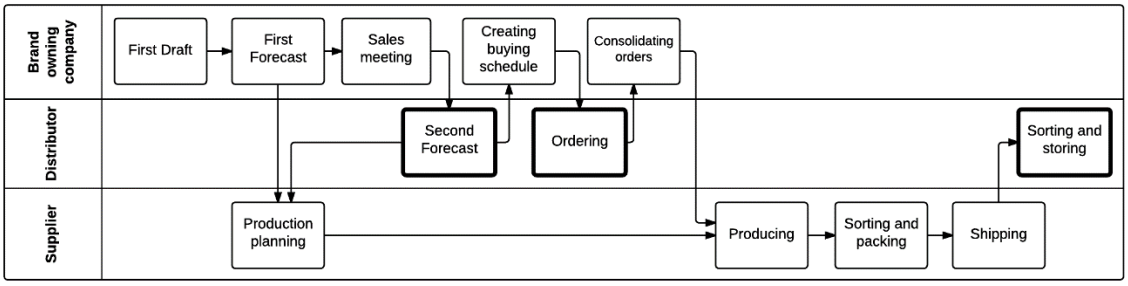

Figure 10: The highlighted activities are activities performed by the distributors.

5.3.1 The activity second forecast, performed by the distributors

After the sales meeting each distributor make a forecast, labelled second forecast, that is based on an estimation of what quantities can be sold. All three distributors are forecasting the volume of the products based on the same factors, historical sales data, market trends, and risks. The distributors are mainly using historical sales data for old products. For new products similar historical products' sales data is analysed to get an estimation of what volumes are reasonable to sell[37]. For example the sales volume of a long sleeve jumper can be estimated to be almost the same as last year even if the product is new.

All three distributors do not receive any forecast or orders from the retailers before making the forecast. The historical sales data is therefore really important for the forecast, since the sales volume for similar products is quite stable from year to year. In addition, the three distributors visits fairs and communicates with the largest retailers to get indications of market trends and a first opinion on what retailers are interested in buying. The three distributors do also evaluate the risks of the products before doing the forecast. The risks that are important to evaluate for the second forecast are also important for the distributors' actual orders. The three distributors evaluate the risks based on different factors, which are described below.

According to one large distributor the risks that are evaluated before forecasting are mainly product life-time, product complexity, price, and margin[38]. Product life-time means that a product has a decided time it will be sold. If a product only will be sold for one season the large distributor consider an order for this product having larger risk than for a product with a product life-time of several seasons. The demand of products with a high complexity of design and function is also stated to have higher risk, because the demand for those products is more unpredictable.

High price products are harder to sell on sale and need a larger discount, for example down jackets[39]. These products are hence associated with a higher risk because they result in a larger loss if the products will be sold on sale. The margin can also be

[37] Key Account Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-02-19
[38] Key Account Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-02-19
[39] Key Account Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-02-19

important for what products that will be ordered. The brand owning company is always setting a recommended price to the retailers, therefore distributors knows the potential margin before ordering a product. The mean value of all products' margin that the large distributor orders, has to be a certain percentage. To reach this mean value of the margin, the margin cannot be too low on a major part of the product assortment. The margin is therefore even more important for products with large sales volume.

According to another large distributor, the risk is evaluated based on new products, margin, price, product life-time, and lead time. New products are considered to have high risk by the distributor, because it is hard to know how customers will react on new products[40]. Already existing products are easier to know how the market will react upon. Other factors that affect the distributor's ordering decision are margin and price. The price is considered by the distributor to indicate which products that will have reasonable margin and price at the market. For high volume products, the margin is even more important, due to the same reason as mentioned by the other large distributor. The product life-time is another factor affecting the distributor's ordering decision. The distributor affords to order a higher volume of products with longer product life-time, because the distributor then has more time to sell the product. A shorter product life-time can therefore result in a lower volume ordered, because of the risk for obsolescence. Finally, lead time is a factor that can affect the distributor's choice of what products to order. For example, the distributor would not order products with a long lead time for a campaign.

The medium size distributor evaluates the risks of the products based on colours, price, margin, and product life-time[41]. According to the distributor a colourful product assortment is demanded by its customers. Anyhow, colours are seen as a risk, because it is difficult to know which colours that will be demanded. The price of the product is evaluated before ordering, so the distributor can get a reasonable margin and sell the product at a reasonable price to the customers. Additionally, the distributor evaluates products with short product life-time as high risk products. However, the distributor stated that the product life-time of products is changed frequently and that the product life-time data often is not accurate[42].

To summarize, the distributors base the second forecast on historical sales data, market trends, and risks. Together all three distributors evaluated risks on the factors; product life-time, price, margin, new products, lead time, and colours.

[40] Key Account Manager and Buyer (Large distributor, Nr. 2) Interviewed by the authors 2015-03-12
[41] Manager (Medium size distributor) Interviewed by authors 2015-04-14
[42] Manager (Medium size distributor) Interviewed by authors 2015-04-14

5.3.2 The activity ordering, performed by the distributors

A couple of months after the second forecast, the distributors place the orders to the brand owning company. First, volume of each product is decided and thereafter a size division is done for the decided products. According to all three distributors the most important input for the final order volumes are; current stock volumes, orders placed in earlier order windows, and second forecast. As mentioned in the previous chapter, second forecast includes historical sales data, risks, and market trends. The risks that are evaluated for the second forecast are hence also considered when distributors order products. The size division of the orders is primarily based on historical sales data and in some cases real customer orders[43].

The current MOQ of 60 pieces per product does not affect the ordering for the large distributors, because their smallest order volumes are always more than 60 pieces. Small orders are seen as time-consuming since they create manual work, especially at the distributors' warehouse[44]. The medium size distributor is sometimes placing orders for some products that are below the MOQ of 60 pieces, but the limit of 60 pieces is not seen as an obstacle[45]. Small size distributors generally find it difficult to order 60 pieces of some products[46]. However, the brand owning company still accepts orders between 30-59 pieces. Hence, the MOQ of 60 pieces is not strictly followed.

The medium size distributor is stating that it is a problem when a quantity of 60 pieces or more is ordered of a product, and the product is still cancelled due to too low volumes ordered, i.e. the aggregated volume is lower than the production minimum quantity[47]. If only some smaller distributors order a product, it will normally not be enough to reach the production minimum quantity. Conversely, the larger distributors do often place volumes large enough to reach production minimum quantity alone.

To summarize, the current MOQ of 60 pieces is difficult to order for smaller distributors, while it does not affect larger distributors. However, currently the MOQ restriction is not followed strictly by the brand owning company. The large amount of cancelled products is also mentioned by the distributors as a problem. However, the cancellations of products are mostly affecting small and medium size distributors, because they are dependent on that other distributors order the same product.

5.3.3 The activity sorting and storing, performed by the distributors

The goods are shipped directly to the distributors from the suppliers. After receiving the products, the products are sorted and stored in the distributors' warehouse. The distributors can receive packaging with products both in containers and on pallets[48]. To

[43] Supply Chain Planner (Brand owning company) Interviewed by the authors 2015-02-24
[44] Manager (Medium size distributor) Interviewed by authors 2015-04-14
[45] Manager (Medium size distributor) Interviewed by authors 2015-04-14
[46] Key Account Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-02-19
[47] Manager (Medium size distributor) Interviewed by authors 2015-04-14
[48] Warehouse Manager (Large distributor, Nr. 1) Interviewed by the authors 2015-01-28

check that all products and packaging are received, the packaging are sorted according to the order number and thereafter verified with a receiving list. Thereafter, the products are stored in the warehouse at different stock locations.

One of the large size and the medium size distributor stores the products according to SKU, solid colour and solid size, in their warehouses. The other large distributor stores the main part of the products according to SKU, however some product models with different colours or sizes can sometimes share stock location in their warehouse. Currently, all three distributors receive many different packaging sizes. Packaging size is the physical dimensions of a packaging. All three distributors argue that different packaging sizes are not a problem to manage in the warehouses.

An estimation is that approximately 40 % of all packaging, that one of the large distributors receives, are mixed[49]. A mixed packaging is a packaging that includes mixed products, i.e. different sizes and colours of a product model. If 40 % of all packaging are mixed, the AW14 season would result in over 11 000 mixed packaging in the large distributor's warehouse. The number 11 000 mixed packaging is based on that the large distributor ordered approximately 275 000 products for the AW14 season, and a packaging is estimated to include 100 products. Hence, for season AW14 the large distributor received totally 27 500 packaging, 40 % of them were mixed packaging, which results in 11 000 mixed packaging. After visits at distributors and suppliers it is identified that a packaging in most cases includes less than 100 products. Since the mean value of products in a packaging are estimated to be lower than 100 products, the number of mixed packaging are not over estimated. The proportion of mixed packaging is even higher in the SS season than in the AW season, because of the lighter and less voluminous clothes sold for the SS season[50]. Therefore, the large distributor receives more than 22 000 mixed packaging during a year.

Mixed packaging results in more handling time for the distributors, because if there are several sizes or colours in a packaging the products need to be sorted and packaged in a new packaging. This manual sorting can also result in manual errors, which further can result in wrong sizes sent to retailers. Both the large size distributors argue that it is a time consuming activity to handle mixed packaging. However, the medium size distributor does not consider mixed packaging as a time consuming activity[51]. According to the medium size distributor, it is more important to keep the load factor in a packaging high and hence keep the transportation cost as low as possible.

Moreover, the retailers of one large and one medium size distributor have increasing requirements on information about the orders. For instance the retailers want information about the volume of a pallet with products, and how many products a pallet

[49] Buying Manager (Large distributor, Nr. 2) Interviewed by the authors 2015-03-12
[50] Buying Manager (Large distributor, Nr. 2) Interviewed by the authors 2015-03-12
[51] Manager (Medium size distributor) Interviewed by authors 2015-04-14

contains[52]. Some retailers also require certain packaging sizes and are not accepting mixed packaging[53]. Another prediction is that the large retailers soon will require that all packaging are labelled with EAN bar code. Therefore, the distributors also start to require information about packaging size and number of products in each packaging.

To summarize, different packaging size are not judged as a problem by the three distributors. Moreover, the large distributors, not the medium size distributor, argue that mixed packaging are a time consuming warehouse activity. Retailers also have increasing requirements about logistic information. As a result, the distributors start to require information about packaging size and number of products in each packaging.

5.4 Activities performed by suppliers

In this chapter, the activities performed by suppliers are presented. The activities performed by the suppliers are illustrated in Figure 11. The activities are production planning, producing, sorting and packing, and shipping. The chapter includes the perspectives of the activities of two different suppliers, one operating in Europe and one operating in Asia.

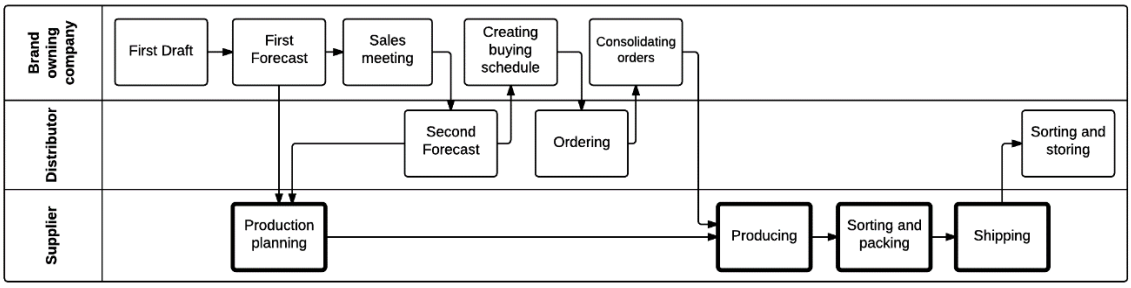

Figure 11: The process map, where activities performed by suppliers are highlighted.

5.4.1 The activity production planning, performed by the suppliers

Before the production of products starts, suppliers need detailed information about the products and the brand owning company requires samples of products[54]. All necessary information for suppliers about the products is collected in a product specification document, by the brand owning company in Sweden and in Asia[55]. The product specification includes all details about a product that the suppliers need to have information about, before making samples and producing. The product specification can be updated by the brand owning company during the sample making. The product specification includes e.g. colour sketch, black and white sketch, how to make the product, details about the trims, fabric, and position of fabric.

[52] Buying Manager (Large distributor, Nr. 2) Interviewed by the authors 2015-03-12
[53] Manager (Medium size distributor) Interviewed by authors 2015-04-14
[54] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[55] Buyer (Brand owning company, Asia) Interviewed by the authors 2015-03-18

Both the European and the Asian supplier are making samples of the forecasted products, after the first forecast is received. The samples are used for the sales meeting and when distributors are showing products to retailers. When making samples, the Asian supplier measures both how many pieces of a product that fits into their standard packaging (55x32.5x40 cm) and the weight of each product[56]. Information about weight and number of products in a packaging is used by the Asian supplier when creating the packing list, see chapter *5.4.3 The activity sorting and packing, performed by the suppliers*. How many pieces that fit into a packaging can vary between different sizes of a product. For lighter and less voluminous products, the same amount of pieces independent of size of the product can normally fit in a certain packaging size, e.g., 100 pieces of small and 100 of pieces large can fit in the same packaging size. This is however not the case for heavier or voluminous products.

The product specification document is hence important for the result of the production, because all necessary information about production for suppliers is presented in that document. Moreover, additional information about weight and how many products that fit in a certain packaging size are collected during the sample making.

5.4.2 The activity producing, performed by the suppliers

For each order window, orders from distributors are collected and aggregated, and the brand owning company forward the orders to suppliers. The suppliers ship the ordered products directly to each distributor. Most distributors order small volumes, and the distributors are located at 26 different destinations. As a result, both suppliers need to manage small order volumes and many destinations. However, both suppliers are experienced and can manage the situation.

The production lead time, from an order is received, to an order is ready to be sent, differ between the suppliers. The suppliers in Europe have a lead time of 90 days[57], while the supplier in Asia has a lead time of 120 days[58]. Some other suppliers have a lead time which is up to 140 days.

The European supplier is one of few suppliers that do not have a production minimum quantity[59]. Production minimum quantity is the minimum volume the brand owning company can order of a product from the supplier. The main part of the European supplier's products is packed six pieces together and therefore products need to be ordered in multiples of six. In case of an uneven order, the European supplier rounds up the order to the closest multiple of six. The Asian supplier has a production minimum quantity of 300 pieces per product, per order window[60]. Other common minimum

[56] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19
[57] Plant Manager (European supplier) Interviewed by the authors 2015-02-17
[58] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19
[59] Plant Manager (European supplier) Interviewed by the authors 2015-02-17
[60] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19

production quantities, per order window, among the other suppliers are 500 pieces per product and 1 000 pieces for a product model including different colours.

One important aspect of the production is the small orders and the many destinations of distributors, which the suppliers need to manage. Two other important aspects of the production are the long production lead times and the large difference among suppliers' lead time. A third aspect that is important to highlight are the existing minimum production quantities which differ between suppliers. A final important aspect is that the main parts of the European supplier's products have to be ordered in multiples of six.

5.4.3 The activity sorting and packing, performed by the suppliers

This chapter is first describing the sorting and packing activities for the European supplier and thereafter for the Asian supplier.

After production the European supplier sorts products into baskets. One basket contains one SKU to avoid errors when later packing the products. The European supplier has instructions regarding packaging and labelling of the packaging. The instructions constitute of that the size of the packaging should match with standard pallet size[61]. All the packaging, used by the European supplier, are therefore designed to fit on a euro pallet. The used standard packaging size is called SK4. Smaller standard sizes called SK1, SK2 and SK3 are used for smaller orders to get a reasonable load factor[62]. All the sizes of packaging used, are presented with measures in Table 5.

The European supplier sells products in multiples of six and hence the products are always packed six pieces together in a polybag[63]. In case of smaller orders, sizes and sometimes colours of a product model are mixed in a packaging. In a mixed packaging, different sizes and colours are separated with a sheet of paper. The European supplier has information about how many product that fits in a packaging. This information is used by the employees in the packing activity. For the packing activity it is prioritized to pack as few unmixed packaging as possible, but at the same time it is also prioritized to use a large packaging size.

Table 5: Sizes of packaging used by the European supplier.

Packaging	Size in cm (Length x Width x Height)
SK1	40x30x40
SK2	60x40x30
SK3	40x30x20
SK4	60x40x40

[61] Plant Manager (European supplier) Interviewed by the authors 2015-02-17
[62] Customer Service (European supplier) Interviewed by the authors 2015-02-17
[63] Customer Service (European supplier) Interviewed by the authors 2015-02-17

The Asian supplier is also sorting the products into baskets after the production, where one basket contains one SKU. Moreover, the Asian suppliers are provided with other packaging instructions than the European supplier, made by the brand owning company in Asia[64]. According to these instructions the packaging can have a maximum weight of 25 kg and the size of the packaging can be as maximum 60x40x40 cm. The suppliers are recommended to always use the same length and width of the packaging, and if a smaller packaging is needed instead have a lower height of the packaging[65]. According to the interviewed Asian supplier, packaging with different bottom areas is harder to pack on each other on a pallet.

The Asian suppliers are also according to the instructions recommended to pack according to single colour, single product model, and single size. The suppliers are allowed to mix colour and sizes in a packaging, but not product models. It is also written in the packaging document that the suppliers are supposed to separate different products with polybags and mark each polybag with a sticker, which contains information about the product. However, the instruction about separating different sizes and colours is not always followed by suppliers. The instructions from the brand owning company in Asia neither includes information about how many products should be packed in each packaging.

After the production, the Asian supplier creates a packing list. The packing list is an instruction of which product and how many products that will be packed in a packaging, and which packaging size that will be used. The information about how many products that fits in a standard packaging is collected during the sample making, and it is used to create the packing list. One packing list is created for each product model and each distributor[66]. When creating the packing list, the supplier tries to avoid mixed packaging and strive for using as few packaging as possible. First prioritization is to use the supplier's standard size of packaging, 55x32.5x40 cm, and the second prioritization is to mix products as little as possible in a packaging. Smaller packaging, than the supplier's standard packaging, is in general used for remaining products of an order, or for a distributor that orders small volumes per product model. When using smaller packaging the supplier normally chooses to use a packaging with shorter height. If orders are really small the supplier can use a packaging with shorter length and height.

If a packaging is mixed, nothing is done by the Asian supplier to separate the products. After the supplier has packed everything, the volume of each order is calculated to get the total volume and weight for each distributor's shipment. Moreover, the Asian supplier states that different sizes of packaging do not affect the operations in the factory[67]. However, mixed sizes of products in a packaging take longer time to sort and

[64] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[65] Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-18
[66] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19
[67] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19

pack, compared to a packaging that not contains mixed sizes. The supplier, hence, prefers packing packaging that are not mixed.

To summarize, all the brand owning company's suppliers do not have the same instructions regarding recommended sizes of packaging and how the packaging should be packed and labelled. Hence, different packaging size standards are used and the packaging are not packed in the same way. Furthermore, mixed packaging is mentioned as a time consuming activity by the Asian suppliers.

5.4.4 The activity shipping, performed by the suppliers

The incoterm is different for products produced in Asia and in Europe, due to the different business models used for Asia and Europe. The incoterm used for Asia is free-on-board (FOB) and the incoterm used for Europe is delivered-at-place (DAP). Hence, the European suppliers are responsible for the products until the products reach the distributors' warehouse and the Asian suppliers are only responsible for the products until the products are loaded on the ship in the port of shipment. Firstly, the Asian supplier's shipping activity is described, and secondly, the European supplier's shipping activity is described.

The brand owning company has predetermined shippers for the transport from Asia for the subsidiary distributors[68]. External distributors decide by themselves which shippers to use. Normally, sea transport is used and air transport is only used when products are delayed. Around three weeks before shipping departure, the suppliers book capacity via a shipper. The process is the same for all the parent company's suppliers[69]. The shipper enters the booking into a system and sends the information to the brand owning company in Asia. It is checked that the products passed the brand owning company's final quality inspection, and that the invoice matches the shipping document. Thereafter the brand owning company in Asia updates the information from the shipper and returns it to the shipper. The suppliers are only allowed to send the products to the shipper's terminal if the goods passed the final inspection[70].

After the goods are confirmed for delivery to the shipper's terminal, the brand owning company in Asia tries to consolidate the goods for the shipping. The brand owning company's products are consolidated together with other products for the parent company. The parent company has a packaging size standard that is 60x40x40 cm.

The Asian supplier uses trucks to transport the products to the shipping terminal[71]. The products are not transported on pallets, but the shipper puts the packaging on pallets in their warehouse[72]. The products are stored in the shipper's warehouse for approximately

[68] Senior Merchandiser (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[69] Logistics controller (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[70] Logistics controller (Brand owning company, Asia) Interviewed by the authors 2015-03-17
[71] Key Account Manager (Asian supplier) Interviewed by the authors 2015-03-19
[72] Warehouse Employee (Shipper) Interviewed by authors 2015-03-18

four days. The packaging are thereafter manually loose loaded in containers and arranged after order number in the containers[73]. Subsequently the containers are shipped to their destinations.

The European supplier books the transports to deliver the products to all distributors, except for two distributors which are not located in Europe[74]. These two distributors arrange their own transports from the supplier. The booking of transports for the other distributors is made by the European supplier when the products are ready for delivery. Moreover, most transports are arranged by an assigned shipper. In addition, the transports are mainly road transports and the products are primarily sent directly from the supplier to the distributors. However, it exists some exceptions, for instance when products to a distributor are consolidated with other products having the same destination.

To summarize, actors pays for different parts of the transport depending on which business model is used. It is at least one actor of the supply chain that has to pay for the transport. Hence, it is important to secure that packaging and load carriers have a high load factor, to secure efficiency in the whole supply chain. Moreover, the products from Asia are consolidated with other products that have a packaging size of 60x40x40 cm. Hence, the size of the packaging might impact on how easy it is to consolidate and manage the products.

[73] Warehouse Employee (Shipper) Interviewed by authors 2015-03-18
[74] Customer Service (European supplier) Interviewed by the authors 2015-02-17

6 ANALYSIS AND RESULTS

The first part of the analysis and results chapter consists of stakeholders' requirements regarding the differentiated ordering strategy. The segmentation of products is analysed and presented after the stakeholders' requirements. Consequently, order quantity restrictions of each segment are discussed. Finally, the implementation of the differentiated ordering strategy is analysed and presented.

6.1 Stakeholders' requirements on the differentiated ordering strategy

The aim of the study is to propose an ordering strategy that differentiates products based on their ordering characteristics, for the ordering process between the retail brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products. Hence, it is of importance to secure that the differentiated ordering strategy leads to the two above mentioned improvements. The process to create a differentiated ordering strategy is divided into four parts, based on the research questions presented in chapter *1.4 Research questions*. The four parts are; stakeholders' requirements, segmentation, order quantity restrictions for each segment, and implementation of the differentiated ordering strategy.

The stakeholders' requirements concern segmentation, order quantity restrictions, and implementation. The requirements are identified through studying the brand owning company, the suppliers, and the distributors, which is in line with how Croxton (2003) describes how requirements for an ordering process should be found. The identified requirements are used as guidelines to form the differentiated ordering strategy. Requirements are presented for the segmentation, for the order quantity restrictions, and finally for the implementation process.

6.1.1 Stakeholders' requirements on the segmentation

The aim of the segmentation is to identify segments of products that have the same characteristics from an ordering perspective, and are suitable for having the same ordering strategy. An ordering strategy in this study is defined as the quantities that restrict distributors order. According to Croxton (2003) it is important to design the ordering process from customers' perspective, in this study the distributors' perspective. The segmentation therefore has to be based on factors distributors evaluate when they order. Hence, situation specific factors are used for the segmentation, which is stated as important by David (2011).

The segmentation has to be easy to use, because existing activities related to the ordering process of the brand owning company are manual, complex, and time consuming. These activities are presented in chapter *5.2 Activities performed by the brand owning company*. Hence, it is not suitable to implement a new complex and time-consuming activity. By using data in the segmentation that the brand owning company

already collects, the segmentation of new products is simplified, because no extra data needs to be collected. Additionally, the numbers of segments and the number of factors per dimension have to be as few as possible, otherwise it will be a time consuming process to segment products.

Another requirement on the segmentation is that products should only be segmented when they are new in the product assortment, to reduce the complexity of the segmentation. As a result products cannot change segment, from one season to another. This is a requirement, since if a product changes segment, the order quantity restriction also changes. If a product changes order quantity restriction from one season to another, it is both confusing for the distributors and it requires new information to be communicated to suppliers and distributors. Currently, there is no system support for the communication of orders with distributors and suppliers, which is described in chapter *5.2.4 The activity consolidating orders, performed by the brand owning company*. The requirements on the segmentation from a stakeholder perspective are summarized in the bullet points below:

- The segmentation have to be created from distributors' perspective on ordering
- Data used for the segmentation should already be collected by the brand owning company
- Number of segments and number of factors per dimension have to be as few as possible to simplify the segmentation
- A product cannot change segment from one season to another, hence only new products are segmented

6.1.2 Stakeholders' requirements on the order quantity restrictions

Every segment that is identified in the segmentation will have an ordering strategy, with belonging order quantity restriction. According to Croxton (2003) the order quantity restriction is one decision which is necessary for a strategic ordering process. The strategy and the order quantity restriction for each segment have to be based on the characteristic of that segment (Dannenberg and Zupancic, 2009). The brand owning company has asked for order quantity restrictions in terms of MOQ and multiples[75]. MOQ and multiples are both quantity restrictions for orders. MOQ is the minimum quantity the distributors have to order of a product. Multiples are lot sizes. For example, if a multiple is 20 pieces for a product, the distributors are only allowed to order 20, 40, 60 etc. pieces of that product.

If it is too many different order quantity restrictions for the product assortment, the ordering process will be increasingly complex when distributors place orders. Currently, as mentioned in chapter *5.2.4 The activity consolidating orders, performed by the brand owning company*, all orders are managed in excel. If the distributors place wrong order quantities, i.e. not according to the restrictions set, it will result in extra manual work for

[75] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

the brand owning company to correct the orders. Therefore, the number of different order quantity restrictions, have to be kept as low as possible. To keep the number of different MOQ and multiples as few as possible, it can be necessary to evaluate, if some segments can have the same MOQ or multiples. However if a system is implemented in the future, it might be possible to have a higher number of different order quantity restrictions, because the restrictions can then be managed automatically.

Through a dialogue with the brand owning company's supply chain manager it was settled that it is suitable to start with multiple restrictions for 15-20 % of the product assortment[76]. According to the brand owning company it is favourable to start with multiple restrictions for a smaller proportion of products from the product assortment, to secure the advantages with the differentiated ordering strategy as a first step.

The size of the distributors differs a lot. The large size distributors are not affected by the current order quantity restriction, the MOQ of 60 pieces. But the small size distributors argue that it is difficult to order 60 pieces of some products. The brand owning company has stated that the same order quantity restrictions should be used for all distributors[77]. Therefore, the order quantity restrictions have to be suitable for all different sizes of the distributors. Finally, the differentiated ordering strategy has to result in improvements for the whole supply chain, it cannot lead to sub-optimizations. Below the stakeholder requirements on the order quantity restrictions are stated:

- The order quantity restrictions of each segment should be based on the segment's characteristics
- The order quantity restrictions should be in form of MOQs and multiples
- Number of different order quantity restrictions for the product assortment have to be as few as possible
- 15-20 % of the products are suitable for having multiple restrictions
- The order quantity restrictions have to be suitable for all different sizes of the distributors
- The changes implied by the new order quantities have to be based on improvement of the supply chain, no sub-optimizations

6.1.3 Stakeholders' requirements on the implementation

The last step of the study is the implementation. The brand owning company's assortment is updated two times per year and the segmentation is a tool that the company has to use every time a new product is created. It is necessary to establish which activities, of the process between products are developed until products are delivered to distributors, are affected by the differentiated ordering strategy and what changes are needed for these activities.

[76] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20
[77] Supply Chain Manager (Brand owning company) Interviewed by the authors 2015-01-20

Moreover, the implementation of the differentiated ordering strategy has to be adjusted to the existing processes. The differentiated ordering strategy is only affecting one small part of the process identified in chapter *5 The process from products are developed until products are delivered to distributors*. Hence, it is not possible to change the whole process for a differentiated ordering strategy. Small adjustments to the existing process can be done, but the main parts of the process cannot be changed. The identified stakeholder requirements on the implementation are:

- Identify which activities that are affected by the differentiated ordering strategy
- Specify the required changes for activities affected by the differentiated ordering strategy
- The implementation of the differentiated ordering strategy has to be adopted to the existing process

6.2 Segmentation of the products for the differentiated ordering strategy

According to Dannenberg and Zupancic (2009) there are three goals of segmentation. The first goal is that a segment should get a more customized strategy for its special characteristics. The second goal implies that a customized strategy is more efficient. The third goal is that specified targets for each segment should generate better evaluation of the performance of a segment.

This chapter includes a segmentation of the brand owning company's products. Firstly, dimensions or axes of the segmentation matrix is selected, thereafter factors related to each dimension is identified and analysed. Tests of correlation between factors of the same dimension are presented. Thereafter, selection of data for the dimensions' underlying factors and number of segments in the segmentation are presented. Finally, a validation to test the segmentation is presented.

6.2.1 Dimensions that are of importance from an ordering perspective

A matrix with two dimensions is the segmentation method presented in chapter *2.3.1 A product segmentation method*. David (2011) stated that it is important to select dimensions of the matrix that are specific for the studied situation. Therefore, dimensions of the segmentation matrix are identified based on the studied context. As mentioned in chapter *6.1 Stakeholders' requirements on the differentiated ordering strategy*, the segmentation should be made from the distributors' perspective on ordering. Hence, the dimensions have to be selected from the distributors' ordering perspective, because it is the distributors that order the products. Conversely, when the order quantity restrictions for the segments are set, the distributors' perspective is not the only input, to avoid sub-optimizations in the supply chain. This chapter is analysing and presenting two dimensions from the distributors' perspective, see Figure 12 (inspired by Padhi et al., 2012). Furthermore, each dimension consists of underlying

factors (Padhi et al., 2012). The underlying factors are presented in the next chapter, chapter *6.2.2 Underlying factors of the dimensions*.

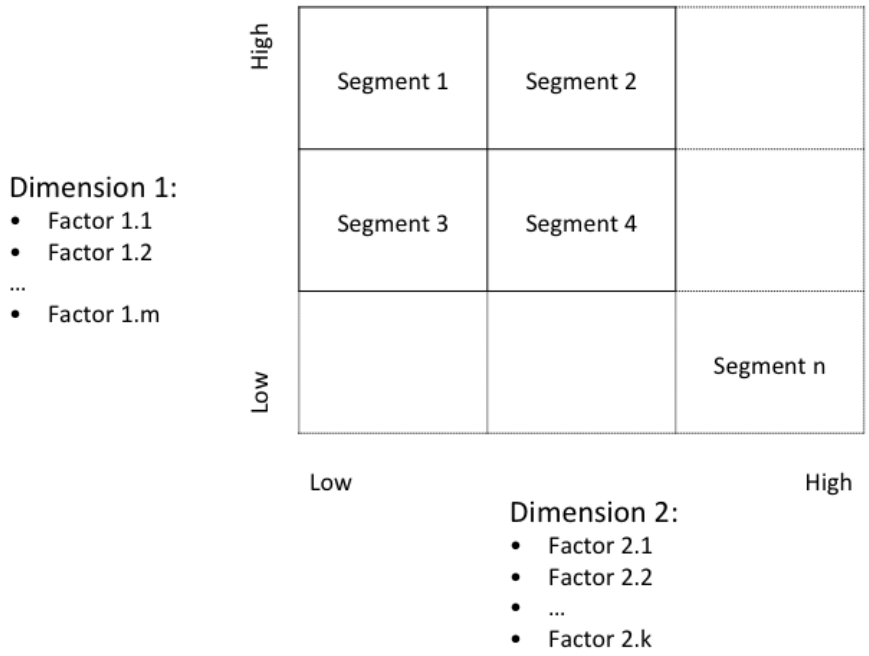

Figure 12: The two dimensions with underlying factors will be selected from distributors' point of view (Inspired by Padhi et al., 2012).

As mentioned in chapter *6.1.1 Stakeholders' requirements on the segmentation*, it is required to identify different product segments with equal characteristics from an ordering perspective. Each segment should have a different ordering strategy with a connected order quantity restriction. Hence, the selected dimensions of the matrix has to segment the product assortment so that products that are suitable to have the same order quantity restriction, ends up in the same segment.

As presented in chapter *5.3.1 The activity second forecast, performed by the distributors*, distributors decide which products and which volumes to order based on historical sales data, risks, and market trends. Historical sales data and market trends are related to the overall demand of the products, while risk is more related to the characteristics of a product. Hence, demand and risk are two separate aspects that are evaluated when distributors place orders. Both risk and demand are therefore evaluated in this chapter, to investigate if they are suitable as dimensions of the segmentation matrix.

In this study risk is defined as how large quantities a certain distributor is willing to order of a specific product. The studied distributors are willing to order a lower volume of high risk products and a higher volume of low risk products. Distributors are hence willing to accept higher order quantity restrictions for low risk products. Conversely, the distributors request lower order quantity restrictions for high risk products. If high risk products have higher order quantity restrictions the products might not be ordered at all, because distributors are not willing to take a higher risk and order a higher quantity. A

product with low risk can instead have higher order quantity restrictions without affecting the volumes ordered. Thus, products with low and high risk are not suitable for having the same order quantity restrictions. Risk is as a result appropriate for identifying different segments from an ordering perspective. Hence, risk is suitable as one dimension of the segmentation matrix.

Demand of a product is what volumes the market wants to order of a product. If the demand of a product is higher, the distributors order a larger aggregated volume, and vice versa. By using higher and firmer order quantity restrictions for high demand products, the products can be handled in a more standardized way. A standardized way to manage products can for instance be to use the same packaging sizes and send less proportion of mixed packaging. On the other hand, products with lower demand need lower order quantity restrictions to not create an even lower demand of the product, by using too high order quantity restrictions. This indicates that products with low and high demand should not be managed in the same way when ordering. If low and high demand products are managed in the same way, it is possible that low demand products never reach the market due to too high restrictions. It is also possible that high demand products result in higher costs than needed, associated with an unstandardized way of handling the products, due to too low order quantity restrictions.

The demand in a garment retail supply chain is often characterized by high volatility and many different factors that influence the demand (Christopher and Peck, 1997). Therefore, it might be difficult to identify specific factors that relates to the demand of the product. For example, it is complex to prove that colour and demand is related, i.e. that the demand of a product with a certain colour always is higher. Hence, the demand of the product includes relevant information about the product, which is hard to identify through other aspects of the product. Demand is therefore, an appropriate dimension to use in this context to segment the products from an ordering perspective.

Both risk and demand are suitable as dimensions of the segmentation matrix, because they are the two main aspects that distributors evaluate when ordering. Risk and demand are therefore the most relevant aspects to use when segmenting the brand owning company's products from an ordering perspective. The selected dimensions are depicted in Figure 13 and the underlying factors of the dimensions will be described in chapter *6.2.2 Underlying factors of the dimensions.*

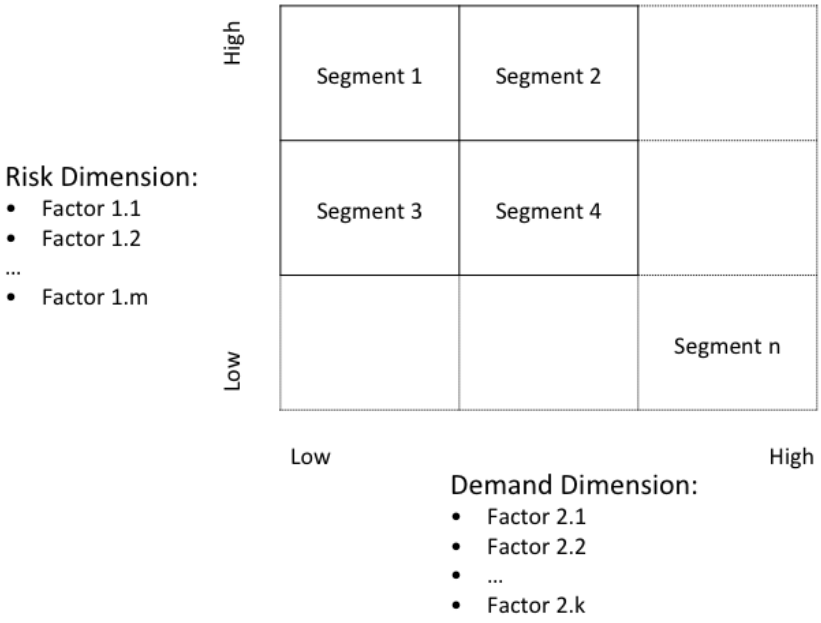

Figure 13: The selected dimensions, risk and demand, of the segmentation matrix.

6.2.2 Underlying factors of the dimensions

This chapter identifies the underlying factors of the two dimensions of the segmentation matrix, risk and demand. The factors are later used to segment the products in the matrix (Padhi et al., 2012). The analysed factors are identified in the literature and through interviews with the brand owning company, suppliers, and distributors. The chapter starts with an analysis of factors that only were identified in the literature, to investigate if the factors affect the risk or the demand of distributors' ordering. Subsequently, factors that both were identified in the literature and when interviewing the supply chain actors are analysed, to investigate if these factors affect risk or demand. The factors that affect risk or demand are of relevance to consider in the segmentation.

6.2.2.1 Factors only identified in the literature

The factors analysed in this chapter are only identified in the literature. The analysed factors are presented in Table 6.

Table 6: Four factors that only were identified in the literature.

Factors only identified in the literature	
Stock-out rate	Forecast error
Product variety	Markdown on the price

It never exist a stock-out rate between the brand owning company and the distributors, because the brand owning company does not own the products and does not have an inventory. Product variety is a factor related to the number of products that has the same function, for example the number of t-shirts. Since the segmentation of products investigates every product model and colour the product variety is not relevant. In

addition, markdown on the price of the products between the brand owning company and distributors is not used. Hence, the factor markdown is not included. At last, forecast error is a factor irrelevant for the differentiated ordering strategy because it does not affect distributors' ordering decision, since the forecast error only affects the brand owning company. To summarize, all four factors only mentioned in the literature are not relevant in this retail supply chain, hence none of these factors are included as an underlying factor in the segmentation.

6.2.2.2 Factors identified both in the literature and through empirical data

The factors which are analysed in this chapter are mentioned by Van Weele (2010) or Fischer (1997) and identified as important from an ordering perspective through empirical data, which is presented in chapter *5 The process from products are developed until products are delivered to distributors.* The factors that are investigated are visualized in Table 7; order volume, price level, margin, customer segment, product life-time, ordering situation, and lead time. Each factor is discussed based on its relevance for the dimensions risk or demand.

Table 7: Seven factors identified in the literature and through empirical data.

Factors identified in the literature and through empirical data	
Order volume	Product life-time
Price level	Ordering situation
Margin	Lead time
Customer segment	

Order volume

Van Weele (2010) mentioned the order volume as an important factor. In this study, the order volume is forecasted in the first forecast and in the second forecast, and later the distributors place the orders. Hence, the order volume is included in many activities and the factor is of importance to investigate. If the demand of a product is higher, the order volume is higher, and vice versa. The dimension demand and the order volume are therefore directly interlinked with each other. Moreover, the order volume of a product is directly related to order quantity restrictions. The order volume is therefore an important factor to be able to segment products in groups that can have similar order quantity restrictions. Because different data for order volume, first forecast, second forecast, and orders, exists, one needs to be selected to use in the segmentation. The selected data of order volume is presented in chapter *6.2.4 Selection of data for the dimensions' underlying factors.*

Price level

Price is mentioned by the distributors and by Van Weele (2010) as an important factor. Price in this context is the price distributors have to pay for the product. A clear relation between the risk and the price is identified. The distributors have stated that products with high price have higher risk, and products with low price have lower risk. Therefore

distributors can take a higher risk, in this case ordering a larger quantity, for products with low price, and vice versa. Hence, it is suitable to have different order quantity restrictions for high and low price products. Consequently, price is important to include in the segmentation.

What is seen as a high price differs between different products. For example, a pair of trousers for 500 SEK is a low price product while a t-shirt for 500 SEK is a high price product. Therefore, it is not possible to argue that products that have a price over a certain amount are high price products. The brand owning company has assigned price-levels to all products, and there are three different levels, low, mid, and high price. With this price level segmentation it is possible to identify which price level a products belongs to, low, mid, or high price. The price level is therefore used as a factor of risk, instead of the price itself, in the segmentation.

Margin

The margin in this study is the margin for the distributor, i.e. the difference between the price distributors pay for the product and the recommended price to retailers. Margin is a factor which is described as relevant for a supply chain strategy by Fischer (2007). According to distributors, the margin is related to the risk of the product. The total margin, for all sold products, of one distributor is the main contributor to reach that distributor's sales budget. The margin is therefore a relevant factor for the distributor. If a product's margin is low, it is a risk that distributors do not want to buy that product. If a product has a high margin, it is a larger possibility that distributors want to order the product. Therefore, a higher margin is associated with a lower risk of the product and a lower margin is connected with a higher risk of the product. The margin is therefore affecting the distributors ordering decision. Thus, the margin is related to the dimension risk and the margin is of importance to include in the segmentation.

Customer segment

Van Weele (2010) describes technical level as a factor of product complexity. A technical level in the brand owning company's context is the complexity of the design and the function of the product. The brand owning company has divided their products into four different customer segments, which have differentiated complexity of design and functional performance. The four different segments are easy, endurance, explore, and edge. The segment easy has the lowest complexity of design and function, and it gradually increases to the segment edge, which has the highest complexity of design and function. Therefore, it is assumable that different technical levels can be connected to the brand owning company's different customer segments.

Distributors have stated that it is a higher risk to buy products with high complexity of design and function, because the demand for those products is more unpredictable. Hence, it is suitable with lower order quantity restrictions for products with high complexity of design and function. The products with low complexity of design and function are generally associated with less risk for distributors. Higher order quantity

restrictions can therefore be applied on low complexity products. To summarize, the customer segment is related to the risk dimension and is important to include in the segmentation.

Product life-time

The product life-time indicates how long time a product is available on the market. Both Fisher (1997) and Van Weele (2010) state that product life-time is an important factor. The distributors argue that the product life-time affects their ordering decision and that it is related to the risk of the product. For a product with long product life-time, distributors can afford to take a higher risk, which implies to order a larger quantity. Distributors can afford to take a higher risk because a long product life-time indicates that the product will continue to be sold on the market. But even if it is a product with long product life-time, the product will be removed from the product assortment at some point. When a product soon will be removed from the product assortment, the risk of the product increases, because the product soon cannot be sold on the market. Hence, the risk of a product gradually increases during a product's life-time.

If product life-time is included in the segmentation, as an underlying factor to the dimension risk, the segmentation of the product has to be updated each season. Since the stakeholders' requirements define that a product cannot be moved to another segment, product life-time is not suitable to include in the segmentation. Furthermore, it is identified that the factor product life-time is not assigned to a large proportion of the products, and the distributors' state that the product life-time often changes. These two aspects indicate that it is not possible to include product life-time in the segmentation, until the brand owning company has accurate data of product life-time for all products. To summarize, product life-time is not included in the segmentation, but it is recommended for the brand owning company to further investigate the factor when accurate data is available.

Ordering situation - new or repeat ordering

Van Weele (2010) stated that the ordering situation is an important factor. The ordering situation can either be a new ordering or a repeat ordering. New ordering occurs when the product is ordered by the distributor for the first time. On the contrary, repeat ordering occurs when the product has been ordered before by the distributor. One of the large distributors stated that new ordering is associated with higher risk, because it is difficult to know how the market will react on new products. The distributor also states that repeat ordering is associated with less risk, because the reaction of the market on the product is already known. However, the ordering situation is only mentioned by one distributor and it is therefore not considered to impact the risk of a product to a large extent. As mentioned in chapter *6.1.1, Stakeholders' requirements on the segmentation*, the segmentation should include as few factors as possible, to keep the segmentation easy. Due to the reason that the ordering situation is not seen as an important factor of risk and few factors should be selected, the ordering situation is not included in the segmentation.

Lead time

The lead time was mentioned by Fisher (1997) as an important factor. The lead time of the production was stated as important by one of the large distributors when ordering. The lead time for production varies between 90 and 140 days between different suppliers and products. The large distributor also argues that it is important with short lead times for campaigns, and that products with a long lead time never are selected for campaigns. However, campaign products are a small share of all products and other distributors have not mentioned lead time as an important factor. Hence, the lead time is not considered to affect the risk of the products to a large extent when distributors order. The lead time is therefore not included as an underlying factor in the segmentation.

6.2.2.3 Factors relevant for the dimensions risk and demand

None of the factors only identified in the literature are suggested to be an underlying factor of the dimensions risk and demand. Instead, the four factors: order volume, price level, margin, and customer segment, are argued in chapter *6.2.2.2 Factors identified both in the literature and through empirical data*, to be underlying factors of the dimensions risk and demand. The factors considered to impact on the risk dimension, are, price level, margin, and customer segment. The factor considered to impact on the demand dimension is the order volume, see Figure 14.

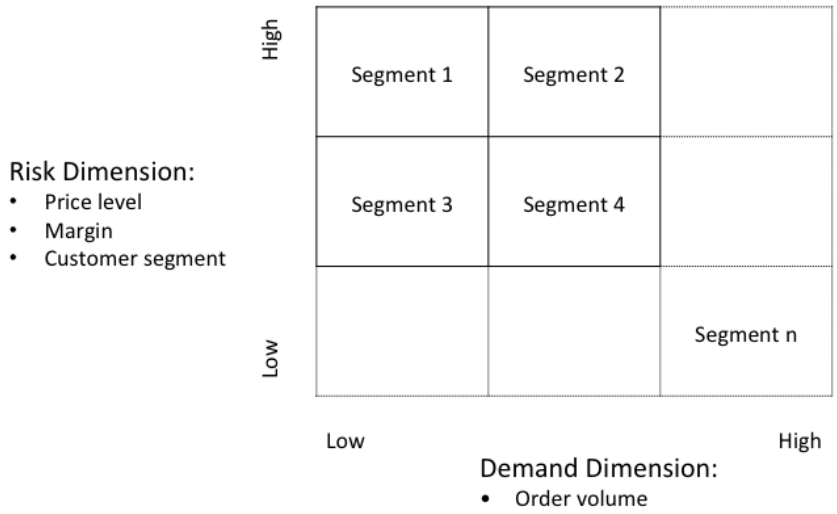

Figure 14: The segmentation matrix with the two dimensions, risk and demand. The risk dimension has three underlying factors, price level, margin, and customer segment. The demand dimension has one underlying factor, order volume.

6.2.3 Correlation test between factors relevant for the dimensions risk and demand

This chapter consists of an investigation to identify if some of the factors, relevant for the dimensions risk and demand, have any correlation with each other. If factors of the same dimension show correlation, only one of the factors is necessary to include in the segmentation, otherwise the segmentation will be made on the same aspect twice. The demand dimension is only including one factor, hence it is not possible to investigate

any correlation for this dimension. The risk dimension consists of three factors, price level, customer segment, and margin. The correlation between these three factors is tested, to identify if it exists a correlation between some of them.

First, the correlation between the factors price level and customer segment is tested. The commercial manager has stated that different price levels are connected to different customer segments; easy, endurance, explore, and edge[78]. It is argued that easy includes low price products and endurance includes mid price products. Furthermore, it is stated that explore includes mid to high price products, and edge includes only high price products. To analyse if these factors are correlating, data of what price levels different customer segments have for season SS15, has been summarized in Table 8.

Table 8: The table describes how many products from each customer segment that has a certain price level. The products analysed are products from season SS15. The shaded squares highlight the price level that is most common for each customer segment.

Customer segments	Low price	Mid price	High price
Easy	79 % (278)	21 % (72)	0 % (0)
Endurance	4 % (20)	90 % (418)	6 % (26)
Explore	3 % (3)	34 % (34)	63 % (63)
Edge	0 % (0)	24 % (12)	76 % (37)

For the main part of the products, it is a correlation between price level and customer segment. Hence, the customer segment easy normally has a low price, the customer segment endurance normally has a mid price, the customer segment explore normally has mid and high price, and the customer segment edge normally has a high price. The correlation makes it possible to only include one of the factors, price level or customer segment, in the segmentation. If both factors are included, the products will be evaluated on the same aspect twice. The factor customer segment is chosen, because it is a segmentation already used by the brand owning company. It is also chosen because price level is one aspect of the customer segments, not the other way around.

The second test investigates the correlation between the factors customer segment and margin. The correlation between price level and margin will not be studied, because price level is from now on included in customer segment. It is identified that the mean value of the margin indicates a correlation with the customer segments; easy, endurance and explore. The correlation depends on that the mean value of the margin is lowest for explore and gradually increases to easy, see Table 9. However, it is no correlation between the mean value of the margin and edge, because the segment edge has the highest mean value of margin. If it was a correlation, the segment edge should have had the lowest mean value of margin, among the four customer segments.

[78] Commercial Manager (Brand owning company) Interviewed by the authors 2015-01-28

Table 9: The mean value of the margin for each customer segment. The data is collected from AW15.

Customer segment	Mean value of margin
Easy	63,75%
Endurance	60,09%
Explore	57,38%
Edge	65,59%

Even if edge products have high margin, it might not be suitable to order these products with a high order quantity restriction, because the high price is still a large risk. It depends on that high price products are expensive to keep in stock and normally have an unpredictable demand. This indicates that edge products are still suitable to treat as high risk products in the segmentation, even if the high margin decreases the risk of the edge segment.

Hence, it is possible to argue that the margin is included in the customer segments. The segment easy has the lowest risk of the customer segments, which also the high margin indicates. The segment endurance has the next risk level after easy, which also the margin points at. Moreover, the segment explore has as high risk, which the low margin also indicates. The segment edge also has a high risk, which the margin does not indicate, but as argued above the high price still indicates that the segment edge should be treated as a high risk segment. In addition, the brand owning company especially works to secure the margin for low price products. Therefore, the margin is argued to be included in the customer segment. To summarize, the factor customer segment is the only factor needed to represent the risk of the products in the segmentation, because it correlates with price level and show a connection to the margin. See the matrix in Figure 15.

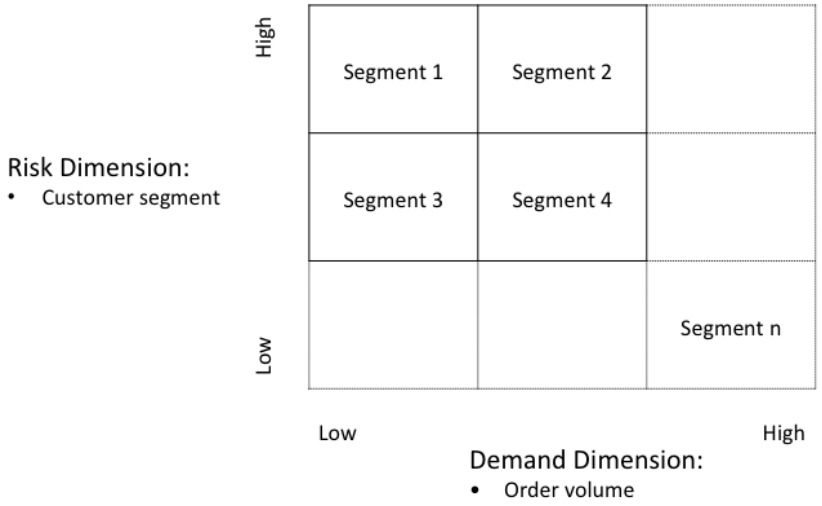

Figure 15: The segmentation matrix with the selected dimensions, risk and demand, and the selected factors, customer segment and order volume.

As a result of that only one factor of each dimension is selected, there is no need to weigh the factors against each other. According to Padhi et al. (2012) a dimension with one factor automatically results in a weight of 1.0 for the factor, which means that it is the only factor affecting the dimension.

6.2.4 Selection of data for the dimensions' underlying factors

This chapter presents the selection of data for the underlying factors of the dimensions. The two factors are order volume and customer segment. For the factor customer segment it only exists one kind of data, which is created with the first draft. Hence, it is not possible to select any other kind of data for the factor customer segment. For the order volume however, it exists different data. Except for the actual orders, the order volume is also forecasted in the first forecast and in the second forecast. Therefore, it is important to select which data that should be used as the order volume in the segmentation.

The order volume is initially forecasted in the first forecast by product managers at the brand owning company and then in the second forecast by the distributors. The real order volume is quantified at first when the distributors place orders. The order quantity restrictions have to be set before distributors ordering, why the orders cannot be used as data input for order volume. If the order quantity restrictions are not included when distributors make the second forecast, but included when distributors place the orders, it can be confusing for distributors that the order quantity restrictions are changed. Furthermore, the communication of the order quantity restrictions will not be consistent, if the restrictions are changed between second forecast and ordering. It can also be hard to motivate for distributors why a certain product will have changed order quantity restrictions. Therefore, it is necessary to include the order quantity restrictions before the distributors make the second forecast.

The only measure of order volume that exists before the second forecast, is the first forecast. The first forecast only includes a forecast for each product model. However, the difference in order volume between colours of the same product model can be large. For the same product model, different colours can have a demand between 400 and 30 000 pieces. If using the first forecast as it is accomplished today, would hence not consider the difference in demand between colours of a product. If a product is segmented without considering colour, it could therefore be questionable to equalize, a colour that sells 400 pieces, with a colour that sells 30 000 pieces. Therefore, it is necessary to use order volume of each specific colour of a product, in the segmentation.

It has also been investigated if the first forecast of a product model can be combined with a generalized demand of specific colours for the whole product assortment. Therefore, an investigation has been done, to see if there are colours that always have a large demand. The result was that for example black, can be the most popular colour for some products, but for other products the colour black has not sold in a single piece.

The conclusion is hence that it is not as simple as only looking at the colour to be able to define if a product will have a high or low demand. Christopher and Peck (1997) also state that the demand is unstable in a garment retail supply chain and influenced by many factors. Due to the complexity of the demand it is not possible to combine the first forecast of a product model, with a generalized demand of different colours.

Even if it is stated in stakeholders' requirements that only existing data should be used, the brand owning company is recommended to start doing the first forecast on colour level. It will be more time consuming and complex to do the first forecast on colour level. However, it would be useful for the brand owning company to get an indication of the demand of each product in the beginning of the development process. Currently, many products are cancelled, and by forecasting the demand of each colour, it will be easier to earlier discover products with low demand and cancel these products early. By cancelling products earlier in the process, the unnecessary work with developing too many products can be reduced. So even if it is time consuming and complex to do the first forecast on colour level, it can reduce unnecessary work and related costs. To summarize, it is recommended to start doing the first forecast on colour level, and include it in the segmentation as the factor order volume.

6.2.5 Number of segments in the segmentation

The segmentation aims at finding segments that is suitable for different ordering strategies with different order quantity restrictions. To achieve a segmentation that represents the product assortment from an ordering perspective, it is necessary to investigate how many levels of each dimension that is suitable to separate segments from each other, see Figure 16. In addition, one of the specified requirements on the segmentation is to keep it simple, and therefore the number of segments is limited to achieve an easy result. Therefore, as a basis, each dimension will have as few levels as possible, which in this case implies two levels. Following, there is an argumentation of how to find the levels that separate the products into different segments. First, levels for the risk dimension are analysed, and thereafter, levels of the demand dimension are analysed.

The first dimension, risk, contains the factor customer segment. In order to not get too many segments but still be able to separate different levels of risk, two levels of risks are at least necessary. Because high risk products are suitable for having a lower order quantity restriction it is important to find a high risk segment. The customer segment edge is characterized by high price and technical products. As argued in the previous chapter the margin for edge products are the highest, but an edge product is still argued to be a high risk product, because it is not suitable to order high price and complex products with higher quantity restrictions. The customer segment explore consist of high to mid- price, mid technical, and low margin products. These aspects indicates that explore products are not suitable to order with high order quantity restriction either. Hence, explore and edge products are seen as high risk products in the segmentation.

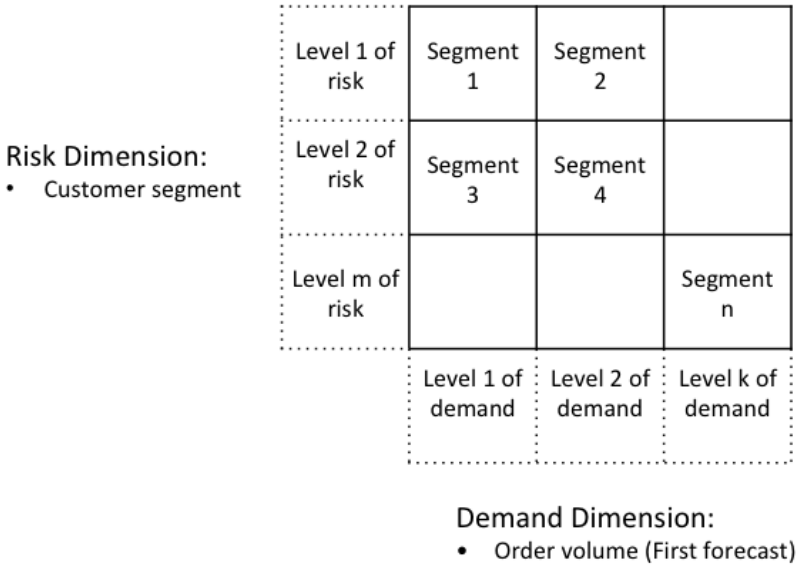

Figure 16: The levels of the two dimensions risk and demand need to be identified, to be able to create different segments in the segmentation.

It is also of importance to identify which products that have a lower risk. Endurance and easy products are less technical products than edge and explore products. Furthermore, easy and endurance products are low and mid price products, and the focus for the brand owning company is to secure the margins for these products, which implies that easy and endurance products have lower risk. Easy and endurance are low risk products, and therefore suitable for having higher order quantity restrictions. Hence, two levels, high risk and low risk, are enough to represent the brand owning company's products from a risk perspective. Edge and explore products are high risk products, while easy and endurance are low risk products, see Figure 17.

The second dimension, demand, represents the first forecast of the product. For the demand dimension it is important to separate low forecasted volume from high forecasted volume, because it will impact on how high the order quantity restrictions on a specific product can be. For a low forecasted volume product it is not possible to have a high order quantity restriction, because the first priority is to secure that the product will reach production minimum quantity. Instead for a high forecasted volume product it is possible to investigate the potential for having higher order quantity restrictions. As a basis, two levels of the demand are investigated, low demand and high demand, and one limit is needed to separate the two levels.

The limit, between low and high demand, is based on the stakeholders' requirements. According to the requirements it is suitable with multiples, for around 15-20 % of the products. Approximately 18 % of the products have an order quantity of 2 000 pieces and above, for season AW14. Since these 18 % of the products stood for 62 % of the turnover for the season AW14, it can be assumed that these 18 % are suitable for treating as high demand products. For season AW15 the corresponding data is that, 15 % of the products have a volume higher than 2 000 and their turnover stands for 54 % of

the total turnover of that season. As a result, 2 000 pieces is a suitable limit to separate low demand products from high demand products.

The variety of the demand is large, for the season AW15 the demand of a product varied from 0 to 35 000 pieces, hence it might not be enough to only have two levels of the demand dimension. As mentioned above, 15-18 % of the products have a demand over 2 000 pieces, hence 82-85 % of the products have a demand lower than 2 000 pieces. It was therefore investigated to also have a lower limit of demand, 500 pieces, to separate the low demand and high risk products into one group. However, the high risk products, edge and explore, only stands for approximately 15 % of the products. Therefore, it was difficult to separate the high risk products into three different segments, and according to the stakeholders' requirements it is important to keep the segmentation simple. The demand dimension is therefore only divided into two levels, low demand and high demand.

Consequently, the resulting segmentation will have two different levels of risk and two different levels of demand. The resulting segmentation will as a result have four different segments, which is depicted in Figure 17.

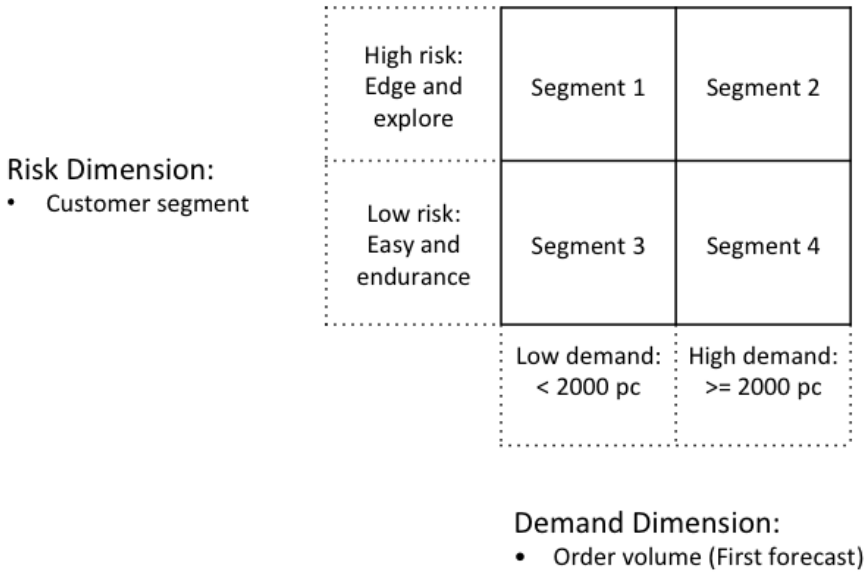

Figure 17: The resulting segmentation has four different segments. The risk dimension has two levels, high risk and low risk. The demand dimension also has two levels, low demand and high demand.

6.2.6 Validation of the segmentation

The aim of the validation is to check if the segmentation meets the requirements and divides the products as expected. Two ways to validate the segmentation were described by Dannenberg and Zupancic (2009) and Padhi et al. (2012). Firstly, the method described by Dannenberg and Zupancic (2009) is presented, and secondly, the method described be Padhi et al. (2012) is presented.

One way of testing segmentation according to Dannenberg and Zupancic (2009) is to use four questions which need to be answered positively to confirm that the segmentation is approved. The four questions are presented in bullet points and will consequently be answered with basis in the performed segmentation.

- Are the selected segmentation criteria really relevant from an ordering perspective?
- Are the characteristics within the identified segments as homogenous as possible, and as heterogeneous between the segments as possible?
- Does the segmentation correspond to the company's strategy and competences?
- Are the segments stable for a long time?

The first question was investigated through frequent communication with stakeholders at the brand owning company, but also through examining the whole process, from products are developed to the products are delivered at distributors' warehouse. The segmentation criteria, risk and demand, were considered relevant for the study by the authors as well as by the commercial manager and the supply chain manager at the brand owning company.

The second question can be answered with that the correlation between different factors of each dimension has been investigated. The correlation showed that price level and customer segment correlated, and that customer segment and margin correlated. A customer segment therefore has same characteristics in terms of price, margin, and functionality. Hence, it can be stated that the characteristics within the segments are homogeneous. The heterogeneousness of the segmentation is ensured through the decided levels for the dimensions demand and risk.

The third question relates to the company's strategy and competences. The brand owning company strives towards a narrower product assortment with higher demand per product. One of the segmentation's aims is to increase the amount of products that reach the production minimum quantity, in order to decrease the large amount of cancelled products. Hence, the aim of the segmentation is to increase the demand for some products. The segmentation therefore relates to the brand owning company's strategy.

The fourth question considering if the segments are stable for a long time, can be interpreted in different ways. However, in this study it is interpreted how long time the identified segmentation is valid. As long as the brand owning company uses the customer segments, it can be used as a factor. However, the demand might change, and therefore it might be necessary to update the limit of 2 000 pieces over the long time. Moreover, if larger changes happen in the supply chain it can affect the validation of the segmentation. To summarize, if not any larger changes occur in the supply chain, the segments are stable for a long time.

The second step of the validation is to validate the positioning of the products in the segmentation, by seeking advice from experts in the subject (Padhi et. al, 2012). Experts in this study are identified as employees working at the brand owning company with a great knowledge about the products and the process from products are developed to products are delivered at the distributor. The commercial manager together with the supply chain manager was selected to be the experts. Furthermore, an in-depth discussion about the positioning was recommended by Wagner et al. (2013). Hence, an in- depth discussion about the positioning of products with the commercial manager and the supply chain manager, is the second step to validate the segmentation.

The in-depth discussion test are carried out with basis in products that are specially selected, cherry picked, to get products with different characteristics and to be able to know which segment a product with specific characteristics should be placed in. Products from each of the brand owning company´s product categories are selected. Each category has different concepts and each concept is related to a customer segment. At least one high risk customer segment concept and one low risk customer segment concept, within each category are selected. In addition, two products from each selected concept are selected. All selected products are presented in Appendix III.

The discussion comprised the relevance of the levels of the segmentation based on how the products were segmented. The division between high and low risk products was considered by the experts to create an appropriate limit for segmenting the risk. In addition, the division of low and high demand was not questioned. The cherry picked products were positioned as expected in the segmentation, which indicates a representative segmentation from an ordering perspective.

To summarize, two different methods for validating the segments are applied to the segmentation. Both of the methods showed that the segmentation is reasonable and valid for the specified context.

6.3 Order quantity restrictions in terms of MOQ and multiples for each segment

In order to investigate what kind of order quantity restrictions that is suitable for each segment, an analysis of the characteristics of each segment is included in the chapter. The included order quantity restrictions are MOQ and multiple restrictions according to the stakeholders' requirements identified in chapter *6.1.2 Stakeholders' requirement on the order quantity restrictions*. Consequently, an MOQ for each segment and multiples for selected segments are presented.

6.3.1 Characteristics of the segments

A discussion of what characteristics the products in each segment have is included in this chapter. The segmentation matrix, which is used as a basis in this chapter, is depicted in Figure 18.

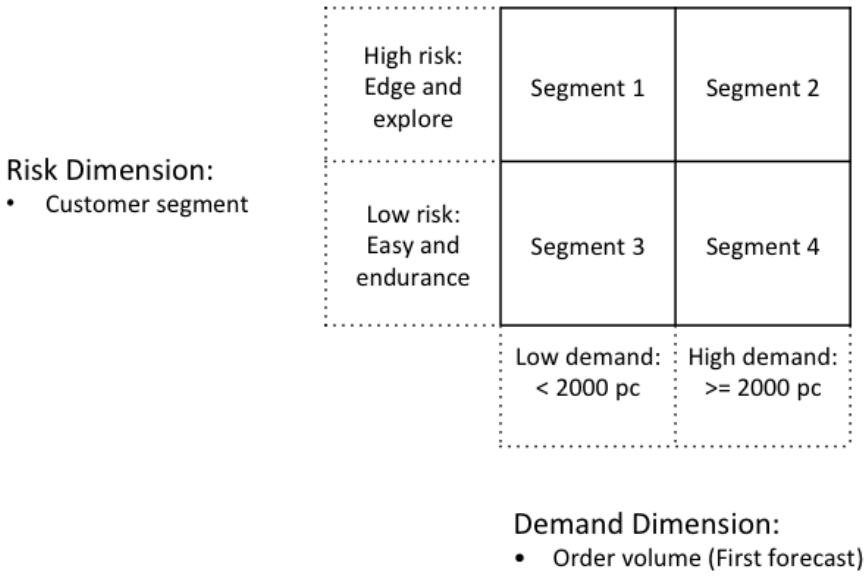

Figure 18: The segmentation matrix including four different segments.

The products are segmented in four different segments and actual orders are used to represent the demand in this test, because the first forecast does not exist on colour level yet. Table 10 shows how many products and percentages of products that belong to each segment, based on data from season AW15 and SS15. Furthermore, Table 10 also shows that the low risk products, segment 3 and segment 4, stands for the majority of the products. 84-88 % of the products are placed in segment 3 and segment 4 for the two seasons. Consequently, only 12-16 % of the products are placed in segment 1 and 2. An analysis of what characteristics the products in each segment have is presented below, in order to investigate what kind of order quantity restriction is suitable for each segment.

Table 10: The number of products and the percentage of products that belong to each segment, for season AW15 and SS15.

	Number of products AW 15	**Percentage of products AW 15**	**Number of products SS15**	**Percentage of products SS 15**
Segment 1	191	11 %	178	15 %
Segment 2	12	1 %	14	1 %
Segment 3	1303	74 %	269	60 %
Segment 4	253	14 %	289	24 %
Total	1759	100 %	1220	100 %

Segment 1 contains products with high risk and low demand, see Figure 18. For the seasons AW15 and SS15, the segment represented 11-15 % of the products. Generally, these products have a high risk, due to mid to high price, and advanced functionality. The objective is to have a low order quantity restriction, in terms of a lower MOQ, because the products within segment 1 have low demand and high risk. The low order

quantity restriction will make it possible even for smaller distributors to order expensive and seasonal products with a high risk and a low demand.

The lowest volume of products is placed in segment 2, a segment with high risk and high demand products. It is only 1 % of the products that matches with this indication. These products are also characterized by mid to high price and advanced functionality, like segment 1. Because of the higher demand of products in this segment, the distributors might be willing to order the products, even if the order quantity restriction is higher. Hence, this segment should have a higher MOQ than segment 1.

Segment 3 consists of products with low risk and low demand and the segment contains the major part of the products for both season AW15 and season SS15. The identified characteristic for segment 3 is hence a lower risk compared to both segment 1 and segment 2. The lower risk of this segment implies that this segment should have a higher order quantity restriction than both segment 1 and 2. However, this segment has lower demand than segment 2, which implies that this segment should have lower order quantity restrictions than segment 2. Hence, the order quantity restriction for segment 3, can be both higher and lower than for segment 2, depending on which factor that is taken into consideration. In chapter *6.1.2 Stakeholders' requirements on the order quantity restrictions,* it is stated that as few different order quantity restrictions as possible should be used for the product assortment. Therefore, it is recommended that segment 2 and segment 3 can have the same order quantity restriction.

Segment 4 includes 14-24 % of the products, the second most products after segment 3. The segment contains products with a low risk and a high demand. The low risk is characterized by low price products with less advanced functionality. The low risk makes it possible also for smaller distributors to manage higher order quantity restrictions, hence a higher MOQ. For the products with a high demand and low risk it is also possible to increase the handling efficiency of the products, by introducing additional order quantity restrictions in addition to MOQ. The additional order quantity restriction, multiple, is described in Chapter *6.3.3 Multiple restriction for the high demand and low risk segment.*

To summarize, the segments are analysed based on their characteristics for ordering. The order quantity restrictions for each segment are based on these characteristics. Low risk and high demand are characteristics that imply that it is more secure to set higher order quantity restrictions, without impacting on the demand. On the other hand, high risk and low demand are two characteristics that imply that it can be necessary to have a low order quantity restriction to favour the product, so the product is not deselected because of the restriction.

6.3.2 MOQ restrictions for each segment

As stated in chapter *6.1.2 Stakeholders' requirements on the order quantity restrictions*, the restrictions should be in form of MOQ and multiples. This chapter presents MOQ, multiples are presented in chapter *6.3.3 Multiple restriction for the high demand and low risk segment.* The current MOQ, for all distributors and for all products are 60 pieces per order window. The distributor chooses itself how to divide these 60 pieces between different sizes. The MOQ was recently increased from 30 to 60 pieces, but the brand owning company is still accepting less than 60 pieces for some products. The MOQ for distributors was raised by the brand owning company to get a larger proportion of products to reach production minimum quantity and to generally increase the sales volume for each product.

The brand owning company's strategy is to narrow down the assortment and increase the sales volumes for each product. As a result the company hopes to decrease the large amount of cancelled products and increase the profit. Currently, distributors order small volumes of a large amount of products. The brand owning company wants the distributors to take more strategic decisions about the product assortment, in terms of selecting fewer products and order a higher volume of these products. By raising the MOQ, the wanted result is that distributors take more strategic decisions about their assortment. The MOQ for all segments identified in the segmentation, therefore need to correspond to the brand owning company's strategy. Three identified approaches of setting a new MOQ are analysed in this chapter. The three approaches are:

- The mean number of distributors that order a product
- Relation between different segments and production minimum quantity
- Relation between order volume and production minimum quantity

One approach of setting a new MOQ is to analyse how many distributors that place an order, for each product during each order window. The mean value of distributors ordering the same product can be compared with a general production minimum quantity, to get an assumption of what an appropriate MOQ can be, to be able to reach the production minimum quantity. Two common minimum production quantities are 300 and 500 pieces per colour of a product model. For season AW14 and SS15, the mean value of distributors that ordered the same product in each order window, are four distributors. If it is assumed that a product has a minimum production quantity of 500 and a distributor order the minimum quantity, a reasonable MOQ to reach production minimum quantity would be 500 divided by four, which is 125 pieces see Figure 19. If the minimum production quantity instead was 300 pieces per colour a reasonable MOQ, with the same reasoning, is 75 pieces.

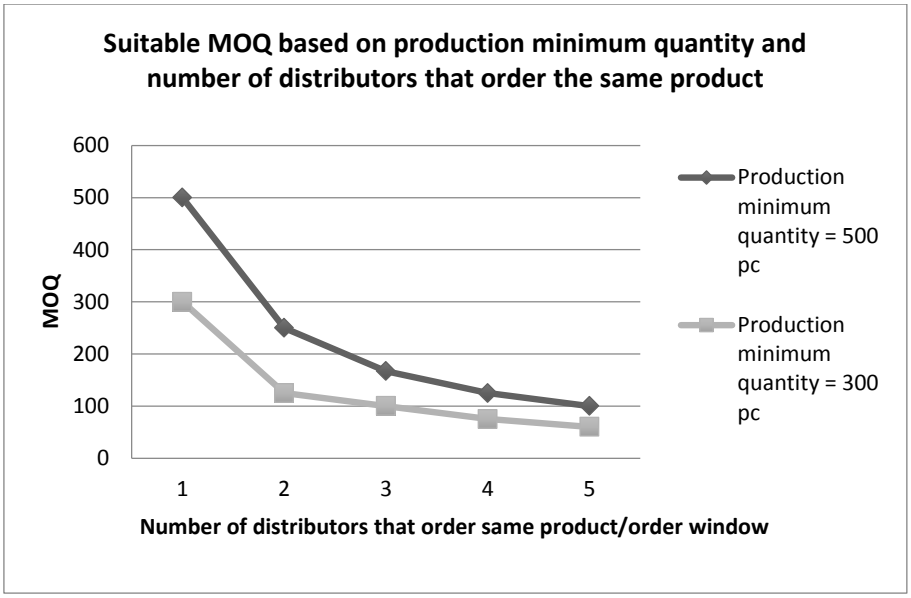

Figure 19: The mean number of distributors that order the same product is four, hence when the production minimum quantity is 500 pieces a suitable MOQ is 125 pieces and when the production minimum quantity is 300 pieces a suitable MOQ is 75 pieces.

A second approach that is investigated is if there are any relation between different customer segments and current production minimum quantity from suppliers. If the production minimum quantity is similar for each different customer segment, the MOQ can be decided based on the production minimum quantity for each customer segment. For SS15 no edge product had a production minimum quantity higher than 300 pieces per colour. For the explore segment, approximately 90 %, had a production minimum quantity equal or lower than 300 pieces per colour. For the explore products that have higher minimum production quantity, the quantity was 500 or 1 000 pieces per colour. Hence, the conclusion is that both the edge and the explore customer segment had production minimum quantities that in general were close to 300 pieces per colour.

For the customer segments easy and endurance the variation of the production minimum quantity was large and no clear correlation was identified. The production minimum quantity varied from 200 pieces to 5 000 pieces, but the main part had a production minimum quantity of 300-1 000 pieces per colour. Hence, compared to the customer segments explore and edge, the production minimum quantity is larger for the customer segments easy and endurance.

The third approach to analyse MOQ, is if there is any relation between the order volume and production minimum quantity for a product. After a simplified test of the data no clear correlation between order volume and production minimum quantity was identified. Hence, it was not possible to show that production minimum quantity varies with low and high order volume. Therefore, the relation between the order volume and production minimum quantity cannot be used as an input when setting the MOQ.

Based on the mean value of distributors that order the same product, the order quantity restriction should be 75 or 125 pieces. This indicates that the current MOQ of 60 pieces is too low. Furthermore, Bennion (1987) states that MOQ is used to control costs associated with small order volumes. This also indicates that the MOQ should not be too low. Nevertheless, as stated in chapter *6.1.2 Stakeholders' requirements on the order quantity restrictions*, differentiated quantities for different segments are necessary. The relation between production minimum quantity and customer segments indicates that it is possible to have lower MOQ for the high risk customer segments, edge and explore, than for the customer segments, easy and endurance. The recommended MOQ for the four different segments are presented below.

Segment 1 is characterized by high risk and low demand, which indicates that the MOQ should be low. According to Croxton (2003) it is also of importance to weigh customer requirements against the cost of order fulfilment. A too small order quantity might not be profitable to accept frequently, but under specific circumstances it can be important, for example for special products. As mentioned above, it is also possible to have a lower MOQ for the high risk segments, due to a lower production minimum quantity. Therefore, the MOQ for segment 1 should be based on a lower production minimum quantity.

When calculating the suitable MOQ for segment 1, which has a low production minimum quantity, it resulted in 75 pieces. However, small distributors claim that it is difficult to place an order of 60 pieces for high risk products, and the brand owning company argue that some of the high risk products are not ordered due to a too high MOQ. As a result it is not possible to currently increase the MOQ to 75 pieces for these products. With basis in the current situation a lower MOQ than 60 pieces is therefore recommended for segment 1. However, the MOQ cannot be too low, because a low MOQ requires that many distributors order the same product to reach production minimum quantity. Therefore, the MOQ is not recommended to be decreased to 30 pieces again. Instead the recommendation is to implement an MOQ of 40 pieces. The MOQ of 40 pieces in particular targets the small distributors, which are not keen to order large volumes of high risk products.

As argued in chapter *6.3.1 Characteristics of the segments*, segment 2 and segment 3 should have the same MOQ. For these two segments it is suitable to have a higher MOQ than for segment 1. Segment 2 has a high risk. Based on the lower production minimum quantity for high risk segments, the MOQ should be set to 75 pieces for segment 2. Depending on the higher production minimum quantity, for segment 3 that has a low risk, it is suitable to have an MOQ of 125 pieces. To meet the requirements of both segments the MOQ should be set to a quantity between 75 and 125 pieces. However, the MOQ cannot be too high, because the products in segment 2 have a high risk. The MOQ is therefore recommended to be closer to 75 pieces than 125 pieces. A recommended MOQ for segment 2 and segment 3 is hence 80 pieces.

Segment 4 has high demand and low risk. The low risk means a higher production minimum quantity, which indicates that it is suitable with an MOQ of 125 pieces for this segment. The high demand of these products also indicates that a high MOQ is suitable. However, the MOQ cannot be too high, due to the small size distributors. If it is too high the small size distributors might not be able to order the products. Furthermore, it is stated in chapter *6.1.2 Stakeholders' requirements on the order quantity restrictions*, that as few different order quantity restriction as possible should be used. Therefore, it is recommended to also have an MOQ of 80 pieces for this segment. The segment 4, will however also be restricted with multiples which is presented in chapter *6.3.3 Multiple restriction for the high demand and low risk segment.*

To summarize, an MOQ of 40 pieces is recommended for segment 1 and an MOQ of 80 pieces is recommended for segment 2, 3 and 4. The increased MOQ, strengthen the strategy of increasing volumes of each product and narrowing down the current product assortment. The lower MOQ will in particular support the sales of high risk and low demand products, segment 1, to small distributors.

6.3.3 Multiple restriction for the high demand and low risk segment

Multiple restrictions in this case refers to that products only can be ordered in certain lot sizes depending on what the decided multiple quantity is. For instance, if the multiple is ten, only volumes that are multiples of ten can be ordered by distributors. Multiples are hence a stricter order quantity restriction for distributors, compared with only having an MOQ. Multiple restrictions are only suitable for products with low risk. If a multiple restriction is combined with a high risk product, the distributor might consider not buying the product. Another aspect is that multiple restrictions are not suitable for products with low demand, because if the total demand is low it is hard to restrict order quantities for individual distributors. The multiple restrictions are hence suitable only for products with low risk and high demand, products in segment 4 in this study.

A multiple restriction in this case aims to increase the efficiency mainly for distributors' warehouse operations, by sending products in packaging with solid size and solid colour. According to Richardson (1999) packaging can add productivity to picking operations, if products are packed in order quantities so that the packaging does not need to be opened or split. This chapter includes an analysis of how to find quantities suitable for multiple restrictions and how multiples can be adapted to packaging, to increase the efficiency of activities in the supply chain.

6.3.3.1 Quantity of the multiple restriction

The purpose of implementing multiples is both economies of scale in general through selling more products and also through achieving a higher efficiency with solid colour and solid size packaging. However, currently, it is not possible to get solid colour, solid

size packaging, when deciding restrictions for how distributors could order, due to following four reasons.

Firstly, if the quantity in a packaging is used to restrict orders for distributors, it would lead to an endless number of different quantity restrictions when ordering, because the products have varying dimension. The supplier even varies the quantity in a packaging between sizes of the same product, at least when it is a voluminous product. To have so many different restrictions dependent on product and size is hard to manage at present, due to no existing system support. Secondly, to use customized packaging to secure that the quantity in a packaging is the same for all products is also an unrealistic scenario, because it is costly and inefficient due to all different packaging sizes needed.

Thirdly, if the problem is simplified so all sizes of the same product model is sent in the same quantity in the same packaging size, it would lead to a low load factor of many packaging. Since the distributor pays for the transport for all products with the payment term FOB, the distributor would not accept that solution. Fourthly, a common packaging size (60x40x40 cm) which is used by suppliers, normally includes a little less than 100 pieces. However, the current demand for medium and small size distributors is low, much lower than 100 pieces. Hence, the packaging size needs to be really small, to result in solid colour and solid size in a packaging. It is not suitable to ship too small packaging sizes, because it is costly and complex to manage when packaging are consolidated with other goods.

Due to these four reasons it is not possible to have solid size and solid colour in a packaging. Instead it is recommended to use poly bags within a packaging to achieve solid colour and solid size in these poly bags. To increase the efficiency even more, modules and packaging can be combined, which is discussed in chapter *6.3.3.2 Multiples and packaging.*

Next challenge to overcome is what quantity is realistic to have as a multiple in the poly bags, when the demand for different sizes of a product fluctuates a lot. An example of a general size distribution for orders of a product group is presented in Table 11. Because, the difference of demand between different sizes is large, as seen in the table, it is complex to decide a suitable multiple quantity which is valid for all sizes.

Table 11: Size distribution for orders of a product group.

Size	**XS**	**S**	**M**	**L**	**XL**	**XXL**
Men	-	11 %	30 %	35 %	20 %	4 %
Women	6 %	23 %	38 %	23 %	10 %	-

To exemplify how the orders from a medium sized distributor can look, two products are selected from segment 4, see Table 12. The Table 12 indicates that the orders for the end sizes, XL and XXL, are small. The order quantities which are demonstrated are

from a medium size distributor, and it exist distributors that order even smaller quantities per size. A conclusion is consequently that a suitable multiple cannot have a high quantity, especially for the end sizes.

Table 12: Orders from a medium size distributor of two products from the same product group.

Size	XS	S	M	L	XL	XXL
Men	-	45	98	102	46	6
Women	36	92	103	51	19	-

Another factor which is important to consider when designing the multiple restrictions, is that the size distribution differs when a product is ordered for the first time compared to when a product is replenished. A size distribution is the proportion of each size that is ordered of one product. In a new order situation the size distribution for comparable products are normally quite similar[79]. In a replenishment situation the sizes are instead more randomly distributed, according to what sizes have been sold of the product. The size distribution of replenishment orders is as a result hard to predict, therefore the differences of the multiple quantity between different sizes cannot be too large. Furthermore, the replenishment orders can be really small volumes. Hence, it is important with low quantities as order multiples to not prevent sales to distributors.

The conclusion is that the difference in ordered volume between sizes of a product makes it complex to find a suitable standard multiple for all sizes. However, it is difficult to customize a multiple after which size it is, because the size distribution differs between new orders and replenishment orders. Furthermore, it can also be a difference in size distribution depending on what type of product it is. For more advanced products, the smaller sizes are sold in larger proportion compared to other product groups[80]. The point of departure is thereof, to have a low standard multiple independent of size. A low standard multiple will simplify the ordering for distributors, reflect replenishment orders, and be suitable for the smaller distributors demand.

The recommended quantity of a multiple is mainly based on that small distributors do not want to order a high quantity of less demanded sizes. Nevertheless, the products in segment 4 have low risk and high demand, so it should not be impossible to order a higher quantity even of a less demanded size for a small distributor. As seen in Table 12, the medium size distributor's smallest order was six pieces. Hence, it is suitable to have the multiple around this volume, even if the demand is lower for small size distributors. The outcome of this analysis is that a multiple quantity of five pieces is recommended for all sizes, colours, product models, and distributors. The segment 4 is therefore recommended to have order multiples of five. The different order quantity restrictions, MOQ and multiples, for each segment is visualised in Figure 20.

[79] Supply Chain Planner (Brand owning company) Interviewed by the authors 2015-02-24
[80] Supply Chain Planner (Brand owning company) Interviewed by the authors 2015-02-24

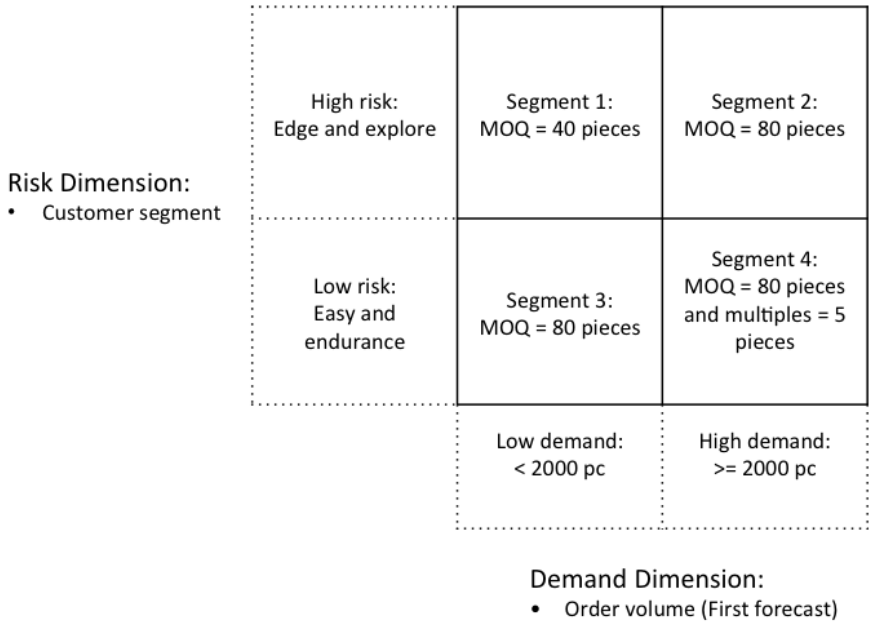

Figure 20: The segmentation with the different order quantity restrictions, MOQ and multiples, for each segment.

6.3.3.2 Multiples and packaging

As stated in the previous chapter *6.3.3.1 Quantity of the multiple restriction*, currently, it is not possible to implement multiples in the ordering process that matches with packaging sizes. Instead it is investigated how packaging can contribute to efficiency in other ways. The target is that packaging and multiple order quantity restriction together can result in a higher efficiency for packaging activities compared to the current situation.

According to Richardson (1999) there are increased requirements to have standard packaging and modules to encourage efficient operation, which is something that is confirmed by the distributors. In addition, according to DHL (2015) standard packaging and modules are necessary in a supply chain to guarantee an economical use of capacity and generate efficiency in affected operation. Currently, the suppliers choose to a large degree themselves how to manage the packaging, and therefore the solution is economical for the supplier, but perhaps not optimal from the supply chain's point of view.

Both the interviewed suppliers use standard packaging sizes, but not the same standard. Standard dimensions of packaging will as stated by DHL (2015) guarantee an economical use of capacity and increase efficiency in operations affected by the packaging. The brand owning company is therefore recommended to implement standard dimensions for packaging as a requirement for all suppliers, independent of the supplier’s location.

Both suppliers' current packaging standards are somehow based on the group's standard packaging dimension, 40x40x60cm. However the European supplier uses a standard called SK, see Table 13, which matches better with the parent company's packaging standard. The SK standard consists of four packaging modules and their volumes are 100 %, 75 %, 50 %, and 25 % of the volume 60x40x40 cm.

Table 13: Sizes of packaging used by the European supplier.

Packaging	Size in cm (Width x Length x Height)
SK1	40x30x40
SK2	60x40x30
SK3	40x30x20
SK4	60x40x40

For smaller packaging sizes, low height and same bottom area as the standard packaging, was stated as important by one of the merchandisers at the brand owning company, to secure that the managing of the packaging is efficient. Currently, some order quantities are too small to fill up a packaging with the standard bottom area of 40x60 cm. Therefore, it is necessary to have alternatives with a smaller bottom area. Hence, the packaging sizes presented in Table 13, is suitable for the current order volumes and are therefore recommended to implement as a standard for the brand owning company's suppliers.

To implement multiples and a packaging standard with modules is one step in the right direction to facilitate efficient material handling for the distributors. The implementation does however not fully solve the described issue with many mixed packaging for distributors. Something that is recommended to evaluate in the future is therefore the possibility to communicate how many pieces of each product of each size that fits in a packaging, to distributors. The distributors can with that information choose to order packaging that are not mixed, this is further discussed in chapter *7.4 Future recommendations to the brand owning company.*

6.4 Implementation of the differentiated ordering strategy

Next step is to implement the differentiated ordering strategy. Therefore, it needs to be investigated which activities of the process that need to be changed to be able to implement the suggested recommendation. The activities that are affected due to the implementation of the differentiated ordering strategy are highlighted in Figure 21. As seen in the figure, five activities: first forecast, production planning, second forecast, ordering, and sorting and packing, are affected by the implementation of the differentiated ordering strategy. In the chapters *6.4.1-6.4.4* the required changes of these five activities are presented.

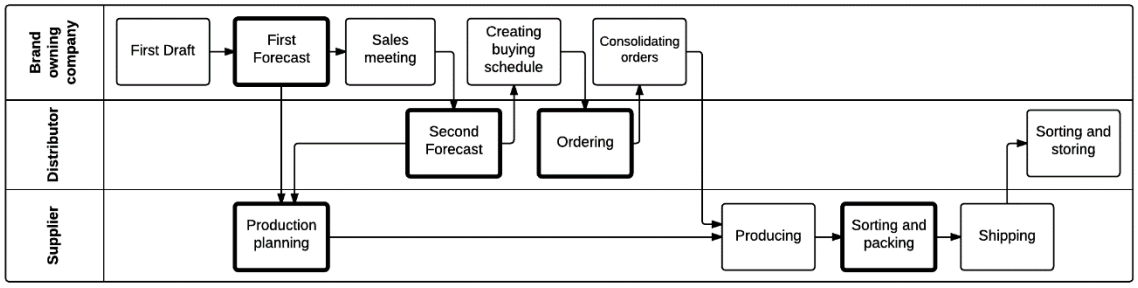

Figure 21: The highlighted activities are affected by the implementation.

6.4.1 The required changes of the activity first forecast

The first step to generate the differentiated ordering strategy is to segment the products and to generate which segment all products belong to. The segmentation has to be done every season for all new products, before the second forecast. To segment the products both factors of the segmentation, customer segment and first forecast, is needed. The customer segments are decided in first draft and the data can therefore be collected from that activity. Currently, the first forecast is not on colour level, but as mentioned in chapter *6.2.4 Selection of data for the dimensions' underlying factors*, it is recommended that the brand owning company starts to do the first forecast on colour level. Shortly after the first forecast, it is recommended that the product managers do the segmentation to identify different products' ordering strategies. Each strategy has specific order quantity restrictions, MOQ or MOQ and multiples. The order quantity restriction for each product needs to be added as a column into the line list, a document where all product information is gathered.

6.4.2 The required changes of the activities second forecast and ordering

The brand owning company need to add the order quantity restrictions in the excel file, which is used for the second forecast and for ordering. To secure that distributors follows the order quantity restrictions it is recommended to insert the restrictions as a function in the excel file, both for second forecast and orders. For example if the MOQ is 80 pieces it would not possible to write anything less than 80, in that case the function would indicate that the quantity is not allowed for ordering. The function is recommended in order to avoid manual work for the brand owning company and to make the distributors to follow the restrictions. When the function is implemented, it is a simple solution to receive orders from distributors that follow the recommended order quantity restrictions.

6.4.3 The required changes of the activity production planning

Suppliers need information about the products that have order multiples, because these products should be packed solid colour, solid size in a poly bag. The information about multiples are recommended to be included in the product specification document, the document that includes all information about each product that a supplier produces. The product specification document includes information about which consumer packaging

and polybag every product has, why it seems reasonable to also include information about the multiples in the product specification document. It is also important to update the packaging instructions to suppliers, with information about how multiples should be managed.

6.4.4 The required changes of the activity sorting and packing

The suppliers need to pack every multiple quantity of five, in a polybag. The multiple restrictions consider approximately 15-20 % of the products. The updated packaging instructions for suppliers will also include the four recommended packaging sizes. Furthermore, the document will include that suppliers are able to choose among the recommended packaging sizes to secure the load factor. The first prioritization of the new packaging instructions is to have unmixed packaging, hence the suppliers have to change their current first prioritization of using a standard packaging size. It will be impossible to avoid mixed packaging, so when packaging are mixed another instruction is that the suppliers have to separate different products with a polybag.

To summarize, no large changes are needed to implement the differentiated ordering strategy, however an implementation can be the most critical part of a new strategy. It is important that all of the mentioned changes are implemented and that the result is secured. Otherwise benefits of the differentiated ordering strategy might not be reached. Changes are often difficult to implement and handle, therefore it is recommended to start with a pilot project. This case study is not investigating a pilot project. Hence, a pilot project needs further investigations in terms of scope and execution by the brand owning company.

7 DISCUSSION

The discussion chapter focuses on discussing the differentiated ordering strategy presented in the analysis and results. In this chapter, contributions, validity, and generalization of the differentiated ordering strategy are discussed. Moreover, future recommendations are presented.

7.1 Contributions of the differentiated ordering strategy

The aim of the study is to propose an ordering strategy that differentiates products based on their ordering characteristics, for the ordering process between the retail brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products. Therefore it is important to discuss how the differentiated ordering strategy contributes to these two aspects.

7.1.1 Decreased material handling cost for distributors

The material handling cost for distributors are decreased in three ways, the three ways are described below.

Firstly, it is decreased by introducing ordering multiples. By introducing multiples for segment 4, products with low risk and high demand, the amount of mixed packaging can decrease. The large distributors are claiming that it is time consuming with mixed packaging. As mentioned in chapter *5.3.3 The activity sorting and storing, performed by the distributors*, one of the large distributors can receive over 22 000 mixed packaging per year. For example, if it takes two minutes extra to handle a mixed packaging, it results in 92 extra working days per year for the large distributor. Hence, by reducing the amount of mixed packaging the handling time, hence the material handling cost, is decreased for distributors. However, ordering multiples does not lead to unmixed packaging for all products that has multiples, but at least it is a start to avoid mixed packaging. In chapter *7.4 Future recommendations for the brand owning company*, it is presented how an ordering system can support a continued work to decrease the amount of mixed packaging.

Secondly, the material handling cost is decreased, by introducing new packaging instructions for the suppliers. For the packing process at suppliers, a new instruction is that the first prioritization has to be unmixed packaging, which will lead to less mixed packaging. Moreover, another instruction is that the suppliers have to separate different products in a mixed packaging with polybags. By separating different products, it is much easier for the distributors to sort the products into new packaging, which will decrease the handling time. Moreover, if the products are separated it leads to less human errors, that otherwise can result in that wrong products are shipped to the retailers. By minimizing the errors, the extra work to correct the errors is decreased, hence the material handling cost is decreased.

Finally, the higher MOQ of 80 pieces, which is recommended for approximately 85 % of the products, can decrease the material handling cost for distributors. The higher MOQ aims to support the distributors to take more strategic decisions about the product assortment. A strategic decision implies that larger volumes are ordered of a smaller amount of products. If smaller amount of different products are ordered and the volumes of the ordered products are higher, it will also decrease the amount of mixed packaging received at distributors' warehouses. Hence, the material handling cost is reduced.

These three aspects indicate that the differentiated ordering strategy leads to decreased material handling cost for the distributors. However, it is not possible to identify how much the material handling cost for distributors are decreased. If the brand owning company does a pilot project, it is therefore recommended to measure how much the material handling cost decreases.

7.1.2 Decreased amount of cancelled products

The differentiated ordering strategy will decrease the amount of cancelled products in three different ways. The different ways of achieving a decreased amount of cancelled products are described below.

By raising the MOQ to 80 pieces for segment 2, 3, and 4, distributors need to take more strategic decisions about which products to order, which can decrease the amount of cancelled products. Hopefully, the distributors will order larger volumes of a smaller amount of the products. In the long term this behaviour supports the brand owning company in narrowing down the assortment, and hence decreases the amount of cancelled products.

The different segments are based on distributors' ordering perspective. Hence, the MOQ for each segment are based on how the distributors mainly value the products according to risk and demand when ordering. The result is that MOQ is recommended to be decreased to 40 pieces for high risk and low demand products. These products can therefore be ordered by a larger amount of distributors. Hence, a decreased MOQ can result in decreased amount of cancelled products, if more distributors order the same products. For the remaining products the MOQ is recommended to be increased to 80 pieces. A single distributor needs to order a larger volume of a product when MOQ is increased, and it will result in that fewer distributors need to order the same product to reach the production minimum quantity. An increased MOQ for suitable segments can therefore also decrease the amount of cancelled products.

In the differentiated ordering strategy it is also recommended that the brand owning company should start forecasting on colour level, for the first forecast. By making the first forecast on colour level, it is possible to directly quantify what volume of each colour of a product model, which is expected to be sold to distributors. By directly

forecast on colour level, it is possible to remove some colours which are not commercial enough, already in the first forecast. Hence, a first forecast on colour level can decrease the cancellation of products.

To summarize, there are three identified parts of the differentiated ordering strategy which can decrease the number of cancelled products. The large amount of cancelled products is time consuming and costly for the brand owning company, which makes these improvements of high importance. However, it has not been investigated how large proportion of the cancelled products that can be reduced. This is also recommended to be investigated in the pilot project.

7.2 Validity of the differentiated ordering strategy

The validity of the differentiated ordering strategy is discussed in this chapter. The discussed areas are; the scope of the selected supply chain, large changes in the supply chain, number of dimensions in the segmentation matrix, first forecast, and order quantity restrictions.

The investigated supply chain is only including the distributors, the suppliers, and the brand owning company. However, it is of interest to discuss how the results would change if more actors were included, for example fabric suppliers and retailers. By including these two actors a broader understanding of the supply chain could be reached, especially by including retailers. If retailers were studied an investigation of their requirements on orders and packaging could be added. However, the retailers' perspective is partly represented through the distributors' perspective since these actors are directly interlinked. To secure no sub-optimizations in the supply chain, retailer is an actor that might be important to investigate in future research.

If any large changes occur in the supply chain, the identified requirements can change. If the requirements change it affects the differentiated ordering strategy, and hence all steps of the ordering strategy might be necessary to do again. It is, therefore, recommended to examine the differentiated ordering strategy if large changes are executed.

The number of dimensions of the segmentation was limited to two. What needs to be discussed is how the differentiated ordering strategy is affected by this limitation. A two dimensional matrix was selected, because the frame of reference supports the use of two dimensions to create a segmentation that is easy and understandable. Moreover, during interviews with distributors two dimensions were only identified, risk and demand. Furthermore, the authors could not identify additional dimensions with the observations. If more than two dimensions were found, it would be necessary to include another dimension in the matrix to get a valid segmentation. However, currently, it is not required to implement one additional dimension, because the distributors are primarily evaluating two aspects when ordering. Hence, a two dimensional segmentation is

suitable in this study, and the differentiated ordering strategy can be considered to be valid.

The brand owning company is recommended to start making the first forecast on colour level. Hence, it is not known how the result of a first forecast on colour level will be. If the result of the first forecast is not reliable, another factor need to be chosen in the segmentation, which would make the current identified differentiated ordering strategy unusable. Furthermore, the validation of the product segmentation should be based on factors that are used in the segmentation, customer segment and first forecast. However, the validation of the segmentation is done with actual orders and not first forecast, because first forecast on colour level does not exist at present. Hence, the segmentation is not completely validated. It is therefore not possible to guarantee, that the segmentation fully represents the products from an ordering perspective. The brand owning company is therefore recommended to do the validation again when first forecast on colour level is made. If the validation later indicates that the segmentation does not represent the product assortment, it is necessary to evaluate if other factors should be included in the segmentation.

The identified order quantity restrictions are based on the current production minimum quantity and the volumes ordered by distributors. Production minimum quantity and volumes ordered by distributors are factors that can change. If the factors change the restrictions might need to be updated. The order quantity restrictions should therefore not be seen as static. However, it is not recommended to change the order quantity restrictions too often, because it will be time consuming for the brand owning company and confusing for distributors.

7.3 Generalization of the differentiated ordering strategy

As mentioned in chapter *1.2 Problem description* it exist less literature about distributors' ordering process than retailers' ordering process, which also make this study interesting from a research point of view. This chapter discuss how to generalize the differentiated ordering strategy for a retail supply chain.

A retail supply chain is a broad definition, because a retail industry can sell everything from garment products to grocery products. The characteristics of different retail supply chain are therefore very different. Hence, it is not possible for other retail supply chains to use exactly the same differentiated ordering strategy that is identified in this study. However, by following the method and the process identified in this study other retail supply chain can gain knowledge of how to create a differentiated ordering strategy for their retail supply chain. The starting point is to identify the requirements of the ordering strategy. The requirements are different in each retail supply chain, hence it is important to investigate the specific requirements for each situation.

After the requirements are identified, the segmentation of the products from an ordering perspective was accomplished in this study. The segmentation method used in this case study was a two dimensional matrix. In other retail supply chains a matrix might be a too simple method to segment products from an ordering perspective. Other segmentation methods are then recommended to investigate. However, the ordering process is often required to be simple in a retail supply chain (Fernie and Sparks, 2004). Therefore, a matrix can be a useful tool in many retail supply chains.

Further, dimensions and factors affecting the ordering decision should be identified to perform the segmentation. The segmentation in this case study resulted in two evaluated factors, customer segment and forecasted volume. In other retail supply chains it might be necessary to include more factors than two. Furthermore, the number of segments that are suitable depends on the identified requirements and the expected result of the differentiated ordering strategy.

In this study the identified order quantity restrictions are based on the current production minimum quantity and the current order volumes. However, in other retail supply chains other factors might be of higher importance. Therefore, each retail supply chain needs to identify what the order quantity restrictions should be based on. The choice of what order quantity restrictions should be applied, also depends on the aim of the segmentation for that retail supply chain. The implementation of the differentiated ordering strategy can be based on an identified process map. However, the implementation process will differ between all retail supply chains.

By using this method it is possible to gain knowledge of how to create a differentiated ordering strategy for a retail supply chain. However, each retail supply chain is specific, therefore further investigation is needed to fully understand how to create a differentiated ordering strategy for another retail supply chain.

7.4 Future recommendations for the brand owning company

During the study, additional challenges for the brand owning company outside of the scope were identified. This chapter presents the three most important challenges and recommendations how the brand owning company can manage these challenges.

Requirements from the retailers are not included in the scope of this study. However, Fernie and Sparks (2014) mentioned, that it is often the retailers that manage and control the supply chain. Therefore, it is interesting to investigate retailers' requirements. It has been identified that the retailers are starting to have higher requirements on information than before. Especially, it has been identified that the retailers want more information and more accurate information about the products. The brand owning company is therefore recommended to investigate requirements from retailers about standards for exchanging data, for example electronic data interchange

(EDI), to communicate information about products. As Van Weele (2010) mentioned, information exchange is of high importance in a retail supply chain.

Furthermore, the brand owning company's products are competing against large worldwide brands products'. These worldwide brands already use standards for exchanging data such as EDI. To compete with these worldwide brands, the brand owning company need to comply with them, not just in product development, but also in information exchange and data accuracy. Therefore, it is recommended to benchmark competitors' standards for exchanging data and communicate with retailers to get indications what retailers' requirements on information are.

Moreover, it is recommended to implement system support, an ordering system, due to all current manual work with the ordering process. The manual work is time consuming and result in errors. Furthermore, it is an obstacle for improving the ordering process. With an ordering system all manual work would be done automatically within the system, hence the time consuming process to manage all orders would be reduced. With an ordering system it is also possible to regulate the MOQ, so it is not possible to order a quantity lower than the MOQ. It would decrease the errors and the manual work and the brand owning company would also be more consistent in their communication.

Furthermore, with an ordering system it is recommended to provide the distributors with information of how many products of a product model and size that fits in a packaging. By sharing this information it is possible for the distributors to always order unmixed packaging. If all orders consisted of unmixed packaging it would result in much lower material handling cost for the distributors. Without an ordering system it is not feasible to provide this information, because it would result in too much manual work. This study is not investigating an ordering system, but the brand owning company is recommended to investigate it as soon as possible.

The relation between the differentiated ordering strategy and the packaging is also evaluated in this study. However, the label information of the packaging is not investigated. With more advanced technology used by distributors and retailers for warehousing, the requirements on the label information are increasing. Therefore, it is recommended, from a supply chain perspective, to investigate which information is required on the packaging. Furthermore, the EAN bar codes on the packaging for the two studied large distributors are currently not used, hence the need and requirement of EAN bar codes is also recommended to be evaluated.

To summarize, the primary future recommendation regards information exchange and system support to communicate information internally in the company and to actors of the supply chain. Currently, the brand owning company is lacking system support in several areas. To be able to manage the complex retail supply chain, it is of high importance that the brand owning company starts investigating suitable system support and information exchange immediately.

8 CONCLUSION

The conclusion chapter summarizes and highlights the most important parts of the study.

The aim of the study was to propose an ordering strategy that differentiates products based on their ordering characteristics, for the ordering process between the retail brand owning company and its distributors and suppliers, in order to decrease the material handling cost for distributors and the large amount of cancelled products.

The study was conducted for a retail brand owning company. The aim of the study was formed with basis in identified problems for the brand owning company. Two main problems related to the orders from distributors to the brand owning company were identified. The first identified problem was that many of the products developed by the brand owning company, was never produced and sold to customers. The second identified problem was that the material handling cost for distributors was high, due to many mixed packaging sent to distributors from suppliers.

The aim was broken down into four research questions, which considered four areas: stakeholders' requirements from an ordering perspective, segmentation from an ordering perspective, order quantity restrictions for each segment, and required changes to implement the differentiated ordering strategy. Moreover, the scope of the study included three supply chain actors, the brand owning company, distributors, and suppliers. The study also primarily focused on the strategic ordering process between the three actors, and not on the transactions of the ordering process.

The four research questions formed the four parts of the analysis. Firstly, stakeholders' requirements were identified. The requirement formed the foundation for what aspects of ordering that were most important to consider in this study. The requirements included three parts, segmentation, order quantity restrictions, and implementation. A general requirement was that the proposed differentiated ordering strategy needed to be simple to use for the brand owning company and other stakeholders. The simplicity was therefore highlighted both in the requirements on segmentation and on order quantity restriction. One of the requirements on the implementation phase was that no larger changes on the existing process were acceptable.

Secondly, a segmentation of the product assortment was investigated. The frame for segmentation of the brand owning company's products was based on a two dimensional matrix. The dimensions used for segmentation were distributors' risk and demand, areas that primarily affect the ordering process. For each dimension underlying measurable factors were identified. The two underlying factors were customer segment and first forecast. These two factors were used to divide the products into different segments. The resulting number of segments was four. Furthermore, the segmentation was

validated with two methods. One method consisted of questions for validation and the other involved seeking advice from experts of the brand owning company.

Thirdly, order quantity restrictions were formed. For each segment, order quantity restrictions were proposed depending on the segment characteristics. The recommended order quantity restrictions are 40 pieces for segment 1 and 80 pieces for segment 2, 3, and 4. The differing MOQ between segments was based on production minimum quantity, mean value of distributors that order the same product in an order window, and current order volumes from distributors. One segment of products, segment 4, was except for the MOQ of 80 pieces recommended, a multiple restriction of five pieces for all sizes of all products. The multiple restriction aims to decrease the material handling costs for distributors.

Finally, the required changes to implement the differentiated ordering strategy were identified. The implementation considered what changes was necessary to make to the existing activities in the studied process, between the brand owning company and its suppliers and distributors.

As a result of the proposed differentiated ordering strategy, the brand owning company is recommended a differentiated MOQ for products depending on which segment a product belongs to. The differentiated order quantity restrictions are reflecting distributors' perspective when ordering. The differentiated ordering strategy will as a result lead to decreased material handling costs and a decreased amount of cancelled products. Furthermore, the brand owning company is recommended to investigate three areas to stay competitive. The three areas are, standards for exchanging data for product information, system support for ordering, and requirements from supply chain actors concerning information on the packaging.

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APPENDIX I - SEMI-STRUCTURED INTERVIEW TEMPLATES

Template for interviewing distributors

Work role:
Can you describe your role and work tasks briefly?
Forecasting process:
Can you describe a typical process for when you create the forecast of products?
Do you receive orders or forecasts from retailers before you create the forecast?

- If YES, how does the aggregation of the received orders or forecasts from customers differ from what you actually order?

What factors influence the buying decision, which products and which volumes to buy, when you do the forecast?

- Which of these factors do you consider as most important for the buying decision?

Ordering process:
Can you describe a typical process for when you place orders?
What factors influence the buying decision, which products and which volumes to buy, when you place order?

- Which of these factors do you consider as most important for the buying decision?

What do you consider as a risk when forecasting/ordering?

- How does the risk affect the buying decision?
- How do you evaluate the risk?

How does the margin of a product affect your buying decision?

- What do you base your margin on?

How does the fob-price of a product affect your buying decision?
How does the product life-time of a product affect your buying decision?
How does the customer segment, the degree of functionality of the product, affect your buying decision?
Are there any other factors that affect your buying decision?
Which of all mentioned factors do you consider affect the buying decision the most?

- Why?

Current MOQ:
Which effects does the current MOQ of 60 per product model and colour have for your forecasting/ordering?

- Is it some special product group or product that is affected by the current MOQ?

Warehouse: Receiving, sorting, and placing in shelves
Can you describe and show us the flow and the handling processes of packaging/products in the warehouse?

- What do think about the flow and the handling activities of the packaging?
- Receiving
    - Do you see any problems with the receiving part?

    - Have you identified any opportunities for improvement?
- Sorting
    - Do you see any problems with the sorting part?
    - Have you identified any opportunities for improvement?
- Placing in shelves
    - Do you see any problems with the placing in shelves part?
    - Have you identified any opportunities for improvement?

What do you think about mixed packaging?

- What proportion of packaging is mixed today?
- How does mixed packaging affect the handling activities?

What are the current packaging sizes?

- Does it differ from different suppliers?
- How do different packaging sizes affect the warehouse activities?

How is the load factor inside the packaging?

- Does it differ from different suppliers?
- How does it affect the warehouse activities?

How is the packaging labelled today?

- What information does it include?
- Do you miss any information?
- Does the labelling differ between suppliers?
- How does it affect the warehouse/handling activities?

Template for interviewing suppliers

Work role:

Can you describe your role and work tasks?

Production planning:

Can you describe the process from when you receive a first indication on what production capacity is needed until that you are able to deliver the products?

- What are the most critical parts of the process?
- What documents and instructions (orders) do you receive from the brand owning company?
    - Can we see them?

How do the low volumes and many distributors affect you?

- Potential improvement?
- Problems?

Ordering process:

Can you describe what happens in an ordering process, from A to Z

- Can you show a packing list?

Sorting process:

Can you describe the sorting process for the different distributors?

- How is it done?

- When is it done?
- What challenges and possible improvements do you see with the sorting process?
- Can you show us the sorting process?

Packing process:

Can you describe how the products are packed?

- What decides the choice of packaging size?
- Do you have any instructions from the brand owning company regarding packaging?
- Do you have any instructions regarding labelling?
- Do you have any standard packaging sizes that always is used?
- What challenges and possible improvements do you see with the packaging process?
- Can you show us the packing process?

APPENDIX II - STRUCTURED INTERVIEW TEMPLATES

Template for interviewing distributors

Which of the following factors do you consider as the largest risk when ordering?

- Customer segment (complexity of the product)
- Price
- Margin
- Product life-time
- Ordering situation - new or repeat ordering
- Lead time

APPENDIX III - TEST OF SEGMENTATION

Category	Concept	Customer segment	Order volume	Segment
Category 1	Concept 1	Edge	380	1
Category 2	Concept 2	Edge	270	1
Category 3	Concept 3	Explore	310	1
Category 4	Concept 4	Edge	1623	1
Category 5	Concept 5	Edge	1660	1
Category 5	Concept 5	Edge	630	1
Category 3	Concept 3	Explore	1500	1
Category 1	Concept 1	Edge	2100	2
Category 2	Concept 2	Edge	4900	2
Category 1	Concept 6	Easy	470	3
Category 2	Concept 7	Easy	280	3
Category 2	Concept 8	Endurance	478	3
Category 6	Concept 9	Easy	453	3
Category 4	Concept 10	Easy	700	3
Category 5	Concept 11	Easy	650	3
Category 5	Concept 12	Endurance	1200	3
Category 5	Concept 12	Endurance	883	3
Category 1	Concept 13	Endurance	515	3
Category 6	Concept 14	Endurance	1021	3
Category 3	Concept 15	Easy	1800	3
Category 3	Concept 16	Easy	1600	3
Category 3	Concept 16	Easy	530	3
Category 4	Concept 10	Easy	27000	4
Category 4	Concept 4	Endurance	15432	4
Category 5	Concept 11	Easy	9000	4
Category 1	Concept 6	Easy	12000	4
Category 1	Concept 13	Endurance	5500	4
Category 2	Concept 7	Easy	3800	4
Category 2	Concept 8	Endurance	5400	4
Category 6	Concept 9	Easy	2600	4
Category 6	Concept 14	Endurance	2360	4
Category 3	Concept 15	Easy	23000	4