

CHALMERS



Goods Allocation Strategies to increase the Customer Service Level at H&M Online, utilizing a Warehouse Network

Master of Science Thesis in the Master Degree Programme, Quality and
Operations Management

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ABSTRACT

This report is a Master of Science thesis and presents a case study at H&M Online. H&M Online is an e-commerce within the H&M group that operates at eight markets in Europe. The organization utilizes two distribution centers to fulfill the customer demand at seven out of the eight customer markets. The case study is focused on the current situation at H&M Online regarding goods allocation strategies and customer service level. The organization assesses the possibility to utilize a warehouse network with three warehouses in the future and the Master thesis project aims to identify goods allocation strategies for the future warehouse network that increase customer service level and profit.

A theoretical background is presented within topics such as e-commerce, how to handle demand, the customer order process, customer satisfaction and logistic strategies. The analysis of the report compares the findings in the case study with the theoretical background. Conclusions are then drawn from the analysis, which leads to recommendations for the studied organization.

H&M Online keeps an anticipation inventory at one of their warehouse and the excess stock is kept in a centralized warehouse. The centralized warehouse relocates products to the other warehouse throughout the season. However, when the relocation is not sufficient enough, customers place orders with products that are out of stock. Orders made on products out of stock result in extended delivery time and split deliveries, which reduce the customer service level and result in extra cost for H&M Online.

It is recommended for H&M Online to classify their products in accordance to the products contribution to sales. The products that contribute the least to the sales should only be centralized stored while products with high contribution to sales are important to have in stock to be able to fulfil the customer needs. Furthermore, implementing Virtual Pooling, where the customers can purchase products from any distribution centre, will increase the ability to fulfil complete customer orders without increasing the stock availability at each warehouse. Virtual Pooling will increase H&M Online's ability to fulfil customer orders, however to decrease the amount of split orders further Order Swap is also recommended. Order Swap re-evaluates the order assignments in real time to assess the ability to swap order assignments between distribution centres to ensure that the customers receive their products in one delivery.

The distribution centre that is to fulfil the customer orders is to be decided by a priority list. The priority list takes into account the distance between distribution centre and customer market, stock levels, resources at distribution centre, and forecasted need. The priority list is also recommended to direct the flow of product returns so that no relocation will be needed during the season. The possibility to send product returns to any distribution centre will allow for the returns to balance the inventories and relocation would therefore no longer be necessary. Together the recommendations create a concept solution for H&M Online that will increase their customer service level and profit.

Key terms: Inventory Management, Warehouse network, E-commerce, Reverse Logistics, Product Allocation, Virtual Pooling, Order swap, Warehouse prioritization

SAMMANFATTNING

Masters uppsatsen är uppbyggt kring en fallstudie på H&M Online. H&M Online arbetar med distanshandel av kläder, skor och inredning på utvalda europeiska marknader. För att tillgodose sina kunders behov på dess marknader så använder sig H&M Online av två distributionslager. I fallstudien beskrivs dagens situation på H&M Online gällande produktallokering och kundservicenivå. Inför en framtida expansion undersöker H&M Online möjligheten för att i framtiden använda sig av ytterligare ett lager för distribution i Europa. Målsättningen med rapporten är att identifiera nya sätt att allokera produkter mellan dessa tre lager för att öka kundservicenivån och H&M's lönsamhet.

Rapporten innehåller en teoretisk bakgrund inom områden såsom e-handel, strategier för att tillgodose kundefterfrågan, kundorderprocessen, kundnöjdhet och logistik strategier. I analysen jämförs den empiriska studien på H&M med teori. Slutsatser dras sedan utifrån analysen och leder till rekommendationer till den studerade organisationen.

H&M Online håller ett säsongslager på ett av sina lager och ett säkerhetslager på produkter hålls på ett centraliserat lager. Från det centrala lagret relokeringar man produkter till övriga distributionslager under säsongen, men när relokeringen inte är tillräckligt effektiv kan man inte uppfylla kundernas behov. När kundens order inte kan uppfyllas vid kundorderpunkt blir leveranstiden förlängd och ordern kan bli levererad i fler än en leverans, vilket innebär en lägre kundservice nivå och extra kostnader för H&M Online.

H&M Online rekommenderas att klassificera sina produkter efter produkternas inverkan på försäljningsvolymen. Produkter med lägst försäljningsvolym bör lagras på ett centralt lager och produkter med hög försäljningsvolym bör finnas med hög tillgänglighet för att öka möjligheten att uppfylla kundens behov. H&M Online rekommenderas även att använda *virtual pooling* som innebär att distributionslagren samarbetar för att tillgodose kundernas behov. För att minska antalet dubbla leveranser rekommenderas den studerade organisationen även att använda *order swap* i IT systemet. Order swap omvärderar uppdelningen av kundorder mellan distributionslagren för att genom byten minska antalet dubbla leveranser.

Vilket distributionslager som ska uppfylla kundens förfrågan bestäms av en prioritetslista som tar hänsyn till distansen till kunden och lagernivåer, behov och resurser på respektive distributionslager. Genom att nyttja prioritetlistan även för returflödet kan man balansera lagren för att undgå relokeringen av produkter mellan lagren under säsongen. Tillsammans så bildar rekommendationerna ett lösningskoncept anpassat till H&M Online för att öka företagets kundservicenivå och lönsamhet.

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1. INTRODUCTION

This chapter of the Master thesis will present the background to the analysed problem, the purpose of the Master thesis, a problem analysis and research questions, expected outcomes of the research and finally project delimitations.

1.1 BACKGROUND

H&M's business concept is to provide customers with "fashion and quality at the best price". The company offers a wide range of clothing, accessories, shoes and home decoration to several customer segments through a number of sales channels. H&M retail stores are present on a global market and at selected markets it is also possible to purchase products from H&M Online by the Internet, telephone or mail. H&M Online offers the possibility for customers to shop at any time and at any place. H&M and H&M Online are constantly expanding sales in existing markets but also entering new markets.

H&M's production is mainly based in Asia, and therefore the lead times become long. The long lead times and short fashion seasons makes it necessary to produce to stock based on seasonal forecasts. To serve its eight existing markets, H&M Online utilizes three distribution centres, located in Sweden, Poland and Norway. Borås DC, Sweden distribute to Sweden, Denmark, Finland and United Kingdom. Poznan DC, Poland distribute to Germany, The Netherlands and Austria. The Norwegian market is distributed from a separate distribution centre located in Oslo, Norway.

Depending on the customer market, H&M Online has different delivery times. The promised time of delivery is kept when the products are in stock. However, problems with extended delivery time occur when the requested products are out of stock. Even if the delivery promise is kept, the provided service level can be questioned, as the order cannot be fulfilled within customer's expectation of delivery time. In order to increase customer service level and to handle the future expansion H&M Online currently assess the possibility for new goods allocation and relocation strategies for the European market.

1.2 PURPOSE

The Master thesis report describes the current allocation and relocation processes in the studied organization. The purpose of the Master thesis is to investigate what strategies an organization dealing with e-commerce may utilize in order to increase customer service level and profitability. The thesis further presents recommendations of goods allocation strategies using warehouse network of multiple distribution centres.

1.3 PROBLEM ANALYSIS AND RESEARCH QUESTIONS

The Master thesis aims to answer two research questions by analysing the problem theoretically, but also using an empirical study. The research questions are stated below:

1. How should an e-tailer allocate consumer goods within a warehouse network to ensure high stock availability and cost efficiency?
2. How should an e-tailer execute customer orders utilizing a warehouse network to ensure a high customer service level and low costs?

1.4 EXPECTED OUTCOME

The recommendations provided in the Master thesis report will primarily focus on increasing customer service level. Furthermore, the recommendations aim at providing cost efficient solutions to maintain profitability for H&M Online. The recommendations will further be attuned to the fashion industry. The

results will also provide a framework for future strategic warehouse decisions regarding allocation and relocation of goods.

1.5 DELIMITATIONS

The Norwegian market will be excluded from the Master thesis report.

1.6 ASSUMPTIONS

The location of the third warehouse is not settled but within the scope of the report it has been hypothetically assumed that the third warehouse is to be located in Belgium. Developments in the current IT system are necessary due to H&M Online's future expansion. Therefore, the Master thesis project has not been limited by the functionalities of the currently utilized IT system.

2. METHODOLOGY

The Master thesis is based on an extensive theoretical study and an in depth case study. The methodology chapter will describe how the theoretical background was gathered. The chapter will also describe the research design applied and which strategies and methods that were chosen to collect empirical data.

2.1 THE RESEARCH METHOD

The process of research for this project was carried out according to Figure 1. Firstly the problem presented by the company was analysed and a problem definition was created to set limitations and main objectives for the Master thesis. Research questions were then created based on the defined problem. A theoretical study was then examined to gain knowledge in the field, aiming to find answers to the research questions. In parallel, qualitative research were made at the company, collecting primary data by open interviews. Also, secondary data, such as internal documents and webpage information was collected. The data was the basis for mapping and examining processes of the organization. The theoretical framework and the process mapping were followed by quantitative research where secondary data was collected. The information at this state was mainly numerical data presented in internal documents or by employees. The data was then analysed and evaluated compared to the theory. Lastly the analysis led to conclusions and improvement recommendations for the studied company.

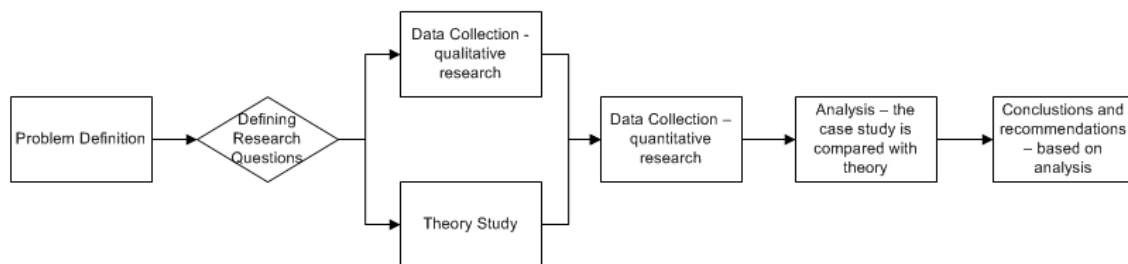


FIGURE 1 - THE RESEARCH METHOD PROCESS

2.2 CREATING THE THEORETICAL FRAMEWORK

The theoretical research was firstly focused at gaining knowledge in general areas of logistics such as, inventory control, logistics costs and service elements. Further literature studies were then made on specific logistic strategies such as low demand items strategies, virtual pooling and order swap.

Textbooks, online resources and articles were used for the theoretical research. The information was evaluated on validity by an examination of publishing year. A citation search was also used to ensure the validity of the articles.

2.3 THE RESEARCH DESIGN

A case study was chosen as the research design for the Master thesis in order to get a deep understanding of the problem and effects that it has on the company. A case study enables the opportunity to study the case intensively and in detailed (Bryman et al, 2007). The studied case in the report is a representative or typical case, as it exemplifies an everyday situation or form of organization.

2.4 THE EMPIRICAL STUDY

The first state of the empirical study was the qualitative study, the third step of the research process, seen in figure 1. The purpose of the data collection was to get an understanding of the organization and to map the current state. An understanding was reached through open interviews with the supervisor at the

studied organization and semi structured interviews with other employees at the logistics and purchasing department. These interviews were qualitative interviews made face-to-face except from a telephone meeting. Semi-structured interviews were chosen since it allows the researchers to prepare questions to be discussed and at the same time it allows the interviewees to discuss and explain their reasoning. When the process mapping was done and the current state described, the interviewees were asked to verify their contribution to the case study, which verifies the credibility of the case (Bryman and Bell, 2007). Secondary internal documents were also used as a source of information to create an understanding of the current state.

The next step of the empirical study was a quantitative study where mostly numerical data was gathered at the company. The collected data consist of sales statistics, costs, stock levels etc. The data was gathered from internal documents in meetings and through mail communication with employees. Several employees then verified the information to confirm the credibility.

The sample of interviewees for interviews was selected by recommendations from the supervisor at the company and further recommendations by the other interviewees. The way of sampling might question the validity of the research. However, this will be handled through cross checking the gathered information with other interviewees.

2.5 DATA ANALYSIS

The focus of the analysis and the methods was decided on beforehand to ensure that only data with relevance of the research was collected. Qualitative and quantitative data was analysed differently, because of its difference in type of variables and sample size.

In order to evaluate the research reliability, replication and validity are examined. According to Bryman and Bell (2007) reliability is important in qualitative research as it confirms whether the research is repeatable. It further examines whether the concepts are consistent and stable. Replication is concerned with the possibility of repeating the same research by following the same procedure (ibid). Documentations of procedures are thus important for the research to be replicable. The external validity and the generalizability of a case study are often questioned (ibid). However, the case study in this report is deeply analysed in relation to a theoretical base.

3. THEORY

This chapter of the report the theoretical framework will be described. Theories behind e-commerce, how to handle customer demand, the customer order process, customer satisfaction, delivery time and logistics strategies are described in more detail.

3.1 THE E-COMMERCE BUSINESS

The first online store, Amazon.com, was started in 1995 and Amazon.com and formed a new generation of shopping experiences. E-commerce is based on a direct customer business model, which allows the customer to select, configure chosen products, and receive a price and delivery date instantly. Marketing, IT systems and webpage design has since 1995 been the focus of e-commerce (Ricker and Kalakota, 1999). To succeed in today's competitive market the focus on marketing, IT systems and webpage design has to be moved to order fulfilment. Order fulfilment is concerned with picking the ordered product, packaging and shipping the product. A well-managed logistic planning process is the key to achieving customer satisfaction. Ricker and Kalakota state that it is as important for e-commerce to have the right fulfilment strategies as the provided product range and price. It is found that e-commerce customers demand fast and reliable deliveries (Ricker and Kalakota, 1999).

3.1.1 COMMON CHARACTERISTICS FOR E-COMMERCE

Online retailers might have different market segmentations, operational scales, and supply chain structures. However, e-tailers have several characteristics in common. Xu (2003) describe these elements as follows. E-tailers often offer a large scale of products due to the unlimited physical space in the storefront compared to a retail store. Moreover, reliability and efficiency of the supply chain is crucial in e-commerce since trust is a major criterion for customers evaluating online retailers. Furthermore, the picking process in e-tail business, when products are gathered to make an order, can be seen as an assemble-to-order system where the final product is a complete customer order. The delay in demand fulfillment is also to be seen as a common characteristic for e-commerce. As the customer does not receive his or her products until days after placing the order, there is a time window before the order is fulfilled. If the e-tailer delays the decision on inventory allocation and shipping methods the ability to better utilize resources will increase. Therefore, the e-tailer might encourage the customers to choose a longer delivery time by, for instance, making use of different pricing schemes. Another common factor for e-commerce is that the e-tailer has the right to decide how the customers order will be served as the customer himself cannot choose which warehouse to get the delivery from. Therefore, the e-tailer can better utilize its warehouses when choosing how the customer's request will be fulfilled (Xu, 2003).

3.2 HOW TO HANDLE CUSTOMER DEMAND

The logistics design of an organization is influenced by several independent factors. One of the main reasons for holding inventory of finished goods is long lead times for producing and delivering the products. The type of demand faced by the organization impact the choice of inventory management approach (Rushton et al, 2006).

3.2.1 LOGISTIC OBJECTIVES

Ballou (2004) identifies three logistic strategies to reach logistic objectives. *The cost reduction strategy* aims at reducing variable costs associated with transportation and storage and maximize profit. *The capital reduction strategy* aims at reducing the tied up capital in the logistics system. Usually, this strategy results in higher variable costs, as products might be transported directly to customers to avoid warehousing, or using a just in time approach. However, profit maximization results in a higher return of investment. The final strategy is the *service improvement strategy*, which is based on the knowledge that revenue depend on the logistics service level provided. It is stated that the logistics costs increase as the logistics service level increase, however the increase in costs is usually far less than the increase in revenue (Ballou, 2004).

3.2.2 PUSH AND PULL

The nature of demand and limitations of the supply chain affects the logistics design and inventory decision. In the case of uncertainties or capacity limitations in supply, the *push* approach is preferred (Rushton et al, 2006). A push based inventory planning is based on forecast and the inventory is replenished with goods to fulfill future demand. Further, the approach is beneficial when organizations are able to predict the forthcoming demand and is also useful when the demand has seasonal fluctuations (Rushton et al, 2006).

The alternative to the push approach is to use the reactive approach; *pull* which responds directly to customer demand. When applying the pull approach, quick reactions to sudden changes in demand is needed and the approach is most useful when there are uncertainties in the demand requirements or the order cycle time (ibid).

3.2.3 FORECASTING

According to Jonsson and Mattson (2005) forecasts are made to enable the ability to balance the amount of delivered products with the customer demand for a set time frame. Forecasts can be set on a strategic, tactical and operational level. It is appropriate to forecast for a sufficient time span regulated by the time it takes to adapt the production system, purchase material and the time needed to deliver products to customers.

3.2.3.1 FORECASTING DATA & DEMAND PATTERN

Forecasts are often based on previous records that can be identified from delivery and invoice statistics. Moreover, statistical data can be used to determine a demand pattern. Jonsson and Mattson (2005) describe three common patterns; random variation, trend where the demand increase and decrease, and finally; season where the demand change in accordance to the time of year. The demand trends can be seen as cyclic but often influenced by the national and international economical situation (ibid).

3.2.3.2 FORECASTING PROBLEMS AND FORECAST CONTROL

It is sufficient to calculate forecasting errors and to control them to ensure that they are kept within set standards. According to Jonsson & Mattson (2005) this is especially important for calculated forecasts, where one misleading forecast will lead to another misleading forecast. A forecast error is the difference between the forecast and the actual demand. However, to ensure the stock availability the company can use safety stock.

3.2.4 WAREHOUSES AND STOCK KEEPING

One of the main reasons for keeping finished goods in stock is due to long production or delivery times (Rushton et al, 2006). Jonsson & Mattson (2005) identify several reasons for keeping products in stock at warehouses. Firstly, holding excess of products increases the ability to reach a higher customer service level. Secondly, it enables joint transportation and economies of scale in procurement negotiations. However, as products are kept in warehouses capital is being tied up. There are several principles for stocking inventory; three of these are described below.

Cycle stock is a warehouse with more products in store than what is required for the immediate need. It aims to provide products gradually when needed. The rationale behind cycle stock is presented in Figure 2.

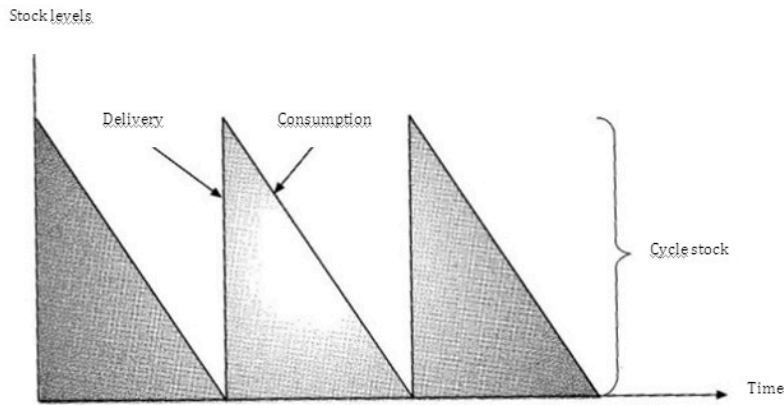


FIGURE 2 - CYCLE STOCK SOURCE: JONSSON & MATTSON (2005)

To be able to produce in the same pace over the year, an *anticipation inventory* can be built up during low season and used during high season. The size of the stock is set due to preferences in the tradeoff situation between carrying costs and costs due to low utilization of resources or extended capacity costs. The main reason for using this type of inventory is to equalize the production of seasonal products. The rationale behind anticipation inventory is presented in Figure 3.

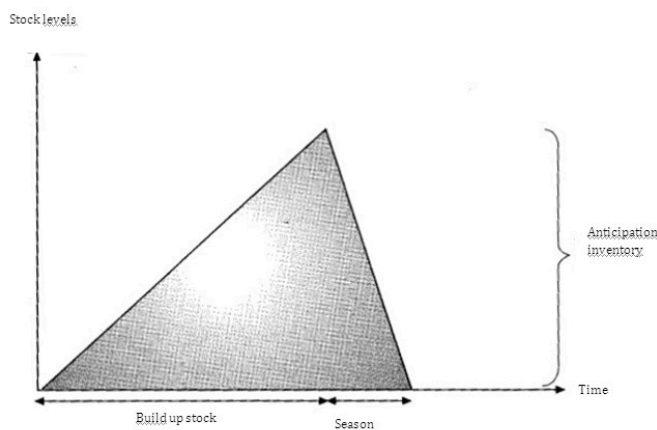


FIGURE 3- ANTICIPATION INVENTORY SOURCE: JONSSON & MATTSON (2005)

Often the demand is not as expected, and when it is larger than expected stock out is the result. However, this can be avoided through sufficient *safety stocks* (Aronsson et al, 2004). The safety stock is also used to avoid shortage of products due to late material deliveries or lack of quality in the deliveries. The size of the safety stock is a tradeoff between costs and shortages costs. The rationale behind safety stock is presented in Figure 4. Setting the appropriate size of safety stocks is complex, and the methods used to set the stock levels vary (Aronsson et al, 2004).

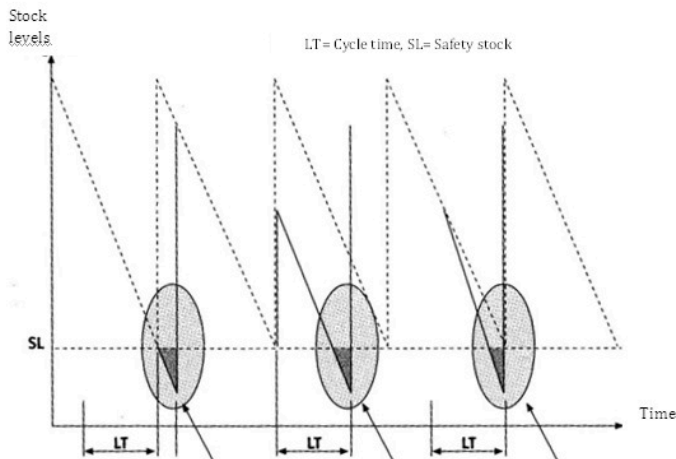


FIGURE 4 - SAFETY STOCK SOURCE: JONSSON & MATTSON (2005)

3.2.4 DECENTRALIZED AND CENTRALIZED WAREHOUSING

A distribution system, consist of several, few or just one warehouse. Having several warehouses operating on a local level is known as a high level of decentralization. One advantage with decentralization is closeness to customers, which is especially important for products requiring a short delivery time. Another advantage is that the distribution cost can be kept low, and this is advantageous on markets where customers buy frequently and in small quantities (Melachrinoudis, 2007).

A centralized warehouse has potential to gain advantage of economies of scale and low holding costs. According to Melachrinoudis (2007) a higher customer service level can be achieved, using a centralized warehouse, as it is easier to control products in stock and the availability is higher. However, the opposite is argued since a centralized warehouse means distance from the customers and a lower service level will be the result if the transports are not fast and efficient enough (Ballou, 2004). Another advantage with centralized warehouse is the reduced risk of cascading effects and obsolescence. Also, less warehouse space is needed in total and the non-value adding activities are less compared with decentralized warehouses. Melachrinoudis (2007) present calculations of how the inventory level is decreased. By reducing from 10 warehouses to 1 warehouse the inventory volume can decreased by 68 percent (the calculation is presented in the Appendix). Another advantage is that the inventory velocity can be increased due to warehouse consolidation (Melachrinoudis, 2007). The tradeoffs between centralized and decentralized warehousing in the aspects of service and costs are presented in Figure 5.

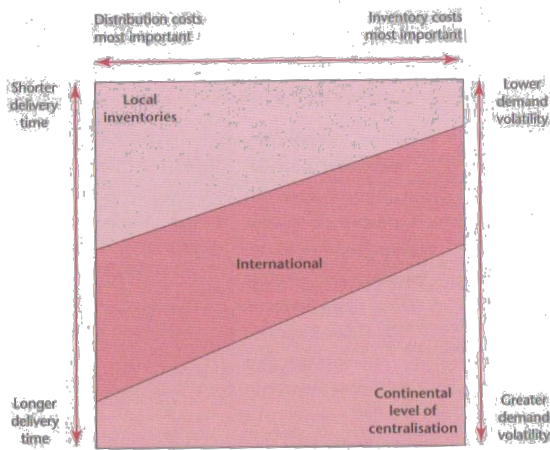


FIGURE 5 - CENTRALIZED AND DECENTRALIZED TRADEOFFS SOURCE: HARRISON AND VAN HOEK (2004)

3.3 THE CUSTOMER ORDER PROCESS

A customer order can be defined as a commitment from the customer to purchase a certain quantity of products from the supplier at a certain time. The supplier usually confirms the order when it is processed. If the order consists of standard products in stock, a picking list is created. After the order has been picked it is packed and sent to the customer. A notification is also sent to the customer to inform that the order is about to be delivered. Standard products have individual article number, which allows them to be registered in the suppliers' business system and to create a reservation of the products in stock (Jonsson & Mattson, 2005).

3.3.1 DETERMINING THE DELIVERY TIME

When setting the delivery time it is important that the products are available both in the right quantity and at the right time. It is further important to identify when the products are available, even though there are a number of products in stock, they might be reserved by other customers and can thus not be sold. One method of setting the delivery date is to look at when the ordered products are available. Another method is to use a standard delivery time, which is usually based on experience within the industry and from the employees. A disadvantage with this method is however that the delivery time has to be long in order to keep the customer promise even when the demand is high. On the other hand, an advantage with using standard delivery time is that the customer will immediately receive a delivery time when placing an order (Jonsson & Mattson, 2005).

3.3.1.1 E-COMMERCE DELIVERY TIME

Posten Norden has done a research concerning expected delivery time on customers living in the Nordic region. The results from the customers in Sweden, Denmark, and Finland presented in Table 1. From Table 1 it can be remarked that 45 percent of the asked Finnish inhabitants expect a delivery within 7 days. 48 percent of the Danish customers expect a delivery time shorter than five days. It can also be seen that 40 percent of the Swedish customers expect a delivery time in less than 5 days (Posten Norden, 2010).

TABLE 1 - EXPECTATIONS ON DELIVERY TIME SOURCE: POSTEN NORDEN (2010)

	SWE	DK	FIN
<i>One day</i>	1 %	1 %	0 %
<i>Two days</i>	5 %	9 %	4 %
<i>Three days</i>	14 %	18 %	4 %
<i>Four days</i>	7 %	10 %	2 %
<i>Five days</i>	13 %	9 %	4 %
<i>Six days</i>	1 %	1 %	3 %
<i>Seven days</i>	36 %	30 %	45 %
<i>Eight days or more</i>	18 %	16 %	33 %
<i>Unsure</i>	5 %	5 %	4 %

3.4 CUSTOMER SATISFACTION

Creating value for their customers is crucial for companies to be successful in their market. Moreover, the product or service offered is providing value to the customer by fulfilling certain needs (Harrison och van Hoek, 2004). A customer purchasing a service purchases a concept rather than a product. The concept can be such as a comfortable transportation from A to B, rather than a train ticket from A to B. The transportation from A to B includes many different aspects that the customer will judge, where the final arrival to B is purely a benefit of the service. The experience of the service as a whole and the outcomes in terms of benefits, emotions and values are what create satisfaction or dissatisfaction for the customer. The way the customer perceives the service is a result of the customer's experience of the service (Johnston and Clark, 2008).

In order to provide a satisfying service to customers it is important to understand what makes a service satisfactory and perceived as of good quality. According to Johnston and Clark (2008) a customer will be satisfied with the service delivered if it is perceived as exceeding the customer's expectations. A customer is dissatisfied when the perceived service does not match the expectations of the service or the outcome. There are several reasons for why this might happen; for instance an inappropriate specified service or inappropriate customer expectations.

Johnston and Clark (2008) identify the importance for organizations to understand their customer's expectations and manage the expectations. A customer's expectation will differ between ideal and intolerable depending on for instance the price he or she is paying for the service. The customer usually accepts a range of acceptable outcomes; this range of acceptable outcomes is known as the zone of tolerance and means that the customer will accept a deviation from the expected service within the zone of tolerance (ibid).

Customers expectations can be divided into quality factors according to Johnston and Clark (2008), which are the attributes of the service that the customer expect to be delivered at a certain level. In Figure 6 a selection of these quality factors are presented. The quality factor, *availability*, is the service organization's staff per customer ratio and the range of products available for the customer to purchase. *Communication*, the second quality factor, assesses the organizations ability to understand the customer and to make the customer understand the organization in verbal and written information. *Flexibility* is the organization's ability to adapt the service to suit the customer's needs. The fourth quality factor, *integrity*, is concerned with how honest, fair and trustworthy the customer is treated. *Reliability* is the organization's ability to keep the promises made to the customer, such as delivery time. Finally, *responsiveness* assesses the service organization's ability to respond to the customer's requests.

- | | |
|--|--|
| <ul style="list-style-type: none">• Availability• Communication• Flexibility | <ul style="list-style-type: none">• Integrity• Reliability• Responsiveness |
|--|--|

FIGURE 6 - SERVICE QUALITY FACTORS ADAPTED FROM: JOHNSTON AND CLARK (2008)

In order to ensure that the customers are satisfied it is necessary to influence the customer's expectations to suit the delivered product or service. The seven factors presented in Figure 7 especially influence the customer expectations. The price the customer is paying is the most influence factor on the customer's expectations as the higher the price is, the higher the customer's expectations are. If there are alternatives available and the customer has experience from these alternatives, the customer's expectations will be influenced by their experience from the alternative. Marketing, which includes image, branding and other types of advertising campaigns and Word of mouth, will also affect the expectations. If the customer has previous experience of the service requested, this experience will influence the expectations. Also, internal factors such as the customers' mood and attitude will also influence the customer's expectations, as someone in a good mood will have a wide tolerance span. Finally, the customer's confidence in the

organization will affect the expectations and the more confidence the customer feels in the organization, the higher the expectations become (Johnston and Clark, 2008).

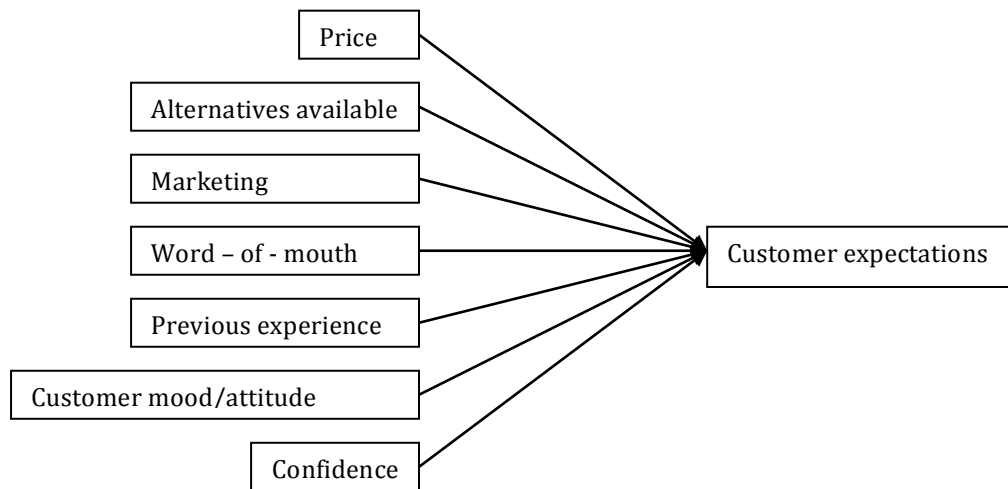


FIGURE 7 - KEY INFLUENCERS ON EXPECTATIONS SOURCE: JOHNSTON AND CLARK (2008)

3.4.1 REVERSE LOGISTICS

Reverse logistics is the return flow of goods that have been sent to customers (Dowlatshaha, 2000). The amount of products being returned is extensive in e-commerce and Min et al (2008) state that the return rate is as high as 20 – 30 percent for some categories of products sold online. Reasons for why products are returned can be such as quality problems, transportation damage, exchange for another product, refund and order error. Product returns can be of two different types, controllable and uncontrollable. Controllable returns are products that can be controlled and avoided by the organization. Problems such as order errors can be controlled through programs and strategies. The organization is also considered as in control over product returns caused during transportation. An example of how product returns can be decreased is by more accurately presenting the products. Uncontrollable returns are returns that are caused by factors outside of the organizations control, such as customer regret (Stock et al, 2006).

Dowlatshaha (2000) recommends organizations to integrate the reverse logistic into the business operations. Min et al (2008) even identifies reverse logistics as a competitive factor. However, the costs of reverse logistics are very high, and can be three times higher than the costs for outbound shipping. A comparison between reverse and forward logistics is presented in Table 2.

TABLE 2 - COMPARISON BETWEEN REVERSE AND FORWARDS LOGISTICS ADAPTED AND MODIFIED FROM MIN ET AL (2008)

<i>Features</i>	<i>Reverse Logistics</i>	<i>Forward Logistics</i>
<i>Quantity</i>	Small	Large
<i>Order cycle time</i>	Medium to long order cycle	Short order cycle
<i>Inventory control</i>	Not focused	Focused
<i>Priority</i>	Low	High
<i>Cost Elements</i>	More hidden	More transparent

Stock et al (2006) categories the return process into five stages. The first stage is *goods receiving* and describes when the products are returned to the distribution centre or centralized warehouse. One of the

complexities with reverse logistics is the multiple distribution channels. For an online store this will most often be individualized return in small quantities or centralized returns by a collection point (Min et al, 2008). When the product is received a return acknowledgement is made (Stock et al, 2006). After the return acknowledgement is made the product is evaluated to see if it is of value for the organization. By evaluating the value of the product early the risk of doing value added tasks to a worthless product is decreased (ibid). The second stage of the return flow is *sorting*, and during this stage the products are sorted depending on how they were returned, the type of return, the size of the return and the number of items being returned. In the third stage, *processing*, the products are sorted by their stock keeping number. During the fourth stage, *analysing*, the products are analysed to estimate the product value. If the product value is high enough the product is repackaged and ready for resale and if the product is of lower quality it might need to be refurbished. *Support* is the final stage and during this stage the products are ready for resale are returned to their assigned place, stock or store (ibid).

3.5 LOGISTICS STRATEGIES

The logistic strategy planning is closely related to the business strategy of the company that gives guidelines about how the company should operate successfully in the market. In more detail, the logistic department aims to accomplish high delivery service and keeping costs low. Therefore, it is of great importance for the logistics department to identify how the company values the tradeoff achieving competitive strategies by using cost advantages and using service advantages (Aronsson et al, 2004).

3.5.1 LOGISTICS PLANNING AND THE INFLUENCE ON CUSTOMER SERVICE

Logistics planning includes handling and combining four decision areas, presented in Figure 8, which are interdependent of each other. These areas are *the transportation decisions, the facility location decisions, the inventory decisions* and *the customer service level* where customer service level is central and a consequence of decisions made in the other three areas. Ballou (2004) remarks the importance to view the different planning areas as a system with a common planning process.

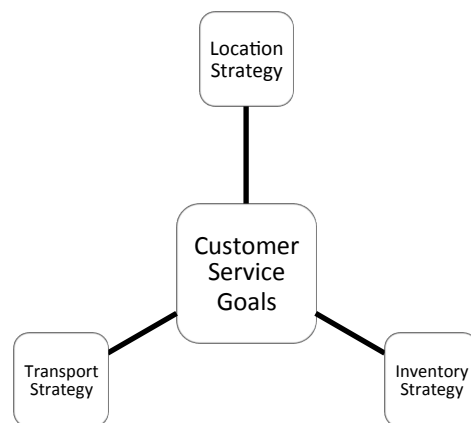


FIGURE 8 - THE TRIANGLE OF LOGISTICS DECISIONS MAKING SOURCE: BALLOU (2004)

Facility location strategies are concerned with decisions about number, size and location of facilities. The provided strategies give guidelines for the assignment of warehouse storing in relation to customer demand. The logistics plan is based on where material will be stored and how much that can be stored at each warehouse. Ballou (2004) state that finding the lowest cost assignment or the maximum profit assignment is the goal of facility location strategy. Inventory strategies include decisions concerning the inventory levels, deployment of inventories and control methods. The inventory strategy can be based on push or pull policies. The strategies also include decisions concerning goods location such as if products from the same product lines should be located at the same place, and how inventory levels should be controlled. Transport strategies set the modest of transport, routing scheduling and shipments size.

Transport strategies include decisions such as shipment size, transportation style, route and schedule (Ballou, 2004).

The customer service goals declare the level of customer service the company aims to provide, and these goals highly affect the logistics system. The service level is often set in relation to competitors' performance and industry standards or as a result of a marketing strategy (Bowersox et al, 2010). If the marketing strategy is to be better than competitors in logistic accuracy the service provided need to be high. Providing a high customer service will therefore be an order-winning factor resulting in the generation of more and loyal customers. In general, having a high service level will require designing the logistics system in such a way that customer requirements can be met at all times. To design a logistics system seeking to satisfy customer accepting a low level of customer service is less complicated as the requirements are lower. However, it is important to assess the risk of providing a low customer service as it can result in the cost of customers choosing competitors instead (Croucher et al, 2000). However, the cost of having a low service level and a high service level are not in relation to each other. As the service level increase the logistics cost increase un-proportionally more than the service level itself. Because of this fact, it is important to set the customer service level at an appropriate level (Ballou, 2004).

3.5.1.1 DELIVERY SERVICE ELEMENT

The customer service level can be evaluated by examining factors known as delivery service elements. The service provided by an organization to its customers can be categorized into several different elements. Jonsson and Mattsson (2005) and Aronsson (2004) specify the elements that create delivery service as stock availability, delivery accuracy, delivery cycle, delivery reliability, flexibility and information exchange.

Stock Availability is concerned with if the products are in stock when the customer places an order. This measurement is important for organizations producing to stock and delivering from stock (Jonsson, 2005). Stock availability can be assessed by stock out frequency, fill rate and shipped complete orders (Bowersox, 2010). Stock out frequency is the measure of how many products that are available when the customer requests a product, however the measure makes no difference between if some products are more critical to have available than other (ibid). Shipped complete orders, is the measure of if the whole order is available and it is a harsh measure as an order can consist of unlimited amounts of products (Jonsson and Mattsson, 2005). The logic behind this measure is that the standard of acceptable order is to have all the products requested by the customer available (Bowersox, 2010).

Delivery Consistency is if the customer gets its ordered products delivered at the time promised by the organization. Bowersox et al (2010) state that customers want fast delivery but it is of limited value if the products are not delivered at the set time. A time span is set as the acceptance level for delivery. Too early and too late deliveries are seen as low delivery consistency. The time it takes from the customer order point to the delivery is referred to as the delivery cycle time (Aronsson, 2004).

Delivery Reliability measures if the right product at the right quantity is delivered to the customer. According to Jonsson and Mattsson (2005) the delivery reliability is also defined as the number of orders that are delivered to customer without any complains about the quality of the products or deviation between the delivered products and the actually ordered products.

Flexibility is the organizations ability to adapt to the customer's requirements, both prior to the customer order point and after. Flexibility before the customer order point is for instance concerning the delivery flexibility, such as the ability to adapt the delivery point in time. The delivery flexibility after an order has taken place is the ability to adapt to changes in the customers requirements, for instance, adding or deleting products to the order (Jonsson and Mattsson, 2005).

The final service element is *Information Exchange*. It is concerned with the customer's ability to receive information about stock availability and the possibility to track the status of an order. With a high

information exchange it is possible to track an order both in the warehouse and as the order is transferred. (Jonsson and Mattsson, 2005)

The delivery service can reach different levels. However, there is a tradeoff between the costs of providing a high delivery service and the competitive advantage it will result in. Aronsson et al (2004) point out that there is optimal point where delivery service is profitable. Usually the most profitable service level is between 95 - 99 percent. The reasoning is presented in Figure 9.

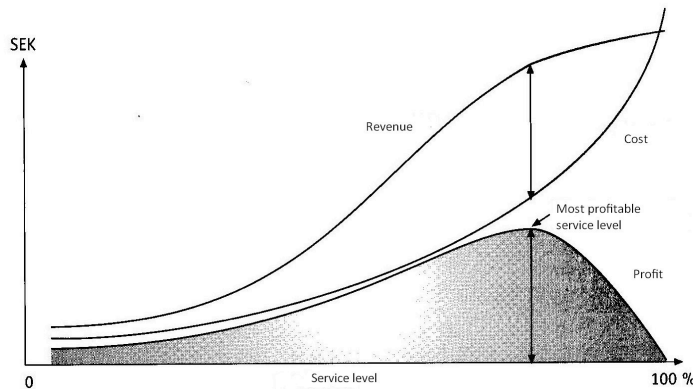


FIGURE 9 - CORRELATION BETWEEN SERVICE LEVEL AND PROFIT SOURCE: ARONSSON ET AL (2004)

3.5.1.2 PERFECT ORDER ACHIEVEMENT

To assess service performance each of the service elements can be examined to see how the performance meets the set standards. However, it is valuable to not view each of the service elements independently. If the organization sets an acceptable standard for their provided service elements, the actual delivered service will be lower when viewing all the service elements as a whole. The reason for viewing all the service elements jointly is that for a delivery to be failure-free, the product has to be on time, complete with all requested products and error free. For instance, if the products are delivered in the right quantity and error free, but delivered late, the whole order is viewed as a failure (Bowesox, 2010). The order that meets the customer requirements within all service elements is called “the perfect order”. An organization can calculate their level of achievement of perfect orders by calculating the percentage of on-time deliveries multiplied by the percentage of in full deliveries multiplied by the percentage of error free deliveries (Christopher, 2005). A calculation as such shows the importance of providing a high service level within each of the service elements. An organization achieving 97,0 percent fulfilment within each of the elements will fulfil “perfect orders” in 88,5 percent of the customer orders.

3.5.2 STRATEGY FORMULATION

The logistics strategies can be based on, *total cost concept, differentiated distribution, consolidation, or standardization*. The organizations business strategy influences the choice of logistics strategy and the aim of the logistics activities.

3.5.2.1 TOTAL COST CONCEPT

An issue faced in many organizations is that a decision that aims to reduce a certain cost often effects and contradict other costs. It therefore becomes necessary to make tradeoffs analysis to balance the activities in order to ensure that all costs are collectively optimized. The optimal level to be found is where the sum of all costs is the lowest. Ballou (2004) identifies three total cost concepts: to set the customer service level, to determine the number of warehouses in the logistic system and to set the safety stock levels. The rational behind these total cost concepts is presented below.

3.5.2.1.1 SETTING THE CUSTOMER SERVICE LEVEL

As the customer service level increase, fewer customers are lost due to product stock outs, delivery inaccuracy or long lead times and therefore the lost sales costs decrease. However, the total costs increase with a higher customer service level higher then a certain level, demonstrated in Figure 10, presented below.

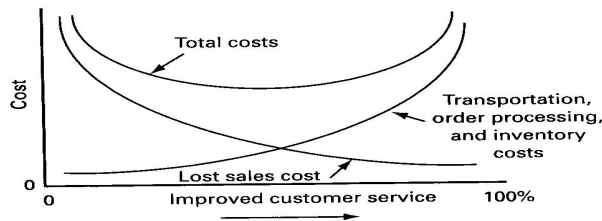


FIGURE 10 - SETTING THE CUSTOMER SERVICE LEVEL SOURCE: BALLOU (2004)

3.5.2.1.2 DETERMINING THE NUMBER OF WAREHOUSES IN A LOGISTICS SYSTEM

The more points to store inventory that are utilized the smaller the transportation costs become. However, the inventory costs increase with more stocking points in the warehouse network. The aim of this total concept is to find the lowest sum of inventory and transportation costs, while keeping a satisfying customer service level, the reasoning behind the relation between inventory, transportation cost and customer service is presented in Figure 11.

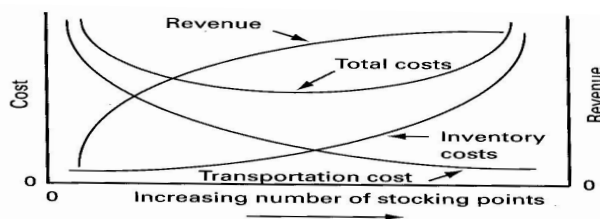


FIGURE 11 - DETERMINING THE NUMBER OF WAREHOUSES IN A LOGISTICS SYSTEM SOURCE: BALLOU (2004)

3.5.2.1.3 SETTING SAFETY STOCK LEVELS

High safety stocks increase the inventory costs, while lacking safety stocks can result in lost sales. Therefore a balance between inventory costs and the cost of lost sales need to be found. Figure 12 presents this reasoning.

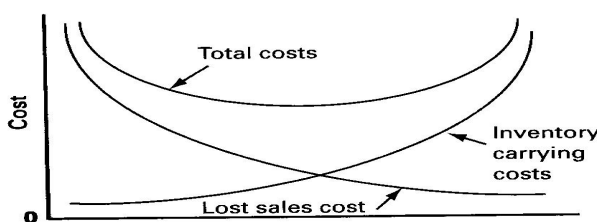


FIGURE 12 - SETTING SAFETY STOCK LEVELS SOURCE: BALLOU (2004)

3.5.2.2 DIFFERENTIATED DISTRIBUTION

According to Ballou (2004) not all products should have the same level of customer service. An example of how to apply this strategy is to use diverse priorities for the products depending on the sales volume. For instance, decisions concerning the stock level and the inventory location for the products can be determined based on if sales of the products are high or low. If all articles in the product line would be available in stock at all warehouses, the organization will experience higher carrying costs than necessary. However, it can be avoided by for instance placing fast moving products at field warehouses,

medium volume products at fewer regional warehouses and finally slow moving products at centralized warehouses. Ballou (2004) argues that one distribution system with the warehouses, as order fulfillers should be the regular option. Moreover, a backup distribution system can then be used when a customer order is out of stock. The backup distribution system might use premium transportation system and fulfill the order through secondary warehouses.

3.5.2.3 CONSOLIDATION

Gathering customer orders received at different times to a common transportation can achieve economy of scale. However, consolidation can extend the delivery time and it therefore becomes a matter of tradeoff between cost and service level, since longer delivery times have influence on the service level (Ballou, 2004).

3.5.2.4 STANDARDIZATION

Increasing product variety will increase inventory and accordingly by adding only one more product in the product line that is comparable to another will increase the combined inventory level of both items by 40 percent or more (Ballou 2004). However, it does not mean that the total demand increase as a result. Consequently, there is a constant tradeoff between providing the products desired by the customer and keeping low logistic costs.

3.5.3 LOW DEMAND STOCK KEEPING UNITS

Christopher (2005) presents a model, Figure 13, where he suggests how products should be handled based on volume and profit contribution. If the stock keeping unit (SKU) has a high profit contribution and sell large volumes, the SKU should be provided with high availability. It should be noticed that only a few products will fall into this category and it is therefore possible to favour these products and offer a high service level. Moreover, if a product contributes with high sales volumes but with low margins, the company should revise the product and seek for cost reductions to gain higher profits. For products that contribute with a high level of profit but are sold in low volumes, the company should seek to use centralized inventories to reduce the total inventory investment and ship products by express transport directly to the customers instead of keeping the items in store at a more close location. For products that have a low contribution of profit and low sales, a review of its existence should be examined. Further, it is stated that if the product plays a strategic role in the company's product portfolio, it should be kept in the product line.

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

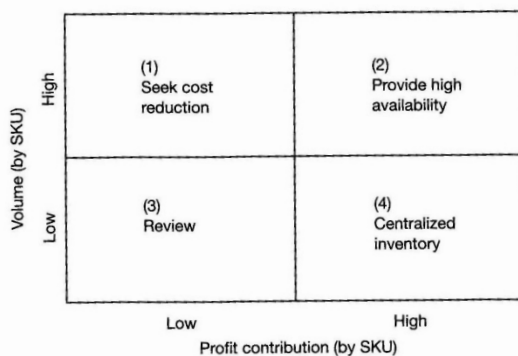


FIGURE 13 - SALES VOLUME AND PROFIT CONTRIBUTION SOURCE: CRISTOPHER (2005)

Additionally it is argued that even though some product has low demand and offer a low profit contribution, it might be advantageous of several reasons to keep these low demand items in stock. Xu (2003) argues that having these products in inventory contributes to provide a wide range of selection of

products, faster customer fulfilment service. Sometimes, offering these products is even to be seen as a competitive advantage.

3.5.4 THE 20-80 CURVE

Pareto’s Law can be used to evaluate a product range and proves that a relatively small percentage causes a large share of the total volume. More specifically, it declares that 80 percent of an effect is caused by 20 percent of the cause (Wild, 2002). The effect can for instance be sales or volume and the cause is the product categories or suppliers. The reasoning behind this is presented in Figure 14. The percentage sectioning does not have to be exact, but the principle is that a small number of products are responsible for a large share of the causes (Ballou, 2004). As can be seen in the graph, Pareto’s law also presents other interesting statistics, such as that 50 percent of the products result in 97 percent of the sales. This also means that 50 percent of the products only result in 3 percent of the total sales (Wild, 2002).

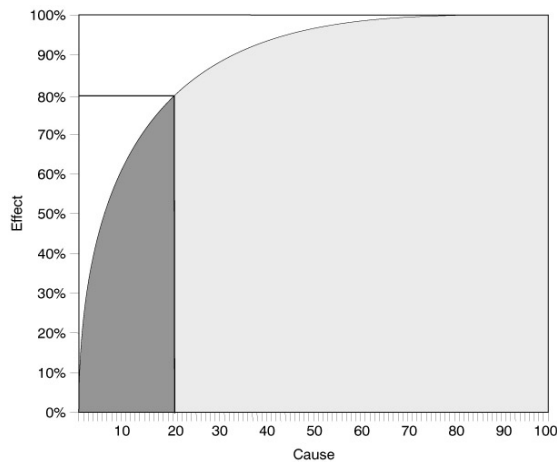


FIGURE 14 - PARETO CHART SOURCE: WILD (2002)

3.5.5 ABC CLASSIFICATION

In order to ease the inventory control a classification of the products into different categories can be done. The categories can be based on sales volume, price or other factors of interest. According to Ballou (2004), the 80-20 principle can be used to classify products by their sales activities. A common classification is to identify ABC products. The top 20 percent of the products are called A products, the following 30 percent are B products and the rest of the products are called C products. This identification helps to set appropriate service levels for the products in order to satisfy customers while keeping costs as low as possible (ibid). The product classifications and percentage of items and percentage of sales volume are presented in Table 3.

TABLE 3 - ABC CLASSIFICATION SOURCE: BALLOU (2004)

<i>Class</i>	<i>% of items</i>	<i>% of sales volume</i>
<i>A</i>	20	80
<i>B</i>	30	15
<i>C</i>	50	5

A products carry the most value, and therefore need close attention. Whereas C products just require attention enough to meet customers demand (Wild, 2002). Further specifications of how to handle the different product categories are presented in Table 4.

TABLE 4 - ABC INVENTORY CONTROL ADAPTED FROM: WILD (2002)

Characteristics	Policy	Method
<i>A products</i> Few items Most of turnover	Tight control Personal supervision Communication Balanced safety stock	Frequent monitoring Accurate records Sophisticated forecasting Service level policy
<i>B products</i> Important items Significant turnover	Lean stock policy Use classic stock control Fast appraisal method Manage by exception	Rely on sophisticated method Calculated safety stocks Limit order value Computerized management and exception reporting
<i>C products</i> Many items Low turnover value (Few movements or low value items)	Minimum supervision Supply to order where possible Large orders	Simple system Avoid stock outs and excess Infrequent ordering Automatic system

As each product category requires different attention it is also appropriate to store them differently. Ballou (2004) has identified how the product categories should be stored. A products should have a wide geographic distribution and high stock levels. B products should be stored at regional warehouses. C products, on the other hand, should be stored at a centralized warehouse. These products are also in need of lower stock levels.

3.5.6 THE CONCEPT OF POOLING

When the selling prices is high enough to cover the shipping costs plus the differential in salvage cost it is profitable to ship units from a given location for sale at another. This arrangement is called pooling of stocks (Anupindi et al 2001).

Andupindi et al (2001) describe the concept of pooling as sharing inventory among several retailers so that shortages at one retailer can be satisfied from surpluses at another. *Physical pooling* means using a centralized location to hold inventory that it is available to all distribution centres. Moreover, *virtual pooling* means that if the assigned warehouse cannot fulfill demand, the demand can be met from another warehouse in the network. Lastly, another way to utilize pooling is by letting distribution centres cover its own demand firstly, and only relocate the residual inventory and it is called *pooling of residuals* (ibid).

Pooling allows the system to increase its overall profit since the centralization of stocks helps a firm to reduce inventory investment and to improve customer service. The search of excess stock can be either customer driven or retailer driven (Anupindi et al, 2001). In e-commerce the search of excess stock is retailer driven since the e-tailer decides which warehouse to fulfill the customers' needs (Xu 2003).

To enable pooling, an information system that provides accurate data on excess demand and excess stock is needed. Moreover, the willingness of the various parties to cooperate with each other is important and a process for allocating the relevant cost and revenues in a way that is consistent with the self-interest of the relevant parties is needed (Anupindiu et al, 2001).

3.5.6.1 E-COMMERCE VIRTUAL POOLING

To fulfil customer orders sufficiently many organization assign their customers to have their orders fulfilled from a selected distribution centre depending on their location. Chhaochhria (2007) presents a solution of how online stores can fulfil their customer demand, even though the customer assigned warehouse is out of stock. If a customer orders a product which is out of stock in the customer assigned distribution centre, retailers with good IT infrastructure have the possibility of fulfilling the customer demand from another distribution centre. A sufficient IT system makes it possible to create a shipment from another distribution centre with the selected product in stock. Chhaochhria (2007) also extends this reasoning further with the reasoning that if all warehouses are out of stock, the IT system can assign the order to the distribution centre receiving the requested goods first.

The costs of holding products, the ordering cost and the cost of having a backorder are independent of which distribution centre that serves the customer. However, the distribution costs might differ largely depending on the warehouse location and customer location. Because of the difference in distribution cost the DC from which the customer demand is to be served is assigned by a priority list (Chhaochhria, 2007). The principle behind such a priority is presented in Table 5.

TABLE 5 - WAREHOUSE PRIORITY SOURCE: CHHAOCHHRIA (2007)

		A	B	C
DC Filling Order	A	1	2	3
	B	2	1	2
	C	3	2	1

The table presents the priority of order fulfilment depending on the distribution centre the customer is assigned to. For instance, if a customer from region A orders a product distribution centre A should primarily fulfil it. If A is out of stock the second option is to fulfil the order by distribution centre B and finally by distribution centre C. If none of these have the requested product in stock, the first distribution centre receiving replenishment will be responsible for fulfilling the order (Chhaochhria, 2007).

3.5.6.2 SPLIT ORDER

Products are picked and packed from stock to be delivered to the customer. If not all products are in stock the order has to be put on hold until all products are in stock or the order has to be split delivered. A split order means that the missing products will be backordered and delivered when disposable (Jonsson & Mattsson, 2005).

A split order is a customer order that requires more than one shipment. In the transportation cost of shipping and package, the fixed cost is significant. Therefore, when selling low weight items, the e-tailer minimizes its transportation costs by minimizing the number of shipments (Xu 2003).

3.5.7 ORDER SWAP

Xu (2003) describe the process of assigning an order in a virtual pooling e-commerce. Firstly, the customer places an order and the e-tailer in real time searches for available options for fulfillment from its warehouses. Secondly, the e-tailer assigns the order to one or more warehouses virtually, a decision based on transportation costs and the current warehouse inventory availability. After the order has been assigned to a certain warehouse, the e-tailer quotes a promise-to-ship-date to the customer depending on the inventory availability and customer preferences. When the e-tailer assigns the order, the order enters

a picking queue at the warehouse where the order might wait six to eight hours before the products are picked and assembled to shipment (ibid).

Xu (2003) argues that the agreement that occurs between the customer and the e-tailer when the order is placed in the system is to be seen as myopic since the e-tailer wants to reserve products for the customer as soon as possible. Further, the e-tailer wants to give the customer a promise of delivery but the large number of orders and the need to quickly respond to the customers' requirements makes it difficult to make efficient assignment.

By reevaluating the real time decisions about order assignment, Xu (2003) argues that the total logistics costs can be reduced. The process of reevaluating real time decisions would mean that the system first seek to find a feasible solution when the customer places the order and then iteratively finds better solutions. One way to utilize the revaluation concept is to use single orders to join the split orders. The concept is called *Order Swap* and aims entirely at reducing all split orders to one shipment that will better utilize warehouses and decrease the number of split orders. The Order Swap concept utilizes the flexibility of single orders and the abundance of unassigned inventory by considering split orders one at the time and examines possible swap of assigned orders from one warehouse to another. For instance, by re-assigning a single order from warehouse A to warehouse B, we free up a unit of inventory at warehouse A that might be used to avoid a split order. Order Swap performs especially well when there is a large amount of single orders or unassigned inventory. Moreover, a single order consists of only one unit and is therefore very flexible. Furthermore, a majority of split orders in the real-time assignment include a single shipment. Moreover, all unassigned inventory can be treated as single orders to increase the possibilities for exchange. It is also important to consider the time dimension when making order swaps, as the promise-to-ship date should not be affected by the swap (ibid).

3.6 THEORETICAL FRAMEWORK SUMMARY

The following section presents a summary of the theoretical framework.

Common characteristics for e-commerce

Some common characteristics for e-commerce are;

- A large scale of products due to unlimited physical space in the storefront
- Reliability and efficiency of supply chain is crucial
- The company has the ability to collect a great amount of data
- There is a delay in the demand fulfillment
- The e-tailer has the right to decide how the customers need will be fulfilled

The logistic system

The logistic strategies have three main objectives;

- Cost reduction
- Capital reduction
- Service improvements

Push and Pull

Push based inventory planning;

- Based on forecast
- The inventory is replenished with goods to fulfill future demand
- Beneficial when it is possible to predict forthcoming demand
- Useful when there are seasonal fluctuations in demand

Pull based inventory planning;

- Responds directly to customer demand
- Quick reactions to sudden changes in demand is needed
- Useful when there are uncertainties in the demand requirements or order cycle time

Forecasting

Forecasts enable the ability to balance the amount of delivered products with the demand.

It is appropriate to forecast for a time span regulated by the time it takes to adopt the production system.

Warehouses and stock keeping

Reasons for keeping stock;

- Excess of products increases the ability to reach higher service level
- Economies of scale

Reasons for avoiding stock keeping;

- Capital is tied up
- Risk of obsolescence

Centralized and Decentralized warehousing

Benefits with centralized warehousing;

- Economies of scale
- Low holding costs
- Reduced risk of cascading effects
- Reduced risk of obsolescence
- Less warehouse space is needed in total
- Lower level of non-value adding activities

Benefits with decentralized warehousing;

- Closeness to customer
- Low distribution costs

Determining the delivery time

When setting the delivery time it is important that the products are available both in the right quantity and at the right time. A standard delivery time can be used to give the customer an immediate a delivery time. A disadvantage of using standard delivery time is that the delivery time must be kept even during high demand times.

Reverse logistics

Reverse logistics is the return flow of goods. The return rate for products sold online can be as high as 20-30 percent. The reasons for returning the products are several and the returns can be either controllable or uncontrollable.

Logistic planning and the influence on customer service

The logistic planning handles three interdependent areas influencing the customer service goals;

- Location strategy
- Inventory strategy
- Transport strategy

To provide a high service level can be costly, but a high service level can increase sales and customer satisfaction. It is therefore important to find the most profitable level of service.

The delivery service consist of following elements;

- Stock availability
- Delivery consistency
- Delivery reliability
- Flexibility
- Information exchange

To evaluate the service performance, the perfect order achievement method can be used.

Strategy formulation

The logistics strategies can be created from different angles, total cost concept, differentiated distribution, mixed strategy, consolidation, or standardization. The organizations business strategy influences the choice of logistics strategy and the aim of the logistics activities.

Low demand SKUs

Pareto's Law can be used to evaluate a product range and proves that a relatively small percentage causes a large share of the total volume. More specifically, it declares that 80 percent of an effect is caused by 20 percent of the cause. The products with the highest sales might therefore be treated differently than the product with the lowest sales.

- Products with high profit contribution and high volumes should be provided with high availability
- Products with high profit contribution and low volumes should be stored at a centralized inventory
- Products with a low profit contribution and high volumes should be examined for cost reduction
- Products with low profit contribution and low volumes should be reviewed

ABC classification

A products are 20 percent of the items which stands for 80 percent of the sold volume

B products are 30 percent of the items which stands for 15 percent of the sold volume

C products are 50 percent of the items which stands for 5 percent of the sold volume

The concept of pooling

Pooling means charring inventory among several retailers so that shortage at one retailer can be satisfied from surplus at another.

- Physical pooling means using a centralized warehouse that is available to all distribution centres
- Virtual pooling means that if the assigned warehouse cannot fulfill the demand, the demand can be met from another warehouse in the network
- Product substitution means that the demand for a particular product is to be satisfied by another related product
- Pooling of residuals means that the distribution centre cover its own demand firstly and relocate the residual inventory

Warehouse priority

If a customer orders a product which is out of stock in the customer assigned distribution centre, retailers with good IT infrastructure have the possibility of fulfilling the customer demand from another distribution centre. If the assigned DC cannot fulfill the customer demand, the customer gets their need fulfilled by the next DC in the priority order. Using warehouse priority enables a more sufficient customer order management.

Split orders

If not all products required in a customer are in stock the order can either be put on hold or become a split order, which requires more than one shipment. The fixed cost is significant in the transportation cost (shipping and package) and the e-tailer will benefit from minimizing the number of shipments, especially when selling low weight items.

Order swap

By reevaluating the real time assignment of customer orders, the customer order assignments can be more efficient and increase the utilization of warehouse inventory. The total transportation cost can be lower since the number of split orders decrease.

4. EMPIRICAL DATA COLLECTION

The gathered information in the Case Study is collected from interviews with employees from the logistic and buying departments at H&M. The study is further based on information from internal reports and documents provided by the employees. The study is mainly based on figures from the year 2010. A comparison over time is not representative as the studied organization goes through a constant expansion. It should be noted that the sales channel online was introduced to customers in United Kingdom September 2010. All information in the case study has been verified and approved by the interviewed employees. A list of the interviewed employees and internal documents is presented in the reference list.

4.1 H&M BACKGROUND INFORMATION

H&M Online began selling products over the Internet year 1998 in Scandinavia and has since then expanded its sales volumes and new markets. The sales channel H&M Online is today offered in eight countries, Sweden, Norway, Denmark, Finland, Holland, Austria, Germany and United Kingdom. The customers in Sweden, Denmark, Finland and United Kingdom are provided with products from a distribution centre in Borås, Sweden while the customers in Holland, Austria and Germany are provided with products from a distribution centre in Poznan, Poland. The Norwegian customers are provided with products from a distribution centre located in Oslo, Norway. All the markets are presented with the same product offer with the exception of a few products, which are national specific. The printed catalogue is the same in all markets, which limits the ability to offer different products to different markets. H&M divides the fashion seasons into spring and fall. The spring season is offered online from December until July, and the fall season from July until December. Approximately five percent of all products in the product line are offered to the customers for more than one season. These products are often classified as more basic clothing.

4.2 H&M ONLINE PRODUCT OFFERING

The product tree is presented in Figure 15. Firstly the products are divided into eight divisions, depending on product categories. The product divisions H&M provides are Ladies, Ladies selected concept, Men, Baby, Girls, Boys, Divided, Ladies Underwear and White room. Each division contains five sections where each section represents a product line, which can be linked to a customer style. This means that within a division such as Men there are approximately five different types of customer styles such as sporty clothes and suited clothes. The sections of each division are then divided into departments, which are categories such as jackets, dresses and shorts. The model is one step lower in the hierarchy and describes the product in more detail. Each product is then available in about three different colours and each colour in about four different sizes. The sixth level in the product tree is the SKU that are specified by division, section, department, model, colour and size. The number of SKUs available for customers to purchase from H&M Online during a season is approximately 20 000 pieces.

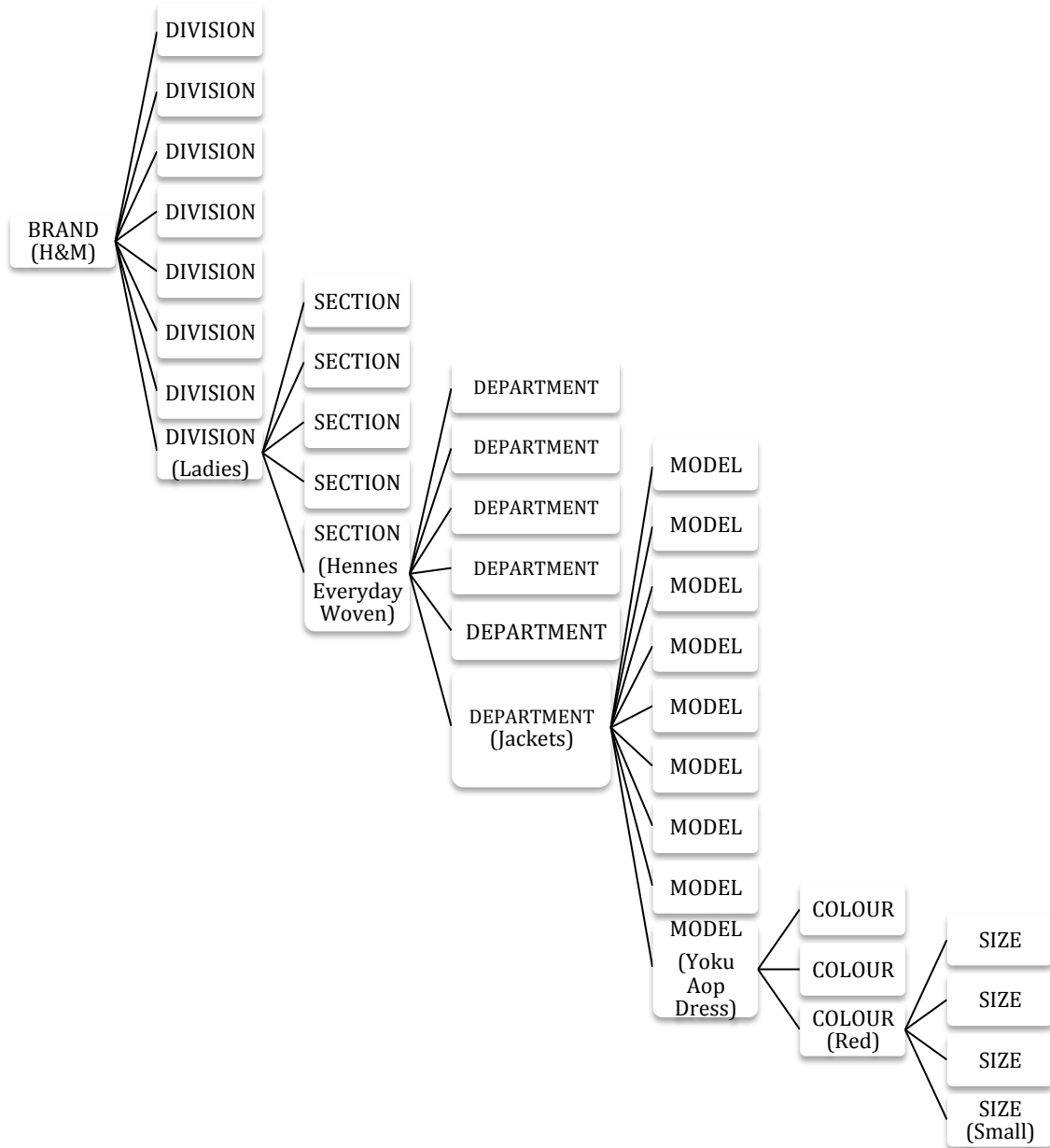


FIGURE 15 - H&M PRODUCT TREE

Number of Divisions: 9
 Number of Sections: 40
 Number of Departments: 270
 Number of Models: 3000
 Number of variant (product + colour + size): 20000

The models contribution to sales is presented in Figure 16. As seen in the graph not all products contribute significantly to the sales volumes. The graph is steep in the beginning indicating that few products result in a large part of the sales. For instance, 50 percent of the products contribute to 87 percent of all sales. The analysis is made at models, and as previously described each model consists of several colours and sizes creating the SKU. If an analysis were to be made at SKU level it is believed that the slope would be even steeper in the beginning as certain colours and sizes of products have a higher impact on sales. The same accounts for the opposite that certain colours and sizes are only sold in very few quantities.

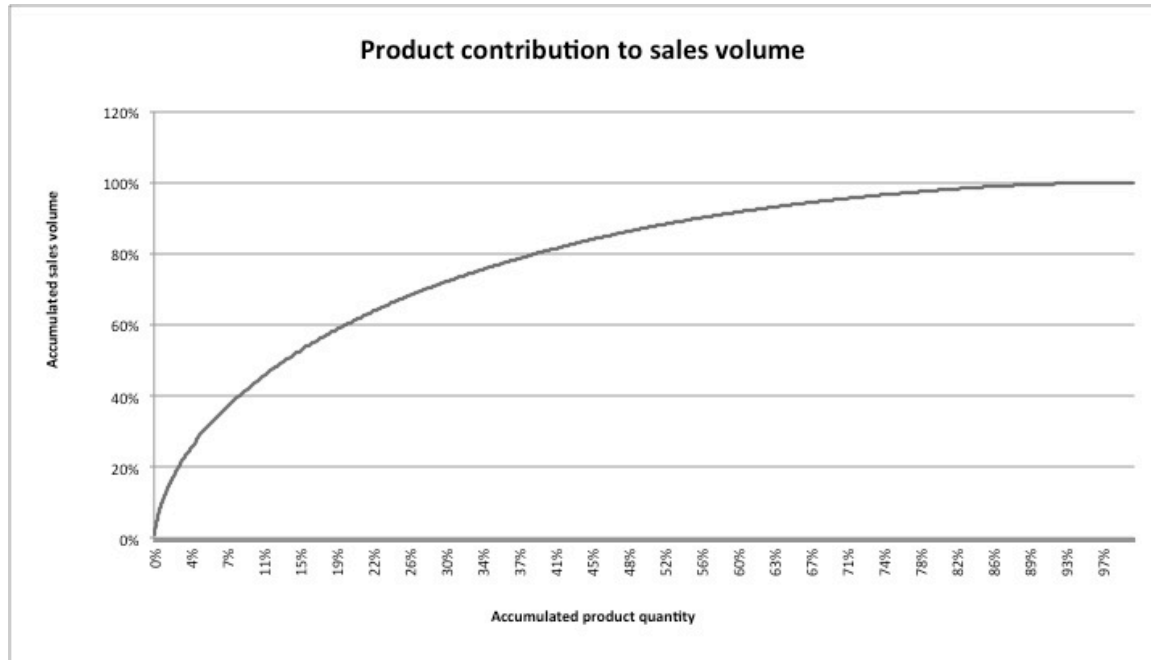


FIGURE 16 - PRODUCT CONTRIBUTION TO SALES VOLUME SPRING 2011

4.3 PURCHASING PRODUCTS FROM H&M ONLINE

Customers from all markets have the possibility to purchase products from H&M Online by the Internet, by phone or by mail. Approximately 85 percent of all orders are made online and thus the focus of the customer experience is from the online customer’s perspective. The customer order process is presented in Figure 17.

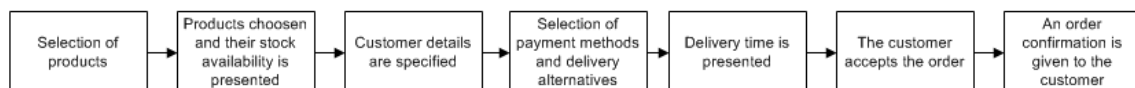


FIGURE 17 - CUSTOMER ORDER PROCESS

The customer has the possibility to view all products available for purchase at the online store. The products are displayed in the same way with no relation to stock availability and delivery time, which means that the customer is unaware of whether the products are in stock or if they are temporarily out of stock when selecting products (Figure 18, Figure 19). However, the customer is informed of the stock availability if the product is sold out without any planned refills. Products, which are sold out, are still

shown at the home page, but they have a remark of being sold out, either for all sizes or for selected sizes. However, the customer has the possibility to purchase products, which are temporarily out of stock and receive an incoming refill delivery.

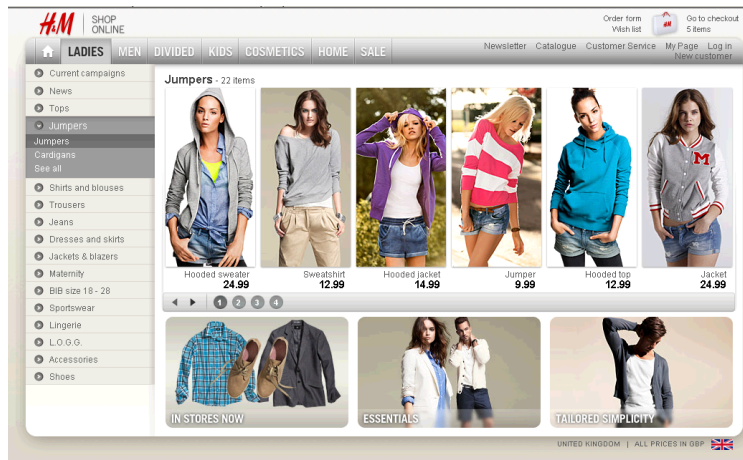


FIGURE 18 - PRODUCT DISPLAY AT H&M ONLINE SOURCE: H&M ONLINE

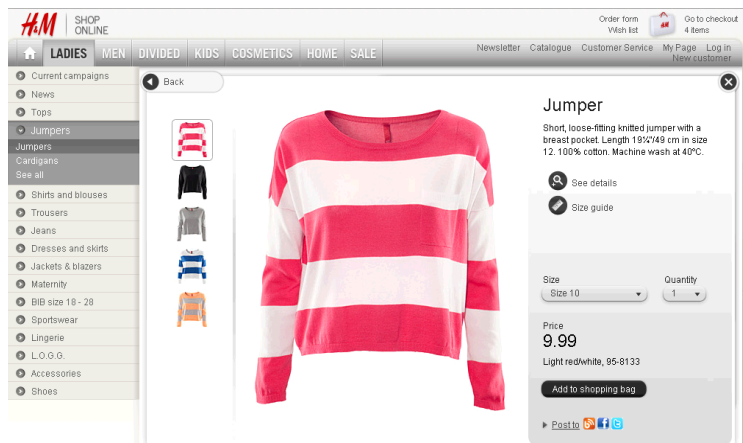


FIGURE 19 - PRODUCT SELECTION AT H&M ONLINE SOURCE: H&M ONLINE

At the online store the customer selects the products chosen for purchase and places them into a virtual shopping bag, exemplified in Figure 20. At the webpage presenting the content of the virtual shopping bag, the customer also receives information of the stock availability of each product and an estimated delivery. For the order to be further processed the total value of the order needs to be higher than a set requirement which depends on the customer market. At the point when the customer views the virtual shopping bag the customer still has the possibility to add more products to the order and to delete products. To carry on the order the customer needs to select payment methods and select a delivery alternative. When payment method and delivery alternative is selected a more detailed delivery time is presented. This is the order promise and proof that an order has been made.

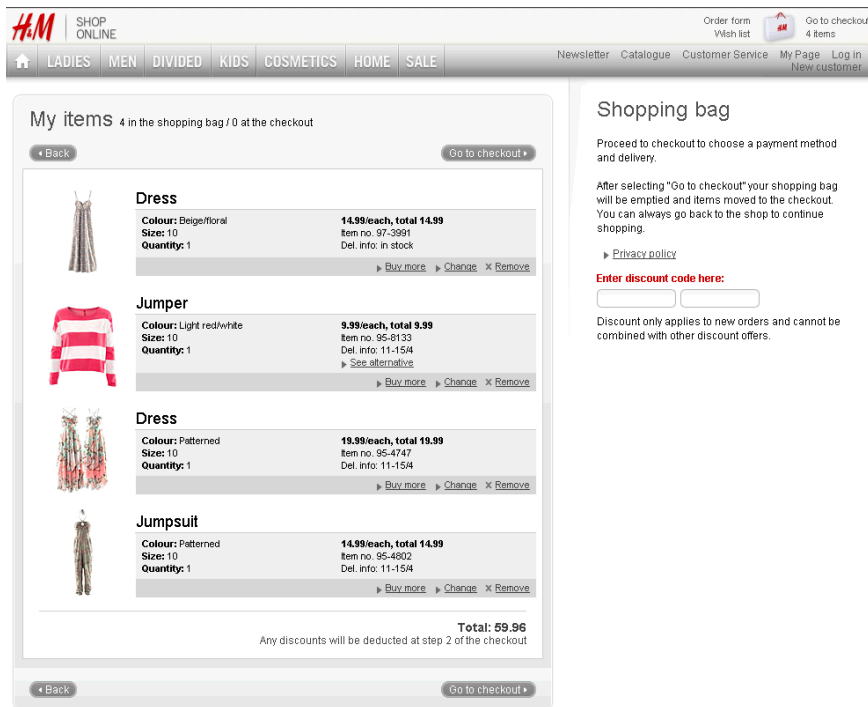


FIGURE 20 - CUSTOMER SHOPPING BAG SOURCE: H&M ONLINE

4.4 THE ORDER MANAGEMENT PROCESS

When the customer places an order at H&M Online the order gets registered in the Order Management System. The system controls the availability of the products required in real time and gives the customer a promise of delivery. The following night the Order Management System runs a control of the customers in the system to make sure that the customers have registered the correct information, for instance, the address registered is compared with the address connected to the social security number, and a credit control is run. If the entered information is not approved by the system an operator at the back office division has to manually control the customer order and adjust it. When the customer order is controlled and accepted by the system, it enters the order queue. To create picking lists, withdrawals are made from the order queue utilizing *first in first out* principles. The customer orders are then picked in the picking area due to the picking list and to keep the customer promises the distribution centres set goals for the picking and packing lead time. All customer orders, which are sent through the Order Management System, should be picked and packed the day after the customer has placed the order. After the products have been picked they are then packed either in light parcels or packages depending on size, weight and volume of the products as well as country specific requirements. The products are then placed in transport carriers to be picked up by the distributor. The distributor is then responsible for delivering the products to the customer in time.

4.5 THE SUPPLY CHAIN FROM PRODUCTION TO END CUSTOMER

Products sold at H&M Online are processed through a number of value adding activities before reaching the customer. The product process begins with a research of which design and product strategy that should be used for the new season of products. The research results in finished designs of products to be sold the following season. These products are then assigned to suppliers in Asia or Europe for production. H&M's production is mainly based in Asia, and the lead times are therefore long. Moreover, long lead times and short fashion seasons makes it necessary to produce to stock and base the procurement on forecasts.

To serve seven of its eight existing markets H&M Online utilize two distribution centres (DCs), which are located in Sweden and in Poland. After the products have been produced they are transported via a transit storage in Hamburg to Poznan DC, the central distribution centre for H&M online. If the products are to be sold in markets distributed from Borås DC, they are transported via Poznan DC to Borås DC. The goods are then primarily stored in the dispatch area and when the dispatch is full the remaining products are stored in buffer. The products are picked from the dispatch and packed when ordered by a customer. Finally, the distributor collects packages to be delivered to the customers. A schematic flow of this process is presented in Figure 21.

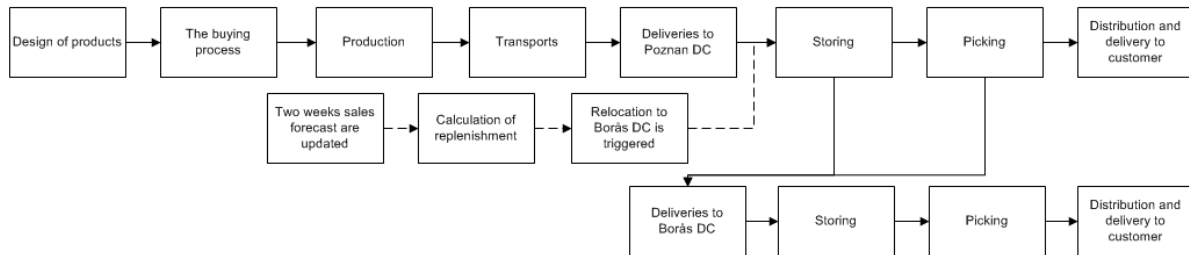


FIGURE 21 - THE PRODUCT FLOW-FROM IDEA TO CUSTOMER

4.6 PUSH AND PULL SYSTEM

The streams of material in H&M's supply chain consists of both push and pull principles, demonstrated in Figure 22. The material flow into the warehouse is described as a push flow where products are produced to stock and not yet consolidated to a certain customer. However, when the customer places an order in the system, the production of customer order allocated starts and the items are picked to assemble a customer order. This point in time is the decoupling point since the total order is customer specific and is seen as a pull flow. When the customer gets their products the pull flow has reached its destination. However, as the customer has the possibility to return products, the total material flow might not be over yet. If the customer chooses to send items back, they will start the reverse logistic process, creating a push flow back to the distribution centre.

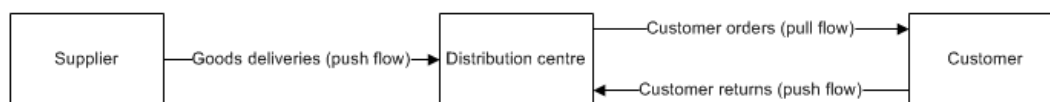


FIGURE 22 - PUSH AND PULL MATERIAL FLOW

4.7 COOPERATION BETWEEN DEPARTMENTS

The H&M Online departments correlation is represented in Figure 23. The Buying office orders the quantities of products that are to be sold and the sales department manages the marketing of the products. The logistics department is responsible for delivering the products to the customers.

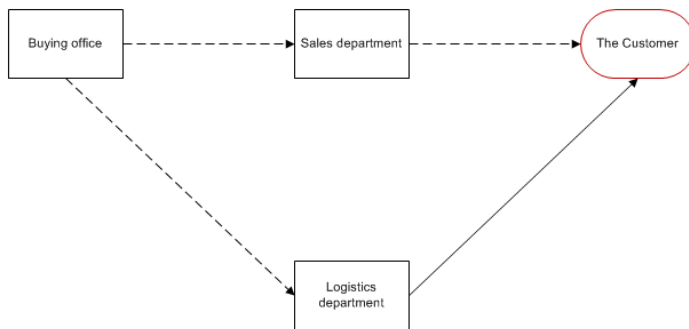


FIGURE 23 - COOPERATION BETWEEN DEPARTMENTS

4.7.1 PRODUCT MANAGEMENT

The designs of the collections to be sold at the online store and in the retail stores begin one year ahead of the season release. The first step in the designing process is to perform a research of what will be fashionable and to find common factors of what will be asked for by the customers. When the products are partially designed the buyers analyse what products are to be sold and estimate the required quantities of each product for H&M Online and the retail stores.

The production time of garments can differ from two weeks to half a year depending on the material and complexity of the product. The lead time is also affected by the location of the supplier, which is in either Asia or Turkey. Products leaving from Asia have a transportation time of eight weeks and products produced in Turkey have a transportation time of two to four weeks. The logistics department receives information of quantities of goods for the upcoming season from the Buying Department and the products arrive to the distribution centre a few weeks prior to the start of the season until the end of the season.

During the season H&M launches eight different catalogues to present their products and in relation to the catalogues the products are presented at H&M Online. The catalogues present different quantities of products and two of the catalogues represent a large part of the sales (main catalogue and midseason catalogue). The main catalogue is released at the beginning of the season and presents approximately 50 percent of all articles. The mid season catalogue is released at the middle of the season and presents 25-30 percent of all articles. Starting five weeks prior to the release of these catalogues the distribution centre receive products to fill up the stock levels. Some products are not presented in the catalogues and these are delivered to the distribution centre throughout the season.

4.7.2 SALES MANAGEMENT DURING SEASON

The Buying Department study and evaluate the sales during the season. When managing products during the season the product models are firstly reviewed and if the product model is not selling in accordance to forecast it will be reviewed on colour level. Size is only looked upon when a decision has been made of how to handle the colour. It is possible for the Buying Office to order more products during the season or to some extent also cancel already placed orders.

The Buying Office is responsible for managing the purchased products and thus control and manage the sales during season. For example, if a product is not being sold according to the forecast, the Buying Office has the possibility to take action according to a four-step method to decrease the risk of losing profit. Firstly, the production of more products is cancelled. Secondly, an analysis is made concerning if the products are selling better at any of the markets connected to the other distribution centres. If so, the products will be transferred to another of H&M Online's distribution centres to meet the demand at a different market. A third option is a market channel move to H&M retail stores if the products are selling better in store than online. The final option is to put the products on sale.

A large sale of all products left in stock is made at the end of season; this sale takes place at the same time as in the H&M stores. Throughout the season smaller sales and promotions of certain products are launched.

4.8 SALES MARKETS

The sales volume sold at H&M Online varies according to seasonal fluctuations demonstrated in Figure 24. This means that the demand for products throughout the year and the capacity requirements at the distribution centres vary. As the H&M Online sales channel is offered to eight markets within Europe the different seasons and product preferences in these markets vary further.

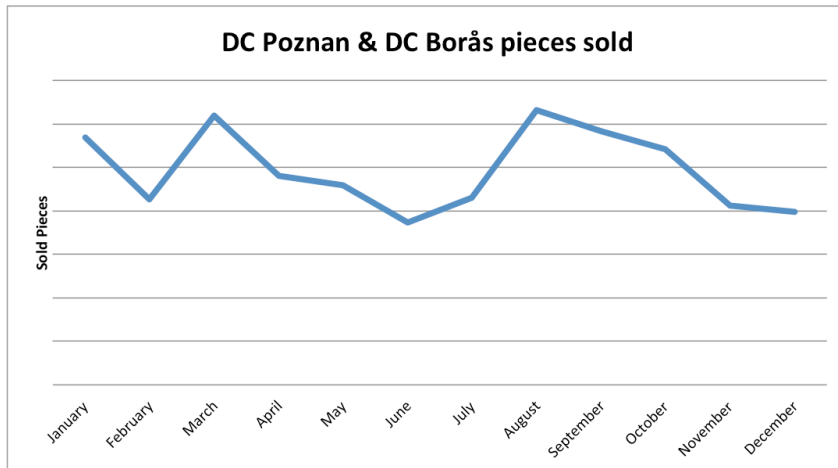


FIGURE 24 - SOLD PIECES 2010 FROM POZNAN DC AND BORÁS DC

The sales statistics presented in Figure 25 per piece and in Figure 26 per customer order varies on the different markets. The mature market in Germany captures the largest market share with 56 percent of the sold pieces and 51 percent of the sold customer orders. The online sales channels were launched in United Kingdom in September 2010 and therefore the sales volumes for that market is significantly lower than other markets.

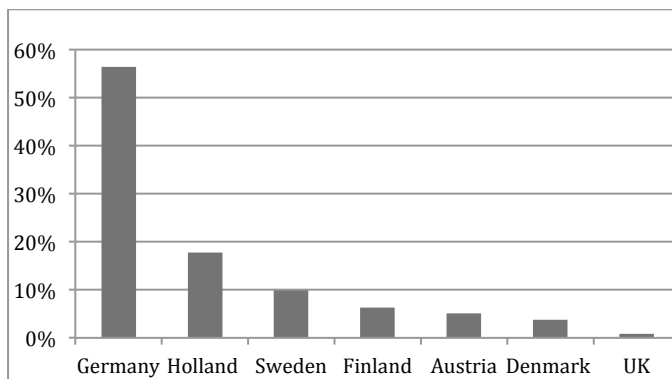


FIGURE 25 - DIVISION OF SOLD H&M ONLINE PIECES PER MARKET 2010

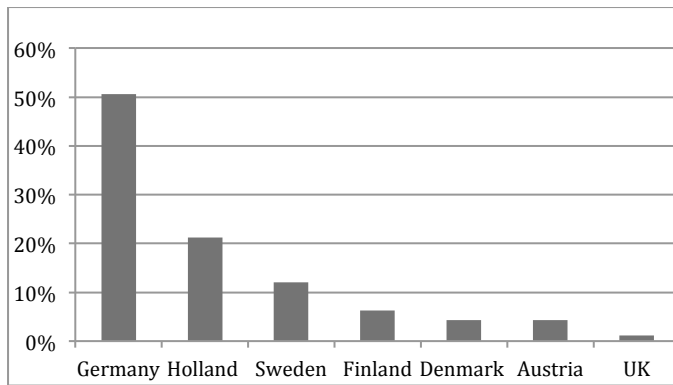


FIGURE 26 – DIVISION OF TOTAL CUSTOMER ORDERS PER H&M ONLINE MARKET 2010

4.9 THE WAREHOUSE LOGISTICS

The products are delivered to the distribution centres from the suppliers in boxes that contain in average 46 pieces during the fall season and 56 pieces during the spring season. The suppliers sort the units for each box to contain one type of SKU. When the products arrive to Poznan DC they are stored in a large buffer with space for 470 000 boxes and in the picking area which contain approximately 39 000 stock locations. Poznan DC keeps an anticipation inventory for all of the European markets and distributes products with two weeks cycle stock to Borås DC.

Borås DC has a smaller buffer with space for 37 200 boxes and a pallet buffer used for cosmetics and home decor. The dispatch area in Borås DC has 35 000 stock locations. At both distribution centres each SKU has its own picking location with the exception of products with only very small quantities left. The products with low quantities, of maximum 10 pieces, are at the end of the season, usually moved to a temporary stock location where several SKUs with low quantities are stored together. A SKU keeps its own stock location for maximum two seasons, but after a review they can also be moved into a temporary stock location earlier.

During 2010 the distribution centre in Poznan sent more than 15 million customer orders containing more than 94 million items. During 2010 the distribution centre in Borås sent almost 5 million orders to its customers containing more than 24 million items. Poznan DC has more running hours during the week than Borås DC and is also opened during the weekend. The personnel costs are almost six times higher in Sweden than Poland and because of this many labour intensive activities such as quality controls are performed at Poznan DC.

4.10 REPLENISHMENT TO POZNAN DC

The distribution centre in Poznan receives daily deliveries from suppliers in Asia and Turkey. Five percent of the items in each procurement order are quality controlled when they arrive to Poznan DC. Products arrive to Poznan DC in accordance to catalogue releases to ensure that the DC has adequate stock. Poznan DC therefore receives 50-60 percent of the total seasonal products in the beginning of the season when the first catalogue is released. The rest of the goods are then delivered during the season, primarily with the second catalogue release.

4.11 REPLENISHMENT TO BORÅS DC

Most products at Borås DC have been transported firstly to Poznan DC where they have gone through a quality control. Transports from the supplier directly to the distribution centre in Borås only occur exceptionally. A situation when Borås DC are supplied directly from the supplier is when the ordered products from that supplier is enough to fill a container or when the supplier is located in the closeness of the distribution centre in Borås. The final reason for direct transportation to Borås DC is when articles

are going to be sold only within the Scandinavian region. Articles that are directly transported from the supplier to the distribution centre in Borås are quality controlled in Borås DC.

Each week the sales forecast for the next two weeks are updated. The distribution centre in Borås is then requesting a relocation of goods from the warehouse in Poznan. The system is then comparing the request from the distribution centres with their previous replenishments and the forecast for the season. When products are selling more than expected for one of the distribution centres, it sometimes means that the quantity of products requested will be reduced. If the distribution centre has not exceeded its limitations due to the seasonal forecast or the demand at other distribution centres, the requested products are then allocated to that distribution centre. The relocation process is presented in Figure 27.

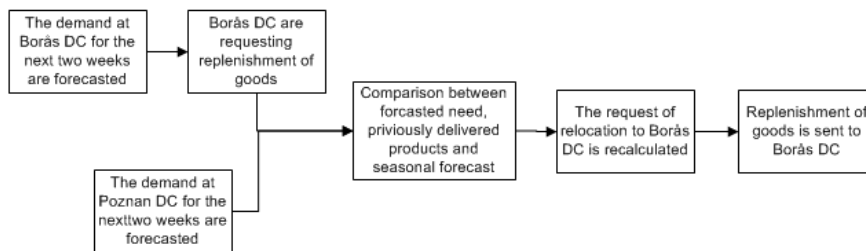


FIGURE 27 - THE RELOCATION PROCESS FROM POZNAN DC TO BORÅS DC

4.11.1 RELOCATED PIECES

The products transported from Poznan DC to the distribution centre in Borås, can be delivered from the goods reception area, the buffer area or the picking area in Poznan. Products received from the goods reception area are directly sent to the distribution centre in Borås after a quality control at Poznan DC. The goods from the buffer area have been stored at the buffer system and are then taken out of the system to be delivered to Borås DC. The goods received at the distribution centre in Borås are transported from areas in the central warehouse in Poznan with a distribution process as represented in Figure 28.

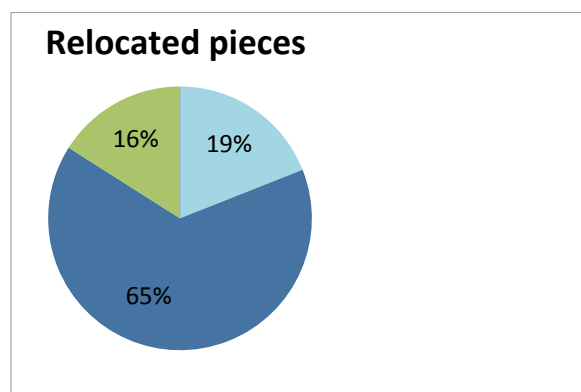


FIGURE 28 - RELOCATED PIECES FROM POZNAN DC TO BORÅS D 2009

- 16% single picks from dispatch area
- 65% boxes from buffer area
- 19% boxes from goods in

4.11.2 IMMEDIATE OR FORECAST TRIGGERED REFILL

Each week, the sales forecast for the following two-weeks is updated to assign the products needed for relocation. However, when the forecast is not totally accurate, and sales are higher than expected, the customers order products not in the storage of Borås DC. Relocation can either be triggered by forecasted need or by a customer request. A customer order made on products not in stock, and the picking of the last piece triggers an immediate relocation from Poznan DC to fulfil the needs of the customers. For the immediate relocation to be settled, the value of the products requested for relocation needs to be higher than a set lowest relocation product value (specified in the Appendix). Approximately 23 percent of all products transported to the distribution centre in Borås DC 2009 were classified as immediate relocations. The immediate relocation goods are assigned either from the buffer storage area or the dispatch area in Poznan. 33 percent of all products that are assigned to Borås DC from the dispatch area at Poznan DC are immediate relocations, whereas 32 percent of the products from the buffer area are immediate relocations (calculation are presented in the Appendix).

4.12 REVERSE LOGISTICS

H&M Online is based on the business model Find-Try-Buy. The business model encourages customers to find products in the online store, try the products at home and after the products have been tried decide whether to buy the products or not. High levels of products ordered by customers are returned in a reverse logistic flow. The return flow for the European markets is presented in Table 6.

The return flow is high and it is a large part of the replenishment as the returned products in good condition are sold after a quality control. On the returned products the customers declare the reason for returning the product. The right of return is two weeks at all markets except for in the United Kingdom where the right of return is extended to 28 days.

The return rates are often higher at newly entered markets, due to the fact that the customers are unfamiliar with the product characteristics. In Germany, Austria, the Netherlands and United Kingdom, customers returning products bought online are provided with the possibility to return the products at any H&M store instead of sending it back to the distribution centre. The option is to be provided to customers at all H&M Online markets in the future. The customer price for returns, presented in Table 7, varies from market to market depending on competition and national legislation. In Germany, United Kingdom, and Finland returns are free of charge for the customer.

TABLE 6 - H&M RETURN FLOW

	Returns	
	Packages	Pieces
Sweden	29 %	16 %
Finland	40 %	23 %
Denmark	23 %	12 %
United Kingdom	14 %	17 %
Germany	67 %	42 %
Holland	46 %	28 %
Austria	64 %	38 %

TABLE 7 - CUSTOMER PRICE FOR RETURNS

	<i>Price for return paid by the customer</i>
Sweden	36, 90 SEK
Finland	Free
Denmark	40, 5 DKK
United Kingdom	Free
Germany	Free
Holland	1 €
Austria	1 €

4.12.1 DISTRIBUTION COST

The process of distribution makes up the greatest proportion of all costs concerning logistical activities. As much of two thirds (2/3) of the logistic budget is allocated to distribution. At the time, these costs are partly covered by the service fee in some countries (for calculations see the Appendix). However, internal documents state that as the market for online purchasing matures, trends have shown that the customers are becoming less willing to pay for deliveries.

4.13 FULFILMENT OF SERVICE ELEMENTS

To analyse the level of customer service at H&M Online six areas are studied in more detail. These areas are service flexibility, delivery time, stock availability, delivery consistency, delivery reliability and information exchange.

4.13.1 SERVICE FLEXIBILITY

Customers at H&M Online have some possibilities to affect their order during and after the purchasing process. When placing the order the customer has the option to choose between two distributors, allowing for the choice of pick up points. In Denmark, United Kingdom, Germany, Austria and Holland the customers have the option of home delivery. The customer further has the option to choose between payment methods at all markets.

After the customer order has been made some changes are still possible. If the customer contacts H&M Online Customer Services they have the possibility to stop an order, as long as it has not been withdrawn from the order queue. Prior to the withdrawal point it is possible for the customer to add more products to the order. If an order has been split into two deliveries due to low stock availability, there is a possibility to add products until the last product is withdrawn. From the withdrawal point until when the customer receives the order the flexibility is limited. However, further flexibility is offered since H&M offers the option of returning unwanted products.

4.13.2 DELIVERY TIME

Depending on the customer market, H&M Online has different delivery times. This promised delivery time is kept when the goods are in stock. However, problems with keeping the delivery time occur when products are out of stock. When a customer order includes products that are out of stock the result is an extended delivery time promised to the customer.

H&M give the customer a delivery promise set in weeks depending on stock availability and customer market. H&M's customer promise is more concerned with a longer but accurate delivery time, rather than a short delivery time which risks being incorrect. This promise can be as long as eight weeks if the requested product is out of stock in both Borås DC and Poznan DC. However, the supply chain network usually operate faster than the predicted lead times.

H&M's delivery time is set to fulfil the customer promise at all times. In Table 8 and Table 9 the delivery time to the seven European markets distributed from Poznan DC and Borås DC is presented. The delivery time for the markets assigned to Borås DC differ depending on if the product is available at the Borås DC or not. For products that are not available in Poznan DC, the custom delivery promise is set depending on the status of the requested product.

TABLE 8 - DELIVERY TIME TO MARKETS DISTRIBUTED FROM POZNAN DC

Market	Standard delivery time (Product is available at Poznan DC)	Extended delivery time (Product is not yet available in Poznan DC)
Germany	3-5 days	Up to 12 weeks
Austria	3-5 days	Up to 12 weeks
The Netherlands	3-5 days	Up to 12 weeks

TABLE 9 - DELIVERY TIME TO MARKETS DISTRIBUTED FROM BORÅS DC

Market	Standard delivery time (Product is available at Borås DC)	Extended delivery time (Product is available at Poznan DC)	Extended delivery time (Product is not yet available in Poznan DC)
Sweden	3-5 days	14 days	Up to 12 weeks
Denmark	4-6 days	14 days	Up to 12 weeks
Finland	3-5 days	14 days	Up to 12 weeks
United Kingdom	4-6 days	14 days	Up to 12 weeks

Internal research at H&M presents the delivery time offered by European competitors. The competitors delivering to the Netherlands delivered within three days. In the United Kingdom the competitors deliver within five days, with the exception of one competitor. The competitors in Sweden offer a delivery time of about one week pending from 1-5 days for one competitor and another competitor offering 7-10 days. In Denmark the delivery time is also about one week, with competitors offering deliveries between 1-3 days, 2-6 days and 3-7 days. In Finland the deliveries are also within one week. In Germany and Austria the competitors are not specifying their delivery time with the exception of two competitors, whom offer three days and 8-10 days delivery. Important to note is that the discussed times are promise to delivery and not a proof of actually delivery accuracy. The same research also shows that the future deliveries are to be shorter than today and because of this it is of high importance for H&M Online to assess its customer promise.

4.13.3 STOCK AVAILABILITY

Stock availability is measured at H&M Online by comparing the products offered in the catalogues with the actual availability of products in stock. H&M Online wants to provide a stock availability of 95 percent in the beginning of the season. H&M aims to have all products sold out at the end of the season to refill the inventory with products for the upcoming season. The evaluation of stock availability has only been conducted since the fall 2010 therefore the availability is measured during the spring 2011. The presented analysis in Figure 29 and Figure 30 represents both the main spring catalogue released week 52 and midseason catalogue released week 12.

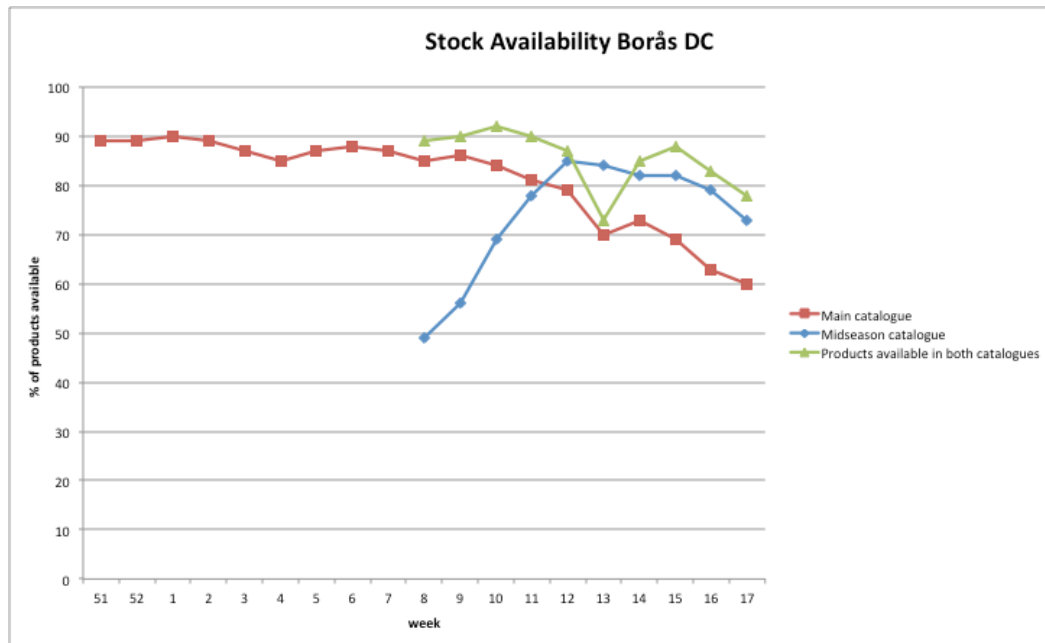


FIGURE 29 - STOCK AVAILABILITY BORÅS DC

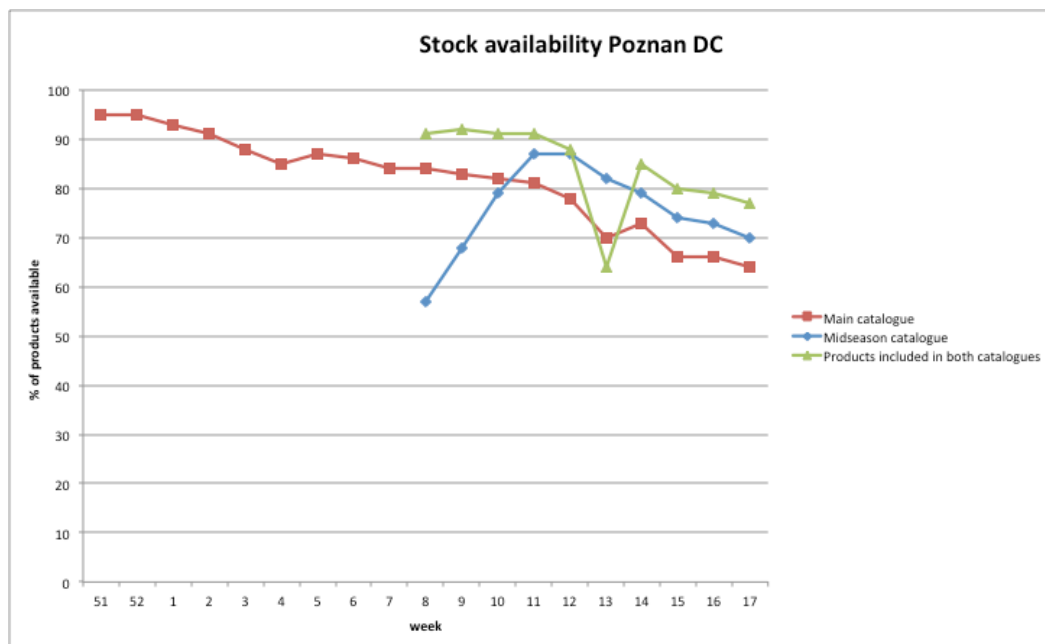


FIGURE 30 - STOCK AVAILABILITY POZNAN DC

4.13.4 SHIPPED COMPLETE CUSTOMER ORDERS

The distribution centres ability to fulfil the assigned customer orders is the result of the stock availability. When at least one product in the customer order is out of stock, the customer order can be delivered in two shipments, this is called a split order. Table 10 and Table 11 present percentage of customer orders fulfilled by one delivery for the European countries. It is presented that the shipped complete customer orders is higher for the markets distributed from the distribution centre in Poznan DC than Borås DC.

TABLE 10 -SHIPPED COMPLETE CUSTOMER ORDERS 2010 DC POZNAN

<i>DC Poznan</i>	<i>Order Fulfilment</i>
Holland	76 %
Austria	80 %
Germany	78 %
	78 %

TABLE 11 -SHIPPED COMPLETE CUSTOMER ORDERS 2010 DC BORÅS

<i>DC Borås</i>	<i>Order Fulfilment</i>
Sweden	67 %
Denmark	62 %
Finland	70 %
United Kingdom	75 %
	67 %

A split order results in high distribution cost for the company as H&M pays for the delivery of remaining products. The number of split orders is high and the associated costs are therefore a major issue. The number and percentage of split orders is presented in Table 12. The cost of split orders is essential which can be seen in the Appendix.

TABLE 12 - SPLIT ORDERS 2010

<i>Split orders</i>	
Sweden	33%
Denmark	38%
Finland	30%
United Kingdom	25%
Holland	24%
Austria	20%
Germany	22%

In Figure 31 the shipped complete customer orders is presented for each month and distribution centre. The graph shows that the shipped complete customer order decreases in line with the stock availability each month from the beginning of the season until the end of season.



FIGURE 31 –SHIPPED COMPLETE CUSTOMER ORDERS IN DC POZNAN AND DC BORÅS PER MONTH

4.13.4 DELIVERY CONSISTENCY

H&M wants to delivery 90 percent of their customer orders within time. As previously mentioned the delivery time promised to the customer is internally divided into shorter lead times. Firstly, a customer order should go through the order management system within 24 hours of that the customer has placed the order. Secondly, a customer order should be picked within 24 hours from that the Order Management System has controlled the customer order. Finally, the distributor needs to deliver within a set standard presented in Table 13 to ensure that the customer receives the product within promised time. By calculating the goal times it can be seen that H&M has some slack time as 24 hours + 24 hours + the set delivery time at all markets gives time to handle delays but still delivering within the customer promised delivery time.

TABLE 13 - SET DELIVERY TIME BY THE DISTRIBUTORS

	<i>Delivery time after pick up by the distributor</i>
Sweden	The day after
Denmark	The day after
Finland	2 days
United Kingdom	2 – 3 days
Holland	2 days
Austria	2 days
Germany	1 – 2 days

Within 24 hours from the customer order point the customer order system should have processed the customer order and allocated the order to a pick list. The lead time for this is set to be 24 hours, and it is kept 88 percent of the time for the customers distributed from Borås DC and 86 percent of the time from the distribution centre in Poznan DC.

Year 2010, 95 percent of all customer orders in Borås DC were picked and packed within 24 hours to be handled by the distributor in time to fulfil the customer promise. The same year, 89 percent of all customer orders in Poznan DC were picked and packed on time.

After the products have been packed and sorted the distributor is responsible for deliver of the product to the customer in time. No study has been made by H&M of when the distributors actually deliver to the customers. However, Posten Sweden has done studies of their deliveries. The study evaluate their ability to deliver within the above presented delivery time set by H&M. Posten Sweden delivers to customers in Sweden and Denmark and their study show that they have a delivery consistency of 97, 24 percent to the customers in Sweden. This means that 97,24 percent of all packages distributed by Posten Sweden are delivered to the customers the day after pick up at latest. This also means that the delivery will take place in 24 hours (order management system) + 24 hours (picking and packing) + one day (distribution) after the customer has made an order. Thus, it results in a delivery time of three days for Swedish, and Danish customers.

Important to remember is however that the customer experience is influenced by the combination of the time it takes to process the customer order in the management system, picking and packing the order and the time used to distribute the package. Thus the customer experienced delivery consistency is the ability of processing the order within time multiplied by the picking and packing of the customer orders in time multiplied by the distributors delivery consistency. By looking at the combination of these factors and the consistency of each it can be seen that approximately 81 percent of the customers in Sweden delivered by Posten Sweden receive their package within three days, which is the first day of the promised delivery time window. This is illustrated in Figure 32.

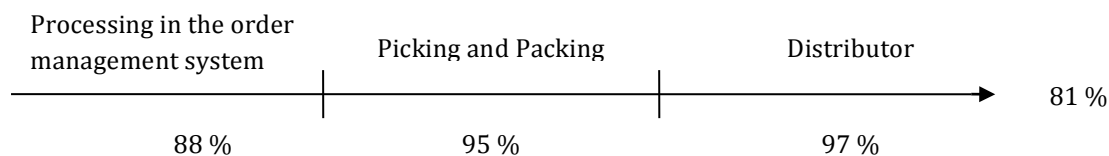


FIGURE 32 - DELIVERY CONSISTENCY OF THREE DAYS TO CUSTOMERS DELIVERED FROM BORÅS DC BY POSTEN SWEDEN

4.13.5 DELIVERY RELIABILITY

H&M has a goal of delivering 99,6 percent of all products without any errors that are within H&M's control. The accuracy of delivery from the two distribution centres are analysed by looking at the number of returns within H&M's control. Between November year 2009 and November year 2010, 0,3 percent of all products sent from Borås DC were returned due to errors within H&M's control. The number of errors in H&M's control sent from Poznan DC during the same time period was 0,6 percent. The errors are such as incorrect bookings made by customer service, incorrect sent article and that the customer has received another customer's product. In Borås DC a weight control is used when the customer order has been packed to detect errors. The weight control compare the specified weight of the products allocated to the customer package and compare with the actual weight.

4.13.6 INFORMATION EXCHANGE

The information provided at the online store is varying in quality. The products are well displayed with pictures and dimensions. However, there is a wide time span with regards to the delivery time communicated to the customers. For products out of stock a delivery time is published with a time span

of one week. For products in stock it is purely mentioned that the product is in stock, but no information is provided of when the customer will receive the product. At the homepage, covering customer service and delivery, it is declared that the customer will receive the product around one week after H&M has received the customer order. However, H&M state that during periods with high demand the delivery time might be longer.

At the online store each customer has their own account where it is possible to view past and current orders. The customer has the possibility to track their order process. If the product is to be delivered in a light parcel, which is packages that weigh less than 500g, it can be followed from customer order point until the light parcel leaves the distribution centre. However, if the product is to be delivered in a package it is also possible to track it while handled by the distributor. The percentage of products delivered by light parcel and package is presented in Table 14.

TABLE 14 - PERCENTAGE OF PRODUCTS DELIVERED WITH LIGHT PARCEL AND PACKAGE 2010

	<i>SE</i>	<i>FI</i>	<i>DK</i>	<i>NL</i>	<i>DE</i>	<i>AT</i>	<i>UK</i>
Envelope	30%	18%	25%	18%	24%	28%	33%
Package	70%	82%	75%	82%	76%	72%	67%

4.13.7 H&M DELIVERY SERVICE GOALS

The goals set by H&M concerning the delivery service elements are presented in Table 15.

TABLE 15 - H&M DELIVERY SERVICE GOALS

<i>Delivery Service Element</i>	<i>H&M Goal 2011</i>
Stock Availability	95,0 % in the beginning of the season
Delivery Consistency	90,0 %
Delivery Reliability	99,6 %

4.14 STRATEGIES TO HANDLE FUTURE EXPANSION

H&M is constantly expanding and during the forthcoming year's H&M Online will face a faster expansion than ever. To fulfil the future customer demands, a third warehouse is to be part of the warehouse network. The third warehouse is to be located in Western Europe and hypothetically in Belgium were the personnel costs are similar to those in Sweden. H&M seeks to provide a wide range of products for all their customers with a high level of availability. However, there is an issue of split orders due to low product availability. In order to increase customer service level and to handle the future expansion H&M Online aims to improve its product flow and create an efficient and high utilizing warehouse network. Therefore, H&M is currently assessing the possibility for a common planning of goods allocation and relocation for the European market. It needs to be considered that even if the main objective is to increase the customer service level, it cannot be to any cost. Profitability is an important aspect, since one of H&M business values is cost consciousness. To cover the areas of interest for the future expansion several products are run in parallel to evaluate aspects such as new distribution management system and capacity management.

5 ANALYSIS

The analysis compares the finding in the case study with relevant theoretical framework to evaluate opportunities for a new logistic strategy for H&M Online.

5.1 WAREHOUSE NETWORK DESIGN

The studied company utilizes a warehouse network with a master warehouse in Poznan keeping the excess stock for all markets and distributing products to three customer markets, and a distribution centre in Borås without safety stock distributing products to four customer markets. The warehouse network is to be seen as decentralized with local inventories. This structure brings advantages such as closeness to the customer (Melachrinoudis, 2007). Some activities are centralized, such as quality inspections and excess stock keeping. Keeping these activities on a centralized level brings advantages such as low holding cost, less tied up capital, and reduced risk of cascading effects or obsolescence (Melachrinoudis 2007). Moreover, since these activities are consolidated to one warehouse, investments in technology and machinery will provide shorter pay back times, due to increased utilization. The studied company also attain cost saving benefits from the centralized performed activities since the personnel cost at the centralized warehouse is lower than at the other distribution centre. According to Melachrinoudis (2007) a decentralized warehouse networks means that the distribution cost is lower as local inventories are utilized. However, in the studied case, the distribution cost is the main cost of the logistics expenses. Contributing to the high distribution cost is the orders sent in more than one shipment to the customer when required products are not in stock.

5.2 INVENTORY MANAGEMENT

The studied company operates with a distribution centre that keeps anticipation inventory for two weeks and a central warehouse that keeps excess stock for all markets. However, the transportation of products from the central warehouse to the distribution centre is not fast enough to be seen as a safety stock. When a customer orders products that are not available in the local distribution centre, these products will not be delivered within the standard delivery time. Keeping a safety stock increase the inventory, while lacking safety stocks can result in lost sales (Ballou, 2004). Lacking safety stock also result in costs associated with split orders since the order might be sent in two shipments when only parts of the required products are in stock. A reason for not keeping safety stock is the inventory cost and therefore a balance between inventory costs and the cost of lost sales due to low stock availability need to be found (Ballou, 2004).

No safety stock → cost of lost sales

No safety stock → split order cost

Split order cost = distribution cost + cost for picking + cost for packing + cost for relocation

H&M Online has to use a push approach in order to handle the long production lead times and to keep the costs low. Rushton et al (2006) describe the push approach as suitable for organizations that are able to predict forthcoming demand and when the demand is seasonal. Both of these parameters are descriptive for H&M Online. The purchasing department has the possibility to forecast seasonal demand by looking at old statistics and estimate future sales and the demand for fashion can be split into seasons.

The push approach results in high seasonal inventories at the distribution centre in Poznan. The distribution centre in Poznan is large and has the possibility to store products during the season and to distribute products directly to the customers. Poznan DC can thus be classified as keeping anticipation inventory (Jonsson and Mattsson, 2005). Poznan DC provides Borås DC, which according to Jonsson and Mattsson (2005) description keeps a cycle stock, with inventory delivered two times per day to fulfil two weeks forecasted demand. Depending on the number of products being relocated they are either picked

as a whole box from the buffer or by piece from the expedition area. Products, which are picked from the expedition area, have a higher product cost as more value adding activities can be allocated to each relocated product than products relocated from the goods in area.

The definition of stock availability is different at H&M than presented in the theory. Jonsson and Mattsson (2005) measures the real demand by the customers whereas H&M measures the availability of products printed in the marketing catalogues presented to customers. A reason for this could be that H&M sees the catalogue as a promise to the customers that the presented products are available for purchase. However, as 85 percent of H&M Online's customers place their order online it can be questioned if the stock availability should not be evaluated in accordance to the products presented at the homepage rather than the catalogues. Bowersox (2010) presents the idea that some products are of more importance to have available than other. In the case of H&M such products could be the designer clothing or other types of products that generate more sales.

Borås DC keeps no safety stock and therefore risk providing a low service level because of low stock availability. The case study shows that the organization has a low order fulfilment rate. A reason for the low order fulfilment ratio is that H&M offers the ability for customers to order products that are incoming and thus not yet in stock. During the highest level of stock availability 2009 the order fulfilment rate reached 87 percent in Poznan and 75 percent in Borås DC. In average 78 percent of the orders made from markets connected to Poznan were available in stock at the customer order point and 67 percent of the order were available in stock at the customer order point at Borås DC. Having a low order fulfilment ratio decreases the provided service level, and to have a high stock availability is especially important for organizations producing to stock according to Jonsson and Mattson (2005). A low stock availability is also not in accordance to the characteristics of an e-commerce as customers purchasing products online expect reliability and efficiency from the e-commerce (Xu, 2003). However, Jonsson and Mattson (2005) emphasize that the measure of shipped complete orders is rigid, but an important factor. The shipped complete orders affect the customer's experience of the provided service as the customer experience if the whole order has been completed rather than if single products in the order are available. As H&M Online offers at times above 20 000 different products a 100 percent stock availability would require large inventory with the warehouse system used today and as the products are produced with a push approach.

H&M has a goal for stock availability that is to keep 95 percent of the offered products in stock in the beginning of the season. In average a customers orders six products and for each product the order fulfilment rate decrease. An analysis of the stock availabilities effect on order fulfillment is presented in Table 16.

TABLE 16 - THE GOAL OF STOCK AVAILABILITY AND THE INFLUENCE ON ORDER FULFILLMENT

<i>Number of products</i>	<i>Stock availability</i>	<i>Order fulfillment</i>
1	95%	95%
2	95%	90%
3	95%	86%
4	95%	81%
5	95%	77%
6	95%	74%
7	95%	70%

Inventory levels decrease through out the season and as a result the order fulfilment rate decreases. An analysis of a decreasing stock availability and the influence on order fulfillment is presented in Table 17. A low order fulfilment rate result in increased split orders and thus split order costs and a lower customer service level.

TABLE 17 - DECREASING STOCK AVAILABILITY AND THE INFLUENCE ON ORDER FULFILLMENT

<i>Number of products</i>	<i>Stock availability</i>	<i>Order fulfillment</i>
1	90%	90%
2	90%	81%
3	90%	73%
4	90%	66%
5	90%	59%
6	90%	53%
7	90%	48%
1	80%	80%
2	80%	64%
3	80%	51%
4	80%	41%
5	80%	33%
6	80%	26%
7	80%	21%
1	70%	70%
2	70%	49%
3	70%	34%
4	70%	24%
5	70%	17%
6	70%	12%
7	70%	8%
1	60%	60%
2	60%	36%
3	60%	22%
4	60%	13%
5	60%	8%
6	60%	5%
7	60%	3%

5.3 SPLIT ORDERS

Each time a customer orders a product that is not in stock, it results in a split order and an immediate relocation of products. If a customer order contains products that are out of stock, the order has to be put on hold until the product is available or the order has to be split delivered (Jonsson & Mattsson, 2005). The products that are relocated immediately are often picked from the expedition area in Poznan DC which result in many non value-adding activities put into the product prior to the relocation. When the out of stock products have arrived to the distribution centre in Borås they are handled in the same way as the products that have been relocated because of forecast. This means that the split order go through picking, packaging and distribution, which results in high costs per sent split order because of man-hours, packaging material and distribution costs. Xu (2003) emphasizes the downside with splitting orders, as the cost for the number of shipments effect the distribution costs more than the weight and volume of the

packages. The previously mentioned stock availability therefore not only results in a low customer service, but also in large avoidable distribution costs. Ballou (2004) describe the importance of having an inventory strategy that is linked to the customer service level wished to keep. It can therefore be questioned if the inventory strategy used by H&M Online suits the service level wished to provide.

When a split order occurs the expected delivery time is never less than two weeks. As mentioned in the theoretical framework customers in the Northern countries are patient concerning deliveries. However, only 18 percent of the Swedish customers, 16 percent of the Danish and 33 percent of the Finish accept a delivery time longer than eight days according to Posten Norden (2010). By looking at these figures, and considering that a split order requires two weeks delivery time, it can be stated that a split order creates dissatisfaction among the customers because of the delivery time. Parameters such as convenience and reliability can also be questioned regarding split orders.

In the studied company, each distribution centre is responsible for its own customer markets and the products are assigned to the distribution centres according to the prior made forecasts. Using virtual pooling for the distribution centres would enable H&M Online to increase its overall profit since the centralization of stock helps a firm to reduce inventory investment and to increase the product availability and there by improve customer service (Anupindi 2001). Virtual Pooling would increase the product availability for the customers as presented in Figure 33. However, for Virtual pooling to function at H&M Online it is necessary for the distribution centres to prioritize all customer markets equally. H&M Online currently utilizes a dependency ratio to ensure that each distribution centre receives their share of the available goods. This kind of reasoning will not allow for virtual pooling as each customer need is more important than to which market the customer belong.

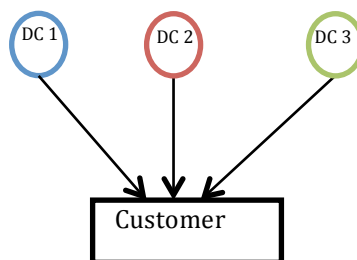


FIGURE 33 - VIRTUAL POOLING

If virtual pooling is to be used in the company, it would further enable Order Swap, which aims entirely at reducing all split orders to one shipment. An example of how Order Swap could function at H&M Online is presented in Figure 34. In the example, the German customers are to be distributed from Poznan DC and the Dutch customers from Belgium DC. Order swap will increase the utilization of the warehouse and the distribution cost due to the decreased number of split orders. If the studied company chooses to utilize Order Swap, it is important to consider the time dimension as the promise-to-ship date should not be affected by the swap (Xu, 2003). The willingness of the various parties to cooperate is important to facilitate the cooperation in the network and a process for allocating the relevant cost and revenues in a way that is consistent with the self-interest of the relevant parties is needed (Anupindiu, 2001).

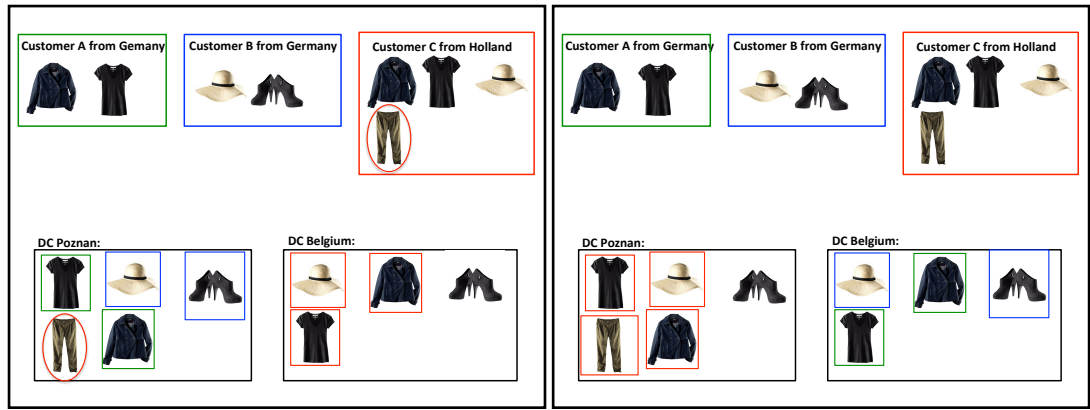


FIGURE 34 - EXAMPLE OF ORDER SWAP

The split order cost is a large part of H&M Online's distribution costs as H&M handles the whole cost. However, the split order costs are added together with the distribution costs in total they become less significant. This is a result of that the customers in general pay a higher price than H&M Online for the distribution. However, the future trends show that distribution costs will be for free. It will therefore not be profitable for H&M to send products in split packages, as they will not receive payment from the customer for any of their shipments.

5.4 REVERSE LOGISTICS

At H&M Online the incoming return flow follows the sales trends with a two weeks delay due to the time of regret. The return rate for products sold online is 20-30 percent according to Min et al (2008). In H&M Online the return flow is higher than usual for an e-commerce, 53 percent of all orders are returned and 34 percent of all pieces are returned. According to Stock et al (2006) returns can be controllable and uncontrollable. At H&M Online almost all of the returns are uncontrollable. However, uncontrollable returns can be avoided by more accurately presenting the products according to Stock et al (2006).

Even though the products coming back in the return flow have been through several value adding activities before delivered to the customer they are of low value prior to a quality control. However, the returned products value will be rebuilt as it goes through several value adding activities described by Stock et al (2006). The activities handling the reverse logistics demand many personnel hours and therefore become a large cost for H&M Online. Currently H&M sends all returned products back to the distribution centre that fulfilled the customer order. Thus, no consideration is taken to product availability, demand at other distribution centres and the cost of handling the returns.

5.5 PRODUCT CLASSIFICATION

The studied company utilizes the same logistic strategies for all their products. Having one single strategy for all the company's products can bring benefits such as economy of scale and less administration. However, when the product line is diverse in weight, order size, sales volume and customer service it is required to have an adapted strategy for each product. Having a mixed strategy allows each product to have an optimal strategy, which results in lower costs for the organization (Ballou, 2004). Moreover, Ballou (2004) argues that not all products should have the same level of customer service. An example of how to apply this is to use diverse strategies for different products concerning the stock level and the inventory location. If all articles in the product line would be available in high stock levels at all warehouses, the organization will experience higher carrying costs than necessary. However, it can be avoided by for instance placing fast moving products at field warehouses, and slow moving products at centralized warehouses (Ballou, 2004).

If H&M Online was to utilize a different inventory strategy, it would be less costly to reach the service level the organization wishes to provide its customers with. Christopher (2005) has identified the importance of keeping stock, and adapting the stock levels depending on the sales volumes and profit contribution of the product. In the case study, the profit contribution has not been examined but the volumes of each SKU are known. It is recommended that SKUs with high volume contribution are kept with high availability while SKUs with low sale volumes are preferably hold at a centralized inventory, as demonstrated in Table 18. By using this approach, H&M Online would provide a higher service level for the prioritized products while attaining low inventory cost by centralizing the stock of low demand products.

TABLE 18 - PRODUCT AVAILABILITY IN RELATION TO PROFIT CONTRIBUTION

<i>Profit Contribution</i>	<i>Availability</i>
High	High – decentralized inventory
Low	Low – centralized inventory

Ballou (2004) describe the ABC classification as a way of classifying the products according to sales, where the A-products stand for 80 percent of the sold volume, B products for 15 percent of the sold volume and C-products 5 percent of the sold volume. Consequently, according to the theory 95 percent of all sold items can be identified to 50 percent of all SKUs. The studied company currently uses no such classification of products in their logistic management, however a VIP classification is used in the purchasing department for marketing reasons. Using a classification of products such as the ABC classification would help setting service levels for different products in order to satisfy customers while keeping costs as low as possible (Ballou, 2004). To increase the service level the stock levels of the products contributing to 95 percent of all sales should be higher.

The 80-20 rule is not perfectly aligned with the figures studied at H&M Online, but as was stated in the theory. The proportions might not be exact but the approach is useful anyway. An analysis of H&M Online’s product contribution to sales volume is presented in Figure 35 and a comparison to theory is presented in Table 19. The case study shows that 67 percent of all products contribute to 95 percent of all sales. This means that the following 33 percent of products only contribute to 5 percent of the sales volume. As H&M Online keeps about 20 000 units in stock, approximately 13 400 of these contribute to 95 percent of all sold items, and the following 6 600 only contribute to 5 percent of all sales volumes. Adapting safety stock levels for frequently sold products will increase the service level and decrease the holding costs.

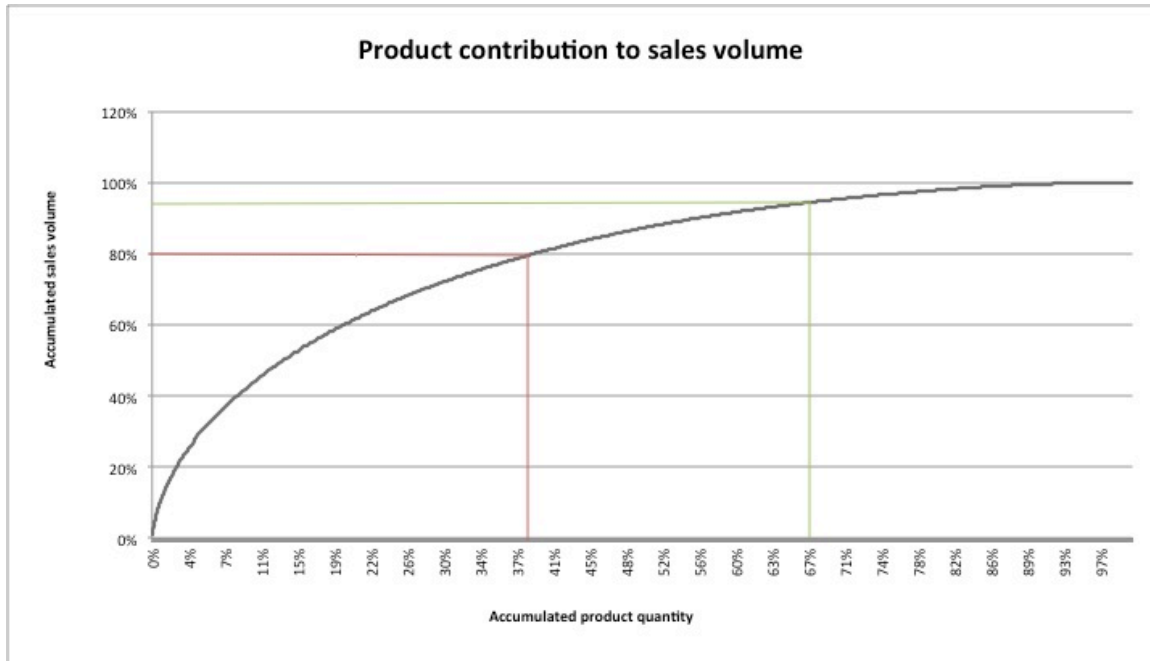


FIGURE 35 - PRODUCT CONTRIBUTION TO SALES VOLUME

TABLE 19 - ABC CLASSIFICATION IN THEORY AND THE EMPERICAL STUDY

	<i>Sales volume</i>	<i>Product Theory</i>	<i>Quantity</i>	<i>Product H&M</i>	<i>Quantity</i>
A	80 %	20 %		38 %	
B	15 %	30 %		29 %	
C	5 %	50 %		33 %	

The classification of products according to sales volume is influenced by different factors. Firstly, H&M Online functions on several different markets, where products will sell differently depending on season and customer preferences. Because of the difference in climate the seasons change through Europe and as a result summer clothing have a higher demand earlier in the south of Europe and winter clothing are earlier demanded in northern Europe. H&M Online forecast the season’s sales, and if these forecasts are to be used to identify product categories it is important to remember that a product can be of a certain class in one market and another class at another markets. Also, the product classification might change during the season. In the product range there are also products that might be present for more than one season and these will thus need to be reclassified prior to each season. Furthermore, some products might sell as an A classified of products for a set period of time and should therefore receive attention as A classified products because of strategic reasons. These items can be products that trigger sales for a period of time such as exclusive products that should only be sold for a limited quantity, and also products that are only attractive by the customers for a short period of time such as Christmas wear.

5.6 CUSTOMER SATISFACTION

According to Ricker and Kalakota (1999) a well-managed logistics system is the key to achieve customer satisfaction. H&M Online has goals concerning delivery consistency, stock availability and delivery reliability. However, the set goals are not reached and even higher goals are strived for. Ballou (2004) describes the complexity of setting the right service level and the cost of not reaching the right service level. A low service level results in costs of dissatisfied or lost customers. Investments or higher operational cost can therefore be paid back since it lowers the cost due to less lost customers. However, this is true to a certain degree, as long as the cost of keeping a high service level exceeds the cost of lost sales.

Customers have expectations that need to be fulfilled in order for the customer to be satisfied. It is therefore important for H&M Online to create the right expectations for the customers and to understand the customer's expectations. If the customers expect a standard delivery when placing the products in the virtual shopping bag, they will be disappointed and dissatisfied when the extended delivery time is presented. In order to avoid dissatisfied customers it is important for H&M Online to present the actual delivery time as early as possible. At the moment it is not until late into the purchase process at the online stores that the customer receives a delivery time.

H&M Online sells products that are in stock, but also products that not yet have been delivered to the warehouse. The products that are out of stock thus have longer delivery time. It can be seen as an advantage for the customers to be provided with the opportunity to purchase products early. However, it can also be discussed if the option of offering an extended delivery time creates a positive experience for the customer or if it decreases the perceived service level.

As Jonsson & Mattsson (2005) describe an order is a commitment from the customer to purchase a product at a certain time. When the customer feels that they have made a commitment they expect the same commitment from the organization. The expectation in this case is that the organization is to deliver the ordered products in time. An organization can use different ways for setting the delivery time (Jonsson and Mattsson, 2005). H&M Online has chosen to work with a standard delivery time, which is set to be possible to keep during times with high and low demand. To evaluate if the organization keeps its delivery time the organization's delivery consistency can be evaluated.

The organization utilizes a *first in first out* principle with the exception of when the missing product of an order with an extended delivery time has entered the distribution centre. A product with an extended delivery time is prioritized in the process. In all other cases the first made order is the first order to be picked and the organization makes no difference between customer locations when picking orders. This method results in that the organization takes no advantage of having a time span to deliver the order within. When studying the delivery consistency of the organization it can be seen that the organization sometimes deliver too early to some customers. Customers delivered from Sweden by Posten receive their packages within three days in 81 percent of all cases. As the customer promise is 3-5 days this shows that the organization does not use the advantage of having a time span and the ability to adapt the picking lists after customer location.

No study has been made of the delivery consistency of the distributors delivering from Poznan and therefore no exact delivery consistency can be calculated. However, by looking at the internal lead time goals that are set to deliver products within time, 76,4 percent of all orders were ready to leave from Poznan DC within 2 days from that the customer order has been made. The delivery promises by the distributors in Holland and Austria is 2 days and in Germany 1-2 days. It is assumed that the distributors keep their promise of delivery the organization thus delivers on the first day in the time span in 76,4 percent of all orders. It is also important to remark that Germany is the largest market in Europe and that the German distributor will deliver within one to two day. By therefore delaying the picking of the

German customers packages that live in regions with a shorter delivery time it might be possible to shorten the delivery promise to all markets.

Another way to view the missed advantages by utilizing a *first in first out* principle is described by Ballou (2004) He argues that by gathering customer orders received at different times to a common transportation, economy of scale can be obtained. However, consolidation can extend the delivery time and it therefore becomes a matter of tradeoff between cost and service level, since longer delivery times have influence on the service level. As H&M Online promises its customers a delivery within a time span it does not necessary mean that the delivery time has to increase by using a consolidation strategy.

A customer order is also a promise by the organization to deliver the correct product, in the right quantity and of a set quality (Jonsson and Mattsson, 2005). H&M Online has a delivery reliability of 98,4 percent for products sent from Borås DC and 96,4 percent from Poznan DC. However, even though these percentages are high, they result in that 1,6 percent of all orders and 3,6 percent of all orders contain an error. In order for the organization to handle these types of errors they need to pay for the return of the products, the handling of the returned product and the product to be replaced and the cost of distributing a replacing product.

As Bowersox et al (2010) describe it is valuable to view all service elements together as they jointly influence the service experience. H&M Online has set goals for the delivered service within stock availability, delivery consistency and delivery reliability. These goals are all high and above 90,0 percent However the customers experience the service as the combination of all of these service elements. If H&M therefore where to keep is set goals of 95,0 percent stock availability, 90,0 percent delivery consistency and 99,6 percent delivery reliability the customers would in fact only experience a delivery service of 85,2 percent.

$$0,95 * 0,90 * 0,996 = 0,852$$

6 RECOMMENDATIONS

In this chapter of the report recommendations of how to improve customer service level by new product allocation strategies are presented. The recommendations are based on an evaluation of the theoretical framework and the studied case.

6.1 ABC CLASSIFICATION AND CENTRALIZED HANDLING OF LOW DEMAND PRODUCTS

In order to keep a high service level, but at the same time keep the costs low, a classification of products is recommended to H&M Online. Decisions regarding product allocation, storing and handling are essential since the sales volumes are rapidly increasing and the online sales channel is introduced to new markets. Today Borås DC and Poznan DC keeps close to the same number of stock keeping locations, to meet the demand from its assigned markets.

The company is recommended to classify their products in line with the sales volumes of each SKU according to the presented Table 20. It is stated that the classification made according to the forecast without significant difference to the sales figures. Therefore, it is recommended that the classification of products is done according to the forecast and in advance. The 80-20 rule is not perfectly aligned with the figures studied at H&M Online, but as was stated in the theoretical chapter, the proportions might not be exact, but the approach is anyway useful.

TABLE 20 - CLASSIFICATION OF PRODUCTS ACCORDING TO THE SALES VOLUME

	<i>Sales volume</i>	<i>Product Theory</i>	<i>Quantity</i>	<i>Product H&M</i>	<i>Quantity</i>
A+B	95 %	50%		67 %	
C	5 %	50 %		33 %	

6.2 THE NEW DC NETWORK

The new recommended warehouse network will consist of three distribution centres; Poznan DC, Borås DC and Belgium DC, presented in Figure 36. The distribution centres in Borås and Belgium will keep A and B products in inventory while the C products for all markets will be located at Poznan DC. Customer orders including C products will be sent directly from Poznan DC to the customer. An estimate of customer orders including A, B and C products is presented in the Appendix. The distribution centres in Borås and Belgium will keep its own anticipation inventory and the stocks will be filled in the beginning of the season, to become less and less during the season. Therefore, no excess inventory for other distribution centres will be held at Poznan DC, except for C products. Moreover, no regular relocation process is needed and the transportation cost is therefore decreased. However, transportation to the distribution centres will still be necessary, but since the products will be transported in a few, larger shipments, economies of scale can be gained and transport alternatives with less environmental impact can be used. It should also be noticed that the transportation cost associated with the new distribution centre in Belgium are not caused by the solution recommended from this master thesis, but is part of the underlying conditions for the case study where the new distribution centre was included in the future state.

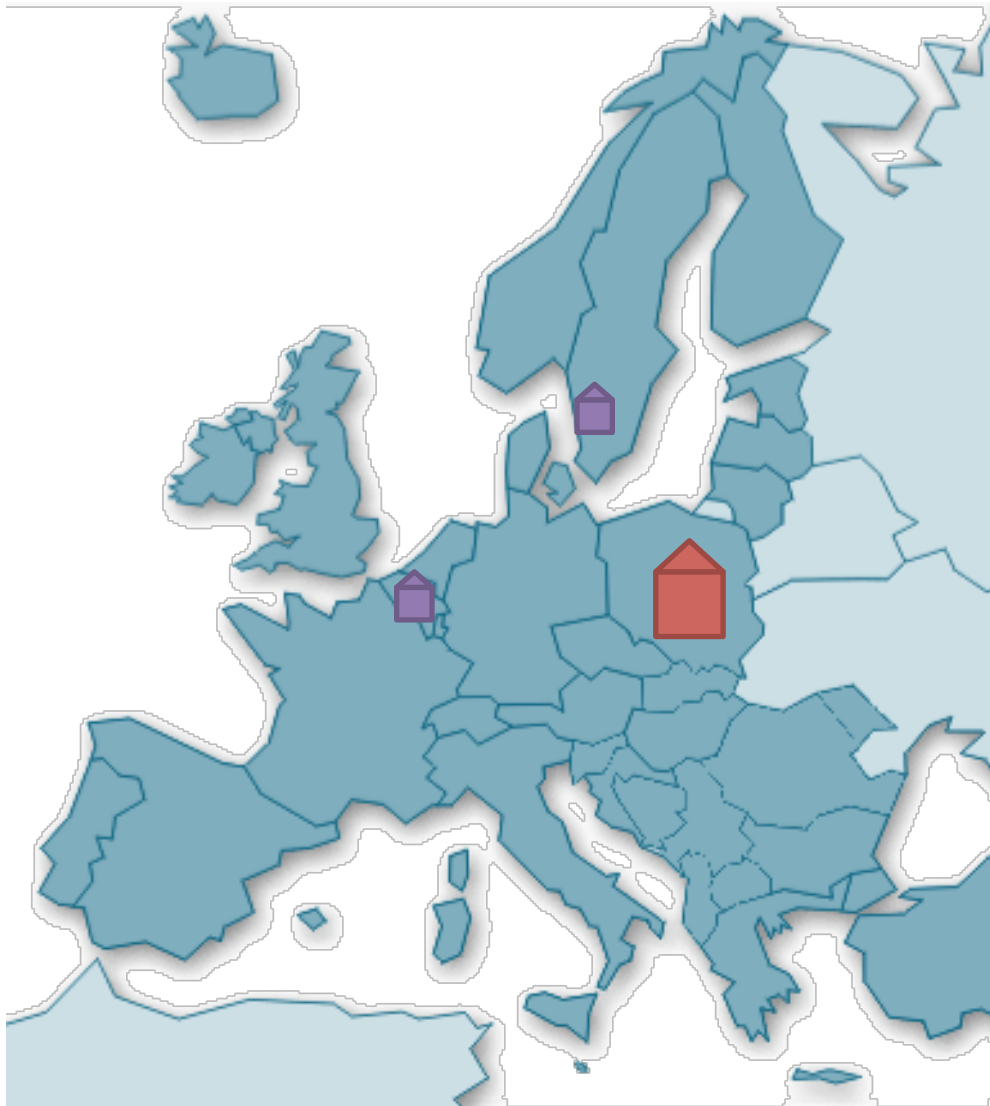


FIGURE 36 - DISTRIBUTION CENTERS SUPPLYING THE EUROPEAN MARKETS

The recommendation includes a virtual pooling system for all European markets. This means that, if the customers demand cannot be fulfilled at the priority assigned distribution centre, it can be fulfilled from another distribution centre instead. Moreover, a priority list of in which order the customer’s order is assigned to each distribution centre is presented in Table 21.

		DC Receiving Order		
		SE	PL	BE
DC Filling Order	SE	1	2	3
	FI	1	2	3
	DK	1	3	2
	UK	2	3	1
	DE	3	1	2
	AT	3	2	1
	NL	3	2	1

TABLE 21 - PRIORITY LIST

All customer orders not including C products will be fulfilled according to the priority list. The Order Management System will consider the following criteria when assigning the order to a distribution centre:

- Closeness to distribution centres
- Stock levels at distribution centres
- Expected future demand at the distribution centres
- Resources available at the distribution centres

Virtual pooling will enable higher warehouse utilization and increase the service level without increasing the stock levels, demonstrated in Table 22.

TABLE 22 - ORDER FULFILLMENT RATE

<i>Number of products</i>	<i>Stock availability</i>	<i>Order fulfillment at DC 1</i>	<i>Order fulfillment at DC 2</i>	<i>Order fulfillment at DC 3</i>	<i>Total Order fulfillment</i>
1	95,0%	95,0%	95,0%	95,0%	100,0%
2	95,0%	90,0%	90,0%	90,0%	99,9%
3	95,0%	86,0%	86,0%	86,0%	99,7%
4	95,0%	81,0%	81,0%	81,0%	99,3%
5	95,0%	77,0%	77,0%	77,0%	98,8%
6	95,0%	74,0%	74,0%	74,0%	98,2%

6.3 REVERSE LOGISTICS

The following process of handling returns is recommended. When customers want to return products from their order they firstly need to register the pieces to be returned at the homepage. The H&M Customer Order Management system then assigns the returned pieces to the most suitable distribution centre and the return code on the return package is assigned to the distribution centre assigned by the system. The customer then leaves the package to the distributor, which scans the code, and the destination for the package is declared.

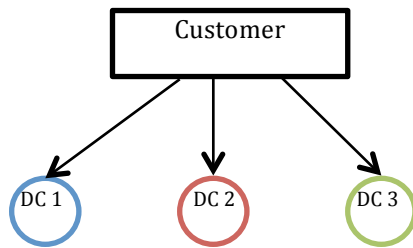


FIGURE 37 - REVERSE VIRTUAL POOLING

The recommendation is to use the incoming flow of returns to refill the stocks to avoid the need of relocation of goods during the season. The return flow can further be controlled using the priority system for assigning the returned products to the most suitable distribution centre. Moreover all the returns including C classified products are sent to Poznan DC. An estimation of the return flows to the distribution centres is presented in the Appendix. The recommended process can be seen as a reverse virtual pooling, demonstrated in Figure 37.

As the labour cost is almost six times higher in Sweden and Belgium than in Poland, the distribution centre in Poznan should be utilized as much as possible. However, there is a risk associated with centralizing too many activities in one warehouse that needs to be regarded. When having all the C-products at one distribution centre, a stop in the production would affect all markets in need of C products. However, as the C classified products only represent 5 percent of the sales volume, 95 percent of the products can be sent even during a stop at the centralized warehouse since the other distribution centres keep stock of A and B products and will be able to send these items to customers in all markets.

6.4 ORDER SWAP

The company is recommended to utilize order swap in their system to optimize the order assignment and increase the utilization of the warehouses. The recommended process to utilize the order swap is by letting the system re-evaluate the real time assignment and seek to find optimal options for swapping order assignment between distribution centres when the primary distribution centre cannot deliver the required products in an order. It is needed to be able to keep the delivery time promised to customer at the real time assignment and prioritization in the Order Management System might be necessary to be able to accelerate the process for orders with the most critical time dimensions. It should be noticed that the customer might not be able to get the order the first day in the delivery time span when their order is assigned to another warehouse, but it will most importantly be delivered within the promised time span.

6.5 REDUCTION IN SPLIT ORDERS COST AND RELOCATION COST

The virtual pooling leads to a higher order fulfilment rate which radically decrease the number of split orders. Utilizing order swap further reduces the number of split orders. The new solution aims to have no split orders which is achievable until the end of the season when the stock levels become lower and lower.

Virtual pooling will further improve the ability to empty the stocks in the end of the season since more customers have the ability to buy the residual products, which decrease the need of clearance sale and the lost profit associated. Since virtual pooling also leads to higher stock availability the total need of products in stock will be lower which leads to less tied up capital and lower risk of obsolescence.

The reduction of inventory, due to centralization of low demand products, means that the distribution centres can fill up their inventories in the beginning of the season with a few shipment instead of the frequent relocation transports of today. Larger transports will gain advantages such as economies of scale and an opportunity to find more environmental friendly transport solutions. The relocation process also includes non value-adding activities in terms of working hours for handling, storing, loading and

unloading products that will be decreased due to the new solution. These working hours can instead be used for picking and packing regular orders, which are value-adding activities.

6.6 CUSTOMER SERVICE RECOMMENDATIONS

The customer expectations are, as previously presented, influenced by several factors. Because of this H&M Online needs to manage the factors that are within H&M Online's control, such as marketing, in order to set the customer expectations at an appropriate level. An appropriate level is where H&M has the ability to over achieve. More specifically, H&M Online needs to control their customers' expectations of the service earlier in the customer purchasing process. Currently, the actual delivery time is not presented to the customers until late in the purchasing process. Because of this their expectations have already been set and if the delivery time is different than what the customer expects dissatisfaction will be the result.

It is also of importance for H&M Online to regard their business of selling products online as a service concept. The customers do not purely buy a garment in the online store they also buy the service concept of having a piece of clothing delivered to their home in a convenient matter. What this concept means to each customer is difficult to identify, but it is important for H&M Online to recognize that the customers place more expectations into the service than purely to purchase a garment. Quality factors such as availability, comfort, communication, and flexibility are therefore important to focus on throughout the customer experience.

6.7 COLLABORATION BETWEEN DIVISIONS

In order to reach a high service level and an efficient flow of information an alternative collaboration model, presented in Figure 38, is proposed to improve the collaboration between divisions. Regular meeting with representatives from each division to discussing decisions concerning product management issues is recommended. Not only would the sales volumes determine the classification of products but also more strategic factors. For instance, a C classified product can be upgraded and stored at all distribution centres for a short period of time due to a strategic designer collection event, which only last for a short period of time.

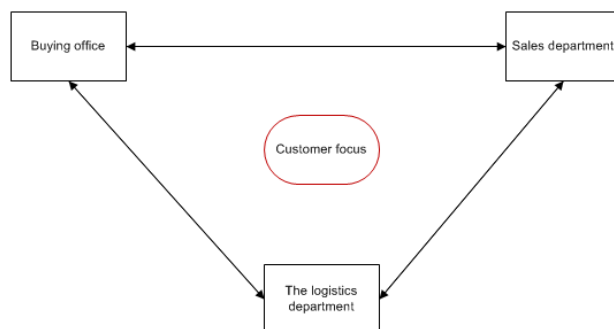


FIGURE 38 - THE RECOMMENDED COLLABORATION PROCESS

6.8 COSTS ASSOCIATED WITH THE SUGGESTED SOLUTION

A new IT system is needed for the recommended solution. However, a more extensive IT solution is requested by other development projects due to the expansion faced by the organization since the current system of today is insufficient for handling extended complexity and the increased information

flow. Therefore, the cost of implementing a new IT system cannot be derived to the recommended solution in this thesis, even though it will be one of the cost units.

As the sales volume increase the need of the new distribution centre will be distinct. Therefore, the new distribution centre is needed due to the future expansion. The new distribution centre was part of the underlying condition and not part of the recommendations for this thesis. However, the new upcoming distribution centre leads to increased transportation cost which has affected the comparison between the current situation and the recommended future solution.

The total distribution cost will decrease due to the reduced number of split orders, which are paid for by H&M. A comparison between today's distribution costs and the distribution cost from a future scenario in line with our recommendations is presented in the Appendix.

6.9 CONCLUSION OF RECOMMENDATIONS

The following actions are suggested for H&M to achieve the recommended solution.

- Classify products according to sale volume
- Enable virtual pooling
- Utilize a priority list for order assignment
- Keep low demand products in a centralized stock
- Fill up the distribution centres with products at the beginning of the season
- Enable an alternative priority system for the picking lists to accelerate the process for urgent orders
- Collaborate between divisions to utilize a common product management process
- Evaluate the customers expectations of H&M Online and review the information flow to the customers to ensure that the customer expectations are met
- Enable online registration for customer returns
- Utilize reverse virtual pooling for returns
- Utilize order swap in the IT system

7 CONCLUSIONS

H&M Online replenishes their distribution centres through a push system. Poznan DC keeps all excess stock and Borås DC keeps cycle stock to fulfil two weeks demand. When the customer demand is higher than expected product stock out is the result. H&M Online provide their customers with the possibility of purchasing products that are out of stock and when a customer order includes products that are out of stock the order is split delivered. Split deliveries result in a low customer service level and high costs for H&M Online.

The master thesis presents recommendations on how to allocate the goods in order to achieve a higher customer service level by primarily increasing the stock availability and delivery reliability while maintaining the profit. A recommendation is to classifying products according to their sales volume and placing the products with high sales contribution at decentralized distribution centres and the product with low sales contribution at a centralized warehouse. An allocation of products in accordance to product classification will result in higher stock availability of each product. By also utilizing virtual pooling the stock availability will further increase and by utilizing order swap the amount of split orders will be close to distinct. Finally, it is recommended for H&M Online to balance their distribution centres' inventory by optimizing the return flow of products.

7.1 FURTHER RESEARCH

The master thesis has potential for further research. The researchers have strived to conduct an analysis of the product contribution per SKU rather than product model. However, the data has not been accessible on SKU specification by the researchers. Therefore the analysis is made on model specification instead of SKU, however it is likely that the 20-80 rule according to sales volume should be even more distinct at SKU level.

It is further recommended for H&M Online to evaluate the possibility to sort the purchased products in Asia in accordance to which distribution centre the products will be stored at. A sorting of products already at the supplier will eliminate the need of delivering products via Poznan DC and will therefore be more cost efficient.

In order to provide a more conceptual picture of H&M's service level further customer satisfaction evaluations should be done. Further analysis of how the customer satisfaction is affected by the long waiting times, the information exchange and delivered time is aspects which will improve H&M's ability to provide a higher service level.

In order for the recommendations provided in the master thesis, such as virtual pooling, order swap and the optimized return flow to work, a new IT system is required. Studies within the functionalities, specifications and implementation of the new IT system are required to be made prior to implementing the new product allocation strategy.

8 DISCUSSION

In this chapter the Master thesis research process and topics outside of the theoretical framework are discussed.

8.1 SPLIT ORDERS

The aim of the project was to increase the customer service by looking at new ways for allocating the products in Europe. The customer service level can be analysed by examining the large number of split orders that were sent to customers. Each split order results in extra costs for H&M Online and for an extended waiting time for the customer, it was therefore seen as poor customer service. However, when the customer is waiting for a split order he or she is able to without charge add extra products into the order. This can therefore be argued to increase the sales. It can though be questioned, and it has not been researched if those customers adding extra products to the split order would not have bought the products even without the free delivery.

The cost of split orders is an essential part of the logistics costs and a cost that can be eliminated. However, when this cost has been calculated only the extra processes have been examined. This means that the picking of a product included in a split order is not included in the split order cost, as the product would have been picked even if the product were to be included in a one-shipment-order.

The future trends regarding delivery fees paid by customers show that deliveries will be cost less for the customer or free. This makes it important for H&M to eliminate split orders, not only because of customer satisfaction but also because of lost profit. Currently the fee for deliveries is large enough to also handle the cost H&M has to pay because of split orders. However, when the delivery fee paid by customers has to decrease because of customer demands and competition the split order cost cannot be paid for by the distribution fees. Further, the trends in online shopping also show that customers expect the delivery times to be shorter than today. Today, H&M Online's customers have the option of waiting for a product that is out of stock to receive all products in one package. However, it can be assumed that the number of customers willing to wait for the out of stock products in order to receive one package will decrease as customers want faster deliveries.

No records are currently kept at H&M Online of the number of orders that are delivered as split orders. Statistics of the number of packages sent from the distribution centres is kept and statistics of the number of products that are in stock when requested. However, as the customer has the possibility to wait for an out of stock product in order to receive all products at once the actual amount of sent split orders is unknown. Also, a customer order may contain more than one product that is out of stock and this then result in more than two deliveries. In the analysis regarding split orders it has therefore been assumed that the number of orders containing a out of stock product but delivered in one package is equal to the orders who contain several out of stock products delivered in more than two packages.

8.2 DISTRIBUTION

Currently H&M use two delivery organizations at each market, which results in extreme amount of different contracts and business arrangements. With the new recommendation even more arrangements are needed and it is therefore suggested that H&M purchase a global agreement with two or three suppliers. This would mean that the same distributor handles several markets and economies of scale can be gained.

8.3 DELIVERY SERVICE LEVEL

It is important for the organization to separate its business model from the retail stores at the same time, as it is valuable to understand the effect the online store can have on the customer perception of the

organizations brand as a whole. H&M currently strive to be perceived as one organization by the customers. Poor service by the online store will affect the customer perception of also the retail stores.

H&M functions on several markets with different competition and customer demands. The different markets shape the level of performance that H&M is required to operate on. At the moment H&M offers more or less the same customer service to all customer markets and makes no difference between customer segments. However it could be profitable for H&M to offer different types of service, such as delivery time and price of expedition to different customer segments.

The recommendations present that H&M should earlier into the purchasing process present the customer with the delivery date in order to influence correct expectations from the customer. In the area of the customer experience there is also the possibility for H&M to influence the customers in order to feel privileged. H&M currently markets all products in the same way, but by changing this strategy into an adapted marketing depending on stock availability the customer experience can be affected. If H&M were to market the products that currently create split orders and waiting times up to eight weeks as “preview products” or “buy it before anyone else” a positive feeling will be created rather than a feeling of disappointment because of the long waiting time.

Regarding the delivery time it can also be discussed if it would not appear as better customer service to deliver all products within six to seven days rather than making customers at times wait for up to 12 weeks for certain products. In the same discussion it can also be argued if H&M would not provide a higher customer service by decreasing the number of products offered to customers and instead offering fewer products with higher stock availability. This recommendation is similar to the reasoning behind keeping low sales contributing products at the centralized warehouse.

8.4 THE REPORT WRITING

The report has been based mostly on information gathered from the logistics department and is therefore biased by the specific departments view even though attention has been put on making the report representative of the situation for H&M Online as a whole.

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