Distribution Challenges within Grocery Retailing

MASTER
THESIS WITHIN: Business Administration
NUMBER OF CREDITS: 30
PROGRAMME OF STUDY: International Logistics and Supply Chain Management
AUTHOR: Caroline Karlsson & Iris Sørgård
JÖNKÖPING May 2018
Acknowledgements

This thesis was written to complete our master studies in International Logistics and Supply Chain Management at Jönköping International Business School. We would like to thank all those who have encouraged and supported us throughout this research process.

Firstly, we would like to especially acknowledge our supervisor Per Hilletoft, PhD, from the School of Engineering who have supported us throughout this journey with his time and expertise. There were several times when things felt difficult and under those times he was always there to guide, encourage and motivate us. His great feedback made it possible to improve our thesis. Secondly, we also gratefully acknowledge the company who shared valuable information and allowed us to visit them. As the managers from the interview would like to remain anonymous, we would still like to thank them all for their time and effort they have contributed with. Without their time and valuable information this thesis would not have been possible. Thirdly, we would also like to express our great appreciation to the participants from other thesis groups who gave us constructive feedback which helped us in many ways so we could improve our thesis. Lastly, we would like to thank all our family members and friends who have supported us.

Caroline Karlsson & Iris Sørgård
Jönköping May 2018
Abstract

Grocery retailing can be recognized as a market with high competitive pressures which requires a focus on the customers and operational efficiencies to stay competitive. Distribution centers play a vital role in grocery retailing since they constitute a significant part of the total cost of logistics. To reach an overall profitability in a company, an effective and efficient distribution is needed. Grocery retailing and distribution challenges has been discussed previously in literature for compact countries whereas a limited focus has been on elongated countries.

The purpose of this thesis is to investigate challenges within a grocery retailing distribution operating in an elongated country with numerous sparsely populated areas located far away from the distribution centers. Thus, this thesis aims to contribute to literature considering the detected research gap.

This study is developed with an inductive research approach, which aims to generate meanings from the semi-structured interviews in order to identify challenges within a grocery retail distribution to develop theory and generalized conclusions. Furthermore, the thesis follows a qualitative research direction where a single case study has been conducted.

Analyzing and comparing the findings revealed 15 challenges in a grocery retail distribution. The main challenge found during this research was the insufficient filling rate of the pallets and trucks when transporting products between distribution centers and the last mile delivery. Furthermore, 9 possibilities to address the challenges with an overall goal of reducing the total cost of logistics was detected for this research.
# Table of Contents

1. **Introduction** ................................................................................. 1  
   1.1 Background ................................................................................. 1  
   1.2 Problem Discussion ...................................................................... 3  
   1.3 Purpose and Research Questions .................................................. 4  
   1.4 Scope and Delimitations ............................................................... 5  
   1.5 Outline ....................................................................................... 6  

2. **Literature Review** ................................................................. 7  
   2.1 Introduction ................................................................................. 7  
   2.2 Distribution ............................................................................... 8  
   2.3 Order Fulfillment Process Adapted to Grocery Retailing ....... 11  
   2.4 Distribution Challenges ........................................................... 14  
   2.5 Addressing Distribution Challenges ........................................... 17  
   2.6 Change Management ............................................................... 20  

3. **Research Methodology** ......................................................... 23  
   3.1 Research Philosophy ............................................................... 23  
   3.2 Research Approach ................................................................. 24  
   3.3 Research Design ....................................................................... 24  
   3.4 Data Collection ....................................................................... 26  
   3.5 Data Analysis ........................................................................... 27  
   3.6 Research Quality ...................................................................... 28  
   3.7 Research Ethics ........................................................................ 30  
   3.8 Methodology Summary ........................................................... 32  

4. **Empirical Findings** ................................................................. 33  
   4.1 Case Description .................................................................... 33  
   4.1.1 Order Fulfillment Process .................................................... 35  
   4.2 Encountered Challenges .......................................................... 39  
   4.3 Possible Solutions to the Encountered Challenges ............... 46  

5. **Discussion** ........................................................................... 52  
   5.1 Discussion RQ1 ...................................................................... 52  
   5.2 Discussion RQ2 ...................................................................... 56  

6. **Conclusion** ............................................................................ 60  
   6.1 Conclusion .............................................................................. 60  
   6.2 Managerial Implications .......................................................... 62  
   6.3 Limitations ............................................................................. 62  
   6.4 Future Research ...................................................................... 62  

**List of References** ...................................................................... 64  

**Appendices** ............................................................................. 70
Figures
Figure 1 Scope........................................................................................................5
Figure 2 Outline......................................................................................................6
Figure 3 Supply Chain Stages..............................................................................7
Figure 4 Order Fulfillment Process....................................................................11
Figure 5 Alpha’s Distribution Centers.................................................................33
Figure 6 Transportation Flow..............................................................................35
Figure 7 Order Fulfillment Process and Activities at the central DC..........36

Tables
Table 1 Distribution Challenges..........................................................................14
Table 2 Possible Solution to Challenges..............................................................18
Table 3 8 Steps of Successful Change.................................................................21
Table 4 Interview Details....................................................................................27
Table 5 Research Quality.....................................................................................30
Table 6 Key Principles of Research Ethics Applied............................................30
Table 7 Methodology Summary..........................................................................32
Table 8 Brief Summary of Encountered Challenges...........................................39
Table 9 Brief Summary of Possible Solutions....................................................46

Appendix
Appendix 1 Topic Guide.......................................................................................70
Appendix 2 Coding.................................................................................................70
Appendix 3 Encountered Challenges.................................................................71
Appendix 4 Possible Solutions.............................................................................72
# List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>Distribution Center</td>
</tr>
<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
</tr>
<tr>
<td>HBW</td>
<td>High Bay Warehouse</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>MRP</td>
<td>Material Requirements Planning</td>
</tr>
<tr>
<td>SCM</td>
<td>Supply Chain Management</td>
</tr>
<tr>
<td>SKU</td>
<td>Stock Keeping Unit</td>
</tr>
<tr>
<td>SC</td>
<td>Supply Chain</td>
</tr>
<tr>
<td>WMS</td>
<td>Warehouse Management System</td>
</tr>
</tbody>
</table>
1. Introduction

The first chapter of the thesis aims to create an understanding of the research context. Starting with the background, a general overview of the grocery retailing industry is presented. The research problem will be formulated together with reasons for why this research is particularly interesting. This leads to the purpose and research questions. Finally, the scope and its delimitations are discussed, and the outline of the thesis is presented.

1.1 Background

Grocery retailing is a consolidated industry where a few actors hold the largest market shares. It can be recognized as a market with high competitive pressures which requires a focus on the customer and operational efficiencies to stay competitive (Kuhn and Sternbeck, 2013; Sternbeck and Kuhn, 2014). Retail companies must balance both efficiency and responsiveness to reach economies of scale to be cost-efficient and at the same time be able to meet the demand of the various customers (Lau, 2012). Customers are better informed due to technology, innovation, and globalization of markets, and therefore have increased power in terms of being more demanding of higher quality, shorter delivery times, lower prices and increased customization (Hilletofth and Ericsson, 2007). At the same time, customers are also becoming more concerned about the environment which pushes the retail companies to implement more green strategies (Yakovleva, Sarkis and Sloan, 2012).

Customers’ buying habits are difficult to control and to adapt to the changing market conditions and customers behavior; retail companies try to differentiate themselves by offering a broader product variety and higher product availability (Dubey and Veeramani, 2017). Simultaneously, there is a need for retailers to aim for more profitable sales prices (Hübner, Kuhn, and Sternbeck, 2013), higher quality, lower costs, and environmental friendly actions (Yakovleva, Sarkis and Sloan, 2012), while at the same time reducing operational costs (Dubey and Veeramani, 2017). To reach an overall profitability of a company, a good distribution strategy is one of the main drivers (Chopra and Meindl, 2016).
Distribution in a supply chain SC means all the activities involved when moving and storing a product throughout the pipeline, from supplier to end customer. Distribution is linked to SC costs and customer experience, depending on a company’s distribution objective, ranging from low costs to high responsiveness (Chopra, 2003). In supply chain management, there is a trade-off between efficiency and responsiveness (Hilletofth, 2012). The more efficient the supply chain is, the less responsive towards customer demand. A more responsive supply chain means, for example, shorter lead times and often higher costs which results in a less efficient supply chain (Lau, 2012).

Grocery retail stores offer both perishable and non-perishable products which increase the complexity of the supply chain. Perishable products often have a short life cycle with an expiry date or can lose value over time. Non-perishable products have a longer product life cycle and can be stored on the shelves for a longer period (Binkley and Connor, 1998; Xiao and Chen, 2012). Perishable and non-perishable products can further be divided into several sub-categories depending on the product characteristics, for example, fresh and refrigerated food, dry grocery and frozen groceries (Binkley and Connor, 1998). Fresh meat, fruits, and vegetables must have the right temperature in the vehicles to prevent the products from decaying, which is especially important when transporting over longer distances (Xiao, and Chen, 2012).

Distribution centers (DCs) play a vital role in grocery retailing since they constitute a significant part of the total logistics cost (Dubey and Veeramani, 2017; Sternbeck and Kuhn, 2014). The activities that take place within a DC includes receiving the goods, storage, order picking, sorting, packing, and dispatch. A DC can be either manual, automated or a combination of both (Berg and Zijm, 1999). The number of DCs for a retail company, often depends on the geographical location of the stores, product value, and demand. The most commonly used design in Europe involves central, regional, and local DCs (Fleischmann, 2016; Holzapfel, Kuhn and Sternbeck, 2016). A central DC often consist of low-volume and high-value products which serves all stores in a country, whereas the regional and local DCs often consist of high-volume and low-value products which serves the retail stores in regions or specific areas (Holzapfel, Kuhn and Sternbeck, 2016). Some products are assigned to be centralized, and some products are decentralized depending on the volume and value of the product (Hübner, Kuhn, and Sternbeck, 2013).
The trend today is that grocery retailers operate their own DCs, so that majority of the products that are brought into the stores flow through DCs and not directly from the supplier (Holzapfel, Kuhn and Sternbeck, 2016; Sternbeck, and Kuhn, 2014). It is thus essential that the retail companies strengthen its order fulfillment process, which can be explained as the steps a company must take from when an order is generated until the products are being delivered to the customer, regardless of operating their own DCs or not (Croxton, 2003; Espino-Rodríguez and Rodríguez-Díaz, 2014). Altogether, this requires effective and structured planning of the supply and demand to coordinate the large number of products moving along the pipeline (Hübner, Kuhn, and Sternbeck, 2013). By operating their own DCs, retail companies can benefit from more frequent shipments, consolidation of products which can result in fuller truckloads and a more efficient SC (Sternbeck, and Kuhn, 2014). However, having their own DCs increases the complexity of the supply chain, which can be a challenge when balancing responsiveness and the overall logistics costs (Hübner, Kuhn, and Sternbeck, 2013).

1.2 Problem Discussion
Previous research has been conducted on grocery retail distribution in compact countries and urban areas related to where a grocery retailer should strategically place its stores (Waddington, Clark, Clark, and Newing, 2017), how to best optimize delivery patterns (Holzapfel, Hübner, Kuhn, and Sternbeck, 2016), demand and supply planning problems (Hübner, Kuhn, and Sternbeck, 2013) as well last mile delivery and the environmental impact (Fancello, Paddeu and Fadda, 2017; Zissis, Aktas, and Bourlakis, 2017). Furthermore, several authors are focusing on the distribution challenges related to E-grocery as it is expected to grow in urban areas (Mkansi, Eresia-Eke, and Oyetola, 2018; Smith, Hyland, and Frolick, 2018; Tadei, Fadda, Gobbato, Perboli, and Rosano, 2016). The grocery retailing industry is an interesting field to investigate since people in the modern society according to Fancello, Paddeu and Fadda (2017) are relying on buying food conveniently in stores. Although the topic of grocery retailing, and distribution is not new, there is an existing gap regarding grocery retailing distribution located in elongated countries with numerous sparsely populated areas located far away from the distribution centers.
There are a few countries in the world having an elongated shape where the distance from the South to the North can be over thousands of kilometers which contributes to high transportation cost, especially for the last mile delivery (Chopra and Medinl, 2016). Long distances can have a negative impact on total cost of logistics, especially when considering the order frequency, where the stores might generate small orders with a high delivery frequency for long-distance transportation (De La Vega, Vieira, Toso and de Faria, 2018; Fleischmann, 2016). It is critical that grocery retail companies achieve cost-efficient solutions in their distribution processes in order to offer the customers low prices and at the same time meet customer requirements to survive in the competitive environment (Kuhn, and Sternbeck, 2013; Sternbeck and Kuhn, 2014). The gap in the literature concerning grocery retailing and distribution in elongated countries with numerous sparsely populated areas can be affirmed after conducting extensive secondary research with no adequate outcomes. Thus, there is a need to explore the challenges for a grocery retail distribution operating in a country mentioned above to contribute to the theory of grocery retail distribution.

1.3 Purpose and Research Questions

This thesis aims to contribute to interesting insights of a grocery retail supply chain and potential challenges related to grocery retailing distribution. It is an important topic of investigation since grocery retailers are constantly striving to reduce the costs but at the same time meet customer demand. Thus, the purpose of the thesis is:

To investigate challenges within a grocery retailing distribution operating in an elongated country with numerous sparsely populated areas located far away from the distribution centers.

To fulfill the purpose of the thesis, two research questions were created to guide the research process. The first step is to identify the challenges that can occur in a grocery retailing distribution operating in an elongated country. Thus, the first research question is:
**RQ 1:** What are the challenges most often encountered within a grocery retailing distribution operating in an elongated country?

When the challenges have been identified, the second step is to understand how these challenges can be addressed with an overall goal of reducing the total cost of logistics. Total cost of logistics can be defined as “the sum of inventory, transportation, and facility costs for a supply chain network” (Chopra and Meindl, 2016, P.85). Thus, the second research question of the thesis is:

**RQ 2:** How can the identified challenges be addressed to reduce the total cost of logistics?

Based on the findings related to these research questions, the goal is to contribute to the existing gap in the literature and add new insights which could lead to future research on this topic. Furthermore, this research will contribute to managerial insights which can help other companies having a distribution located in an elongated country with numerous sparsely populated areas located far away from the distribution centers.

### 1.4 Scope and Delimitations

This research is conducted within the field of business administration, in the area of Supply Chain Management (SCM). The scope of this research will be on a grocery retail SC, with a focus on distribution (Figure 1). Distribution refers to the movement of grocery products from warehouse to end customer. Therefore, a downstream perspective is chosen on warehousing and transportation towards the retail stores. This research includes a particular focus on the distribution and its processes within the grocery retailing industry in an elongated country.

*Figure 1 Scope*
1.5 Outline
This section outlines the structure of the thesis (Figure 2). The first chapter introduces an overview of the grocery retailing industry to familiarize the reader with the chosen topic and the problem discussion which leads to the purpose and corresponding research questions. The second chapter presents a detailed literature review to provide a theoretical foundation of relevant literature. The third chapter presents the chosen methods required to gather empirical data, followed by the empirical findings which are shown in chapter four. The fifth chapter contains a discussion, where empirical data are connected to theory from the second chapter. In the sixth chapter, we present the concluding answer to the research questions, followed by theoretical contributions, managerial implications, and limitations which can lead to future research.

Figure 2 Outline
2. Literature Review

The second chapter of the thesis presents the theoretical foundation for the research, where relevant literature related to the purpose of the research is presented. First, literature review provides an introduction to the grocery retailing industry and the order fulfillment process. Secondly, distribution activities, transportation and challenges within grocery retail distribution is presented.

2.1 Introduction

SCM is defined as the “integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders” (Lambert, Cooper, and Pagh, 1998, p.1). A supply chain typically involves a variety of stages (Figure 3) such as supplier, manufacturer, distributor, retailer, and customer (Chopra and Medinl, 2016). This thesis will be focusing on a grocery retailer and its distribution stage from a process perspective. A process can be defined as “a structure of activities designed for action with a focus on end customers and on the dynamic management of flows involving products, information, cash, knowledge, and/or ideas” (Cooper and Lambert, 2000, p. 76).

Figure 3 Supply Chain Stages

Source: Adapted from Chopra and Medinl, 2016.

The literature review is structured as follows; Firstly, a general understanding of distribution and the various distribution processes will be explained. Secondly, the order fulfilment process will be explained. The order fulfillment process is a key process within distribution in order to improve efficiency and to meet customer requests (Chopra and Medinl, 2016; Croxton, 2003). Croxton (2003) describe that the order fulfilment process can be implemented at a manufacturer, distribution, or retailer stage, but needs to be adapted to the context. Therefore, this paper will explain the order fulfilment process adapted to a grocery retailing context. Thirdly, the reader will be given a broad overview
of some of the challenges that can occur both within distribution and grocery retailing. When this has been clarified, the paper will describe different approaches to address these challenges. When companies want to make improvements within their distribution and its processes, a change is required. According to Milliken (2012), this requires a change from the initial way of doing things which makes this topic essential to include. This can also be supported by Lambert, Cooper, and Pagh (1998) who describe that successful SCM requires a change to be included in the business processes. Lastly, change management is therefore presented as this is an important topic to include when discussing challenges within distribution.

2.2 Distribution

Distribution is defined as “the steps taken to move and store a product from the supplier stage to a customer stage in the supply chain” (Chopra and Meindl, 2016, p.81). This means that distribution is taking place in the middle of every pair of stages (Figure 3) such as the movement of raw material from suppliers to the manufacturer or finished products to the end customers in the SC. Distribution plays an important role in the overall profitability of a company as it has an impact of both the SC cost and the customer value directly (Chopra and Meindl, 2016). Within the retail industry, competitiveness is directly linked to distribution in terms of both costs and customer service, as there is a need to be efficient but at the same time be responsive and able to adapt to the different customer needs (Lau, 2012; Sternbeck and Kuhn, 2014). By managing the distribution as efficient and effective as possible by delivering products on time, at the appropriate place, to the lowest possible cost, it is possible to gain a competitive advantage (Ross, 2015).

Distribution consists of several processes that interact with each other (Figure 4) which have the goal to provide the required level of customer service at the lowest possible cost (Arnold, Chapman and Clive, 2007).
DCs serve the role of a warehouse or a building where different inventories are stored in the process of being distributed to the retailers (Baker, 2007). Warehousing is defined as “the segment of an enterprise’s logistics function responsible for the storage and handling of inventories beginning with supplier receipt and ending at the point of consumption. The management of this process includes the maintenance of accurate and timely information relating to inventory status, location, condition, and disbursement” (Ross, 2015, p. 607). The location of DCs and ability to distribute products to the retail stores can be performed under either centralized or decentralized retailing. A centralized retail distribution refers to centralizing inventories in one central DC or a few locations which can supply a large area or a country (Nozick and Turnquist, 2001; Holzapfel, Kuhn and Sternbeck, 2016). The motivating factor among retailers to centralize the distribution is the ability to reduce costs by utilizing economies of scale. The location of the DC can have an effect on the transportation costs, which is one reason for why retail companies decide to decentralize the distribution, often referred to as regional DCs (Nozick and Turnquist, 2001). Furthermore, a company need to take into account the risk with products when deciding to place them in a central DC or regional DCs. Low-cost products with predictable demand are recommended to place regionally whereas high-value products with unpredictable demand are recommended to be placed in a central DC (Ross, 2015). According to Ross (2015) companies should select cost over responsiveness and flexibility for commodity products and rather select responsiveness and flexibility for low volume, unpredictable products that have a short life-cycle.

Material handling can be defined as the movement of products within a storage area (Manzini, Bozer and Heragu, 2015; Ross, 2015). Products are delivered to the DC where the goods are unloaded with an attached barcode at the receiving docks. After this point, the products can be transferred to the storage area with necessary equipment where they will be stored until further requested (Berg and Zijm, 1999). According to Manzini, Bozer and Heragu (2015) material handling activities that include storing or moving a product is a non-value-added activity. However, material handling plays an important role in the supply chain because it enables efficiency in meeting customer requirements. The purpose of material handling is to “minimize operation costs and time while increasing the supply chain performance” (Manzini, Bozer and Heragu, 2015, p.711).
Transportation is an important process of the distribution since it entails moving an item from one location to another in the supply chain. The mode of transportation will affect the responsiveness and efficiency of a company as faster transportation results in higher prices but better responsiveness (Chopra and Meindl, 2016). There are five types of modes that can be used such as air, truck, rail, sea, and pipeline (Arnold, Chapman, and Clive, 2007). Truck is the commonly used mode of transportation. Unlike ocean and rail transport, truck transportation is usually not constrained to a specific area and has the benefit of reachability and flexibility (Holguín-Veras and Sánchez-Díaz, 2016). Inbound transportation in distribution refers to the transport of products coming into the DCs whereas outbound transportation refers to the transportation of products going out from the company also known as last mile delivery (Chopra and Meindl, 2016). Inbound transportation costs tend to be lower than outbound transportation costs as it is easier to send larger shipments between regional DCs. On the other hand, when a company has several DCs spread across a country, this can contribute to lower outbound costs as the distance becomes closer to the end customer. However, it can be argued that transportation costs are the highest for the last mile delivery (Chopra and Meindl, 2016) and therefore the goal should be to minimize the cost from DCs to retailers (De La Vega et al., 2018).

IT systems play an important role to support the planning and execution of the processes that take place in the distribution, a software is commonly used (Chopra and Meindl, 2016; Faber, De Koster and Smidts, 2013). Linking the entire organization can be done by the use of an Enterprise Resource Planning (ERP) system. An ERP system is an IT system which integrates all the IT systems or functions into one system where all members of the supply chain can share and access real-time information (Su and Yang, 2010). Depending on the choice of IT system a company has integrated, these systems can either support the various processes such as with an ERP system, or it can focus on supporting only a few specific processes with more intensity, such as a Warehouse Management System (WMS) (Faber, De Koster and Smidts, 2013).

To improve the DC processes, planning plays an essential role (Faber, De Koster and Smidts, 2013). It is of vital importance to ensure that products are available in the stores and the companies are therefore scheduling activities to utilize its resources as efficiently
as possible to meet the market demand (Shandong, Robb and DeHoratius, 2018). This involves planning exactly when products should arrive, in what quantities, where to store the products, and how to transport the products to the retail stores (Faber, De Koster and Smids, 2013). If the retail stores suffer from stock-outs resulting from poor forecasting and planning, research has shown that 47% of the customers will purchase a similar product, while 40% of the customers will revisit another store to purchase the product, which will result in lost sales for the retail stores (Shandong, Robb and DeHoratius, 2018). It is shown that the total supply chain costs can be reduced by coordinating inventory replenishment and planning of transportation (Kang and Kim, 2010).

2.3 Order Fulfillment Process Adapted to Grocery Retailing

The order fulfillment process can be explained as the steps an organization must take from the point of sales until the products are being delivered to the customer (Figure 4) (Croxton, 2003).

Figure 4 Order Fulfillment Process

Source: Adapted from Croxton, 2003.

The process of delivering products from a DC to a grocery retail store starts when the order from the store is received (Holzapfel, Hübner, Kuhn and Sternbeck, 2015) and can be explained as the first step (order generated from retail store) in the order fulfilment process. The store either place its own order or the order is automatically generated through an automated system (Croxton, 2003). Grocery retailers are recognized by a repetitive pattern with weekly or daily orders from the different retail stores in the network due to the fact that the demand usually follows a weekly pattern (Holzapfel, et al., 2015). With an automated ordering system, also referred to as Material Requirement Planning module (MRP) or ERP system, an order is generated based on several factors such as historical sales data, volume in the stores, promotions and seasonality (Shandong, Robb and DeHoratius, 2018). Replenishment orders can be made when the inventory reaches a certain level at the stores, which means that the stores will be able to plan for
the next delivery date as this is set on a fixed schedule (Holzapfel, et al., 2015; Ross, 2015).

The second step (processing the order) starts when the order from the store is received at the DC and inventory levels at the DC can be examined (Croxton, 2003; Holzapfel, et al., 2015). Sometimes inventories are placed in different locations at the DC, which means that this step requires some level of coordination. Once the inventory levels and locations are checked, the order flow is planned. That determines how the products will be routed through the supply chain (Croxton, 2003).

Once the order flow is planned the third step (filling the order) takes place which includes picking, packing, and loading the goods (Croxton, 2003). In a manual warehouse, a person is responsible for picking and packing the products manually until the order is complete. The picking of the items can be done by the use of different types of vehicles and equipment (Berg and Zijm, 1999). In the retail industry, there is a trend moving towards automation to reduce DC operations cost and to improve productivity (Dubey and Veeramani, 2017). This is also supported by Ross (2015) who explains that more warehouses implement this type of technology. Automated warehouse systems can handle the whole end-to-end process of receiving, storing, picking and packing the goods. Furthermore, these advanced systems are also able to separate the different Stock Keeping Units (SKUs) and can mix pallets for shipments to each specific store (Dubey and Veeramani, 2017). Once the order is filled, the information will be saved in the system so that the customer can take part of the order confirmation (Croxton, 2003).

After filling the order, the fourth step (delivering the order) is carried out (Croxton, 2003). In conjunction with the repetitive order pattern, grocery retailers are recognized by a repetitive delivery pattern (Holzapfel, et al., 2016). A store delivery pattern “comprises the specific delivery schemes for all order segments applied” (Sternbeck and Kuhn, 2014, p. 208). Based on a predetermined set of criteria, such as store-specific situations and last-mile volume, some stores get deliveries more frequently than others (Fancello, Paddeu and Fadda, 2017; Holzapfel, Kuhn and Sternbeck, 2016). There are several benefits of having a cyclical delivery pattern for each specific store according to Holzapfel, et al. (2015), firstly, the stores can plan accordingly so that there are always enough employees
at work to unpack and refill the shelves. This is also the case for the employees at the DCs, as the right amount of workforce needed for the picking process of the orders can be planned according to the delivery of each day. Secondly, delivery on specific times or days at the week eases the process of planning transportation routes. Finally, as most of the retail stores have an automated inventory ordering system where an order is generated based on volume in the stores, replenishment orders are made when inventory reaches a certain level and the stores will be able to plan for the next delivery date as this is set on a fixed schedule. Store delivery patterns are therefore instrumental in reaching an efficient internal retail supply chain (Holzapfel, et al., 2015).

Transportation is affected by delivery patterns for each store as the size of the order volume varies depending on the size of each store. This means that the delivery patterns are selected based on the size of the order for each store and the picking capacity at the DCs and the number of transportation shipments is adjusted based on necessary order volumes (Sternbeck, and Kuhn, 2014). Furthermore, the product segment also impacts the delivery pattern, as for example perishable goods require more frequent deliveries in order to prevent decay (Holzapfel, et al., 2015).

The outbound transportations costs are often pre-negotiated and are dependent on the number of SKUs which lays the foundation for the volume resulting in the outbound cost (Holzapfel, Kuhn and Sternbeck, 2016). The company should seek for improving its relationship with the carriers to reduce outbound costs (Ross, 2015) to achieve a better distribution (Croxton, 2003). To move towards more sustainable freight transportation, it is critical to have integration between the freight planning and administration as well as increasing the collaboration with other actors in the different departments (Ruesch, Hegi, Haefeli, Matti, Schultz and Rütsche, 2012).

When the products have been delivered to the end destination the fifth step takes place (retail store receives the order). When the products are transported to the retail stores and arrives the employees inspect the incoming products and start refilling the shelves (Holzapfel, Hübner, Kuhn and Sternbeck, 2016; Shandong, Robb and DeHoratius, 2018). If there is no shelf capacity for some of the products, these will be placed in the internal storage at the retail store until shelf space becomes available (Holzapfel, et al., 2016;
These activities performed at the retail stores are both time-consuming and costly and one of the main contributions to the in-store logistics costs (Holzapfel, et al., 2015).

The five steps in an order fulfilment process have been outlined. The order fulfillment process is a key process within distribution (Croxton, 2003) and is according to Espino-Rodríguez and Rodríguez-Díaz (2014, p.18) “important to the competitiveness of firms since it forms part of the activities that are essential to competitiveness”. This means that a company should always strive for improving its order fulfillment process to meet customer expectations at a lower price (Espino-Rodríguez and Rodriguez-Diaz, 2014). To be able to operate efficiently and effectively in the order fulfilment process, integration and coordination between the departments within a company are essential (Croxton, 2003). This is also supported by Espino-Rodriguez and Rodriguez-Diaz (2014) who explains that if a company wants to improve its order fulfillment process, cooperation among the network is essential and to have dedicated teams that can streamline the current processes.

### 2.4 Distribution Challenges

Previous research has identified several challenges related to retail and grocery distribution (Table 1).

<table>
<thead>
<tr>
<th>Distribution Challenges</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>To decide quantity and frequency of products when distributing to retailers</td>
<td>(De La Vega et al., 2018; Holzapfel, Hübner, Kuhn, and Sternbeck, 2016)</td>
</tr>
<tr>
<td>Centralizing versus decentralizing products</td>
<td>(Ross, 2015; Hübner, Kuhn, and Sternbeck, 2013)</td>
</tr>
<tr>
<td>Last-mile delivery</td>
<td>(Chopra and Meindl, 2016)</td>
</tr>
<tr>
<td>Environmental considerations and transportation</td>
<td>(Abbasi and Nilsson (2011;Chen and Hsu, 2015; Fancello, Paddeu and Fadda, 2017; Holguín-Veras and Sánchez-Díaz, 2016).)</td>
</tr>
<tr>
<td>KPI</td>
<td>(Anand and Grover, 2015; Chopra and Meindl, 2016)</td>
</tr>
</tbody>
</table>
One challenge according to De La Vega et al. (2018) is the difficulty within distribution in terms of deciding the quantity and frequency when distributing products from one or several facilitates, as this affect the inventory and transportation cost. Decisions on how to distribute are based on different criteria, depending on what the retail company chooses to prioritize. These criteria can be based on the frequency of delivery, lead time and inventory levels. The more frequent the deliveries, the higher the transportation costs, especially if the quantities are low. Frequent deliveries with small quantities reduce the inventory holding costs for the store but increase the transportation costs. On the contrary, lower frequency of deliveries increases inventory holding costs for the store but decreases the transportation cost (De La Vega et al. 2018). This problem is also discussed by (Holzapfel, et al. 2015) who explains that deciding delivery patterns is an ongoing debate within retailing in terms of how to optimize delivery patterns in the most efficient way as it affects the transportation and in-store logistics cost.

Another challenge described by Ross (2015) is regarding the trade-off to balance cost with responsiveness when having products centralized versus decentralized. As more inventory is centralized, it results in a decrease of inbound transportation costs but on the other hand it increases the outbound transportation costs and lead-time delivery, especially when stores place small orders to diverse locations which have a negative cost of the transportation (Ross, 2015). Furthermore, deciding where to place the products will have an impact of the responsiveness as products placed closer to the customer becomes more responsive. However, being responsive to meet customer demand for distribution creates high transportation cost (Ross, 2015). Hübner, Kuhn, and Sternbeck (2013), describe that even though companies invest in infrastructure and IT systems, retailers still have the problem to serve the goods at the right time at the right place.

The last-mile delivery can be described as the movement of products from a DC to the retailer or customer. The last mile is a challenge for companies as it contributes to the highest transportation cost (Chopra and Meindl, 2016). It is also stated by Henson and Cavanaugh (1993) that the transportation costs rise with distance travelled. Additionally, the rise in fuel prices results in higher transportation costs with distance travelled (Ross, 2015). Therefore, it becomes evident that the planning of the transportation is crucial to
reduce transportation costs (Faber, De Koster and Smidts, 2013). For a grocery retailer, it becomes even more problematic as the type of product must also be taken into account since some products require specific temperatures to prevent the products from decaying, which is critical when transporting over longer distances (Xiao, and Chen, 2012). Temperatures can be controlled in various ways, but there are two types which are most commonly used, Traditional Multi-Vehicle Distribution and Multi-Temperature Joint Distribution. The former is used for different products with one single temperature for the whole transportation while the latter is used when transporting goods which require more than one temperature. This contributes to the energy consumption because it requires multi-temperature trucks which in turn contributes to greenhouse gas emissions (Chen and Hsu, 2015). Due to the attention towards climate change, there is a pressure for companies to implement more sustainable transportation. Distributing trucks that are not fully utilized is according to Yakovleva, Sarkis and Sloan (2012) not cost-efficient and have a negative impact on the environment. Transportation does not only generate emission, but it also has an impact on the society as this contribute to noise and congestion in urban areas (Abbasi and Nilsson, 2011). Within all the motor vehicles worldwide, trucks used for freight transportation are consuming 26.5% of the world’s fuel and produces 41% of the world’s greenhouse gas emissions (Holguín-Veras and Sánchez-Díaz, 2016).

The trend in traditional logistics management has been to focus on efficiency and effectiveness, and the overall goal of a retail company is to create value for the customer at the lowest possible cost (Soysal, Bloemhof-Ruwaard and Van der Vorst, 2014; Sparks, 2010). Due to better information and awareness about the climate change, customers today are increasingly concerned about the environment and companies’ role of impacting the environment (Walker, Di Sisto and McBain, 2008). This trend combined with the characteristics of grocery retail products which can be both perishable and non-perishable and therefore requires quality handling, supply chains are moving towards incorporating environmental considerations into their overall logistics strategies (Soysal, Bloemhof-Ruwaard and Van der Vorst, 2014). According to Carter and Rogers (2008) companies who have a sustainable supply chain and participates in activities which benefit the environment and the society, can gain long-term benefits in terms of competitive advantage and improved economic performance. However, according to
Chopra and Meindl (2016) it can be a challenge to implement environmental actions and sustainability when designing the supply chain strategy (Chopra and Meindl, 2016).

Sustainable Supply Chain Management (SSCM) can be defined as “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goal in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chain” (Carter and Rogers, 2008, p. 369). Abukhader and Jönson (2004) emphasize the importance of implementing solutions which can both fulfill the government regulations and satisfy end customers while at the same time being cost-effective. It has been argued that costs are one of the main drivers of supply chain development and that there is a trade-off between reducing the negative impact on the environment and increased costs of business activities (Abbasi and Nilsson (2011). A challenge in transportation is that it can be difficult to calculate the environmental costs when companies are following environmental laws and regulations (Abbasi and Nilsson, 2011). Companies’ transportation and logistics activities are some of the primary sources of greenhouse gas emissions due to transport emissions from the trucks in terms of fuel and use of energy (Abbasi and Nilsson, 2011; Chen and Hsu, 2015) Furthermore, these activities can also have an unfavourable impact on the environment in terms of pollution, noise and congestion (Abbasi and Nilsson, 2011; Fancello, Paddeu and Fadda, 2017).

KPIs are essential for retail companies so that they can improve their processes. To develop performance measurement tools, such as KPIs, known as metrics to track and analyze processes is seen as a complicated process (Anand and Grover, 2015). Anand and Grover further state (2015, p.156) that “the challenge in measuring the performance is that limited resources used for measurement may as well affect the number and types of indicators developed”. Without the lack of incentives and top management support it can be difficult to implement measurement systems. If processes do not measure properly, managers will have a difficult time to improve the processes (Anand and Grover, 2015).

2.5 Addressing Distribution Challenges
Previous research has identified several possible solutions to challenges that can be applied in retail and grocery distribution (Table 2).

**Table 2 Possible Solution to Challenges**

<table>
<thead>
<tr>
<th>Possible Solutions</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consolidation</td>
<td>(Bhatnagar and Teo, 2009; Estrada and Roca-Riu 2017; Stephan and Boysen, 2011)</td>
</tr>
<tr>
<td>Postponement</td>
<td>(Cheng, Li, Wan and Wang, 2014; Dias, Calado and Mendonça 2010; Hilletofth, 2012; Thangam and Uthayakumar, 2008; Van Hoek, 2011)</td>
</tr>
<tr>
<td>The Pareto rule/ ABC analysis</td>
<td>(Christopher and Towill, 2001; Hilletofth, 2012; Ross, 2015)</td>
</tr>
<tr>
<td>Push strategy</td>
<td>(Ross, 2015)</td>
</tr>
<tr>
<td>KPI</td>
<td>(Chopra and Meindl, 2016; Anand and Grover, 2015)</td>
</tr>
</tbody>
</table>

To optimize distribution processes is a challenge especially when the DC increases in complexity. The use of a centralized DC is an example requiring complex internal logistics processes since this type of warehouses are distributing to larger areas with greater product variety (Faber, De Koster and Smidts, 2013). For every distribution, it is important to make the material handling more effective and efficient as it can lead to improvements in the environment as well as cutting the cost for the company. There are different strategies that can be used within material handling to achieve this such as consolidation where products are combined or postponement where logistics activities are delayed, which all can optimize transportation (Ruesch et al., 2012; Ross 2015).

Consolidation refers to batching products together for transportation to a common region or place (Bhatnagar and Teo, 2009). Consolidating products is beneficial in terms of fuller truckloads and economies of transportation (Stephan and Boysen, 2011), and a more efficient supply chain (Buijs, Danhof, and Wortmann, 2016; Stephan and Boysen, 2011; Sternbeck and Kuhn, 2014). The trade-off by consolidating shipments is time, since it sometimes takes time awaiting completion of the consolidated products which can cause a delay of transportation (Bhatnagar and Teo, 2009; Stephan and Boysen, 2011). Estrada and Roca-Riu (2017) argue that the number of vehicles and mileage within urban areas can be reduced by consolidating the goods by grouping the shipments together. Companies seeing the potential cost savings are more likely to implement this strategy.
In order to improve the logistics performance of the firm, the importance lays according to Bhatnagar and Teo (2009) in maximizing the utilization of transport and warehouse capacity by the use of consolidation.

Postponement is a strategy where activities or functions are partially or fully delayed until the customer order is received (Van Hoek, 2011). Logistics postponement refers to the delay of activities related to time and place, such as postponing the distribution of goods for as long as possible (Hilletofth, 2012). However, a company must consider how prepared customers are willing to wait for its products when applying postponement (Cheng, Li, Wan and Wang, 2014). Having logistics postponement platforms can according to Dias, Calado and Mendonça (2010) help to minimize empty journeys by truck. It helps to reduce cost and to promote space-time compression. Furthermore, Seth and Panigrahi (2015) explain that when a company has forecasting errors is primary the driver for implementing a postponement strategy. Postponement strategy is powerful in a SC network where distribution becomes critical for both cost reductions and customer value creation (Cheng et al., 2014). This strategy can be very successful for many industries with a differentiated SC, including retailers within the food industry (Thangam and Uthayakumar, 2008). For perishable products such as fruit and vegetables, it is important that the activities that the delay does not affect the quality of the products, so that the product does not decay (Xiao, and Chen, 2012).

A supply chain consists of a large number inventories and it can be said that not all products can be treated the same way (Ross, 2015). The Pareto rule approach can be used in distribution to determine the supply chain strategy for some of its products (Christopher and Towill, 2001). The Pareto rule is composed of 80% of the company’s revenue is substantially derived from 20% of the product assortment (Hilletofth, 2009). A company should manage products differently depending on predictability (Christopher and Towill, 2001). Therefore an ABC analysis can be applied to classify products into A, B, selectively, and C, depending on the importance of the product. An A classified product relates to an extremely important product which can be expensive products and/or products that have a high transaction volume. Class B products are somewhat important to a certain degree. Those products have medium sales and usage which are to a larger degree stocked. Class C products are not as important and describe products that are
inexpensive, bulk products, which have low transaction volume. By the use of an ABC analysis, companies can optimize and manage its inventory more accurately (Ross, 2015).

The use of a “push” strategy can be described as when distribution is about to replenish products to the different locations and thereby “push” products through the channel by manipulating the forecasting and replenishment techniques with the help of algorithms. When applying a “push” strategy, the supplying location takes control over the resupply of products and have the ability to adjust the actual replenishment and quantities to improve shipment goals. However, using this strategy can result in too many products left in inventory which emphasize that it requires effective accurate and timely information. On the other hand, this strategy contributes to higher chance to meet customer demand when having the product in inventory (Ross, 2015).

With the help of KPIs, companies can improve their processes. It is suggested that managers in retailing should start prioritizing measures that affect the company in the long run besides managing the day to day operations. Retailers can for example measure the performance of transportation, such as delivery, time, frequency, and capacity to increase the optimization of these processes (Anand and Grover, 2015). Chopra and Meindl (2016) explain that companies also need to measure the fraction transported by mode to understand if certain modes of transportation are under- or overused.

2.6 Change Management

Previous research has argued that companies have to be innovative to survive in the market (Mezias and Glynn, 1993). According to Rogers (1995, p.11) innovation is defined as “an idea, practice or object that is perceived as new by an individual or other unit of adoption”. This means that although the idea or practice being implemented might not necessarily be new, it is new to the company or organization implementing it (Flint, Larsson, Gammelgaard and Mentzer, 2005). The market is constantly changing, new technology is evolving, and companies are therefore continuously trying to adapt to these changes (Appelbaum, Habashy, Malo, and Shafiq, 2012). Change within a company or organization refers to the process of doing something different than what is known from
before (Smith, 2005). Change is a process of enabling the employees to embrace the changes being made within the organization (Milliken, 2012).

The drivers of change can be both internal and external, either in terms of competitive pressures or market changes, or internal within the organization such as make improvements to reduce costs (Smith, 2005). The main barrier of organizational change is managing the people, as it is the people who are doing the work within the organization and the attitude of the employees affect the result of the organizational change. Some employees are eager to change, while others are resistant to change (Smith, 2005). Resistance to change is according to Smith (2005) a tendency in well-established and settled organizations. As Milliken (2012) states, there are two reasons for why organizations tend not to manage change well. Firstly, people within the company that is affected by the change does not see the expected result of effort being put into the change. Secondly, the expected results that the people do see, are usually only on a short-term basis before people start to gradually go back to the way they did things before because the focus of change is removed along the way (Milliken, 2012).

One of the challenges of being innovative is the complexity and size of a company and implementing new ideas or practices requires an organizational change. Barriers of change must be overcome, which can be a difficult process (Mezias and Glynn, 1993; Smith, 2005). Therefore, it is essential to communicate the need for change so that all the people in the organization understand why the change is needed, what the benefits will be and how this will affect the organization (Milliken, 2012). A successful implementation of change can define the success of an organization (Appelbaum et al., 2012). To be able to communicate and implement a successful change, the management must also be committed and link the change to the values of the organization and more importantly communicate the short-term wins so that all the employees see the benefit of the change (Milliken, 2012).

Kotter (1996) has developed a framework consisting of 8 steps (Table 3) an organization must undertake to successfully implement a change within a company.

Table 3 8 Steps of Successful Change
The first step (establish a sense of urgency) is to identify the need for change by surveying the market trends and how the organization can gain a competitive advantage. The second step (form a powerful guiding coalition) is to create a group of people within the organization who can lead and encourage the change. The third step (create a vision) is to form a vision and develop change strategies to help fulfill and guide the developed vision for change. The fourth step (communicate the vision) is to make sure that the employees understand why and how the change will be implemented. The fifth step (empower others to act on the vision) is to involve and encourage the employees in the change effort, remove potential obstacles. The sixth step (plan and create short-term wins) is to generate wins on a short-term basis which are visible for the employees and reward the efforts the employees are putting into the change. The seventh step (consolidate improvements and produce more change) is to continue to build on the change by using employees to implement the vision created for the change. The last step (institutionalize new approaches) is to communicate the successful outcome of the change, incorporate the changes into the organizational culture to secure that the changes will be implemented on a long-term basis (Appelbaum et al., 2012; Kotter 1996).

The people within an organization plays a vital role in implementing successful change, both as the encourager of change and as an obstacle of change (Kotter 1996; Smith, 2005). It is therefore essential that managers guide the change and make ensure that the employees understand why the change is needed, how it can be achieved and what the outcome of the change will be (Milliken, 2012).
3. Research Methodology

The third chapter of the thesis presents the research design with a detailed overview of how this study has been conducted. This section starts with the research philosophy, where the philosophical positions that influence the adopted research design is described. Furthermore, a discussion of how the data has been collected and analyzed will be provided. Finally, the reader can draw conclusions on the quality of the research based on validity, reliability and research ethics.

3.1 Research Philosophy

Research philosophy can be defined as how to create and deal with knowledge. Understanding research philosophy is essential in order for the researcher to be able to clarify what research design to be used, what evidence that are essential, and how the data should be gathered and interpreted (Easterby-Smith, Thorpe and Jackson, 2015). Research philosophy can be divided into ontology and epistemology (Easterby-Smith, Thorpe and Jackson, 2015). Easterby-Smith, Thorpe and Jackson (2015, p. 46) states that “ontology is about the nature of reality and existence; epistemology is about the theory of knowledge and helps the researchers understand best ways of enquiring into the nature of the world”. In research there are different philosophical views that can be adopted depending on the ontology. The activities in the supply chain that will be investigated in this thesis are dependent on human beings and is therefore considered as social science, not natural science. A single reality cannot be discovered through this research, hence, a relativist ontology is applied. The reason for this is that many perspectives can be discovered depending on the behavior and experience of people who can differ from person to person (Easterby-Smith, Thorpe and Jackson, 2015). As a result, different perspectives can be identified when examining a grocery retail distribution and its processes.

When the ontological position is defined, the researcher has the ability to understand the epistemological view. In line with our ontological position, a constructionist epistemology assume that there are multiple perspectives to be discovered during this research since each grocery retail supply chain and distribution and its processes is unique. Since we do not assume that there is no pre-existing reality, a strong
constructionist epistemology is not applied (Easterby-Smith, Thorpe and Jackson, 2015). Therefore, this study follows a relativist ontology with a constructionist epistemology to understand the distribution and its processes within a grocery retail supply chain and to collect viewpoints and experiences of different individuals (Easterby-Smith, Thorpe and Jackson, 2015; Saunders and Lewis, 2012).

3.2 Research Approach
An inductive scientific approach is often chosen when the starting point of the research is observations of patterns and data gathering in order to develop generalized conclusions or theories. This research started with an empirical investigation at a large grocery retailer. Hence, an inductive approach was chosen as it allows the researchers to understand the perspectives that individuals connect to experiences and happenings. Furthermore, it opens for flexibility to make adjustments to the research during the research process (Saunders and Lewis, 2012).

This thesis follows a qualitative research direction, which is commonly used in a relativist ontology and constructionist epistemology. Through qualitative data it is possible to gather empirical data in a non-numeric form through primary and secondary sources such as interviews and additional documents. Interviews provide the benefits of an open dialogue where the interviewee can express their thoughts and experiences and the questions do not necessarily have to be standardized (Easterby-Smith, Thorpe and Jackson, 2015). By the use of qualitative data collection it is possible to gain an in-depth understanding of a grocery retail distribution and its processes, which is needed to fulfill the purpose of the thesis.

3.3 Research Design
The design of this thesis is a qualitative case study. According to Stake, (1995, p. xi) a case study can be defined as “the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances”. Case studies are based on observations and personal contacts within organizations that take place over a period of time usually conducted through interviews (Easterby-Smith, Thorpe and Jackson, 2015). A case study will make it possible to answer research questions that start
with “how” and “what”. It allows gaining a meaningful understanding of grocery retailing and its distribution processes by looking in-depth at one or a small number of organizations (Easterby-Smith, Thorpe and Jackson, 2015; Stake, 1995). The strengths of a case study when collecting data is the ability to understand processes and people over time and it makes it possible to contribute to new theories. Furthermore, it accepts multiple data sources and makes it possible to analyze different perspectives which are essential in this study. The weakness of case study is the amount of time that is required to collect the data as well as the interpretation and analysis of data might be time consuming and difficult (Easterby-Smith, Thorpe and Jackson, 2015; Stake, 1995).

As this thesis is focusing on one company, the design of the case study is considered as a single case study as this also fits with a constructionist epistemology (Easterby-Smith, Thorpe and Jackson, 2015). Our case study is an instrumental case as it will provide in-depth insights with a holistic view by investigating distribution processes and its challenges in a grocery retail supply chain. As Stake (1995) explains, the purpose of the case report is not to represent the world but rather represent the case. Having an instrumental case will according to Stake (1995, p.156) provide “value for refining theory and suggesting complexities for further investigation”. The findings from our case study will provide in-depth information about grocery retail distribution and its processes in an elongated country with numerous sparsely populated areas located far away from the DCs. This can potentially be generalized to other contexts or companies operating in a country with the same terms. In addition, it will contribute to useful information that can allow other researchers to use this information as a comparative point across other cases.

Having an instrumental case enables the researchers to carefully choose their own case based on critical criteria that would make it possible to answer the research question. This purposive sampling technique is recommended when the sample size is small (Easterby-Smith, Thorpe and Jackson, 2015; Stake, 1995). The criteria for the selection of the case study was to (1) choose a company within the grocery retail industry, (2) a company in elongated country with numerous sparsely populated areas located far away from the distribution centers, (3) a company willing to provide us with good accessibility to data as this is of vital importance when conducting a single case study (Gioia, Corley and Hamilton, 2013; Stake, 1995). After considering numerous of companies, Alpha was
selected for the single case study as the company fulfill the selection criteria. The company is a large grocery retailer operating more than 1000 stores in an elongated country with sparsely populated areas. In addition, the company has long distances between the DCs and the retail stores. Furthermore, the company allowed us to interview and take part of all information needed to answer the research questions.

3.4 Data Collection
Primary data, which is data that are collected for a specific purpose (Saunders and Lewis, 2012), were collected through email, a guided tour around the central DC and in-depth interviews with management-level employees at the headquarters of Alpha. The first contact with the company was through email where the research was introduced and the first interview was scheduled. Interviews were the chosen method as this is the matching method for a qualitative case study, and could be structured with a series of questions based on their grocery retail distribution and its processes. Interviews were conducted based on a snowball sampling approach where the interviewee recommended other participants within Alpha that could be of relevance for our study (Easterby-Smith, Thorpe and Jackson, 2015). A confidentiality agreement was signed during the first interview which has been kept in mind during the research process.

The technique selected for the interviews was face-to-face interviews. The interviews were semi-structured which is an open and guided interview (Appendix 1). A topic guide was used to lead the questions but at the same time leaving space for being flexible during discussions of the topic (Easterby-Smith, Thorpe and Jackson, 2015). The main questions of the topic guide differed depending on the participant and aim of the interview. These questions were formulated as neutral, open-ended questions that were clear and easy to understand to avoid misunderstandings and to promote the participant to be reflective. Furthermore, essential elements such as the use of appropriate language, taking notes and recording the interviews were done to obtain successful qualitative data (Easterby-Smith, Thorpe and Jackson, 2015). In total, five in-depth interviews were conducted with participants from two different departments, transportation, and logistics development (Table 4). Furthermore, secondary data was used and refers to data that have previously been gathered for some other purpose, and can be both qualitative and quantitative.
(Saunders and Lewis, 2012). Secondary data that has been collected for this research includes company reports and relevant data sets that we have been given access to by the research participants.

Table 4 Interview Details

<table>
<thead>
<tr>
<th>Code</th>
<th>Participants</th>
<th>Location</th>
<th>Date</th>
<th>Technique</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1A</td>
<td>Logistics Manager</td>
<td>HQ</td>
<td>20.03.2018</td>
<td>Semi-structured, Face-to-face</td>
<td>120 min</td>
</tr>
<tr>
<td>P2A</td>
<td>Transportation Manager</td>
<td>HQ</td>
<td>23.03.2018</td>
<td>Semi-structured, Face-to-face</td>
<td>135 min</td>
</tr>
<tr>
<td>P1B</td>
<td>Logistics Manager</td>
<td>Central DC</td>
<td>09.04.2018</td>
<td>Semi-structured, Face-to-face</td>
<td>240 min</td>
</tr>
<tr>
<td>P3A</td>
<td>Process Manager</td>
<td>HQ</td>
<td>16.04.2018</td>
<td>Semi-structured, Face-to-face</td>
<td>70 min</td>
</tr>
<tr>
<td>P2B</td>
<td>Transportation Manager</td>
<td>HQ</td>
<td>16.04.2018</td>
<td>Semi-structured, Face-to-face</td>
<td>90 min</td>
</tr>
</tbody>
</table>

3.5 Data Analysis

In any research process, the data analysis aims to draw realistic conclusions from the empirical data the researcher has gathered (Saunders and Lewis, 2012). Stake (1995) argue that it is the researchers choice to decide which analysis that is the most fitting when having a constructionist epistemology within a single case study. Therefore, the collected empirical data for this thesis has been analyzed by the use of a systematic inductive approach which is a grounded theory articulation and new development made by Gioia, Corley and Hamilton (2013). This approach has been used previously by authors having a single case study with an inductive approach such as Akhter (2016).

The process for how we progressed from raw data to conduct the analysis (Appendix 2) can according to Gioia, Corley and Hamilton (2013) be described in three analytical steps. Step one (1st order analysis) lays the groundwork for the analysis of empirical findings by transcribing each interview. When the audio recording were transcribed to text format, we were able to highlight crucial information and the main points that we thought could be of relevance for this study. Then, we combined the main points into categories referred to as 1st Order Concepts (Gioia, Corley and Hamilton, 2013). Saunders and Lewis (2012) argue that in order to analyze data, it is essential to categorize and group the data into codes or labels in order to recognize relationship and draw conclusions from the data.
Once the process of grouping the data was completed, it resulted in an enormous amount of emerged categories. However, as the research progressed we started to look for similarities and differences between the categories to decrease the number of categories to a more reasonable number. In the second step (2nd order analysis) we further narrowed down the different 1st Order Concepts into themes that would be linked and help us to describe our phenomenon under investigation, which is named 2nd Order themes. By following this approach, it was possible to discover correlations and emerge this even further to the third step (aggregate dimensions). By narrowing it down to aggregated dimensions it was possible to incorporate the information related to our literature review. Once this was complete, we had the basis for building a data structure. The procedure of our data analysis (Appendix 2) and how the data was grouped into categories, made it possible to move back and forth between the data and theory along the process, which is important when having an inductive approach (Gioia, Corley and Hamilton, 2013; Stake, 1995).

3.6 Research Quality
When having a constructionist epistemology it is important to make sure that the case will provide enough information about behaviors, organizations or groups to make it possible to develop general principles and investigate new inspiring ideas (Easterby-Smith, Thorpe and Jackson, 2015). In order to ensure high reliability and validity and an overall level of high quality of the research, Riege (2003) suggests to include four design tests in case study research to establish trustworthiness: credibility, transferability, confirmability and dependability.

Credibility refers to a way of showing that the data collection, data analysis, and findings are honest and believable to fulfill the purpose of this study (Eriksson and Kovalainen, 2015). Data for this in-depth case study were gathered from one organization within the grocery retail industry, by the use of primary data such as interviews and emails. To avoid ambiguity, managers from different departments was interviewed to get a comprehensive understanding of the chosen company's distribution. Secondary data sources was also used along the research. In the literature review, relevant books were used and only peer-reviewed articles was used as these articles are considered credible. Furthermore, to
ensure credibility a detailed description of this particular case with a systematic procedure for the analysis based on transcriptions are provided which gives the reader the opportunity to decide if the research is credible (Easterby-Smith, Thorpe and Jackson, 2015; Gioia, Corley and Hamilton, 2013). Hence, we are convinced that if other researchers examined our material using the same techniques, they would receive similar conclusions (Eriksson and Kovalainen, 2015).

Transferability refers to being able to show similarities between results from your own research and results from previous research within different contexts (Eriksson and Kovalainen, 2015). Our study was conducted within the grocery retail industry with a particular focus on the distribution processes. The findings represent generalized conclusions about challenges for grocery retailers having a distribution in an elongated country with numerous sparsely populated areas located far away from the DCs (Saunders and Lewis, 2012). Theory can be developed further by other researchers who can benefit from our findings by drawing comparisons between our case and other research projects to be conducted in the future. Furthermore, as this is a business perspective, research within engineering can develop our research further by conducting simulation studies.

Confirmability refers to linking theory and data so that it can easily be understood by the readers of the study (Eriksson and Kovalainen, 2015). To ensure that the information gathered and analyzed in the thesis were accurate and not invented, a semi-structured interview technique was decided in order to have a clear and similar structure, at the same time with a flexible structure. Furthermore, interviews were recorded and transcribed to enhance credibility and ensure that we were not misleading or misinterpreting the data that were analyzed.

Dependability refers to providing a logical and well-documented order of information to the reader of the study (Eriksson and Kovalainen, 2015). By having a clearly defined research approach, the thesis follows a logical order. Furthermore, based on the clear description and illustrations throughout the thesis on how this research has been conducted, other researchers can repeat this study. Furthermore, data is available upon request if it is needed to ensure trustworthiness. To demonstrate the trustworthiness of
this study: credibility, transferability, confirmability and dependability has been summarized (Table 5).

Table 5 Research Quality

<table>
<thead>
<tr>
<th>Credibility</th>
<th>Different managers was interviewed, peer-reviewed articles, systematic procedure for the analysis, transcriptions from all of the interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferability</td>
<td>Generalization, theory development</td>
</tr>
<tr>
<td>Confirmability</td>
<td>Semi-structured interview, recorded and transcribed interviews</td>
</tr>
<tr>
<td>Dependability</td>
<td>Logical and well-documented process of how the research has been conducted, data available upon request</td>
</tr>
</tbody>
</table>

Source: Adapted from Riege, 2003.

3.7 Research Ethics
Ethical considerations are essential when conducting research in order to guide the moral choices and relationships with those who are the subject of this research process (Saunders and Lewis, 2012). During this research process, we have followed the key principles in research ethics by Bell and Bryman (2007) and Easterby-Smith, Thorpe and Jackson (2015), which focus particularly on research within the field of management (Table 6).

Table 6 Key Principles of Research Ethics Applied
The first two principles ensures the interests of the research participants, while the last six principles are related to research integrity so that the integrity of the research is ensured.

During this research process, a focus on plagiarism and fabricating other researchers work were important aspects that we at all times considered when reading literature, synthesizing theory, analyzing and formulating the thesis (Easterby-Smith, Thorpe and Jackson, 2015). As we defined our research problem and research questions, we considered being innovative and not copying any other research that has been conducted before us. Informed consent were given based upon the nature of our research, which role the participants would have in the research and the benefits they would receive from being part of the research (Easterby-Smith, Thorpe and Jackson, 2015). Potential risks were disregarded as we agreed upon a confidentiality agreement during the first meeting. The choice of research design affected the way we gathered data, which meant that during interviews we would have several ethical considerations to take into account (Easterby-

### Key Principles of Research Ethics

<table>
<thead>
<tr>
<th>Principle</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ensure that no harm, wrongdoing or risk comes to research participants</td>
<td>No physical harm or wrongdoing resulted from this research. The well-being of the participants were ensured.</td>
</tr>
<tr>
<td>2. Respect the dignity of research participants</td>
<td>The dignity and values of the research participants were preserved at all times.</td>
</tr>
<tr>
<td>3. Ensure a fully informed consent of research participants</td>
<td>Prior to the interviews, consent to collect information were given from the organization. Consent were given based on the research purpose, the role of the organization in this research and benefits of participating in this research. Contact details were provided so that the participants were able to contact us at all times.</td>
</tr>
<tr>
<td>4. Protect the privacy of the research participants</td>
<td>The privacy of the research participants were protected at all times. Conversations between researchers and participants were kept in a private environment.</td>
</tr>
<tr>
<td>5. Ensure the confidentiality of the research data</td>
<td>Before gathering the data, a confidentiality agreement between the authors of the thesis and the research participants was signed. Data gathered for this research was stored in a safe place and only shared with the supervisor of the thesis.</td>
</tr>
<tr>
<td>6. Protect the anonymity of individuals or organizations</td>
<td>Names of the participants and company was kept anonymous. As we had signed a confidentiality agreement, country was not revealed in order to prevent that others would be able to identify the company.</td>
</tr>
<tr>
<td>7. Avoid deception about the nature or aims of the research</td>
<td>Information, findings or results were not held back. The nature and aim of the research has been presented in an honest manner and participants or the readers of the research has not been misled.</td>
</tr>
<tr>
<td>8. Declaration of affiliations, funding sources, and conflicts of interests</td>
<td>This research is not funded and a conflict of interest did not occur during the research process.</td>
</tr>
<tr>
<td>9. Honesty and transparency in communication about the research</td>
<td>The findings of this study has been reported correctly, meaning that we have not added additional information. The findings are presented in an honest way and based on a structured coding.</td>
</tr>
<tr>
<td>10. Avoid misleading or false reposting of the research findings</td>
<td>Following the principle mentioned above, the findings we have presented can be replicated and further analyzed by other researchers.</td>
</tr>
</tbody>
</table>

Source: Adapted from Bell and Bryman, 2007 and Easterby-Smith, Thorpe and Jackson, 2015.
Smith, Thorpe and Jackson, 2015). Hence, privacy and confidentiality were always kept in mind to ensure that the information were both collected and stored safely, for further being analyzed and interpreted in a transparent and honest way.

3.8 Methodology Summary
A methodology summary (Table 7) has been created in order to give a brief overview of the methodological choices for this thesis.

Table 7 Methodology Summary

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Thesis Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Research Philosophy</td>
<td>Relativist ontology, Constructionist epistemology</td>
</tr>
<tr>
<td>3.2 Research Approach</td>
<td>Inductive scientific direction, Qualitative methodical direction</td>
</tr>
<tr>
<td>3.2 Research Design</td>
<td>Instrumental, Single, Holistic Case study</td>
</tr>
<tr>
<td>3.3 Data collection</td>
<td>Semi-structured interviews, Primary and Secondary data</td>
</tr>
<tr>
<td>3.4 Data analysis</td>
<td>Systematic inductive approach, Grounded articulation and New development</td>
</tr>
<tr>
<td>3.5 Research Quality</td>
<td>Credibility, Transferability, Confirmability, and Dependability</td>
</tr>
<tr>
<td>3.6 Research Ethics</td>
<td>Key principles in Research Ethics</td>
</tr>
</tbody>
</table>
4. Empirical Findings

This chapter presents the empirical findings. The first section provides an overview of the company, Alpha, and a description of the case. It is essential to gain an understanding of the company and the order fulfillment process to be able to fulfill the research purpose and answer the related research questions. The second section presents all relevant empirical findings related to RQ1, where encountered challenges are described. The third section presents the empirical findings related to RQ2 where possible solutions are presented.

4.1 Case Description

Alpha is one of the largest grocery retailers in the country it is located with more than 1000 stores and 20 000 employees by the year of 2016. Alpha strives to constantly improve their strategies to remain as one of the retailers with the best prices offered to satisfy their customers. One of their goals is to reduce the environmental emissions related to operations and transportation by 40 percent within 10-15 years (Alpha annual report, 2016). Alpha has a total of five DCs (Figure 5). The central DC is fully automated, and also act as a regional DC for the South-East region where it is located. The regional DCs are manually operated and strategically placed across the country in four different cities. Implementing a fully automated DC has resulted in increased effectiveness for each activity within the central DC, reducing both picking and packing costs by fifty percent (Alpha Company Report, 2018).

Figure 5 Alpha’s Distribution Centers
The country Alpha is operating in “has a low population density and have among the smallest average store size in Europe” (Company Presentation, 2018). Most of the suppliers are located in the South-East part of the country while the largest market shares are in the North which is far away from most of the suppliers, “we are in a special situation” (Company Presentation, 2018). The products stored at the DCs are divided into four categories: fruits and vegetables, dry goods, frozen goods and refrigerated goods. The central DC contains centralized products such as dry and refrigerated goods, supplying all the regional DCs with these products. However, not all of the dry and refrigerated products are centralized as this depends on the inventory turnover. For example, products with high inventory turnover are not centralized and are instead stored at the regional DCs to be close to the customer. As the central DC also acts as a regional DC for South-East region, it also has all the other remaining product categories but only supplies these products to the South-East region.

When Alpha distribute products, they try to combine all product categories into the same truck by the use of different temperature zones, which means that perishable, refrigerated and frozen goods can be transported in the same truck together with other product categories that do not require a specific temperature. The reason for this is that by splitting the product categories onto a different set of trucks would mean an increased number of vehicles and deliveries, and thereby increased costs. The outbound transportation costs
reached approximately 40 million EUR in 2017. Figure 7 presents an overview of the different transportation flows between supplier and retail stores.

**Figure 6 Transportation Flow**

Alpha has one central DC supplying the whole country with centralized goods, and several regional DCs supplying the stores with a combination of central and regional goods, transportation costs become high when operating in an elongated country. When deciding to build the central DC, Alpha knew that they would be able to take advantage of economies of scale as this would increase the efficiency of the processes and due to this it would outweigh the increased transportation costs followed by an automated DC. However, according to P1A, Alpha has a vision be the cost leader within their market, therefore the aim is to decrease transportation costs even further.

4.1.1 Order Fulfillment Process

To enable the reader to understand Alphas order fulfillment process from the point of order until the products are being dispatched and delivered to the retail stores, an illustration of each numbered step of the order fulfillment process at Alpha and a description is provided. It is essential to understand each process as this lays the
foundation for the findings in order to identify challenges within a grocery retailing distribution and its process and how to address these challenges.

Figure 7 Order Fulfillment Process and Activities at the central DC

The order fulfillment process has a total of 15 steps which is numbered from 1.1-10 (Figure 7). The first step in the order fulfillment process is that an order proposal is made for each store by the material requirements planning (MRP) module in the enterprise resource planning (ERP) system (Step 1.1 and 1.2). For dry and refrigerated goods, several order lines are based on an automated replenishment system where the order proposal is generated based on the sales history of the product, current inventory level for each store and forecasted demand. For fruits and vegetables, however, each store must quantify the necessary amount of products needed. The store receives the order proposal and can determine whether or not the store wants to make adjustments. The order proposal is sent to the stores on a fixed schedule, and each specific store has a deadline every day at 09:00, 13:00 and 18:00 to accept, adjust and send the order back. If the order is not submitted on time, the store has to wait for the next deadline which will delay the arrival of the ordered products. When the store has made its final adjustments or approved the suggestion, an order is generated (Step 1.3).
The orders are split between central and regional DCs as the central DC only contain two product categories. This means that orders for centralized products within the category of dry or refrigerated goods are received at the central DC, while the rest of the order is received at the regional DC. The products at the central DC have to be loaded and transported from the central DC to the regional DC. Once it arrives at the regional DC, the pallets will be unloaded and consolidated with the products at the regional DC before being transported to the retail store.

When the order has been generated, a “delivery” is created, and the transportation planning can start (Step 1.4). The first person to see the volume of the order is the carrier. The carrier has access to the ERP system so that he can see all the incoming orders. The carrier has a time window of one hour after the order is generated, meaning from 09:00-10:00, 13:00-14:00 and 18:00-19:00. Each store has a fixed route in the ERP system, which the transportation department already has planned for each specific store. The carrier can check the specific route that the orders are assigned to and can thereby start planning the transportation based on route and volume. Since the carrier can only see the volume, the transportation planning will be based on the capacity of the truck, which means that if the order volume exceeds the capacity of the truck, the carrier must move additional volume to another vehicle. When the planning is complete, the carrier will list information such as the register number of the truck, name of the driver and phone number so that the company can reach the carrier if necessary.

When the carrier submits the completed planning in the ERP system, a “transport” is created and transferred to the Warehouse Management (WMS) system implemented at the central DC. When the planned transport is received a virtual simulation of packing on a pallet is created (Step 1.5). This is a virtual simulation which creates different alternative patterns of the packing process and different suggestions of final packing pallets to ensure an optimal packing process of the pallet. When the virtual simulation is complete, the picking process can start where products are picked and packed on pallets (Step 6, 7 and 8). Once the picking process is completed, the packed pallets will automatically be transferred to the dispatch area (Step 9). All product categories except frozen goods can be consolidated on the same pallet. Small orders under a certain amount of volume can be a candidate for consolidation. The packages will be labeled during the
packing process at the central DC and manually divided at the regional DCs. The system does not combine different product categories on one pallet, it consolidates only one product category on the same pallet but belonging to different stores which will be supplied within the same area. For the South-East region, all product categories except frozen goods have the possibility to be consolidated on the same pallet which is a manual process where the different products categories are being handled by an operator who consolidates the goods together. Alpha is currently using truck as the mode of transportation. The transportation costs between the central DC and regional DCs are based on price per pallet, while outbound transportation costs are based on volume in cubic meters. The frequency of delivery is based on the size of the store, location, and sales. As a result, some stores have a higher frequency delivery than others. When products are dispatched and placed on trucks, these will be transported out to the various retail stores.

In parallel with the steps explained above, incoming goods from the supplier to the receiving area at the central DC are placed on a convey and moved to the high bay area which is called high bay warehouse (HBW) (Step 1 and 2). The products in the HBW have a stock level of one or two weeks depending on the product category. The HBW is operated by cranes where pallets are vertically stacked and stored on a racking system, which optimizes the warehouse floor and cubic space. Based on forecasting, these pallets are moved to another high bay storage area called miniload. To move a pallet from the HBW to the miniload, the pallet has to go through a depalletization because, in the miniload, the products are stored in single packages on trays for two days. Until this point, the system is fully automated, but because the system cannot automatically remove the plastic which seals the goods on the pallet, this has to be cut manually by an operator at the central DC. The pallet is then moved further down the convey, and the depalletization process begins. The whole pallet is broken down into packages which are moved on trays to the miniload (Step 3 and 4). Until this point, incoming goods placed at HBW and into the miniload is based on forecasting. When the order from the store is generated and received in the WMS, and the virtual packing is simulated, every package on the order is sent from the miniload to a sequence buffer where products will be stored for approximately two hours (Step 5). The sequence buffer is another miniload where the
packages are sorted based on the orders before being picked and packed on pallets for dispatch.

4.2 Encountered Challenges
Based on the empirical findings summarized in Table 8, Alpha’s distribution challenges can be divided into categories related to the IT system, Transportation, Environment, and Organization. The challenges related to IT systems are within both ERP and WMS, but it is also within management as the systems in themselves are not the challenge, but rather how the systems are set based on priorities of Alpha. A more detailed description is provided in Appendix 3.

Table 8 Brief Summary of Encountered Challenges
One challenge within the IT system in terms of the MRP module in the ERP system is related to a rigid configuration where transportation planning is not included when making the order proposals. According to P3A, the order proposal is based on forecasting.
inventory levels and point of sales in the stores, and if the inventory reaches a certain minimum level, an order proposal will be generated and sent to the retail stores. When an order proposal is made, P3A states “we optimize in one way only, if we think what the store should have is optimal, we ask for this exact amount without taking any consideration into fill rate of pallets or full truckloads”. There are, however, some parameters included in the order proposal, such as a “round up” if a product is ordered in kilograms, the store will receive a package or carton. Another example is the 1.5 liter Coca Cola bottle which can be sold in a single unit, 4-pack or 6 pack. If the store orders Coca Cola, the MRP will round up to either a half pallet or a full pallet. The way these round up rules are organized depends on the size and turnover of the stores. Today, Alpha only optimize order proposal based on what the store needs only, the exact amount provided without taking into consideration fill rate of pallets or full truckloads. For instance, if the order generated results in three packed pallets, where two of the pallets are full, and the third pallet only contains seven packages, they will still deliver the order, as P3A states, “it is never allowed to deviate from that”. P3A elaborates on this challenge and explains that if a store requests three cartons or packages of a product, the only answer would be to deliver these three packages, although the store might already have a quantity of 11 in the shelves.

Furthermore, when the stores have received their order proposal, they are allowed to make adjustments based on demand. This can create a challenge if transportation planning is to be included in the ERP, as any adjustments can change the size and utilization of the planned pallets. The aim of the order proposal in the MRP module is according to P2B not to generate an automatic order, but to generate an order proposal which is so good that the stores are making adjustments to a lesser degree. P2B states “that’s what we are doing now, the percentage of order proposals that are adjusted are smaller and smaller. It has been halved over the past year”. Although not every retail store make adjustments, there is also no minimum order limit for how much the retailer can order which can create an additional challenge when considering utilization of pallets with the aim of a full truckload when including transportation planning in the IT system. Even though the smaller retailers might place small orders, postponement of delivery is not applied. Alpha will respond to any type of customer demand if the order is generated on time. According to P2A, other industries are applying this strategy where the order must contain a
minimum amount of volume or weight before it is delivered. P2B explains that it might be because a store can have a good reason for ordering this particularly small amount of goods, either because a customer needs it or because the store will prevent being out of stock. P2A has suggested minimum orders, but this suggestion has not been approved as of today.

When the order is generated at the retail stores, the order is split between products located at the central DC and the regional DC. At the central DC, products are automatically picked and packed, while at the regional DCs, these processes are performed manually. Dividing the orders between central and regional DC means that picking and packing for one order are performed at two locations. This can be a challenge as it generates a lot of half-empty pallets. P1B explains that they “want to find ways to reduce the transportation cost since this accounts for an enormous amount of money for the company each year. At the same time, the environment is an important issue that keeps rising within transportation. When products are to be transported from the regional DC to the store, the problem is that the truck is not full”. Dividing the products between a central DC and a regional DC can create a challenge in terms of filling the pallets so that the carrier can build full truckloads. This is according to P2AB the downside of picking products in two locations. However, the upside is that the products are only in one location, reducing material handling costs and reduce losses and waste.

To optimize transportation, the carrier has a one-hour time window to plan the filling of the truck based on volume. This can be a challenge in terms of creating full truckloads, as the carrier can only see information about the volume and does not see the exact amount of pallets to be transported. This means that there might be free capacity in the truck which is not utilized and contributes to a less environmentally-friendly transportation. Once the transportation planning performed by the carrier is complete in the MRP module, a virtual simulation is performed in the WMS. Performing the virtual simulation after the transportation planning is an additional challenge, as the transport is already created and the volume the carrier has planned for might shift based on which products are available in the DCs.
Furthermore, if previous forecast and sales history shows that the store will most likely not be out of stock until the next scheduled delivery for one particular product that the retail store has ordered, Alpha will still deliver the amount ordered as they do not change the order quantity. This is related to optimal shelf-capacity and storage at the retail stores which can create a challenge in terms of optimizing transportation because the storage capacity and shelf-capacity are not optimal. As Alpha does not push products or postpone deliveries, not utilizing the backroom storage or shelf-capacity in the stores can create a challenge in terms of reducing transportation costs. As P3A states, "I know that he (store manager) would never be able to sell more than a certain number of cartons before the next scheduled delivery and still not run out of stock, so I could only send two full pallets now and not send the last pallet where there are only three cartons, which would cost an additional 1 000 EUR to send. But still, we do it". P3A express his concern “there have to be ways to do this better”.

According to P2B, the filling rate of the truck when distributing to the retail stores is not always filled, although the aim is to have a full truckload for each route. This can especially be a challenge during seasonal holidays, such as Easter. The reason for this is that although the seasonal holidays usually involves a peak in demand, the demand is constantly changing and can be difficult to forecast. P2A states “demand fluctuation is a great challenge in terms of transportation planning”. Although it is possible to examine previous sales history and adjust the automatic store replenishment when providing the store with the order proposal, the store can adjust the order based on their demand before generating the order. The fluctuations in demand are one of the reasons for why some of the truckloads are not optimized during transportation. When the carrier is planning the transportation and the planned cubic meters exceed a full truckload, these products still have to be delivered on time to the stores. As a result, the excessive cubic meters will be placed on another vehicle which can mean less than full truckload. In addition, if the planned order translates to 30 cubic meters in a truck with a capacity of 45 cubic meters, this would also not create a full truckload. This is according to P2AB one of the reasons for why these types of transportations with excessive or not fully utilized cubic meters are distributed with less than full truckloads. P2A further explains that “there might be some competitors who are pushing goods to gain full truckloads, but Alpha does not have a system solution for this yet, and it is not part of the corporate strategy”.

43
Furthermore, the challenge of creating full truckloads differs depending on the distance between the DCs and the retail stores. These distances can range from a few kilometers to more than one hundred, meaning that the main priority would be to create full truckloads for the longer distances, compared to urban transportation within the South-East region. The reason for this is that transportation costs increase with distance traveled and therefore the most substantial outbound transportation costs are in the northern part of the country. In general, P2B says that “the further north in the country, the larger the outbound transportation costs are per cubic meter because of the distances between the stores and between the stores and the regional DC located up north”.

P2AB also explain some challenges related to the transportation between the central DC containing centralized goods to the regional DCs. The carriers on the last-mile delivery between regional DC and the retail stores are dependent on filling the trucks with the centralized goods as well as the regional goods on the last mile delivery. If the transportation between the central and the regional DC is delayed, the carrier must either wait for the goods to arrive, causing delayed delivery to the stores or distribute the goods without the centralized goods resulting in the stores not receiving their complete order. The challenge is the low flexibility in terms of delivery which can affect the performance of the carriers when planning for full truckloads. The carrier’s performance is measured based on timely delivery, and the carrier can to deliver goods to the retail stores 2 hours before scheduled delivery time or 1 hour later. If the stores do not receive the orders on time, a fine must be paid by Alpha, and the performance measurement of the carrier will be 0%.

The challenge of utilizing all available space on the pallets are greater for smaller retail stores. P2AB elaborate that if a store has a turnover of 10 pallets per week, divided by five different product categories, it can be a challenge to build a full pallet for each delivery compared to a larger store who order larger quantities and has more frequent deliveries. The transportation costs for transportation between the central warehouse and regional warehouses are based on a fixed price per pallet. It is difficult to base the costs on volume because the variations of how much volume being transported are high and the volume also depends on how much they are able to consolidate. P2B states “obviously,
the carriers want as many goods as possible to be consolidated, and there have been several successful projects in this regard.

Transporting all products categories on one truck requires different temperature zones which can create a challenge when creating full truckloads. When packing the pallets, the most challenging product categories in terms of utilizing the fill rate of the pallet are refrigerated goods and fruits and vegetables. The reason for this is that the products within these categories are not as stackable and have a higher frequency of delivery to the stores as compared to dry and frozen goods. These product categories require different temperatures which means that fruits and vegetables cannot be placed together with frozen goods to maintain the quality of the products when delivering. According to P2A, temperature controlled transportation is not a challenge between the central DC and regional DCs. However, according to P2A, it can be a challenge for the last mile distribution. P2A explains that “one of the challenges of combining product categories in the trucks are when warm fruits and vegetables are transported at 5 degrees, as their optimal temperature is 10-12 degrees”.

Both P2B and P3A claims that although Alpha had a more poorly transportation planning system in terms of IT support before the automated DC was implemented, the filling rate has not seemed to improve as of today. To improve the overall performance within the company, each department at Alpha has their own key performance indicators (KPIs), where fill rate of the truck is one KPI mentioned by P2B which is rewarded with a bonus if the departments reach their goals. These KPIs could be more strict, according to P2B, as he explains that “I believe we would be able to fill the trucks better than what we do today”.

If Alpha is transporting with a fill rate which is not optimized, this can create a challenge for environmental transportation. According to all participants, environmental considerations are increasingly important for customers. P1B states that “the environment is an important issue that keeps rising within transportation”. P2B explains that when taking the environment into consideration, it is important to try to optimize transportation by transporting full truckloads because a high fill rate of the truck will be beneficial for the environment.
At the organizational level today, Alpha has according to P2A and P3A prioritized to focus on the customers, the stores. P3A explains that the stores have the power during the order fulfillment process. In theory, the stores can order as little as one unit of product. It is a demand-driven approach where they reply to the customer demand without exceptions. P2A have tried to suggest minimum order limit previously, but this has not been approved as of today. P3A states “if we have to send a pallet with just a few cartons, even though it will cost a fortune, we will still do it”. To overcome challenges, changes must be implemented, and this can be a challenge, according to P3A. Members of Alpha’s supply chain might be resistant to change, and the question is who would be responsible for what the store orders, and who would take the consequences if the stores would not receive the order lines they consider as a priority. The stores are used to get the products they want. P3A believes that “a change would be possible but very demanding for the organization”.

4.3 Possible Solutions to the Encountered Challenges

Based on the encountered challenges, Table 9 provides a brief summary the empirical findings related to possible solutions for the encountered challenges. A more detailed description can be seen in Appendix 4.

*Table 9 Brief Summary of Possible Solutions*
Even though the IT systems are rigid, it is not impossible to change. According to P3A, there is a possibility to adapt more flexibility into the systems and to include transportation planning as a priority. This means that when the MRP is generating an order proposal, this could be based on not only forecasting of demand and inventory turnover, but to adjust the amount of the products on the order proposals so that it would result in full pallets and thereby full truckloads.

Another solution would be to move the virtual simulation before the order proposal is sent to the retail stores. According to P3A “it is possible to change the virtual simulation process as this does not require any logical or technical issues so in terms of IT this is possible”. This solution is related to several challenges. Firstly, it would give the carrier an estimation of the number of pallets to be transported for each order, compared to planning the transportation based solely on volume. Today, transportation is planned with available capacity because the carrier cannot see the exact amount of pallets. Simulating the order proposal before the transportation planning would mean that the carrier does not

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Possible Solutions for Challenges</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rigid configuration in the ERP system</td>
<td>Change the priorities within the IT systems so that transportation planning is considered when generating order proposals to the retail stores.</td>
<td>Even though the IT systems are rigid, it is not impossible to change. There is a possibility to adapt more flexibility into the systems and to include transportation planning as a priority.</td>
</tr>
<tr>
<td>4. Picking and packing at two locations.</td>
<td>Virtual simulation determine what is picked at central DC when distributing to regional DC.</td>
<td>By not initially splitting the orders into central and regional DC, but rather undergo a virtual pick simulation so that what is picked is centrally determined by what is needed to fill the pallet could increase fillrate of the truck.</td>
</tr>
<tr>
<td>2. Retail stores allowed to adjust orders.</td>
<td>Virtual simulation performed before the order is generated.</td>
<td>Estimation of the amount of pallets for each order could result in proved fill rate of the trucks, compared to planning transportation based on volume. Take advantage of available capacity in either backroom storage or shelves to increase or decrease order volume to fill pallets.</td>
</tr>
<tr>
<td>7. Backroom storage or shelf-capacity in retail stores not fully utilized, 9. Long distances for last-mile delivery, 12. All product categories on one truck requires different temperatures . Increased awareness of environmental transportation</td>
<td>Quantity rule for non-risk products.</td>
<td>Implement minimum orders. When the pallets are not fully utilized due to demand fluctuations, either add additional order lines and quantities of the products during the virtual simulation in order to fill the remaining pallets, or postpone the remaining half pallets until next delivery.</td>
</tr>
<tr>
<td>10. On-time delivery to the retail stores, Increased awareness of environmental transportation</td>
<td>Increase flexibility, different measurements of performance.</td>
<td>Increase carriers' flexibility, to optimize and utilize fuller truckloads. Implement different measurements of performance can result in a higher fill rate of the trucks and more environmentally-friendly transportation. Improving the KPIs to increase the fill rate of the truck.</td>
</tr>
</tbody>
</table>

Even though the IT systems are rigid, it is not impossible to change. According to P3A, there is a possibility to adopt more flexibility into the systems and to include transportation planning as a priority. This means that when the MRP is generating an order proposal, this could be based on not only forecasting of demand and inventory turnover, but to adjust the amount of the products on the order proposals so that it would result in full pallets and thereby full truckloads.
have to plan with available capacity in the trucks. However, it is according to P3A important to note that it is only when the packing process starts that they know precisely how many pallets that will be ready for dispatch, due to uncertainties such as delays within the automated warehouse. Furthermore, if the virtual simulation of the order proposal results in half pallets, it would be possible to take advantage of the available capacity of the backroom storage and shelf-capacity in the large retail stores. Moving the virtual simulation would give the advantage of a higher fill rate of the trucks, which would not only benefit in terms of reducing the total logistics costs, it would also result in an increased environmental performance.

The virtual simulation could also be used to determine what is picked and packed at the central DC when distributing products to the regional DC. It is according to P1B a challenge that the trucks between central DC and regional DC are not always full. The challenge of picking and packing at two locations which result in not fully utilized pallets, can according to P1B be solved by not initially splitting the orders into central and regional DC, but rather undergo a virtual pick simulation so that what is picked is centrally determined by what is needed to fill the pallets. P1A suggests to simulate the orders to check how many half pallets which will be generated and if there are some products located in the regional DC that can be picked at the central DC. The central DC contains all products categories as it already acts as a regional DC for the South-East region, which will enable the possibility to fill the pallets between the central DC and the regional DC. According to P3A, this is possible; however, it essential to keep in mind that this will disturb the forecasting if they ought to pick and pack products that are meant to be picked and packed in a regional DC. Therefore, this solution would be a better fit for products that have a high incoming frequency from the suppliers to the DCs.

All of the processes of proposing, generating and planning the delivery of an order is performed in the ERP system while the virtual simulation is performed in the WMS system. These two IT systems are integrated in the sense of being able to receive and send information. Therefore, P3A says that if they are to do this, it is essential that the retail stores accept the order proposal which is generated from the MRP module. If the virtual simulation is moved, it would create a challenge when the retail stores are allowed to adjust the order proposals. A possible solution for this challenge would be to implement
a quantity rule in the IT system based on an 80/20 principle. As an example, when
the store receives an order proposal, and the order is generated, Alpha could categorize
specific high-risk and non-risk products where the non-risk product quantity can be
adjusted based on fill rate of the pallet during simulation. Non-risk products are those
products the stores already have on the shelf and the chance of running out of stock before
next delivery is minimal. High-risk products would be for instance seasonal products
where the demand is high. This would also be a solution for the several product categories
which requires different temperatures, and it is important to distinguish between
perishable and non-perishable products, as perishable products would be a high-risk
category. As P3A states, “there are a lot of products which are low-risk with a high
volume that you can change the order lines of without the customer who is coming to the
store would notice. And that is what we have to look for”. This categorization could also
be implemented if Alpha were to set a minimum order limit to increase the fill rate of the
trucks.

Furthermore, a possible solution for several challenges which can be seen in Figure X
would be to either implement a push strategy for non-risk products or to postpone the
delivery of these products. When pallets are not fully utilized due to demand fluctuations,
Alpha could either add additional order lines and quantities of the products during the
virtual simulation in order to fill the remaining pallets or postpone the remaining half
pallets until next delivery. The MRP module knows the demand and inventory of the
stores which could be used as a tool for the simulation to create full pallets. P3A describes
the activities performed within the WMS system and how advanced logic is applied to
optimize the processes from receiving the goods until it will be moved to the miniload.
This includes planning of how much is needed within the next days and hours for each
storage area, postponement of certain processes, forecasting and more importantly round
up rules for whole layers of a pallet or a full pallet. Alpha uses postponement in the
process where they move high inventory turnover from HWB to miniload. Based on
forecasting they know approximately the amount of a product that will moved to the
miniload. If the forecasting says for example 5 pallets, they try to move as little as possible
to the miniload to prevent using all the available storage capacity in the miniload. The
worst thing that could happen at the central DC is according to P3A that the storage areas
are full which can create a bottleneck for movements between the HBW and miniload.
Therefore they would move 3–4 pallets even though the system make a proposal of 5 pallets and postpone the last pallet until the order is received to avoid that the miniload gets full. However, from the processes of MRP, order generated, transport planning and virtual simulation, none of these rules are implemented. P3A suggest to transfer some of this advanced logic from the WMS to the ERP system when planning and distributing to the retail stores. This could be a solution for the challenge of utilizing available space on pallets for small orders, but also for long-distances for the last-mile delivery.

Creating full truckloads provides an advantage for the company not only in terms of environmental performance but it can reduce the total logistics costs as it can also be used during negotiations with the carriers according to P1B and P2AB. The agreements for outbound transportation costs are based on cubic meters and not weight, as a lot of the products are light weighted, and this would not result in reaching the maximum weight capacity of a truck. When negotiating transportation costs, the costs are based on a volume average, due to the fluctuations in demand throughout the year. According to P2B, full truckloads can be used during negotiations as this is advantageous for both Alpha and the carriers, the former being able to transport more goods in one transport and fulfill KPIs and the latter being able to build better truckloads and carry more goods onto one route. Although Alpha only purchase the actual volume placed on each truck, P2A states “it is clear that the more cubic meters we can place on a truck to create fuller truckloads, the more profitable it will be for all parties”. This is also related to environmental transportation, as P2B explains that Alpha is gradually becoming greener and a higher fill rate of the truck will result in less distance traveled. A solution would be to increase the flexibility and to add different measurements of performance. Today, there are many rules that the carrier have to follow, such as that the carrier cannot move products between the pallets to utilize space. This means that if a pallet is to be placed on a different vehicle, it will have to be scanned both in and out when changing vehicle. Furthermore, the carrier must be on time when delivering to the retail stores. If the goods do not arrive on time, a fine must be paid, and the performance of the carrier will receive a low score. According to P3A, this results in lower flexibility for the carrier. “Before, the carriers were allowed to do more such things which meant that they managed to optimize in the end, we have lost some of that flexibility”. If the carrier would have more flexibility, they might be able to optimize and utilize fuller truckloads. Implementing different measurements of
performance does not only apply as a solution for increasing the performance of the carriers which will result in a higher fill rate of the trucks and more environmentally-friendly transportation. At Alpha, improving the KPIs would be a possible solution to increase the fill rate of the truck. Some measurements are based on timely delivery and fill rate of the trucks; however, according to P2AB, these measurements could be even more challenging to achieve.

P3A states “we should perhaps just make organizational changes and say that we decide how to optimize the ordering fulfillment process”. P3A further explains that changes have not been implemented yet because change management is a difficult and complex process. Furthermore, since Alpha have experienced some changes such as implementing an automated warehouse which has been successful it is possible but would require great effort as they would most likely meet resistance to change. A change would require to rethink the whole mindset of the organization. As a concluding ending of the interview, he says “if it is possible to reach the moon, a change like this is not impossible”.


5. Discussion

The fifth chapter of the thesis comprises a discussion where the empirical findings is related to the literature. The challenges within a grocery retailing distribution will be discussed in relation to RQ1. Possible solutions and how these challenges can be addressed with the overall goal of reducing the total logistics cost, will be discussed in the second section in relation to RQ2.

5.1 Discussion RQ1

One factor contributing to high transportation cost for Alpha is the fact that they are operating in an elongated country which contributed to long transportation distances. This is in line with Henson and Cavanaugh (1993) and Ross (2015) stating that transportation cost rises with distance travelled as more fuel is consumed. Alpha has a goal of reducing transportation costs and at the same time reduce the environmental emission which can both be fulfilled if Alpha can better utilize the pallets and trucks during transportation. This was also found in the literature where Yakovleva, Sarkis and Sloan (2012) explains that distributing trucks that are not fully utilized is not cost efficient and have a negative impact on the environment. As per today, Alpha are not utilizing the pallets and trucks fully which can be considered as areas for improvement in terms of environmental performance and cost-efficiency.

The challenges encountered in the findings (Table 8) within IT systems pointed out that the 1st challenge was that the MRP module in the ERP system has a rigid configuration not taking into account transport planning such as fill rate of the pallets and trucks when making the order proposals for the stores except a few “round up” rules. As transportation planning is not a part of the MRP module, the retail stores are allowed to adjust the orders 2nd and thereby order the exact amount as they require as the company also do not include any minimum order limit 3rd. It was shown that Alpha responded to any demand by transporting the goods to the stores without taking into consideration utilization of pallet and trucks which contributes to a low fill rate when distributing products. This is partly in line with Shandong, Robb and DeHoratius, (2018) who argue that it is of vital importance to ensure that products are available in the stores to meet market demand.
Furthermore, the 4th challenge was related to ERP and management due to the fact that Alpha has decided to split orders between the central and regional DC which results in products being picked and packed between different locations which contributes to the unsatisfactory filling rate. In previous research, Ross (2015) pointed out that there is always a trade-off when having products stored in separate locations. This might be the reason for why Alpha is experiencing this. The findings showed that the 5th challenge was that the carrier could only see the volume and not the exact number of pallets to be transported which becomes an issue resulting in sending trucks not fully utilized. The 6th challenge was in relation to the WMS system as the timing of the virtual simulation process is performed after the carrier has planned the volume. By doing the planning in this order, it can create a shift in volume as some products might not be available in the DCs contributing to the bad filling rate. Furthermore, the carrier is not able to see the exact number of pallets which also contributes to a not fully utilized fill rate. This is an interesting aspect since the 5th and 6th challenge cannot, to our knowledge, be found in previous research. On the one hand, the reason for this might be that Alpha has a fully automated central DC, which is relatively new within grocery retailing and therefore not much research have been conducted on the challenges within the specific processes related to virtual simulation. On the other hand, this can be a company-specific process which is why there are no research conducted within this type of challenge. The filling rates are an area of improvement for all of the above-mentioned challenges. This is agreed in previous research where Faber, De Koster and Smidts (2013) have described that low filling rates are common challenges in distribution.

The challenges encountered in the findings (Table 8) under the category of transportation, pointed out that the 7th and 8th challenge is related to planning in terms of backroom storage or shelf capacity not being fully utilized and fluctuations in demand. Alpha aims for full truckloads but they do not push or postpone deliveries, which means that what is provided to the store is the exact amount ordered from the stores. A push strategy or postponement strategy could be beneficial, especially since they can easily access information about the retail stores’ backroom storage and shelf capacity and use this available capacity to utilize pallets and create full truckloads. This is in line with other researchers who has pointed out that postponement can be a solution to create fuller truckloads. Postponement has been applied successfully within the food industry,
according to Thangam and Uthayakumar, (2008). Due to demand fluctuations the carriers have to place excessive cubic meters on another vehicle so that products arrive in time which is contributing to trucks that are not fully utilized are being distributed. Furthermore, to deliver the last-mile from the regional DC to the retail stores up in north is the 9th challenge as it contributes to high cost where utilization of pallets and trucks becomes extra important. The findings shows that the 10th challenge is related to the low flexibility in terms of delivery. The company is not allowed to deliver products two hours before deadline or be delayed by more than one hour. If the delivery is not on time, Alpha needs to pay a fine. This is also in line with Croxton (2003) who argues that if a delivery does not arrive in time it will affect the receiver negatively. Alpha has experienced that the transportation between the central and the regional DC has been delayed which affects the stores as they might not get the products needed and Alpha themselves have to pay fines which is also a challenge in terms of an increased and unexpected transportation cost. As Ross (2015) explains there is a trade-off by having inventories centralized as it decreases inbound transportation cost but increases the delivery lead-time. This have an effect on Alpha as they have longer distances in an elongated country when transporting goods from the central DC to the regional DCs where delays can contribute to more damage rather if the products were placed regionally.

Furthermore, the 11th challenge which is to utilize available space for small orders, it becomes a challenge to build full pallets when small stores orders all of the five product categories but in small quantities as they are lacking space compared to larger stores. This can be supported by Ross (2015) who argues that small orders are a challenging and often have a negative impact on the transportation costs. The 12th challenge lays in utilizing the fill rate of the pallet for refrigerated goods, fruits and vegetables as these product categories are not as stackable and have a higher frequency of delivery to the stores as compared to dry and frozen goods. These product categories require different temperatures which means that fruits and vegetables cannot be placed together with frozen goods to maintain the quality of the products when delivering, which becomes a challenge for the last mile distribution in an elongated country. This is also supported by Xiao, and Chen (2012) who explains that some products require specific temperatures when transporting over longer distances. The 13th challenge relates to their own KPIs which measures full truckloads. The employees currently gets rewarded if KPIs are met,
among these various KPIs, fill rate of the truck is measured. Still, Alpha does not have an optimal fill rate of the trucks, which can indicate that it is not measured properly. This is supported by Anand and Grover (2015) who argue that if processes are not measured properly, managers will have a difficult time to improve the processes.

The challenge encountered in the findings (Table 8) within Environment pointed out that the 14th challenge was increased awareness of environmental transportation among customers. Alpha has a vision to decrease the emissions related to transportation and they thereby need to decrease the environmental burden by transporting fuller pallets and truckloads. This goes in line with Carter and Rogers (2008) who explain that companies who have a sustainable supply chain can improve long-term benefits with the society. These long-term benefits can result in improved economic performance, which is in line with Alphas vision of being cost-leader (Carter and Rogers, 2008).

The organizational challenge (15th) encountered in the findings (Table 8) is related to resistance to change. P2A has unsuccessfully tried to suggest a change by presenting the idea of a solution to improve the filling rate by implementing minimum orders. Nevertheless, the suggestion have not been implemented as of today. As Smith (2005) explained, some employees are eager to change, which in this case seems to be applied for P2A. Overcoming challenges involves changes. Due to Alpha’s demand-driven approach where they reply to all demands received by the retail stores without exceptions, it can be a challenge to change some processes if the retail stores have all the power. Furthermore, another aspect of why the managers can seem to be resistant to change relates to accountability in terms of who would take responsibility for consequences if the store would not receive the order lines in time and be out of stock. This is related to the study of Smith (2005), who describes the main barrier to organizational change as managing the people, because it is the people who are doing the work within the organization and the attitude of the employees affect the result of the organizational change.
5.2 Discussion RQ2

To address the encountered challenges there are possible solutions for each of the challenges. The findings shows that the possible solution for challenge one (rigid configuration) and two (no minimum order for how much retailer can order) is that Alpha needs to include transportation planning as a part of their current IT system and thereby implement priorities such as filling rate, a certain minimum order, and a quantity rule for non-risk products. This is partly a managerial challenge, as it is the company who decide what the system should measure and include. This is related to the literature as De La Vega et al. (2018) describe, it is a matter of choice what the company decide to prioritize.

If the company implement these filling rate priorities they would also be able to address the following challenges; 7th (backroom storage or shelf-capacity in retail stores not fully utilized), 8th (demand fluctuations), 9th (long distances for last-mile delivery), 11th (utilize available space on pallets for small order), 12th (all product categories on one truck requires different temperature), and 14th (increased awareness of environmental transportation). When the priorities are implemented within their IT system, products can be either pushed or postponed to the next delivery to avoid creating half pallets. Though, it is important to note that all products would not be possible to push or postpone according to all participants. This line with the literature where Cheng et al. (2014) describes, that companies would needs to take into consideration how prepared the stores are willing to wait for the products. As well as Ross (2015) explain, that a high level of inventory is not efficient. To resolve this issue according to P1A and P3A, Alpha can take the advantage of categorizing products into non-risk and high-risk products to address the above-mentioned challenges. Postponement can be applied for the non-risk products as these products have a minimal chance of running out of stock before the next delivery and would not affect the store negatively if they were to be delayed. At the same time, Alpha could add additional order lines and quantities of products by pushing them to fill the pallets and truck. This is in line with previous research where Christopher and Towill (2001) and Ross (2015) explains that is possible to have another strategy for some of the product assortments and thereby not treat all products the same, the Pareto rule approach or ABC analysis. Furthermore, as postponement have been applied before successfully within the food industry according to Thangam and Uthayakumar (2008). Alpha would benefit from aiming towards applying postponement for some of its products, which is
supported by P1AB and P3A. P3A argued that there is no need to deliver one package of a product three times a week when it can be postponed and delivered in one delivery.

The solution for the 5th (carrier plan transportation based on volume), 6th (timing of the virtual simulation, 7th (backroom storage or shelf-capacity in retail stores not fully utilized), and 14th challenge (increased awareness of environmental transportation) is to move the virtual simulation before the transportation planning as is could lead to more accurate planning since the carrier would not have to plan with available capacity. By changing the order of the virtual simulation, it would be possible to take advantage of the available capacity of the backroom storage and shelf-capacity in the large retail stores as the simulation could add products to fill the rate of the pallets and trucks which would not only benefit in terms of reducing the total cost of logistics, it would also result in an increased environmental performance. Changing the virtual simulation order would be an interesting topic of investigation as it has not been addressed in previous research within the grocery retail distribution. Nonetheless, as P3A stated “it is possible to change the virtual simulation process as this do not require any logical or technical issues so in terms of IT this is possible”. Furthermore to solve challenge four (picking and packing at two locations) the company should not initially split the orders into central and regional DC, but rather undergo a virtual pick simulation so that what is picked is centrally determined by what is needed to fill the pallets to increase the fill rate of the pallets and truck. This part is also lacking in the literature within grocery retail distribution.

To resolve the 10th (on-time delivery to the retail stores), 13th (KPIs are not optimal in terms of measuring full truckloads), and 14th challenge (increased awareness of environmental transportation), Alpha should increase their flexibility, implement different measures of performance, and have stricter KPIs and bonus agreements. This is in line with Anand and Grover (2015) who explains that managers should start prioritize measures that has an effect of the company in the long run which is in this case, transportation cost and filling rate. As P2AB agree that the performance measurements could be more challenging to achieve than it is today.

For most of the challenges, filling rate is the issue which has a negative impact of the environment. Therefore, by addressing the challenges the company could improve the
filling rate and thereby decrease the burden on the environment as transporting empty space is contributing to energy consumption. This is in line with Carter and Rogers (2008) who argue that companies with a sustainable supply chain can gain long-term benefits of competitive advantage and improved economic performance. Therefore, if Alpha is able to fill their transportation routes better, it would result in a more sustainable supply chain and help them to move towards their goal of reducing environmental emissions, according to Alpha annual report (2016) within 10-15 years. Furthermore, this would also strengthen the company’s reputation which is important as Walker, Di Sisto and McBain (2008) explain that customers are becoming more concerned about companies impact on the environment. If the company can fill the trucks with more volume this may reduce the number of transportation routes, and as a result the operational cost would be decreased. As a consequence, it could lead to more profitable sales prices which the customers would take advantage from which is according to Dubey and Veeramani, (2017) and Hübner, Kuhn, and Sternbeck (2013) important in a competitive industry as retailing.

In order to implement all these changes the company must overcome the 15th challenge (resistance to change). From all of the interviews it becomes evident that all the participants believe that the distribution processes can be improved and changed. According all interviewees working at the headquarters of Alpha, they have all identified that the problem is the filling rate of the pallets and trucks, which becomes important in long-distance transportation as well as the fact that their vision is to become more environmentally friendly. This is in line with the first step of the framework of Kotter (1996) who explains that companies need to identify the problems and why the change is needed so that the company can gain a competitive advantage. Alpha has identified that a change is needed because they want to decrease transportation cost in order to stay competitive. As the participant are all leading managers of important departments within the organization they have the power to lead and encourage the change which is in line with the second step of the framework by Kotter (1996) to form a powerful guiding coalition.

The third step stated by Kotter (1996) is to create a vision and to develop change strategies. From the findings it can be revealed that the company has a goal and vision of where they want to be and have come up with several solutions to how the fill rate of the
trucks can be improved. However, it seems from the interviews that the company are not encouraging the stores into the change process of why they want to make the change. By making changes the aim is reduce transportation costs without affecting the service level, which the stores would benefit from. This is because it would be possible to decrease the cost of the products with the reduced costs from transportation which Smith (2005) describes can be a motivating internal factor why a change is needed. This is related to the fourth and fifth step by Kotter (1996), where Alpha must encourage and empower all involving actors towards a change this is followed by removing the potential obstacles. All participants seems to want a change, but are at the same time finding obstacles for why the solutions cannot be implemented even though some of the solutions would be possible to implement.

As P3A states “we should perhaps just make organizational changes and say that we decide how to optimize the ordering fulfillment process”. It should be taken into consideration that the company is an extremely large company supplying over 1000 stores, and therefore the change process in itself is not an easy process which P3A describes. However, barriers of a change must be overcome as the change is needed to address the company's problem. The company should continue to reward the actors that are putting effort into the change process which is in line with (Kotter, 1996) sixth step of the framework. If Alpha can maintain its product prices low compared to competitors, this would reward the stores in terms of more customers which is also important for the long-term basis. The company should to continue improving and change its processes to become more effective by the help of the people working in the company. These are the steps that Alpha would have to take into consideration in order to successfully implement a change.

The company has before experienced some structural changes by the implementation of the automated warehouse which was a successful change. The company have proved that it is possible to overcome changes and should therefore strive to implement more of the suggested solutions within the company. Having another successful change in terms of increasing the filling rate of trucks and improved environmental performance could help Alpha to become the number one grocery retailer in this country. As P3A said “if it is possible to reach the moon, a change like this is not impossible”.

59
6. Conclusion

In the final chapter of the thesis, conclusions of the research are presented. Thus, the purpose and the research questions are answered. In addition, theoretical contributions and managerial implications are presented, followed by limitations of the research and suggestions for future research.

6.1 Conclusion

The research started with the purpose “to investigate challenges within a grocery retailing distribution operating in an elongated country with numerous sparsely populated areas located far away from the distribution centers”. The research questions were designed to fulfill the purpose. The results are as follows:

*RQ 1: What are the challenges most often encountered within a grocery retailing distribution operating in an elongated country?*

First of all, scientific articles have been chosen to identify challenges that can generally occur within a distribution where some parts are relating to grocery retailing in order to build a theoretical framework for this study. Semi-structured interviews with different managers in a grocery retail distribution have been conducted to investigate encountered challenges from a process perspective in a case context. The findings identified 15 challenges that have been presented in a comprehensive list. The main challenge found during this research was the insufficient filling rate of the pallets and trucks when transporting products between DCs and the last mile delivery. This becomes especially challenging as the distances are longer in an elongated country which have a negative impact on the total cost of logistics and on the environment.

*RQ 2: How can the identified challenges be addressed to reduce the total cost of logistics?*

To address identified challenges, the same procedure has been carried out. The findings shows 9 possibilities to reduce the total cost of logistics which has been presented in a comprehensive list. The suggestions can make it possible to increase the fill rate of the
pallets and trucks and at the same time contribute to environmental improvements. Furthermore, the findings reveal that by implementing more priorities in an IT system helps to increase efficiency and effectiveness within a grocery retail distribution to decrease the total cost of logistics.

Comparing the theoretical and empirical findings, the results revealed insights about challenges within a grocery retail distribution in an elongated country. Some of the challenges was to a large extent similar in the literature. However, there are a few challenges that has been found that may be interesting to use for future research.

6.2 Theoretical Contributions
As the title of this study suggests, the purpose was to investigate challenges within a grocery retailing distribution operating in an elongated country with numerous sparsely populated areas located far away from the distribution centers. The findings were based on qualitative data, which made it possible to gain in-depth understanding of a grocery retail distribution and its processes. This approach enabled to gain rich data and the sample represents a valid and relevant result for contributing to the lack of scientific research when it comes to challenges within a grocery distribution in an elongated country with numerous sparsely populated areas located far away from the distribution centers. The purpose of this study clearly aimed to fill this gap.

Furthermore, the empirical findings have been matched with existing theory in order to build relevant and valuable knowledge for grocery distribution companies operating in a country described above. After analyzing all the data, it is showed that there are 15 challenges that have been identified and 9 possibilities to address these challenges. It can be suggested from the literature, that all challenges are possible to overcome. The discovered gap in this study can be useful knowledge for grocery retail distributions having similar challenges in an elongated country with numerous sparsely populated areas located far away from the distribution centers hence how they can address the challenges.
6.2 Managerial Implications

The findings of the thesis emphasize that it is possible to address most of the challenges according to the literature. Even though challenges can be addressed, the difficulty lays in changing the processes as people tend to be resistance to change. Therefore, to achieve the desired outcomes, it is crucial to follow Kotter's framework (1996) to reach a successful change. Hence, it is essential that managers of the organization are motivated for a change as they are the ones who can affect other people. If a company wants to become more profitable, managers needs to communicate the change with the employees in the entire organization. It is a difficult task, especially when the organization is large and complex. Thus, it is important to keep in mind that the grocery retail industry is highly competitive and all companies operating in this industry always try to strive for cost savings. Therefore, addressing the identified challenges could result in an overall cost savings for the supply chain.

6.3 Limitations

This research is heavily dependent on the information received from the interviews and since this is a qualitative study other researchers might have the assessed the challenges differently or used other research methods. As this thesis is based on a single case study of a grocery retail distribution in an elongated country with numerous sparsely populated areas located far away from the distribution centers, the type of challenges in terms of distances might not be applicable in smaller and compact countries in the world. However, this research provides important lessons of the challenges within a grocery distribution system. Furthermore, the findings shows that the company had a fully automated central DC which may not have the same challenges as a manual central DC. The inductive approach with qualitative rigor we have chosen has been criticized by many authors due to the lack of generalization. However, Gioia, Corley and Hamilton (2013) explains that these types of studies that are qualitative with an inductive approach are important to undertake since it provide originality.

6.4 Future Research

This research was conducted within the grocery retail industry with a particular focus on the grocery retail distribution in an elongated country with numerous sparsely populated areas located far away from the distribution centers. In order to add more insights of the
theory of grocery retail distribution challenges within an elongated country with numerous sparsely populated areas far away from the distribution centers, other researchers can benefit from our findings by drawing comparisons between our case and research projects to be conducted in the future. Furthermore, as this is a business perspective, it would be interesting from an engineering perspective for researchers to develop our research further by conducting a simulation study. As part of the challenges are related to the order of the activities within the central DC, such as virtual simulation, a study is needed to investigate if it would be possible to move the virtual simulation as well as to implement other parameters within the current IT system and the possible effects resulting from this. Furthermore, it would be interesting to undertake the same study but for another grocery retailing distribution in the same country to verify the findings or to emphasize potential differences. In addition, it would be interesting to undertake the same study in of all the elongated countries in the world to emphasize differences in distribution challenges.
List of References


Appendices

Appendix 1 Topic Guide

<table>
<thead>
<tr>
<th>Topic Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening Questions</td>
</tr>
<tr>
<td>Do we have the permission to record this interview?</td>
</tr>
<tr>
<td>Could you give a brief introduction of yourself?</td>
</tr>
<tr>
<td>Which position do you hold in the company?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>The purpose of this interview was to understand the supply chain of the company and activities at the central DC</td>
</tr>
<tr>
<td>Main Questions</td>
</tr>
<tr>
<td>Could you give a brief overview of the company?</td>
</tr>
<tr>
<td>How is the distribution structured?</td>
</tr>
<tr>
<td>Could you explain more about the distribution of the different product categories?</td>
</tr>
<tr>
<td>How are the product categories moved within the distribution centers?</td>
</tr>
<tr>
<td>Could you tell us more about the order fulfillment process from the point where an order is generated until it reaches the retail store?</td>
</tr>
<tr>
<td>How would you describe order fulfillment activities within the central DC?</td>
</tr>
<tr>
<td>How are the pallets packed now, compared to when you had the manual warehouse?</td>
</tr>
<tr>
<td>How does the virtual simulation work?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>The purpose of this interview was to understand the planning process and all the activities involved during the transportation.</td>
</tr>
<tr>
<td>Main Questions</td>
</tr>
<tr>
<td>Could you explain how the system works from the point where you receive an order?</td>
</tr>
<tr>
<td>What considerations does the carrier take into account when planning the transport?</td>
</tr>
<tr>
<td>Could you tell us more about the frequency of deliveries out to the stores?</td>
</tr>
<tr>
<td>Which DC do you consider the most challenging in terms of planning outbound transportation?</td>
</tr>
<tr>
<td>What affect the transportation costs and how do you negotiate freight costs with the carrier?</td>
</tr>
<tr>
<td>What do you consider as the main challenges within transportation and its planning?</td>
</tr>
<tr>
<td>Could you tell us more about the environmental perspective?</td>
</tr>
<tr>
<td>What do you consider as important in terms of environmental performance?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participant 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>The purpose of this interview was to understand the activities within the central DC and to discuss the system, how and if it would be possible to make changes in terms of IT support and the WMS system.</td>
</tr>
<tr>
<td>Main Questions</td>
</tr>
<tr>
<td>We understood that when a store is generating an order, that order get to be one of the main priorities within the IT systems. Is this correct?</td>
</tr>
<tr>
<td>Could you explain more about the MRP, when an order proposal is created, and when an order is</td>
</tr>
<tr>
<td>Could you tell us more about the priorities that are taken into account when both an order proposal is made and when the order has been generated?</td>
</tr>
<tr>
<td>What are the consequences of prioritizing this way?</td>
</tr>
<tr>
<td>What would be the challenges in terms of changing the order of the priorities?</td>
</tr>
<tr>
<td>Could you explain why planning the transportation needs to be completed on such an early stage in the ordering process?</td>
</tr>
<tr>
<td>Does the MRP have any other priorities before an order is generated, and is it the same for each product category?</td>
</tr>
<tr>
<td>Does the priorities differ depending on the size and location of the store?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Closing Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there anything you would like to add?</td>
</tr>
<tr>
<td>If we have any follow-up questions, would you mind if we send you an email?</td>
</tr>
</tbody>
</table>

Appendix 2 Coding
Appendix 3 Encountered Challenges
### Appendix 4 Possible Solutions

**Challenge**

**Description**

**Supporting Quotes**

**Category** | **Subcategory** | **Challenges** | **Success**
--- | --- | --- | ---
IT System | Business从来没有 | One-hour time window after the order is generated. Carrier planning based on volume and cannot see the exact amount of pallets to be transported.鹂: transportation based on volume and cannot see the exact amount of pallets to be transported. | |
<p>| Management | Business从来没有 | One-hour time window after the order is generated. Carrier planning based on volume and cannot see the exact amount of pallets to be transported. | |
| Management | Transportation | Demand fluctuation is a great challenge in terms of transportation planning | |
| | Transportation | The environment is an important issue that keeps rising within transportation | |
| | Change | Implementing changes. Adjusting to change is often a challenge that implementing changes. Today, change is the only constant. | |</p>
<table>
<thead>
<tr>
<th>Challenges</th>
<th>Possible Solutions for Challenges</th>
<th>Description</th>
<th>Source</th>
<th>Suggesting Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rigid configuration in the ERP system</td>
<td>Change the priorities within the IT systems to have transport planning in constant terms and generating order proposals to the retail stores.</td>
<td>Even though the IT systems are rigid, it is not impossible to change. There is a possibility to adapt more flexibility into the systems and to include transportation planning as an option.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>2. Carrier plan transportation based on volume</td>
<td>If the carrier would have more flexibility, they might be able to optimize and utilize the trucks. Implementing different measurements of performance does not only imply a solution for increasing the performance of the carriers which will result in a higher fill rate of the trucks and more utilized transport capacity.</td>
<td>If it is possible to reach the moon, a change like this is not impossible.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>3. Virtual simulation performed before the order is generated.</td>
<td>Virtual simulation determines what is picked at central DC when distributing to regional DC.</td>
<td>Picking and packing at two locations creates a challenge in terms of adding products. By not splitting the order into central and regional DC, it is easier to simulate a virtual pick simulation or that what is picked is centrally determined by what is needed to fill the pallets with maximum fill rate of the truck.</td>
<td>FA, FA</td>
<td></td>
</tr>
<tr>
<td>4. Picking and packing at two locations</td>
<td>Implement minimum orders.</td>
<td>When pallets are not fully utilized due to demand fluctuations, high-risk products would be for instance low stacked products where the demand in high.</td>
<td>FA</td>
<td>There are a lot of products which are found with a high volume that now can change the order lines of the carrier who is coming to the store according to the order. And that is what we have to look for.</td>
</tr>
<tr>
<td>5. Retail stores allowed to adjust orders</td>
<td>Retail stores allowed to adjust orders.</td>
<td>Retail stores allowed to adjust orders.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>6. Increased awareness of environmental temperatures</td>
<td>Carrier plan transportation based on volume.</td>
<td>By simulating order proposal and add priority of capacity in retail stores it would be possible to use the available capacity in other carrier transports or to increase or decrease order volume to fill pallets. Increased fill rate of the trucks which can be done by including transport planning in other programs.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>7. Increased awareness of environmental temperatures</td>
<td>Carrier plan transportation based on volume.</td>
<td>By simulating order proposal and add priority of capacity in retail stores it would be possible to use the available capacity in other carrier transports or to increase or decrease order volume to fill pallets. Increased fill rate of the trucks which can be done by including transport planning in other programs.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>8. Increased awareness of environmental temperatures</td>
<td>Carrier plan transportation based on volume.</td>
<td>By simulating order proposal and add priority of capacity in retail stores it would be possible to use the available capacity in other carrier transports or to increase or decrease order volume to fill pallets. Increased fill rate of the trucks which can be done by including transport planning in other programs.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>9. Increased awareness of environmental temperatures</td>
<td>Carrier plan transportation based on volume.</td>
<td>By simulating order proposal and add priority of capacity in retail stores it would be possible to use the available capacity in other carrier transports or to increase or decrease order volume to fill pallets. Increased fill rate of the trucks which can be done by including transport planning in other programs.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>10. On-time delivery to the retail stores</td>
<td>Implementation different measurements of performance.</td>
<td>The earlier the carrier would have more flexibility, they might be able to optimize and utilize the trucks. Implementing different measurements of performance does not only imply a solution for increasing the performance of the carriers which will result in a higher fill rate of the trucks and more utilized transport capacity.</td>
<td>FA, FA</td>
<td></td>
</tr>
<tr>
<td>11. KPIs are not optimal in terms of measuring full-truckload capacity</td>
<td>KPIs are not optimal in terms of measuring full-truckload capacity.</td>
<td>KPIs are not optimal in terms of measuring full-truckload capacity.</td>
<td>FA</td>
<td></td>
</tr>
<tr>
<td>12. Implementing changes</td>
<td>8 steps to overcome resistance to change.</td>
<td>Solution is 8 steps to overcome resistance to change. Step 1 is awareness. After that, it is clear that the more cubic meters we can place on a truck to create fuller trucks, the more productive it would be for all parties. Before, the carriers were allowed to add more small trucks which meant that they managed to optimize in the end we now have lost some of that flexibility.</td>
<td>FA</td>
<td></td>
</tr>
</tbody>
</table>

73