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OUTBOUND LOGISTICS STRATEGIES FOR LIGHT WEIGHT HYGIENE PRODUCTS AT SVENSKA CELLULOSA AKTIEBOLAGET (SCA)

With a focus on lead time, distribution cost and service level

Master's Thesis in Supply Chain Management

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ABSTRACT

The purpose of this thesis is to map and evaluate the current logistics set up for consumer goods in SCA towards the Baltic countries and to provide solutions to reduce overall distribution costs while at least preserving the current service levels and lead times.

Relevant quantitative data for year 2015 were retrieved from internal data sources while qualitative data were collected through interviews, tollgate meetings and plant visits. A total of 9 factories cater to the Baltic customers, with 85% of the costs being incurred by tissue. It was observed that there were several cases of less than truck loads while transporting baby and feminine products while the tissue transportation was inefficient with 25% of truck volume being unutilized.

Several opportunities were identified through a SWOT analysis and further failure analysis of the weaknesses. These opportunities were grouped and assessed objectively using a framework. The Fisher matrix was used to divide the product categories into Nokia and non-Nokia goods. The former being goods shipped from Nokia, while the latter constituting shipments from plants in Germany, Holland, Sweden, Slovakia and Poland. Scenarios were created using the identified opportunities, with a total of 5 for Nokia case and 6 for non-Nokia. These were assessed based on financial and feasibility parameters to find the best logistics setup.

The most suitable logistics setup for Nokia goods is to double stack the pallets with one extra layer of products in each pallet. The most suitable setup for non-Nokia goods is to have a MW in Lithuania where all the current LTL shipments will be consolidated, while the FTLs will be shipped directly to customers. Besides reduction in distribution costs, the solutions provide improved service level to customers and reduced lead time in the non-Nokia case.

Keywords: *Full Truck Load, Less than truck Load, Top Loading, Consolidation, Fisher Matrix, Market Warehouse, Hygiene Products, FMCG, Outbound Logistics, Baltics, Pallets.*

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The data collection process which was the base to the project was very smooth and hurdle free owing to the collaborative mindset of all those involved. In this regard, we would like to sincerely thank all the members of the team and various stakeholders who have helped us in providing information during the project.

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Gothenburg, August 2016

Aneesh Venkat Venkataraman & Mitică Pecheanu

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ABC – Activity Based Costing

AfH – Away from Home

BI – Business Intelligence

CD – Crossdocking

CPG – Consumer Packaged Goods

CS – Customer Service

CSR – Customer Service Representative

CT – Consumer Tissue

DC – Distribution Costs

DDP – Delivery Duty Paid

EDI – Electronic Data Interchange

ERP – Enterprise Resource Planning

FMCG – Fast Moving Consumer Goods

FTL – Full Truck Load

HT – Home Taking

ICT – Information and Communication Technology

IDC – International Distribution Center

KPI – Key Performance Indicator

LT – Lead Time

LTL – Less Than Truckload

LSP – Logistic Services Provider

MOQ – Minimum Order Quantity

MW – Market Warehouse

PC – Personal Care

POD – Proof of Delivery

RBL – Regional Business Logistics

RCFA – Root Cause Failure Analysis

RFI – Request for Information

RQ – Research Question

SCA – Svenska Cellulosa Aktiebolaget

SCM – Supply Chain Management

SKU – Stock Keeping Unit

SL – Service Level

SWOT – Strengths, Weaknesses, Opportunities, Threats

TG – Toll Gate

TL – Top Loading

TRP – Transport Pack

ULV – Unit Load Variant

1 Introduction

According to Rodrigues and Potter (2013), the FMCG sector is a recognized leader in supply chain management practices and because the industry is termed fast moving, it naturally requires a robust logistics set up. This set up needs to be flexible in order to satisfy the fluctuating demands of customers. According to Yu et al. (2012), distribution flexibility is one dimension of supply chain flexibility and is important to cater to the needs of both direct and indirect customers. The authors further state that the contributing factors for distribution flexibility are physical distribution, demand management and coordination.

At the same time, businesses have to design strategies for specific environmental contexts as one size does not fit all (Yu et al., 2012). There are some problems that challenge the KPIs of logistics organizations in this sector according to Rodrigues and Potter (2013) and those are:

- Exceptions in transportation
- Inaccurate forecast
- Delivery restrictions
- Lack of supply chain coordination and integration

The above mentioned problems can be overcome by consistently revaluating the logistics set up with a focus on distribution cost, complexity, lead time and service level. According to Rodrigues and Potter (2013), usage of advanced ICT infrastructure such as EDI, electronic point of sale and sales based ordering has also changed how freight transport is planned and executed.

1.1 Background

This section is further divided into two parts where initially the FMCG industry and the case company will be introduced. This will then be steered into the division in context which is Business Logistics for Consumer Goods in Region North.

1.1.1 FMCG

In the following paragraph, extracted from a KMPG report, FMCG concept and industry is described. This sector represents one of the largest industries worldwide. Also labelled the CPG sector, it is mainly characterized by companies that supply low-cost products that are in constant high demand (KPMG Africa, 2015). Products that are classified under the FMCG banner include food, beverages, personal hygiene and household cleaning utensils. The term “fast-moving” stems from the fact that FMCG products usually have a short shelf life and are non-durable. From a retailing perspective, the authors of the KPMG report state that FMCG is often cited as a low margin – high volume game.

As profit margins are usually slim, firms operating in the FMCG sector mostly employ a strategy focused on driving top line sales (KPMG Africa, 2015). Within categories, FMCG products are often near-identical, and for this reason price competition between retailers can be intense. To boost profitability, companies use marketing and other techniques to establish loyalty to the product, which enables them to charge higher prices. That said, managing input costs also remain vitally important, as small margin gains still have a significant impact on the bottom line due to the large volumes. Another important characteristic of the FMCG sector as quoted by the KPMG report is that it generally does well in an economic downturn, with consumers rather cutting back on luxury products. Well known FMCG multinationals include Coca-Cola, Unilever, Procter & Gamble and Johnson & Johnson. (KPMG Africa, 2015)

1.1.2 General information about SCA

SCA is a leading global hygiene and forest products company that develops and produces sustainable personal care, tissue and forest products. SCA divides and reports its operations in to three business areas – Personal Care, Tissue and Forest Products. PC includes incontinence products, baby diapers and feminine care products. Tissue comprises of consumer tissue and Away-from-Home tissue encompassing hospitals, large workplaces, restaurants and hotels. Consumer tissue comprises toilet paper, kitchen paper, facial tissues, handkerchiefs and napkins. In AfH tissue, SCA develops and sells complete hygiene solutions comprising dispensers, tissue, soap, service and maintenance. Forest Products includes paper for packaging and print, pulp, solid-wood products and renewable energy. (SCA, 2015)

While Europe is SCA's largest market, the Group also holds strong positions in North America, Latin America and Asia. Expansion takes place through both organic growth and acquisitions, primarily within PC and Tissue. SCA is Europe's largest private forest owner, with 2.6 million hectares of forest land, which covers approximately half of the Group's timber supply and enables efficient raw material integration and effective cost control (SCA, 2015). Some more company facts as published on their official webpage are mentioned in Table 1-1.

Table 1-1: SCA facts and figures, adapted from SCA's Annual Report 2015

Total number of employees	**44.000**
Number of countries of operation	61
Net sales	115,216 BSEK
Sales by region	63% Europe, 10% North America, 14% Asia, 11% Latin America, 2% Other
Sales by category	30% Personal Care, 55% Tissue, 15% Forrest Products

1.2 Problem description and purpose

This section will elucidate the problems associated with the current outbound logistics set up in the mentioned frame. The necessity to improve this set up will be explained which leads to the purpose of this thesis. Finally, the research questions required to fulfil the purpose will be stated.

Consumer goods in the host company's term are a combination of consumer tissue, baby and feminine care products. Consumer tissue products are high volume when compared to the other two. Hence these products are generally shipped FTL and directly to the customers. MOQ is 33 pallet places which is a FTL. The SL measured and perceived by SCA in this case is very good. However, the perception among major stakeholders is that there might be an opportunity to transport tissue in a more cost efficient manner.

On the other hand, the baby and feminine products are mostly shipped directly to the customers from the factory but are mostly LTL shipments. The MOQ is 15 pallet places in this case, and hence the customers themselves are allowed to order LTL. This results in LTL being shipped even from IDCs where consolidation happens. This not just has a negative effect on the financial side for the company but also adds complexity in the supply chain. The added complexity is majorly in the Customer Service team which has a lot of discussions with customers to modify their order quantity in order to increase the fill rate in trucks. This in turn reduces the SL perceived by the customers. Sometimes, the customers also need to wait in order to order quantities of 15 pallet places, which leads to out of stocks in their shelves.

The fallout from the background and problem description leads us to the purpose of this thesis which is **to map and evaluate the current logistics set up and provide solutions to reduce overall distribution costs while maintaining or improving service levels and lead times.** In order to fulfil this purpose, the following Research Questions need to be answered.

RQ1. How is the current setup of outbound logistics towards Baltics structured?

The data about the current logistics set up such as number of trucks, pallet places, SKUs and other data from different production plants have to be collected. The data is quite fragmented and hence needs to be collected and compiled to have a basic understanding of the current set up. In order to answer this question, there is a need to collect quantitative and qualitative data which will be described further in Chapter 3 about methodology. This question will later be answered in the first part of the analysis (section 4.1) which is the mapping of current state.

RQ2. What are the opportunities available in order to improve the current setup?

After having a good understanding of the current setup, there is a requirement to see what the potential improvement areas are. In order to find the improvement areas, the current set up must be analyzed with the help of various tools such as SWOT and RCFA. It is also important to

weigh the available opportunities to see what to focus on. This question will be answered in section 4.2.

RQ3. What are the possible outbound logistics scenarios based on identified opportunities? Which scenario suits best for the current context?

After completing the previous steps, it is necessary to form scenarios by combining relevant opportunities. These scenarios should then be evaluated in line with the project deliverables which are DC, LT and SL by weighing them appropriately. This will then answer the second part of the question and the overall purpose of this thesis, which is to find the best outbound logistics strategy. This research question will be answered in section 4.3.

1.3 Scope and limitations

- The data collection is based only on the data from 2015. If the previous year's data were included, it would have helped to smooth out some of the demand fluctuations. However, relevant stakeholders have been interviewed to identify the demand and transportation exceptions in 2015.
- This scope of this thesis is limited to only three categories of products namely consumer tissue, baby and feminine products. It is also important to note that all the quantitative data collected is only those related to Baltic countries and the respective supply locations.
- A limitation in regard to this thesis is the confidentiality of data, because of which certain sensitive information has not been disclosed in this report.

1.4 Outline

This introduction chapter will be followed by the theoretical framework (Chapter 2) where relevant literature is introduced. This will give a brief background of the area of study and also present the topics needed to answer the research questions and thereby fulfil the purpose. Initially an introduction to supply chain management and logistics is given with a focus on the part which is more relevant to this thesis. Further, some key outbound logistics strategies such as hub and spoke principle, consolidation, cross docking, collaborative supply chain strategies are explained. This will then be followed by some relevant supply chain metrics such as distribution cost, lead time and service level.

These will then be followed by a chapter (3) on the methodology of this thesis. To begin with, the project approach will be described followed by the various modes of data collection such as quantitative, qualitative, literature review, tollgate meetings and plant visits. Further, the quality of data will be discussed with a focus on how it is ensured in the thesis. Finally, tools and models

used to analyze the research questions such as SWOT, RCFA, assessment frameworks and Fisher matrix will be described.

Chapter 4 will encompass the analysis of the thesis where in section 4.1 will have the data corresponding to the current situation. This will include data collected through all methods described in the previous chapter. To start with, all the flows between factories and customers will be described in detail. Consequently, the distribution costs and service level for these lanes will be introduced. Further, the type of customers and the operations within customer service will be explained. Other data relevant and supportive to the current logistics setup in the context will be presented. The reader can expect RQ1 to be answered at the end of this section.

Succeeding the introduction of the current state data will be the analysis of the current setup in section 4.2. A SWOT analysis will be carried out initially after which the identified weaknesses will be subjected to a RCFA using the ‘’5 Why’’ technique. The counter measures from this analysis will be consolidated with the opportunities to form groups which will be assessed using a matrix. The shortlisted opportunity groups will be categorized based on their impact on the targets of this thesis. The reader can expect RQ2 to be answered at the end of this section.

The assessed opportunities will be categorized to form scenarios and the basis of splitting these using the Fisher framework will be explained in the beginning of section 4.3. The scenarios will be described, and then each of the scenarios will be assessed both on financial and non-financial parameters. Further, a combined assessment will be made to see the overall effect of each scenario and the best solution will be selected and the strategy will be described. This will then be followed by a risk assessment and an implementation plan for the solution. The reader can expect RQ3 to be answered and the purpose of this thesis fulfilled at the end of this section.

The thesis will then end with other recommendations (Chapter 5) which are relevant to the context but not directly connected to the purpose. Chapter 6 will have the conclusions which will summarize the answers for the research questions thereby fulfilling the purpose. The references will be provided in Chapter 7 and the appendices in Chapter 8.

2 Theoretical framework

2.1 Supply Chain Management

In literature, the term SCM is generally defined as the task of integrating units of an organization and coordinating information, financial and material flows in order to fulfil customer demands (Stadtler, 2015). Chopra and Meindl (2006) state that a supply chain consists of several actors such as manufacturers, suppliers, transporters, retailers, warehouses, customers, etc. The prime motive of a supply chain is to fulfil a customer's request, either directly or indirectly. It is also important to achieve maximum profitability in the chain and at the same time be highly productive in order to deliver the right quantity and quality desired by the customer at the right place, time and cost. Stadtler (2015) claim that all the flows within a supply chain need not necessarily be linear, but it usually is a network with several convergent and divergent flows as seen in figure 2-1.

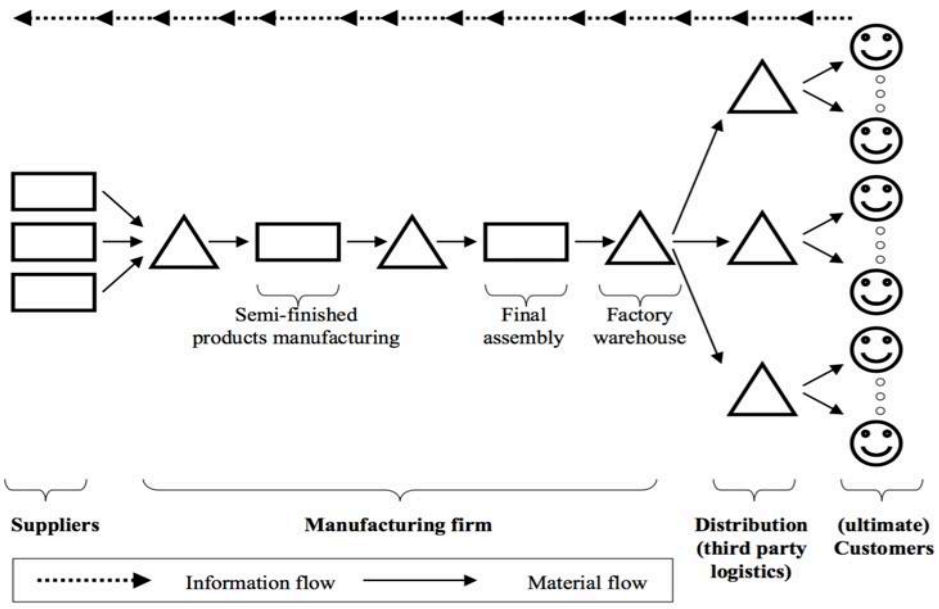

Figure 2-1: An example of a Supply Chain Network. Source: Stadtler et al. (2015)

It is important to have very good integration between different departments in the organization such as research and development, procurement, production, marketing, logistics, sales and finance (Stadtler, 2015). The organization's overall profitability depends on the combined performance of all the parties in the supply chain. Hence, as rightly said by Lambert and Cooper (2000), it is not individual business, but complete supply chains that compete against each other. Christopher (2001) states that supply chains focus on matching supply to demand consequently not only reducing costs but also improving customer satisfaction. He mentions that a lean

approach is followed in order to reduce costs but a more flexible and agile supply chain is required to cater to changing customer needs. These can be done in various parts of the chain and it is quite a common approach from companies in the FMCG industry to implement a lean yet agile logistics organization, more about which would be discussed in the next section.

2.2 Logistics

Lumsden (2007) quotes Shapiro and Heskett (1985) in defining logistics as ‘’those activities that relate to receiving the right product or service in the right quantity, in the right quality, in the right place, at the right time, delivering to the right customer, and doing this at the right cost (the seven R’s)’’. Lumsden (2007) further mentions that logistics is beyond just operational parts of moving materials from one place to another, and includes strategic responsibilities such as administration, purchase and detailed design. It is important to understand that logistics is a part of SCM which deals with flows (onward and reverse) and storage of goods, services and information.

Lumsden (2007) says logistics efficiency is expressed in terms of costs, service and tied up capital as shown in Figure 2-2. An effort to improve one of these parameters would generally affect the others in a negative way. For example, it may be expensive to improve service level to the customers. A typical approach to reduce costs is by decreasing the number of shipments. But this would mean that more stock would be required which means an increase in tied-up capital. At the same time, this would mean that the customers would have to order in larger batches which results in poor service levels. This dilemma is termed by Lumsden (2007) as ‘’logistical goal mix’’, all the three of which needs to be optimized in the right proportion to achieve maximum efficiency.

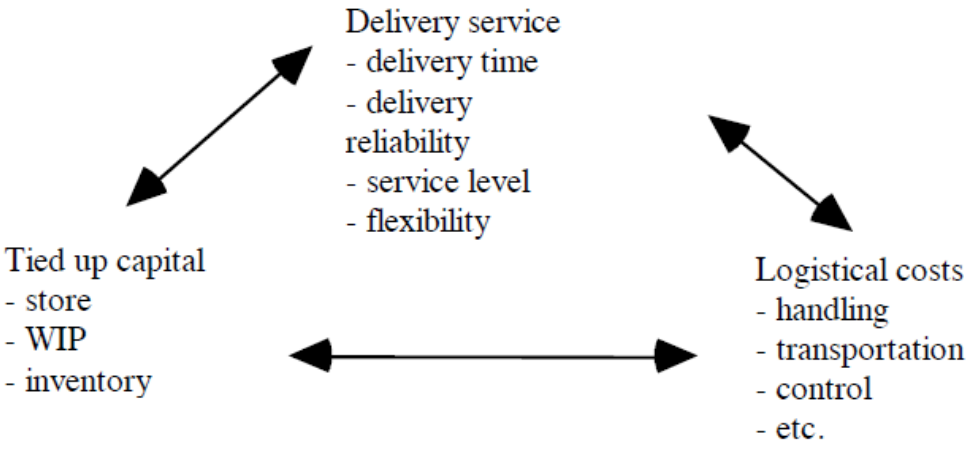

Figure 2-2: The logistical goal mix. Source: Lumsden (2007)

There is also a relation between delivery service and revenues for a company. A good SL positively affects the revenues over a period of time. Lumsden (2007) says that there is a theoretical threshold point until which even a small change in service level does not affect the revenues much, considering the competitors have a better service level. If the service level is improved beyond this threshold, there could be a big change in revenue as shown in figure 2-3. But, it is also important to keep the cost aspect in mind while selecting suitable methods to improve service level to customers. The various supply chain metrics that contribute to effective and efficient logistics are explained in the next section.

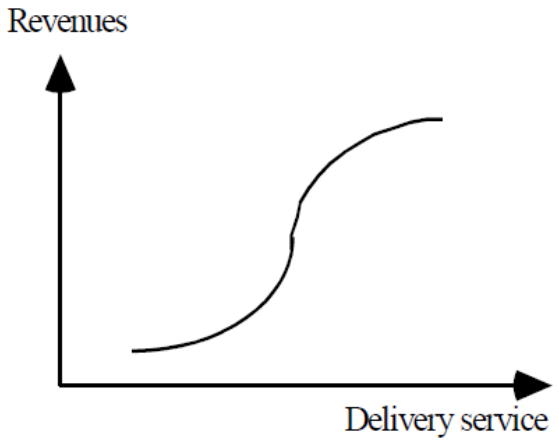

Figure 2-3: Relationship between revenues and delivery service. Source: Lumsden (2007)

2.3 Supply chain metrics

The lack of proper metrics for a supply chain will result in failure to meet consumer/end user expectations, optimization of company performance, missed opportunities to outperform competitors and conflict within the supply chain (Lambert and Pohlen, 2001). A performance measurement system serves as a useful tool to aid managers in monitoring aspects of their business, such as productivity and performance (Elrod et al, 2013). This approach has the potential to bring many advantages. In fact, in real life, many measures identified as supply chain metrics are actually measures of internal logistics operations such as fill rate, lead time, on-time performance, damage and responsiveness, opposed to measures of supply chain management (Lambert and Pohlen, 2001).

There are hundreds of metrics that can be used to measure supply chain performance, so supply chain managers find it difficult to select appropriate measures for their particular business or product. It is also important for managers to have meaningful performance information to avoid becoming lost in a sea of data (Elrod et al, 2013). These measurements should cover a broad spectrum of processes but should not overwhelm the end user but the opposite, help one during the decision making process. Choosing the strategy of operational excellence, companies will

strive to minimize costs while maintaining a desired level of customer service (Constangioara, 2013).

Kasilingam (1998) divides metrics as internal and external. Internal metrics measure the performance of the system or the internal components of the logistics system such as production plant, warehouses and transportation equipment; some of the examples of internal metrics are machine utilization, warehouse throughput and truck utilization. External metrics are measures that reflect the expectations of the organization by entities that are not part of the organization, such as customers, stock markets, government and third party agencies. Examples of external metrics include response time to fix or replace defectives, the frequency of delivery and pick-up and percentage delivered on time (Kasilingam, 1998).

It is important to achieve a good mix of performance metrics corresponding to the four performance areas defined by a balanced scorecard: financial, operational, marketing and innovation (Constangioara, 2013). This approach is balanced, using both financial and non-financial performance indicators to measure multiple areas of performance at supply chain level.

2.3.1 Load factor

The load factor is the ratio of the average load to total vehicle freight capacity (vans, lorries, train wagons, ships) (McKinnon, 2007).

Road transport is by far the main mode of goods transportation in continental industrialized countries. The average weight utilization of trucks in Europe is below 50% (EEA, 2007). Underutilization of truck capacity entails unnecessary congestion, waste of energy resources, and pollution. Thus, increasing capacity utilization leads to a combined improvement of financial performance and CO2 reduction (van de Klundert and Otten, 2011). In the FTL mode, the shipper rents the entire truck space to carry goods directly to customers, indicating to the carrier the various delivery locations to be reached. This kind of shipment is cost-effective if the quantity of freight to be delivered is near to the truck capacity. In this case the shipping cost depends on the final destination and the number of intermediate stops. Provided the full truck capacity is actually saturated, this results in the lowest cost per transported ton (Caputo et al., 2005).

According to Hellström and Nilsson (2011), a more efficient size and shape for pallets for fast-moving consumer goods in European supply chains could cut logistics costs. These savings would accrue from improved utilization of vehicle cube, better space utilization and more efficient handling of materials in warehouses. The choice of the type of packaging is usually subject to considerations involving cost reduction. To illustrate this importance, in the context of the Spanish food sector, among the direct and indirect costs (purchases, packing, physical distribution, waste management, claims, etc.), the adequate or inadequate design of packaging

may affect almost 40% of the packer companies' invoicing and over 10% of the invoicing in the distributing companies (García-Arca et al., 2008).

2.3.2 Cost in supply chain management

Sources in literature argue that both cost analysis and management can influence companies' competitive advantage, therefore, they will need to understand and influence the costs within their supply chains (Kumar and Zander, 2007). The reduction of total costs is a frequently stated objective in supply chain management of organizations. Mostly, the reduction of cycle times and inventories along the supply chain prevail. As these goals are reached, costs will decrease. This simplified assumption does not take into account the full range of decision that influences costs within a supply chain (Seuring and Goldbach, 2002). However, logistics activities do not just generate cost but also generates revenue through the provision of availability – thus it is important to understand the profit impact of logistics and supply chain decisions (Christopher, 2011).

Christopher (2011) claims that logistics costs can account for a large proportion of total costs in the business and hence it is critical that it is carefully managed. However, it is not always the case that the true costs of logistics are fully understood. He further claims that traditional approaches to cost accounting based upon full-cost allocation can be misleading and dangerous. On the other hand, activity-based costing methods provide some significant advantages in identifying the real costs of serving different types of customers or different channels of distribution (Christopher, 2011). These two types of cost accountings are further described in the sections below.

2.3.2.1 Traditional cost accounting

Traditional cost accounting includes logistics as parts of sales, general and administrative expenses. These costs are then allocated arbitrarily as direct labor hours consumed, cost per cases shipped or as a simple percentage of sales (Stapleton et al, 2004). The main problem with conventional cost models is the allocation of overheads by products on the basis of either direct labor or machine hour. Conventional costing ignores important differences between products and services, markets, and customers, which incur different overhead costs. This was the starting point in carefully analyzing the conventional cost models and in criticizing them because of their improper way in accurately explaining the cost of products (Gríful-Miquela, 2001).

In several decision-making situations, management needs more accurate cost information than traditional systems can produce (Pirttilä and Hautaniemi, 1995).

2.3.2.2 Activity based costing

Activity Based Costing is a methodology that measures the cost and performance of activities, resources, and cost objects. Resources are assigned to activities, then activities are assigned to cost objects based on their use. Activity-based costing recognizes the causal relationships of cost drivers to activities (Raffish and Turney, 1991). Understanding ABC can lead to greater knowledge of a firm's business processes and underlying expenses, it also allows to managers to discern between profitable and non-profitable products (Stapleton et al, 2004).

For many companies, their definition of cost is limited only to those costs that are contained within the four walls of their business entity while the proper view of costs has to be end-to-end since all costs will ultimately be reflected in the price of the finished product in the final marketplace (Christopher and Gattorna, 2005). When defining cost as key performance indicator, there needs to be a clearly identified relationship between cost and service requirements (Rushton et al, 2006). This will mitigate the risk of decreasing costs at the expense of service level or lead time.

2.3.3 Service level in supply chain management

The most commonly used criteria for a global supply chain performance are minimization of cost and maximization of customer service level (Sawik, 2015). Customer service is a very wide term and varies from one company to another. Moreover, vendors and customers view this concept quite differently (Kisperska-Moroñ, 2005). Customer service level measures the percentage of customer demand satisfied on time and it is in general in conflict with cost (Sawik, 2015). Therefore, the service level is an expression of the capability to deliver from stock (Jonsson and Mattsson, 2009).

The concept of service level is used in companies in two different aspects: it is used as an efficiency variable to measure the performance levels in stores, i.e. it has a follow-up purpose. However, the service level is also used as a parameter for sizing safety stocks, i.e. it has a planning purpose (Jonsson and Mattsson, 2009). In order to decide on the performance of customer service one has to be able to assess the capabilities of the logistic set-up and how well that it creates time and place utility for a product (Mentzer et al., 1989). The customer service level is one of the most important factors of an organization's success. However, the management is typically unclear about the ideal customer service level to strive for and the amount of inventory and costs required to achieve it. In practice, service level is often set based on experience, without using a scientific approach (Jeffery et al., 2008). The bottom line is, successful organizations constantly strive for higher levels of customer service (Cook, 2008).

2.3.4 Lead time in supply chain management

In the early days of logistics, the focus was more on satisfying the need of the supplier for efficiency (in particular, manufacturing and distribution efficiencies) than on satisfying the need of the customer for service or speed (de Treville et al., 2004). Lead time is defined as the time that elapses between the placement of an order and the receipt of the order into inventory. LT plays an important role in today's logistics management (Glock, 2012). This parameter is used in a number for contexts. It is used when determining re-order points in the re-ordering point system and when comparing current run-out time in run-out time planning. It is also used for calculating when a new purchase order should be released in material requirements planning (Jonsson and Mattsson, 2009).

Lead time may influence customer service and impact inventory costs and as the Japanese example of just-in-time-production has shown, reducing lead times may increase productivity and improve the competitive position of the company (Glock, 2012). Reducing lead times is especially important in situations where customer demand is uncertain, since long lead times put the company at a high risk of running out of stock before an order arrives (Glock, 2012). Furthermore, lead time compression can significantly reduce the bullwhip effect throughout the supply chain (Bertolini et al., 2007).

2.4 Outbound logistics strategies

In this context, outbound logistics refers to the leg between the production facilities and the customers. The hub and spoke principle is a widely used concept to handle logistics and is interesting here. The theory behind this concept will be outlined to have a better understanding of the analysis. Further, strategies such as consolidation, cross docking and collaborative supply chains will be described.

2.4.1 Hub and Spoke concept

According to Lumsden (2007), this concept combines an efficient transportation to customers with utmost resource utilization for the logistics provider. The hub acts as a consolidation point where incoming goods are unloaded, sorted, stored and possibly processed further. After any of these operations, the goods are again loaded to load carriers and transported to the consignee. This enables frequent transports for the manufacturer and high resource utilization for the transporters/hauliers. There is generally a conflict in this regard as the customer needs frequent deliveries but the load carrying unit is not completely utilized. In such a situation, consolidation of various products in the hub helps (Lumsden, 2007).

Spokes are nothing but the direct relations that the hub has with the manufacturing sites on one side and the customers on the other. Consignments are sent to this hub from the sites with utmost utilization of load carriers. It is then unloaded in the hub and consolidated with other goods and sent directly to consignees. The conventional system is when transports are sent from individual supply locations to customers directly and its comparison with the hub and spoke concept is shown in Figure 2-4.

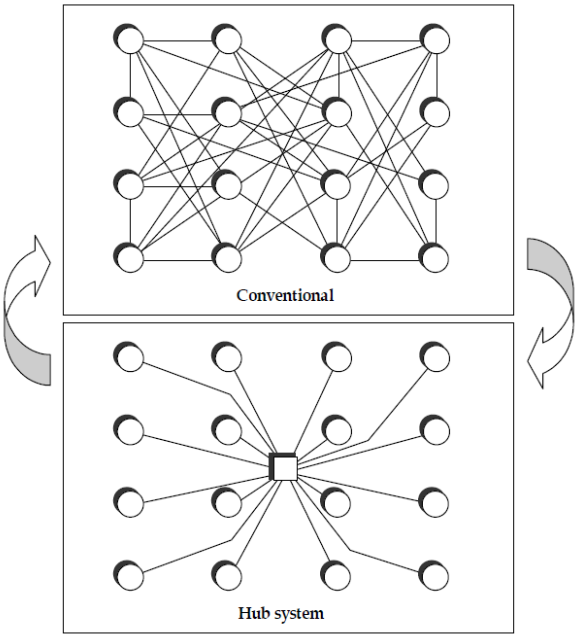

Figure 2-4: Hub and Spoke concept illustration. Source: Lumsden (2007)

2.4.2 Consolidation

Lumsden (2007) states that consolidation is a process of bringing together larger consignments of various sizes. This can either be done by the manufacturing company or by the logistics provider to whom transportation has been outsourced to. This is one of the most common methods to increase profitability of the company (Lumsden, 2007). But at the same time this could be a deterrent in terms of lead time as the load carrier must wait for sufficient amount of goods. This will further affect service levels towards customers. Consolidation can happen both from the factory to a terminal and further on to the customer. Another advantage is that the number of outgoing and incoming transportation relations is reduced which increases efficiency. This enables better resource utilization thereby improving sustainability. Abrahamsson (1993) mentions some specific advantages of consolidation as less tied up capital, decreased

warehousing costs and administration of physical distribution. At the same time, he mentions that the cost of lost sales might increase when the number of warehouses is reduced.

A decentralized logistics set up will have several terminals which imply large fixed costs. On the other hand, the distances to customers are short and hence short delivery times. In a centralized approach, large scale advantages are possible due to economies of scale and reduction of fixed costs. The transportation costs may rise in the centralized approach but can be compensated by high resource utilization of load carriers (Lumsden, 2007).

2.4.3 Cross-Docking

In order to reduce or eliminate storage of their products, companies need constant refilling of goods. There is also a demand from the customers to reduce delivery times. According to Lumsden (2007), the requirements from both the company's end and the market have given rise to the concept of cross-docking. One of the definitions pointed out by the author is that cross docking is the act of transferring goods directly or in a very short time from the incoming gate to the outgoing gate without any value adding in between. In some cases, the goods from the incoming trucks are mixed, sorted and consolidated into outgoing trucks to the customers.

In order to handle larger volumes in shorter intervals, the equipment needed in such a terminal should be advanced such as conveyor belts, automatic bar code readers, track and trace systems etc. This calls for a robust information system from the producer to the consumer and needs integration of both upstream and downstream processes (Vogt, 2010). This can be arranged in several ways, either by outsourcing the complete set-up to a third party logistics provider or by having a provider each for the transport and cross-dock terminal. However, the company may also decide to build a cross dock terminal depending on the expected volumes.

2.4.4 Collaborative supply chains

The era of mass production where the supplier was in the driving seat is being replaced by customer driven supply chains (Doukidis and Ebrary, 2007). Apart from internal optimization processes, a focal company can vertically collaborate upstream with suppliers and downstream with customers. In addition, it is possible to engage in horizontal collaboration, either with competitors or with non-related other organizations that conduct similar activities in another supply chain (Cruijssen, 2012).

Collaborative supply chain management practices are firmly establishing themselves as the way forward for successful and sustainable business operations and there are many benefits that can be gained while embracing this approach; according to Cruijssen (2012), there are three high-level ways in which companies can benefit from cooperation. They can do so by: pooling their

resources and concentrating on core-activities, by sharing and leveraging the specific strengths and capabilities of the other participating firms, and by trading different or complementary resources to achieve mutual gains and eliminate the high cost of duplication. On a lower level way, supply chain partners cite improvement in forecast accuracy as important factor for embracing collaborative practices (Attaran and Attaran, 2007).

Technically speaking, one of the key value creations is the effective deployment of assets. Where spare capacity in those assets exists in the value stream, the ideal, from a lean perspective, would be to stabilize demand and size in the right way the assets. However, often some demand fluctuation is internally created by the wider enterprise through the effect of demand amplification or bullwhip. In these circumstances, if the asset can be additionally deployed on parallel supply chains, their utilization rate goes up by spreading the fixed costs of assets among more activities, thus producing a more attractive business proposition (Doukidis and Ebrary, 2007).

Horizontal collaboration in supply chain remains still relatively embryonic in its current development. In this sense, when looking for opportunities beyond the company's value chain, transport has been considered a versatile asset for supply chain improvement, and horizontal collaboration has proved to be an important element in distribution optimization since it exploits better the conceptualization of supply chain as supply networks (Saenz et al., 2015).

3 Methodology

3.1 Project Approach

This section will explain the steps the authors followed in order to define, structure and perform the project.

The project was planned and executed using PRIME project management tool which is used internally within the host company. The PRIME method consists of four main phases namely Pre study, Preparation, Execution and Termination. There are five major Toll Gates (TG) where the project sponsors take a decision if the project could proceed or not. Besides the decision, their input on the analysis is given by the key stakeholders. These are in turn connected to the project phases where the first TG is a decision to start project preparation after the pre study phase where the project problem is discussed and deliverables are defined. In the current project, the project team including the leaders (authors of this thesis) and the sponsors (Regional Business Logistics Team, Nordics and Consumer Goods Sales, Baltics) were present in this TG meeting as in the following TG meetings.

The second phase was the preparation stage where the project plan was prepared, which was followed by the second TG. After the initial phase of defining the deliverables of the project, it was time to create the project plan and the steps in which it would be executed. Along with the project plan, a risk analysis and mitigation plan was also made in order to overcome bottlenecks during the execution phase. The overall execution phase and its relevance to the RQs are shown in figure 3-1. The following four steps constituted the core of the execution phase.

1. Mapping the current state by collecting relevant primary and secondary data. Primary data was collected through interviews, data reports generated ad-hoc using BI software applications connected to the host company's ERP suite. Secondary data was collected from literature and also from a few stakeholders. The reliability, suitability and adequacy of this data were checked before using it (Kothari, 2004). The data collection constituted a major share of the project and was divided into two major parts namely quantitative data and qualitative data. Besides these, plant visits, tollgate meetings and literature review were sources of data. Each of these is further described in the forthcoming chapters.

2. Analyzing the current setup using mainstream tools like SWOT, RCFA and custom tools such as Opportunities Assessment.

3. Finding relevant solutions inspired from the literature and the business environment

4. Assessing various scenarios using a framework to decide about the most suitable solution and devising a risk assessment and implementation plan.

The execution phase had two tollgates, one to monitor mid-term execution and another at the end of the phase. The final tollgate was to signal the termination of the project where a report would be prepared and also presented to the major stakeholders. The TG 5 was used to determine and decide if the project result would be implemented or not.

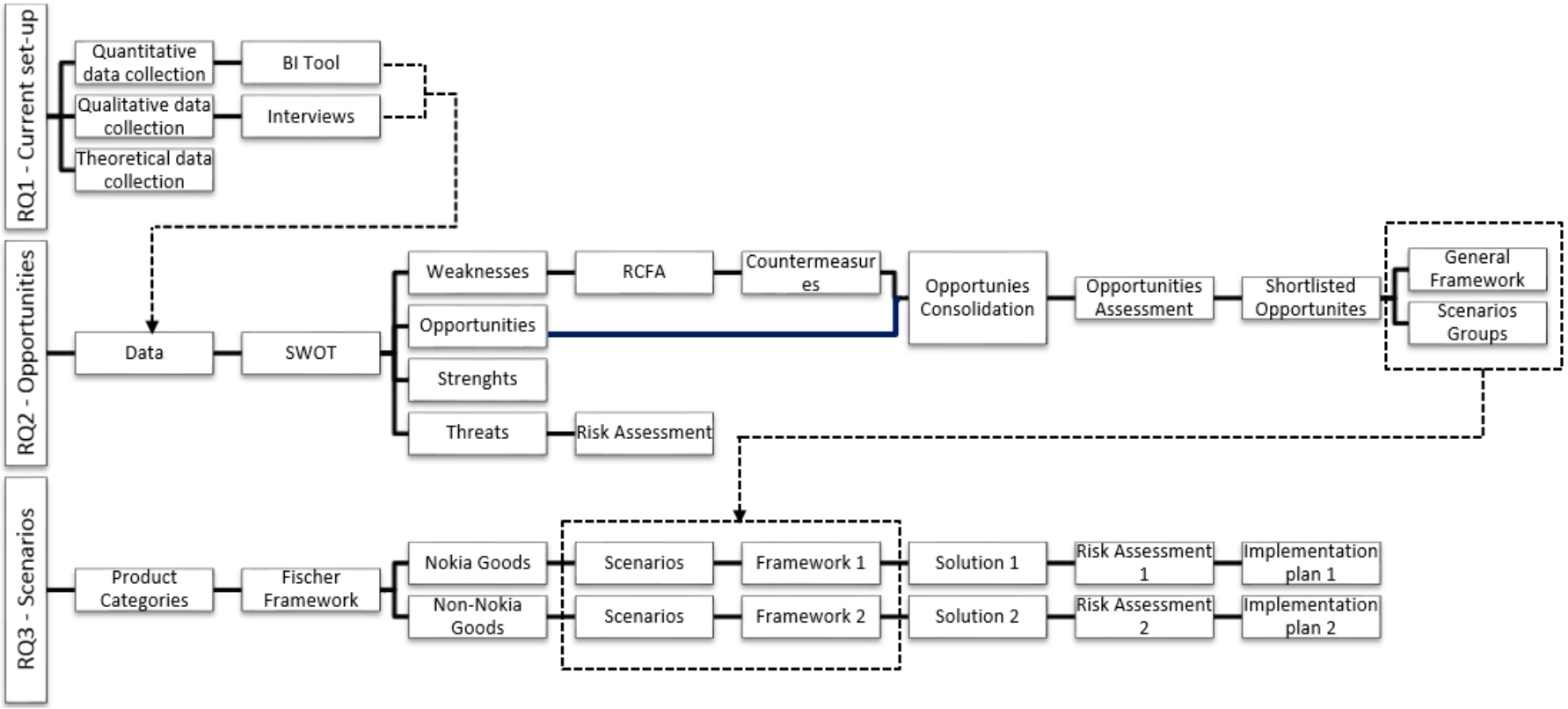

Figure 3-1: Project execution flow chart with relevance to RQs

3.2 Data collection methods

The search for answers to research questions is called collection of data; data is generally composed of facts and other relevant materials that will later on be a base for study and analysis (Krishnaswamy and Satyaprasad, 2010). The choice of data collection method is determined by factors such as sample controllability, accessibility to data sources, availability of subjects, literacy of subjects, and penetration of communication vehicles, e.g., telephone, fax, and Internet (Kao et al., 2016). According to Novikov and Novikov (2013) there are several methods that a researcher can use in order to empirically ensure the availability of data such as:

- Analysis of publications, documents and results of activity
- Observation
- Measurement
- Oral inquiry (conversation, interview)
- Written inquiry – questioning
- Expert evaluation
- Testing

At the same time, Kuada (2012) indicates that research methodologies are grouped into two broad categories: quantitative methods and qualitative methods. These two can be combined in order to better understand the issues that are part of the project at hand. From the methods listed above, the techniques that are commonly used in qualitative data collection are observations and qualitative interviews while the techniques that are used for quantitative data collection are questioning written inquiry and again, interviews (Kuada, 2012).

According to Krishnaswamy and Satyaprasad (2010), data may be classified into primary and secondary sources. Primary sources are original sources from which the researcher directly collects data that have not been previously collected. Secondary sources are containing data which have been collected and compiled for another purpose. They consist of ready available compendia and already compiled statistical statements and reports that can be readily used.

3.3 Quantitative data collection

This section will explain how the quantitative data was collected using internal systems and sources within the host company. The major source of quantitative data for this project was SAP which is the ERP system used by the host company. A database is updated daily and the information can be accessed through the BI cube. The authors have used several queries and combined a few of these using Microsoft Excel to compile relevant data. The data collected was restricted to the year 2015 (January to December). The BI has the ability to generate various key figures (number of pallets, volume, etc.) relevant to certain specific attributes (country, sales group, production plant, etc.). This enabled the authors to derive specific data relevant to the

project in a consistent manner. The data was also restricted to the Baltic consumer goods organization which included the three countries – Estonia, Latvia and Lithuania.

Another major source of quantitative data was the transportation master data file received from the Distribution Manager. This included the transportation tariffs, lead times and also a deployment of the number of trucks sent to the Baltics in 2015. A logistics master data file received from Customer Service Department, Baltics showed indicative logistic figures about individual SKUs such as pallet height, volume, number of layers, transport packs, etc. Besides this, the authors also had access to the Distribution Cost Overview report which had a detailed split of costs on product category, country and shipping location, etc. Other relevant quantitative data were obtained while interviewing different stakeholders of the project which is further described in the section below.

3.4 Qualitative data collection

This section will explain the different ways through which qualitative data was collected, how the interviews were conducted and how the data collected was organized. It will also give an idea about the roles of people interviewed. The interviews conducted were both internal and external, where the former refers to SCA employees and latter refers to non-SCA employees. The major bottleneck here was to ensure availability of the concerned personnel. In order to overcome this identified risk, the authors booked meetings with the identified interviewees immediately after the planning phase. A total of 17 interviews (15 internal as in Table 3-1 and 2 external as in Table 3-2) were conducted as a part of qualitative data collection. These included an hour long interview with the concerned person where questions relevant to the person's expertise area were asked. Notes were taken during these interviews which were later complied as meeting minutes and stored as soft copies.

The reliability of data was ensured by keeping the interviewee well informed about the project. This was done by booking meetings in advance and also by handing in the interview questions well in advance, thereby giving the interviewees sometime to prepare for the interview. During the interview, the authors explained the purpose of the project and also what would be the role of the interviewee and how his/her contribution would affect the outcome of the project.

Table 3-1: Qualitative interviewee details (Internal)

Interview Category	Interview Reference	Designation of Interviewee
Key Stakeholders	I_1	Customer Service Team, Consumer Goods, Baltics
	I_2	Controller, Baltics
	I_3	Regional Business Logistics Director, Consumer Goods, Region North
	I_4	Distribution Manager, Consumer Goods, Region North
	I_5	Sales Director, Consumer Goods, Baltics
	I_6	Customer Service Manager, Consumer Goods, Sweden, Norway and Denmark
	I_7	Key Account Manager, Baltics
	I_8	European Demand and Process Manager, Business Logistics
	I_9	Sales Director, Consumer Goods, Baltics
Product Specification Teams	I_{10}	Product Manager, Consumer Tissue, Retail Brands, Region North
	I_{11}	European Technical Manager, Baby
	I_{12}	Nordic Marketing Manager, Feminine
Comparison Interviews	I_{13}	Distribution Manager, Adriatics
	I_{14}	Logistics Manager, Incontinence Care
	I_{15}	Regional Business Logistics Director, Away from Home, Region North

The internal interviews were categorized according to the requirement of the project phase and were well spread over the different steps of the execution phase. The three major internal interview categories were:

1. Key stakeholders like the Customer Service Team, Distribution Manager, Sales Director, Regional Business Logistics Team, Controlling, etc.
2. Product specification teams for the categories of baby, feminine and consumer tissue.
3. Comparison interviews with homologues from other business units.

Two interviews were conducted with external parties for the following reasons:

1. A customer in order to get some insights on perceived service level and also inputs on other logistics possibilities in Baltics.
2. LSP representative to get information on what services they could offer in the Baltics and quotes on some transportation lanes and warehousing possibilities.

Table 3-2: Qualitative interviewee details (External)

Interview Category	Interview Reference	Designation of Interviewee
External	E_1	Supply Chain Manager, Customer, Baltics
	E_2	Sales Director, 3PL Company, Baltics

3.5 Literature Review

The purpose of literature review was to ensure a good understanding of the concepts related to the project. It was also useful to learn similar projects carried out by others and the kind of solutions recommended for such problems in this particular context. The source for most of the literature review has been Chalmers Library Databases while some information has also been obtained from course material provided by professors of various courses during the Supply Chain Management Master Program at Chalmers. Further, SCA's intranet and the web in general have also been used to get necessary information. The research topics focused on were related to outbound logistics, distribution, consolidation and supply chain metrics.

3.6 Tollgate Meetings

These meetings were conducted on pre decided dates according to the project plan. These were linked to the project phases and were used as decision making points for the next steps in the project. During these meetings, the authors presented their findings to the project sponsors and received feedback. The feedback was an important source of information for the project. These were documented and used as a part of the empirical data used for analysis. The findings from the analysis, especially frameworks were also discussed during TG3 and TG4 and relevant inputs were taken from stakeholders. There were 5 TG meetings in total. The initial TG meeting's purpose was to start project preparation after the pre study phase while the final one's purpose was the complete project presentation.

3.7 Plant Visits

Three different visits were a part of this category. Each visit consisted of several interviews with the concerned personnel. The first one was a visit to the tissue mill in Lilla Edet, Sweden followed by a visit to Nokia tissue mill in Nokia, Finland. These two visits included meetings with members of the logistics organization in the plants as well as mill tours which added a

practical perspective to the project. Another visit to the Customer Service Team at Espoo in Finland provided the authors with hands on experience on how operational tasks are handled by them.

3.8 Quality of data

Once the researcher is convinced that the available data fits the purpose of research the next step is to examine the quality of data. The three dimensions of data quality are accuracy, reliability and completeness (Krishnaswamy and Satyaprasad, 2010).

In a nutshell, according to Krishnaswamy and Satyaprasad (2010), from accuracy and reliability perspectives, it is very important to ensure that the authority and prestige of the organization that collected the data are unquestionable. The completeness dimension refers to the actual coverage of the published data.

In the current research approach, the authors considered the quality of data a risk that was extremely important to be mitigated. For example, the secondary data extracted with the help of BI extension was cross checked with the data in the distribution cost report and challenged the correctness during multiple interviews with stakeholders. Tollgate meetings where stakeholders have been present have been key points of data validity checks.

The frameworks were scored by the authors from the data collected through various interviews, both internal and external. Further these scores were validated by the stakeholders through tollgate meetings.

3.9 Tools used for analysis

The tools used during different stages of the analysis will be described in this section. While analyzing the current setup, tools such as SWOT and RCFA will be described. Further, the Fisher matrix which is used to categorize the product categories will be described.

3.9.1 SWOT Analysis

A SWOT analysis is an organized list of a company's Strengths, Weaknesses, Opportunities and Threats (Bplans, 2016). It is commonly used by companies to assess a changing environment and take some measures to handle it. The input of the analysis comes from various stakeholders relevant to the company/project. The strengths highlight positive attributes of both products and services and are well within the control of the organization. These could also include the positive aspects of the organization when compared to competitors. (Bplans, 2016)

The identified weaknesses are also mostly internal and act as deterrents for the organization to achieve its goals and targets. These areas must be given special importance in order to be able to overcome them and thereby compete with competitors. Opportunities on the other hand are

external factors which will probably be reasons for the company to prosper. These are factors from the environment which will help the company develop. Threats are those external factors which have a negative influence on the business and are a potential risk. It is difficult to have control over these but mitigation measures identified in advance might help handle them. As shown in figure 3-2, strengths and opportunities are helpful in achieving the objective of the organization whereas the weaknesses and threats are harmful. (Rapidbi, 2016)

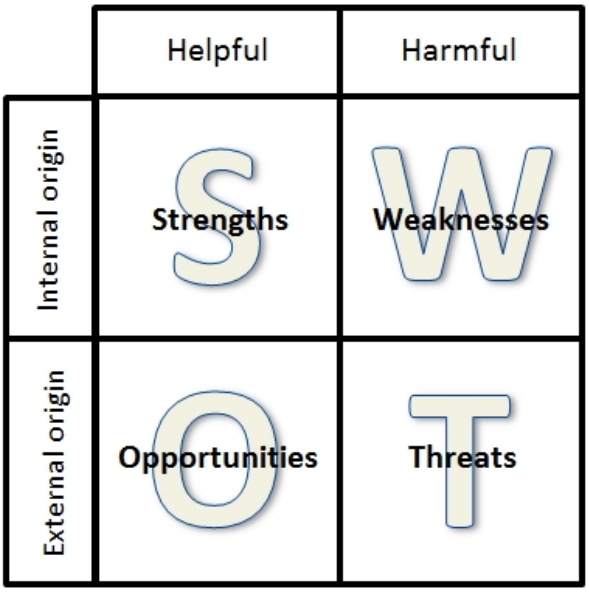

Figure 3-2: A framework for SWOT analysis. Source: Rapidbi (2016)

3.9.2 Root Cause Failure Analysis – RCFA

The weaknesses/problems identified through a SWOT analysis have to be rooted out so that the organization can propel towards its goals. This can be done by performing a careful analysis of each of the problems and identifying its root causes. RCFA thus is defined as a method where a series of actions are taken in order to identify the root cause of problems (Latino R J, 1998).

Root causes for problems can be found using various techniques such as appreciation, 5 whys, drill down and cause and effect diagrams. (Mindtools, 2016)

1. Appreciation is a technique where the facts are used and a ‘’so what?’’ question is raised to determine the consequences of a fact.
2. 5 why technique is where the question ‘’why?’’ is asked repeatedly until the root of the problem is identified.
3. Drill down is where the major problem is broken down in to smaller problems to individually assess them.
4. The cause and effect diagram is where all the causal factors are identified in order to get to the root of the problem.

The 5 why technique used for finding the root cause of a problem starts with identifying the problem statement as shown in figure 3-3. Now, the question ‘’why it happened?’’ is asked until the root of the problem is reached. This is generally asked 5 times by which the objective would be achieved. Once the cause is identified, a countermeasure is proposed in order to get rid of the causal factor. This is done to make sure that the problem does not repeat itself. (Christian, P, 2010).

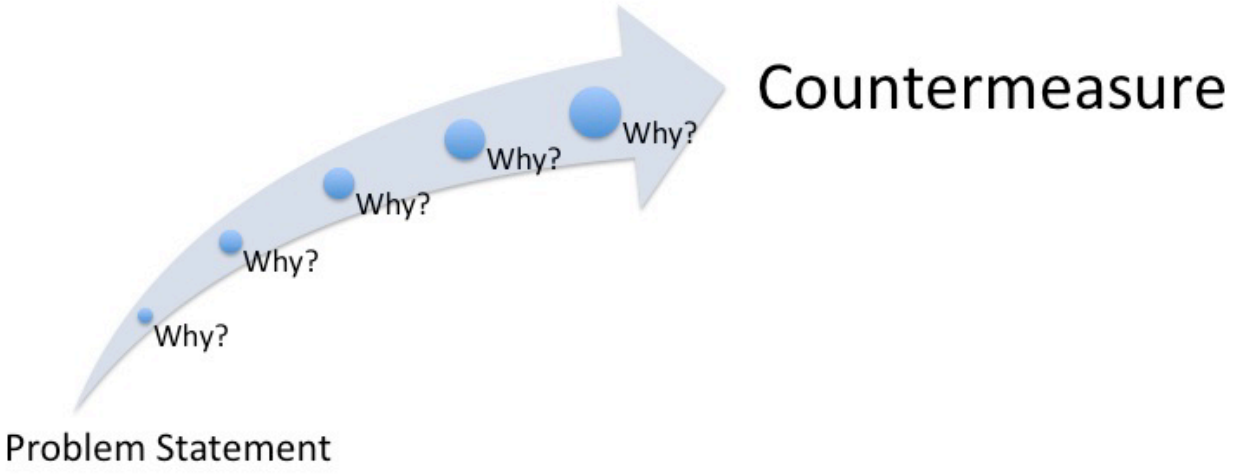

Figure 3-3: RCFA using the 5 why technique. Source: Christian P (2010)

3.9.3 Fisher Matrix

Fisher (1997) claims that the exponential growth in technology and brainpower could be used to improve performance of supply chains. Concepts such as quick customer response, mass customization, lean and agile manufacturing have been buzzwords in the supply chain domain. At the same time, it is quite a challenge to achieve flexibility in the chain and at the same time reduce costs. Hence Fisher (1997) says that it is important to consider the nature of demand of the products before creating a supply chain for them. He has categorized products into two types namely functional and innovative. The differences between the two are shown in table 3-3. Further, he has also categorized supply chains into two types namely an efficient and responsive. The differences between the two are shown in Table 3-4.

Table 3-3: Functional and innovative products characteristics. Source: Fisher (1997)

Aspects of demand	**Functional – predictable demand**	**Innovative – unpredictable demand**
Product lifecycle	More than 2 years	3 months to 1 year
Contribution margin	5% to 20%	20% to 60%
Average stock out rate	1% to 2%	10% to 40%
Product variety	Low	High

Table 3-4: Efficient and responsive supply chains characteristics. Source: Fisher (1997)

Purpose	Efficient supply chains	Responsive supply chains
Manufacturing focus	High average utilization rate	Excess buffer capacity
Lead time focus	Shorten lead time without increasing cost	Invest in ways to reduce lead time
Inventory strategy	Minimize inventory in the chain	Deploy buffer stocks of parts or finished products

It is therefore important to match the right product with the right supply chain to be both effective and efficient. Fisher (1997) claims based on the above tables that there is a match between functional products and efficient supply chains on one hand and between innovative products and responsive supply chains on the other as shown in figure 3-4 which is the well-known Fisher Matrix.

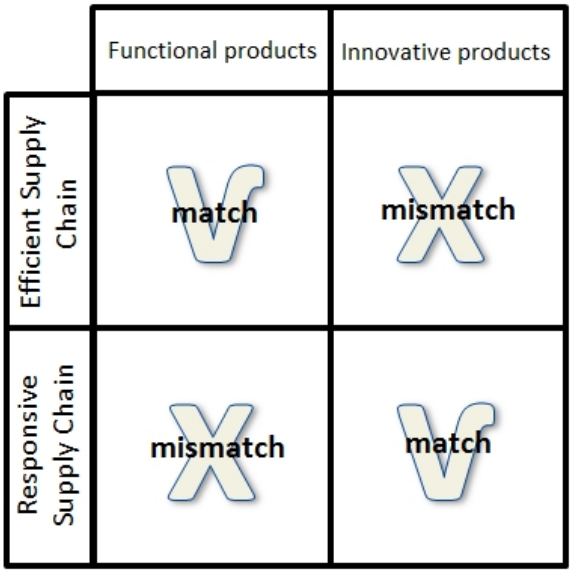

Figure 3-4: Fisher matrix. Source: Fisher (1997)

4 Findings and Analysis

4.1 Current situation

This section will show the data gathered about the current situation and its mapping in order to enable an assessment of the current setup. The data collected through both quantitative and qualitative methods will be presented here. The reader may expect RQ1 to be answered in the end of this section.

4.1.1 Consumer goods and Business Logistics

The product portfolio of SCA is broadly divided into three categories: Incontinence care, Consumer Goods and Away from Home professional hygiene. This thesis focuses only on the consumer goods category which includes consumer tissue, baby diapers and feminine care products. Table 4-1 shows what constitute these product segments and also indicate the factories that cater to the Baltic countries.

Table 4-1: Product supplied by SCA's manufacturing plants to Baltics

Product category	Product portfolio	Factories supplying to Baltics
Consumer tissue	Toilet paper, kitchen paper, facial tissues, handkerchiefs and napkins	Nokia, Finland Manheim, Germany Stembert, Belgium Neuss, Germany Lucca, Italy
Baby	Baby diapers (pant and open), wet wipes	Hoogezand, Holland Olawa, Poland Falkenberg, Sweden
Feminine	Liners and towels	Gemerska, Slovakia

Consumer tissue is a high volume, low margin product and is generally shipped FTL directly from the IDCs attached to the factories to the customers. However, tissue from Stembert and Neuss are consolidated in Manheim before being shipped to the customers. Baby and feminine category are low volume, high margin products which are mostly shipped LTL to the customers. In this case, Falkenberg acts as a consolidation center for all the goods from Olawa and part of the shipments from Hoogezand.

Business logistics is a division in the Sales and Marketing department for every region within SCA. This division handles customer service, demand planning and distribution for the region. The outbound logistics from the IDCs to the customers are handled by this division and hence this thesis was carried out in the Regional Business Logistics team, Region North (Figure 4-1).

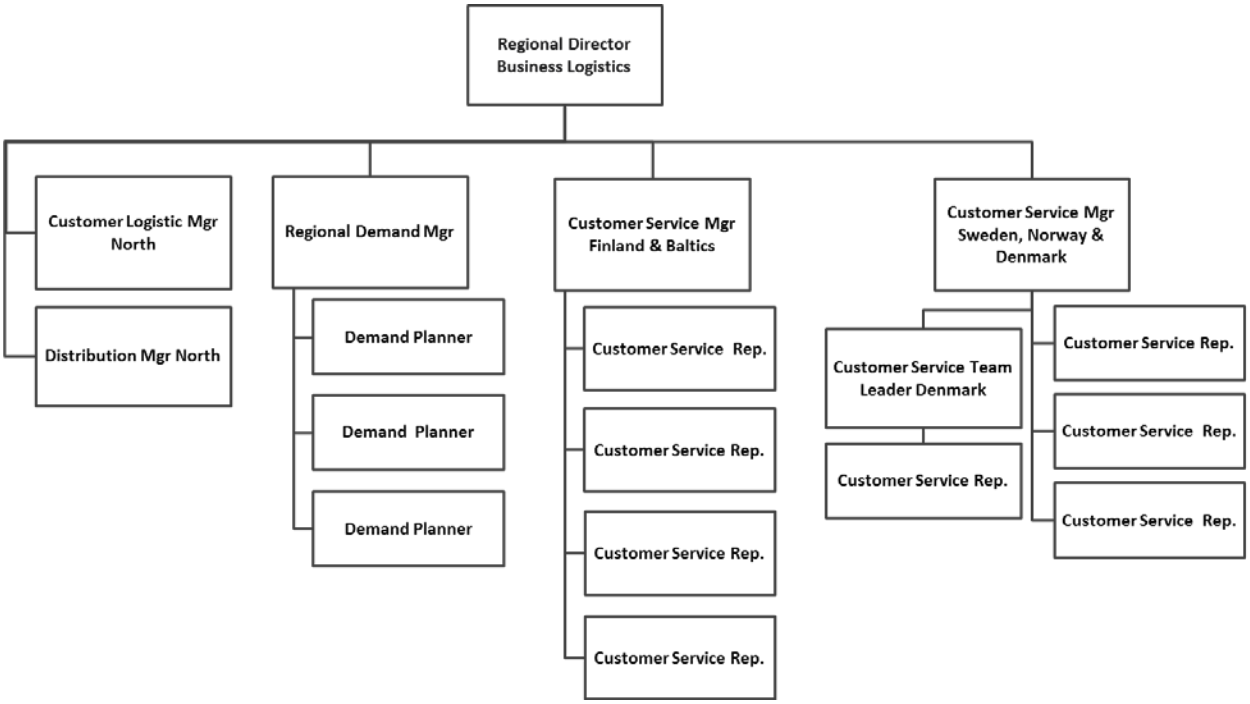

Figure 4-1: Organization structure of Regional Business Logistics team, Region North

4.1.2 Outbound logistics flows

The customers located in the Baltic countries are supplied with products that are produced in 9 manufacturing plants located in Europe. There are 2 types of manufacturing plants. On one side there are the consumer tissue manufacturing plants which resemble process industry plants from a batch size perspective. These are located, in general, close to the markets. On the other side there are the personal care manufacturing plants which produce high value per unit products such as baby diapers and feminine hygiene products. The manufacturing plants supplying the Baltics are located in Belgium, Italy, Finland and Germany for consumer tissue and in Holland, Poland, Slovakia and Sweden for personal care, respectively. All the manufacturing facilities have an attached IDC which is owned by SCA or by a third party. For the goods that are being shipped to the Baltics, the IDCs located close to the manufacturing plants located in Germany and Sweden are acting like a consolidation point, before shipping the goods to the clients. Therefore, goods are either directly delivered or indirectly delivered to the clients (Figure 4-2).

- Directly delivered - When the goods are shipped to the customers directly from the IDC of the factory that produces it.

- Indirectly delivered – When the goods are shipped to the customers by consolidating in another IDC, other than the one that is the IDC of the factory that produces it.

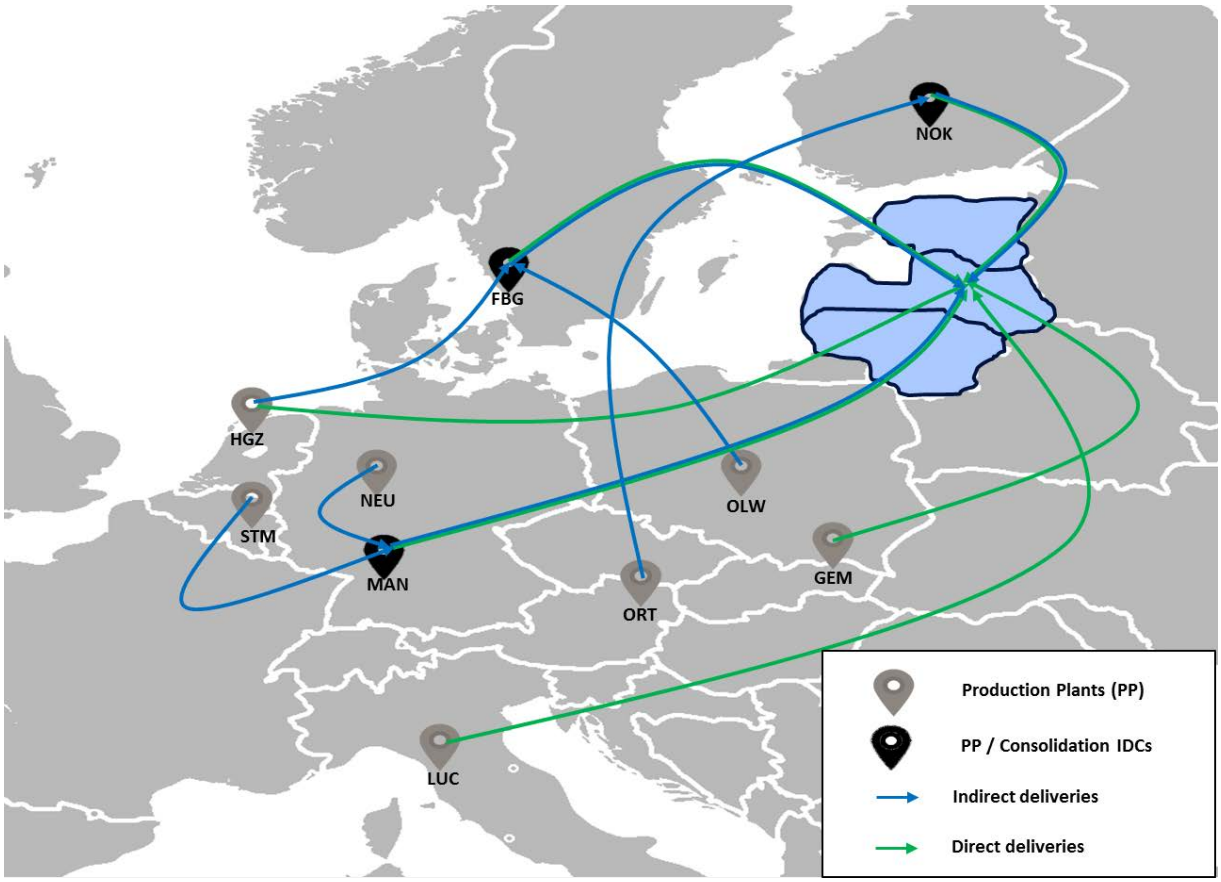

Figure 4-2: Goods flows between SCA's manufacturing plants and the Baltic countries

Overall, on a yearly level, 1861 trucks of goods are shipped to the Baltics, with the majority, 1413, being shipped from Nokia, Finland. (Table 4-2) SCA ships 222 LTL trucks and 112 TL trucks. According to the company's terminology a top loaded truck is one which is filled up to the brim and hence carries more volume than a regular FTL.

Table 4-2: Trucks shipped to the Baltics, split on IDC level

Delivering IDC	FTL	LTL	TL	TOTAL
Nokia, Finland	1394	19	0	**1413**
Mannheim, Germany	30	57	112	**199**
Lucca, Italy	37	0	0	**37**
Gemerska,	7	71	0	**78**

Slovakia				
Falkenberg, Sweden	42	73	0	**115**
Hoogezand, Holland	17	2	0	**19**
TOTAL	**1527**	**222**	**112**	**1861**

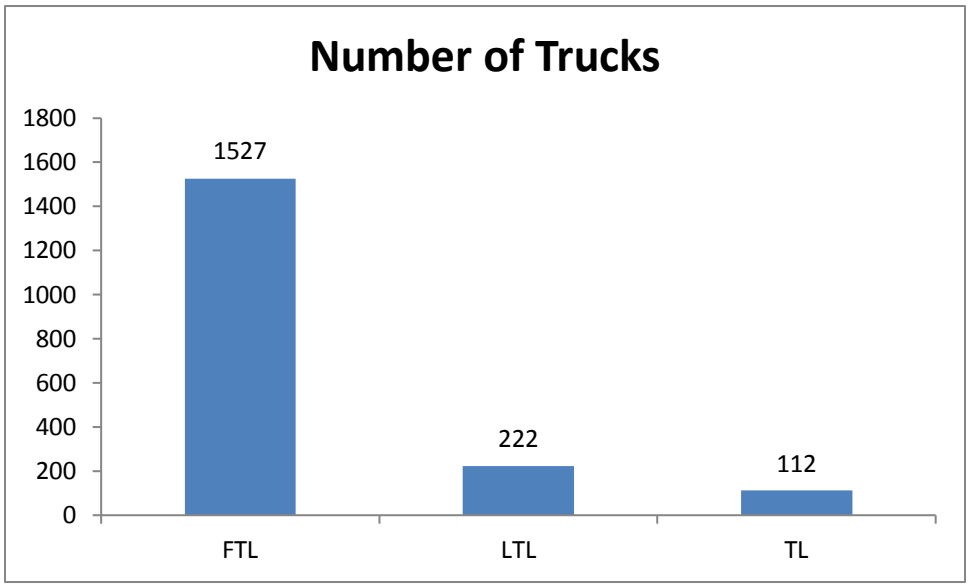

Figure 4-3: Truck utilization for Baltic shipments in 2015

The delivered volumes are split 50/50 between the distributor D1 and the modern retail clients, see Table 4-3.

Table 4-3: Trucks shipped to the Baltics, split on customer level

Customer	FTL	LTL	TL	TOTAL
M1	390	60	9	**459**
M2	318	42	39	**399**
D1	729	106	64	**899**
M3.1	48	7	0	**55**
M3.2	42	7	0	**49**
TOTAL	**1527**	**222**	**112**	**1861**

SCA has 2 market warehouses located in the Nordics, one located in Denmark and another located in Finland. The company has a long relationship with the LSPs that are operating the 2 warehouses and the respective sub regional Customer Service Departments are dealing on a daily basis with them. They are invoicing their services based on an agreed tariff structure. The costs are further internally charged to the respective sales organizations. The IDCs are also charging

the sales organization based on an internal agreed price list which is activated at every ERP relevant transaction. Other extra value added services are charged separately, on a monthly basis. Therefore, the total costs incurred by IDCs and the market warehouses can be compared with the purpose of benchmarking. Of special interest are the extra added value services, such as top-loading and repacking.

The goods are shipped to the Baltics using regular 20 ton trucks with an internal height clearance of above 2,7m. On some of the home taking routes (factory to factory routes), jumbo type trailers are used, which means that they allow an internal height clearance of 3m.

The tendering process takes place once a year for every lane and has the purpose of ensuring low cost while guaranteeing good level of service and good response to surges in capacity demand. Being part of Transporeon network is also a mandatory condition for the hauliers to be considered for the tender. The Transporeon network is a third party service which enables hauliers to have specific access to information regarding transports. For example, it could be used to book a particular loading time at the IDC, or could be used to track the delivery status. As risk mitigation measure, on some lanes, the volume is shared between 2 hauliers.

The transportation tariffs are scale based and do not include SECA surcharge which applies when the truck crosses the Baltic Sea on a ferry. The prices are calculated from door to door, based on the postal code and they are expressed in currency per pallet place. A maximum of 2 drops is not charged. The hauliers invoice SCA on a monthly basis.

4.1.3 Reverse logistics

The empty pallets from the outbound goods flow are currently not returned back to SCA, but the customers follow an agreement which allows them to buy them at a discounted price as compared to the SCA reference price. Currently, CS deals with a number of complaints regarding the quality of pallets shipped from the customers. It is also clear that SCA also loses financially while selling empty pallets to the customers.

4.1.4 Distribution costs for outbound logistics

The shipment of goods to the clients incurs certain distribution costs. The distribution costs are divided in to freight costs which are 50% of total, warehouse costs which are 34% of total and home taking costs which are 11%. The rest are corrections which contribute to about 5% and this part is not in the scope of this thesis. 85% of the distributions costs are generated by consumer tissue category, 10% by baby category and 5% by feminine category. This distribution cost split between product categories reflects the volumes split, with consumer tissue being the largest that is shipped to the Baltic countries. (Figure 4-4)

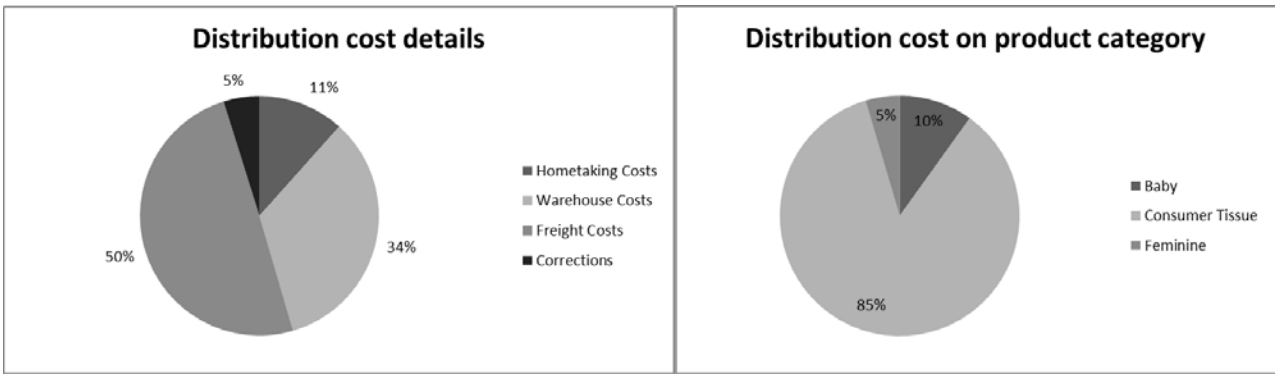

Figure 4-4: Distribution costs deployment for Baltics

In order to have a better image on how efficient is distribution for individual product categories, SCA uses distribution costs as a specific measure dividing the distribution cost to the volume handled. From this perspective, consumer tissue is distributed very efficient, followed by feminine and baby category.

4.1.5 Service level

The service level for consumer goods ranges between 97 and 98%, depending on the country. This is very close to the SCA's performance target. (Figure 4-5)

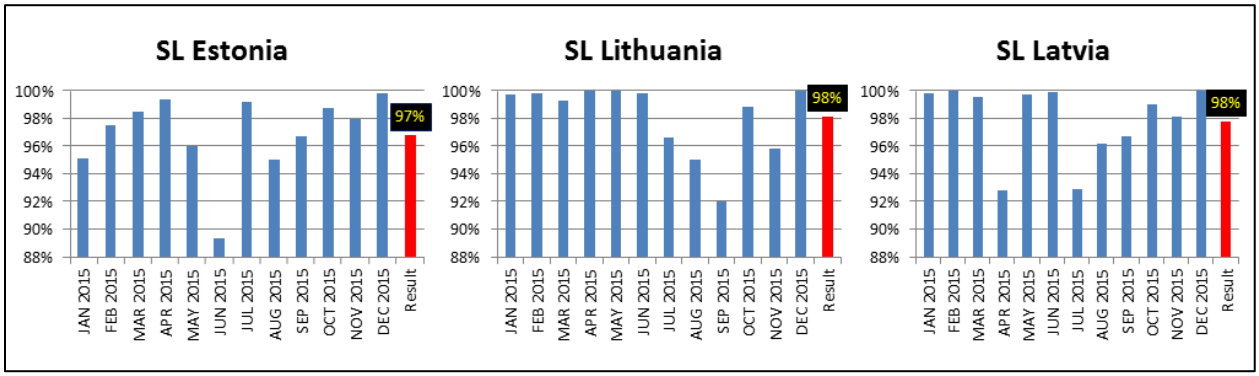

Figure 4-5: Service Level in Baltics for 2015

It is debatable if the service level measured by SCA is the same as the service level perceived by SCA's customers. This is mainly due to the way service level is measured, which has been contested in many instances by the people who were interviewed by the project team. The service level deviations are reported and a follow-up is being done. The main complaints are related to storage and handling as it can be seen in Figure 4-6.

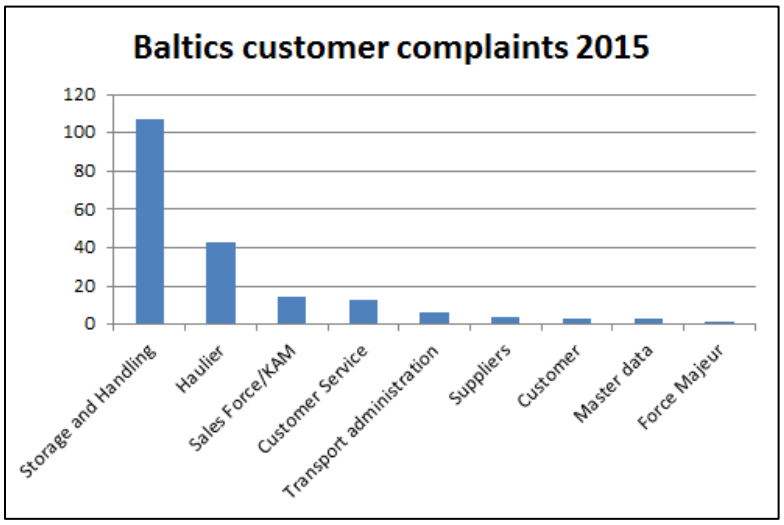

Figure 4-6: Customer complaints deployment for Baltics 2015

4.1.6 Customers and customer service

SCA sells its goods in the Baltics to two types of customers. The first category is large modern retail clients which have large supermarkets and hypermarkets all across the three Baltic countries. The goods are shipped to the respective national hub of the retailer and then the retailers are responsible of supplying its outlets. In this report, the authors will call these M1, M2 and M3. The second category of clients are distributors who have their own distribution center in every country which acts like a last node before supplying the small shops and over the counters located all across the country. The authors will call it D1. The distributor acts on behalf of many other white goods producers, and SCA is one of its strategic suppliers. SCA ships the goods using DDP Incoterms 2000, therefore optimizing the way the goods are shipped could generate improved bottom line results.

The customers' behavior varies from country to country, depending on the local culture and customs. The Estonian customers are more flexible, cooperative and reliable, while the Latvian and Lithuanian customers are hierarchical, bureaucratic and conservative.

SCA has a contract agreement with its customers that specifies the terms that need to be followed in the commercial relationship. In this contract, there are specified the target SL, LT) and MOQ and the penalties that have to be paid in case those agreed rules are not followed. The MOQ is an important parameter that sometimes is a bottleneck for both SCA and the customers and it varies based on the supplying IDC. (Table 4-4)

Table 4-4: Agreed MOQ for Baltics on IDC level

Delivering IDC	Product Category	MOQ [pallet places]
Nokia, Finland	Consumer Tissue	33
Manheim, Germany	Consumer Tissue	15
Ortmann, Austria	Consumer Tissue	45
Lucca, Italy	Consumer Tissue	33
Gemerska, Slovakia	Personal Care	15
Falkenberg, Sweden	Personal Care	15
Hoogezand, Holland	Personal Care	33

The Customer Service that works with the Baltic countries market is composed out of two dedicated employees working solely with the Baltic clients. One of the CSRs is working with orders for consumer tissue, while the other CSR works with orders for personal care products.

The outbound logistics set-up of the case company has a direct influence on the complexity faced by the CSRs and therefore on their workload related to non-value added tasks. Their work time is dedicated to various tasks, as represented in Figure 4-7.

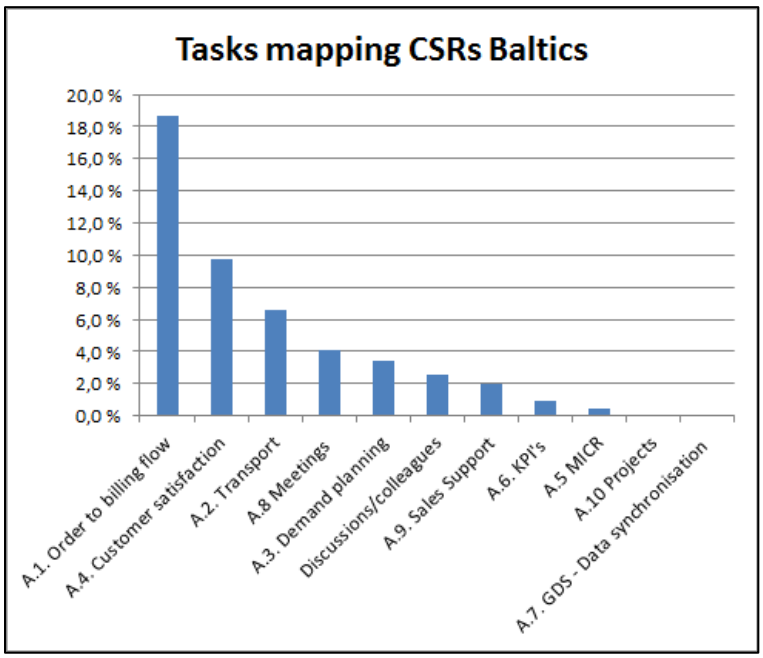

Figure 4-7: CSR tasks deployment over one month

EDI coverage is only 26%, therefore the order to billing flow is mainly manual, meaning that the CSR manually keys in the order contents in the ERP. EDI only goes one way, the order confirmation not being sent back through EDI, but through manual e-mailing.

4.1.7 Product details

From a product perspective, the products supplied to the Baltic market have certain characteristics that impose constraints on the logistics setup. Starting with the tertiary packaging, which is the pallet, SCA broadly uses Euro pallets as a load unit, which have the standard 1200x800 mm dimensions. The pallets with goods can have a height of up to 2,8m in some manufacturing plants. Based on the height of the pallets and the products handled, the height might have a negative impact on the stability of the pallets. Double stacking of pallets improves distribution of weight, but there is a risk that boxes on lower pallet become damaged, which will, unlikely, affect the TRP. The height of the pallets is influenced by the customer demand and based on the demand deployment for a certain item, the market that orders the largest volume will decide the pallet specifications. The goods produced by SCA don't have any contamination constraints while being grouped with other goods.

4.2 Current Situation Analysis

The current set up will be evaluated and analyzed using several tools. Initially a SWOT analysis will be performed to identify the strengths, weaknesses, opportunities and threats followed by a RCFA where the ''5 Why?'' technique is applied to each of the weaknesses and counter measures will be identified. Further, the opportunities and counter measures are consolidated and assessed using a matrix. The reader may expect RQ2 to be answered by the end of this section.

4.2.1 SWOT Analysis

The current situation data presented in the previous chapter is subjected to a detailed SWOT analysis. While analyzing the data collected, two broad aspects of either being helpful or harmful to the organization will be considered (Rapidbi, 2016). Those points that help the context of this project are considered as strengths if it is of internal origin and as opportunities if it is of external origin. The 8 major strengths identified in the current logistics set up are meant to be preserved and those are:

- Most of the consumer tissue is shipped from the closest plant, Nokia;
- The shipments from Nokia are FTL;
- Current reported value of the SL is very good;
- SL as a KPI is coupled with the customer complaints to draw a bigger picture;
- All the Home Taking (HT) flows are completely optimized;
- There is a possibility to produce E28 (2,8 m high euro pallet) ULVs in Falkenberg;
- The shipments from Lucca in Italy are fully optimized and are only FTLs;
- Customers are flexible in providing different value added services.

The are 18 opportunities, mentioned below. These will later be consolidated and assessed using a framework.

- Tap the potential of Olawa IDC having a very low warehousing cost;
- Tap the potential of Olawa IDC's capacity being increased;
- Optimize MOQ to reduce costs and improve lead time;
- Reduce LTL majorly to customers D1, M1 and M2;
- Challenge the TL cost in Nokia;
- Explore the option of a market warehouse and evaluate using quotes from different LSPs;
- Market growth in feminine and tissue over 5 years seems lucrative;
- Increase truck utilization in Nokia either by top loading or increasing the number of layers on a pallet;
- Avoid LTL exceptions in transporting tissue and try to top load wherever possible;
- Evaluate the possibility of multi-drops (one truck delivering goods to more than one customer);
- Evaluate the possibility to consolidate PC category;
- Get a realistic view of SL and LT by taking in consideration POD;
- Use customer complaints as a source of continuous improvement;
- The way roles and responsibilities are assigned in the customer service could be improved;
- Increase usage of EDI and reduce manual handling of data;
- Improve the overall management of pallets;
- Evaluate other pallet deals (CHEP, non-returnable, etc);
- Evaluate the usage of mixed pallets from Gemerska;

Those points that harm the context of this project are considered as weaknesses if it is of internal origin and as threats if it is of external origin. The 14 major weaknesses identified in the current logistics set up, which will be subjected to a RCFA in the next section, are explained below:

- There are cases of LTL for consumer tissue, which is against the overall policy which is to ship only FTL of tissue;
- Most of the shipments for PC are LTL;
- The way SL is measured today is not robust, it is done without proof of delivery;
- There is no proactive approach towards preventing complaints;
- A MOQ of 15 pallet places of tissue can be ordered from Mannheim today;
- Customers are forced to do an early payment, because the invoices have the same date as the goods issue date;
- Many hauliers delay in submitting invoices and also make errors while preparing those;
- Poor pallet quality reported by customers;
- Unclear roles and responsibilities between customer service and supply services;
- Communication gap exists between customer service and other departments;
- Manual handling of data is quite a lot in customer service;
- Frequent out of stocks at the customer due to production, forecasting and other issues;

- There are losses incurred from sale of pallets to customer;
- There are no more than 2 drops done today to customers.

Only one major threat was identified in this setup and it was related to the service level offered to customers. It was:

- The possibility that the service level perceived by customers are different from the levels perceived by SCA.

At the outset, the identified strengths will be preserved while the root cause analysis of weaknesses will be done in the next section. The opportunities identified through SWOT will later be assessed through a framework and the threat identified will also be covered as a part of the root cause analysis.

4.2.2 Root cause failure analysis

All the weaknesses identified through SWOT will now be analyzed using the ‘’5 why’’ technique to understand the root cause of problems (Christian, P, 2010). Out of the 14 identified weaknesses, a few similar ones were consolidated to form 10 broad weakness categories. The motive behind getting to the root cause of these problems is to identify counter measures which could solve the problems. The steps followed in the 5 why technique is explained below:

1. One out of the 10 weaknesses is chosen and the authors ask ‘’why’’ it occurred thereby finding the reason for its occurrence.
2. The loop of asking the question ‘’why’’ is continued until a point (the root cause) where there aren’t any further answers to the question.
3. One or more counter measures are then proposed to solve the root cause.
4. The same cycle is then repeated for another weakness

The various counter measures proposed for the 10 weakness groups are presented in table 4-4.

Table 4-5: Problem statements and countermeasures from RCFA

No.	Problem Statement	Counter Measures
1	There are cases of LTL for CT, which is against the overall policy which is to ship only FTL of tissue	An agile logistic set-up
		Using multi drop as an option
		Consolidate low volume CT with PC
		Reevaluate MOQ and only dispatch FTL for CT
2	Most of the shipments for PC are LTL	Evaluate the possibility of consolidation of PC
		Improve or put a system in place for multi drop
		A framework should be developed to continuously decrease the effects of corrections

		Improve communications between Aino and Tomas
		Ensure timely submission of invoices by hauliers
3	Unclear roles and responsibilities between customer service and supply services	Have optimal safety stock to handle emergencies
		Implement a system to measure actual POD
		Revise the roles and responsibilities of the two divisions
		Have a supply chain perspective at both ends
4	Communication gap exists between CS and other departments	To make sure the procedures in place for communication are being used
5	The way SL is measured today is not robust, it is done without proof of delivery	Implement a POD/T-track or another system to register all customer complaints
		Specify the usage of Transporeon tools T-Slot and T-Track at the RFI stage
		Compare SCA's SL with customer's SL
		Have a system to integrate all the customer complaints into the SL measurement
6	Customers are forced to do an early payment, because the invoices have the same date as the goods issue date	Set up a system to issue the invoice according to the delivery date
		Modify the payment terms period according to the lead time
7	Frequent out of stocks at the customer due to production, forecasting and other issues	Forecast accuracy should be a part of the KPIs for sales force
		Sales should communicate well with CS about promotions calendar
		Measure hauliers with respect to service level, exceptions, agility and customer satisfaction
		Maintain optimal level of safety stocks for all products
		Have a market warehouse/consolidation point
8	Poor pallet quality reported by customers	Haulier should not accept bad quality pallets from the IDCs
		Sales force should have a dialogue with customers and arrange site visits to show how pallets are handled in the IDCs
		Have a project on pallets and decide which is the best way to handle them
9	Loss incurred from the sale of pallets	SCA's internal pallet rate should be reevaluated and its decentralization should be considered
10	Manual handling of data is quite a lot in customer service	CS and sales should promote the implementation of EDI
		Technical training (Excel) can be given to relevant personnel

		Review the order allocation system and reasons for manual intervention

A total of 32 counter measures have been identified to overcome the root causes of the weaknesses observed during SWOT analysis. The next section will describe how these will be processed to decide which of these are more suitable to answer the second RQ.

4.2.3 Opportunities consolidation and assessment

The opportunities identified through SWOT analysis and counter measures found through RCFA will be combined and assessed in this section. The 18 opportunities and 32 countermeasures identified are methods to improve the current setup. However, these initially need to be consolidated for two reasons:

1. The combined number is 50, which is quite large to do an assessment on;
2. There are several similar opportunities which focus on same improvement domains.

The opportunities and counter measures were combined to form 15 broad groups which would be considered for improvement (Figure 4-7). The detailed split of the opportunity groups mentioned below is in appendix 8-1.

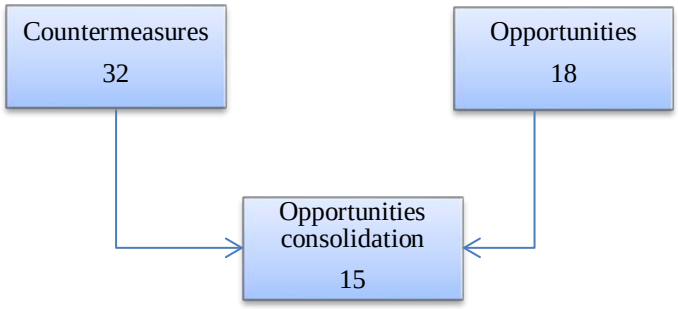

Figure 4-7: Opportunities consolidation

1. Agile logistics
2. Communication
3. Consolidation
4. Customer complaints
5. Data handling in CS
6. Hauliers
7. Invoices
8. MOQ

9. Multidrops
10. Out of stocks
11. Pallets
12. POD
13. Roles and responsibilities
14. Supply chain perspective
15. Top Loading

These opportunity groups are now assessed using a framework which has two major parameters: Its impact on the project targets and the ease of implementation. The former is an evaluation of how much an impact the improvement would have on savings in distribution cost, service level and lead time. The latter will show how easy it would be to implement the suggested improvement which is evaluated based on the investment cost and the time taken to implement. All these five factors are rated on a scale of 1-5 based on the information collected during the data collection phase. The description of the factors and the ratings are shown in Table 4-5. It is important to note that the impact on cost savings is given three times the weightage as that of other criteria. The reason for this being the importance of savings in distribution cost for the project. Hence the scale for distribution cost varies from 3 to 15.

Table 4-5: Description of factors and scale for opportunity assessment matrix

Parameter	Criteria	Weight-age	Definition	Remarks
Ease of implement-ation	Investment Cost	1-5	The cost required to implement	1 is highest cost, 5 is lowest cost required
	Time to Implement	1-5	Lead time for implementation	1 is the longest time required, 5 is least time required
Impact on targets	DC	3-15	The impact of the opportunity on DC	1 is least savings, 5 is maximum savings
	LT	1-5	The impact of the opportunity on LT	1 is negative impact on LT, 5 is positive impact on LT
	SL	1-5	The impact of the opportunity on SL	1 is negative impact on SL, 5 is positive impact on SL

To show how the evaluation was made, the opportunity group ''consolidation'' is taken as an example. The rating of the opportunity and reasoning behind it is shown in table 4-6. The ratings of all the other 15 groups are in appendix 8-2 while the result of the rating has been plotted in figure 4-8. The graph is constructed with ease of implementation on the ''y axis'' and impact on targets on the ''x axis''.

Table 4-6: An example of how an opportunity group (consolidation) was assessed

Ease of Implementation			**Impact on targets**			
Investment Cost	Time to Implement	Total	DC	Lead time	Service level	Total
1-5	1-5	2-10	3-15	1-5	1-5	5-25
3	3	6	15	4	5	24

- Investment cost (3) – Consolidation could either be done in one of the existing warehouses or in a new market warehouse. If it is done in an existing warehouse, the cost would be low but if a new warehouse needs to be used, the cost might be higher. Hence a rating of 3 is given which is midway.
- Time to implement (3) – On similar lines, the time taken for implementing a new set up will be dependent on what type of warehouse/solution would be used. Hence a rating of 3 is given.
- Savings in DC (15) – The savings in distribution cost is expected to be maximum in this case as there are several LTL cases today which will almost be eliminated if consolidated.
- Lead time (4) – When there is a consolidation point, closer to the market with some buffer stock, the lead time will be better than the current setup.
- Service level (5) – The service level to the customer would be very good, considering there will be buffer at the consolidation point. There will also be a possibility to reduce the minimum order quantity, thereby increasing customer satisfaction.

These ratings were given by the authors based on data collected from various stakeholders through interviews. It is important to note that these ratings were reconfirmed during tollgate meeting 3 with relevant stakeholders by incorporating their suggestions and input.

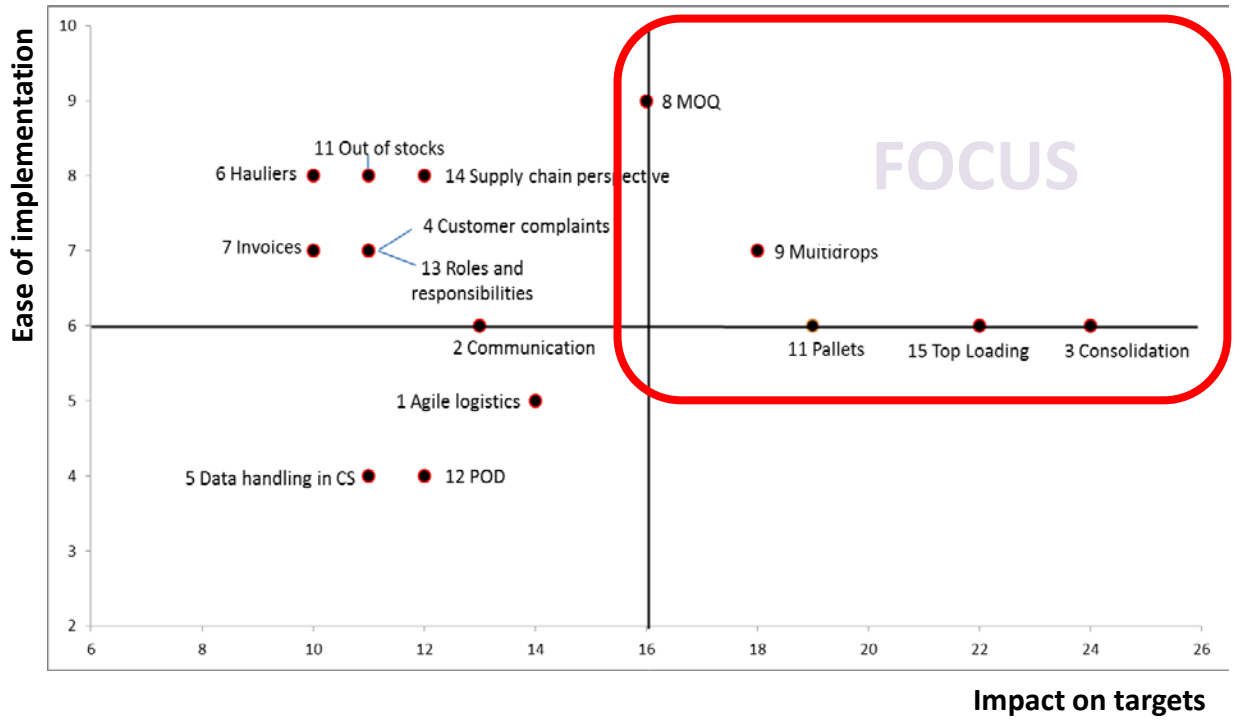

Figure 4-8: Opportunities assessment matrix with areas of maximum impact

4.2.4 Improvement areas with maximum impact

Figure 4-8 shows a classification of what impacts the opportunities will have on the targets and also how easy it would be to implement the changes. It is important to focus on those opportunities which have maximum impact on targets and easy to implement. These include the following opportunity groups:

- MOQ
- Multi drops
- Pallets
- Top loading
- Consolidation

These opportunities will be used to create the scenarios for the new logistics set up. However, the other opportunities will still be used to assess the softer aspects of the scenarios such as service level and lead time. Thus, the opportunity groups were broadly divided into two parts as shown in figure 4-9, one used for scenario creation and the other used to assess service level and lead time impacts of the scenarios.

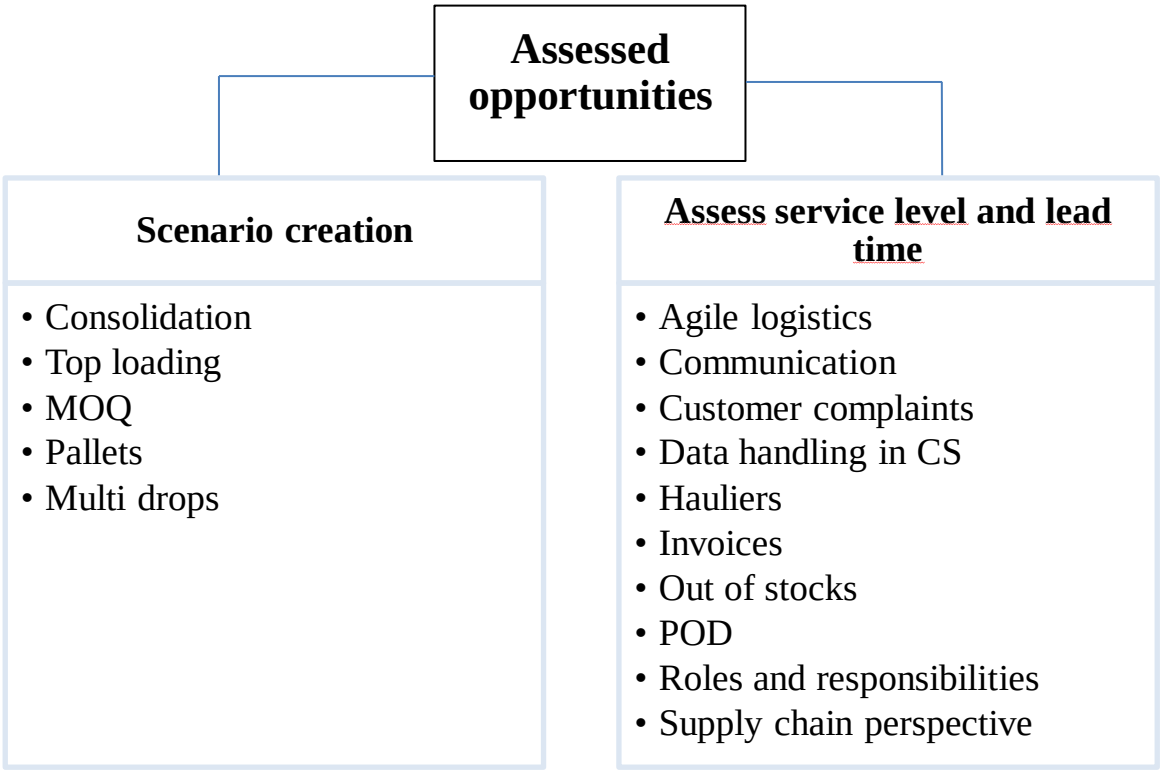

Figure 4-9: Division of opportunity groups

4.3 Scenario creation and assessment

4.3.1 Deciding strategy using Fisher framework

The authors realized that a one size fits all approach might not contribute to the effective achievement of the research goals and therefore there is a need to split the goods shipped to the Baltics in two broad categories. Fisher's matrix was used to objectively decide what the best strategy for individual categories is.

This division was based on the overall characteristics of the goods, see Table 4-7. The category named Nokia includes all the consumer tissue items that are produced in Nokia, Finland which are shipped FTL towards the customers. The items are characterized by steady demand, high volume, very seldom out of stocks and a contribution margin, which is the lowest amongst the goods distributed by SCA. The category named Non-Nokia includes all the personal care products included in the baby and feminine categories produced in various European sites and the tissue products shipped from Mannheim. All these are shipped LTL towards the customers, mainly because the low volumes and high unit value. The demand is fluctuating and it is highly promotion driven. The out of stock instances for Non-Nokia goods are frequent, fact indicated by our interviewee and confirmed by the secondary data generated with BI, where there are many shipments with less than the minimum order quantity agreed with the customers as a response to the backlogs. The contribution margin for Non-Nokia goods is generally high.

Table 4-7: Characteristics of Baltic bound goods

	High volume consumer tissue (Nokia)	Low volume tissue, baby and feminine (Non-Nokia)
Volume	High	Low
Out of stocks frequency	Low	High
Contribution to margin	Low	High

After applying the Fischer's Framework, the authors decided that for Nokia goods, which are basically functional goods, the best fit is an efficient supply chain. For the Non-Nokia goods, which are much similar to the innovative goods described by Fischer, the best fit is a responsive supply chain, see Figure 4-10.

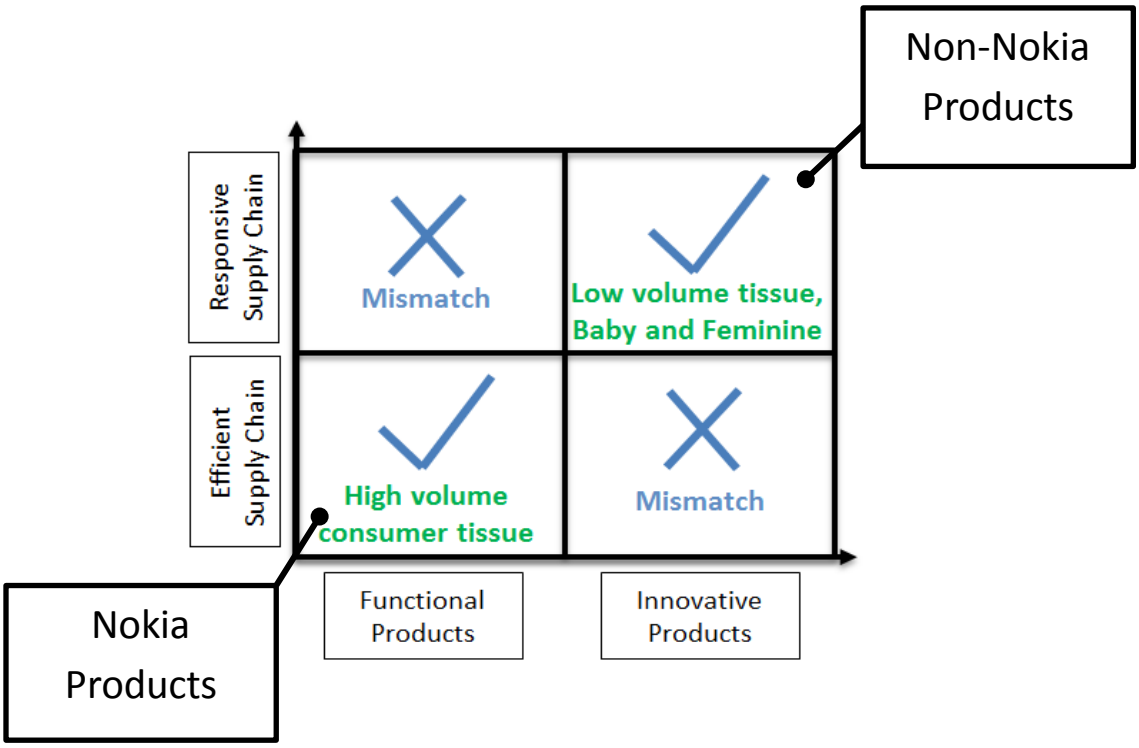

Figure 4-10: Fisher's Framework applied to Baltic goods

4.3.2 Scenario creation process and scenario descriptions

The opportunities in the focus quadrant of the assessment analysis and the goods division based on Fischer framework were used as a starting point for the scenario creation process. The literature review further helped into deciding what are the proven best ways to achieve efficiencies and agility in the quest to supply customers at a low cost, while maintaining or improving the service level and lead time. The results are depicted in Figure 4-11.

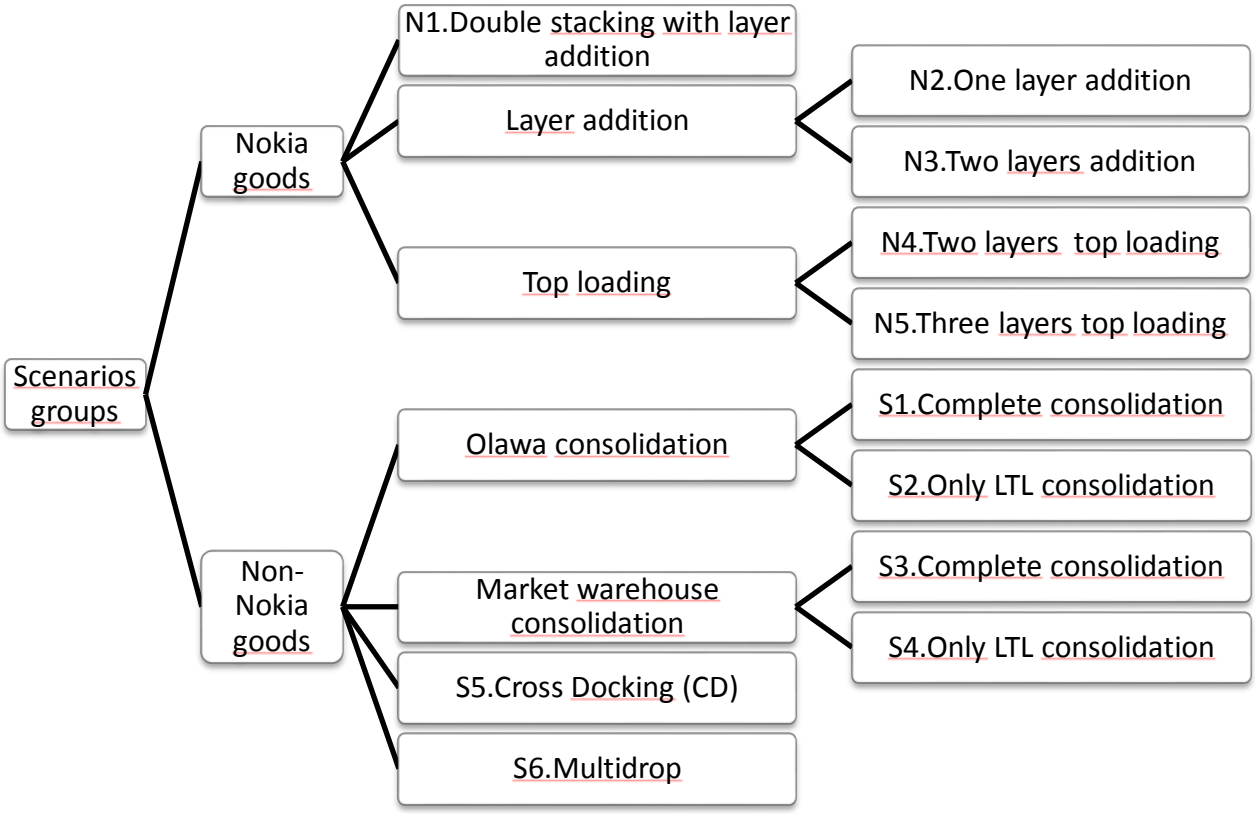

Figure 4-11: Scenario groups

For the Nokia goods the authors propose a total of five scenarios. Currently, most of the shipments of tissue from Nokia are FTL, which is seemingly highly optimal. As described in section 4.1.5. the consumer tissue, baby and feminine categories are not dense and hence weight is not a constraint, but as, volume utilization in the trucks is the issue. Taking in consideration the pallet height in Nokia goods' case, with a maximum of 2,1m, there is a room for truck volume utilization increase of 25%. The following five scenarios (N1-N5) have been identified to have the best potential to mitigate this issue.

N1. Double stacking with layer addition - A truck leaving from Nokia IDC currently has 33 pallets, each of which are 2,1m high. These pallets have 10 layers TRPs each. Double stacking translates into the reconfiguration of these pallets into 1,3m high pallets and 66 in number, which are stacked in two layers. This would also mean that now, each pallet has 6 layers and hence there are 12 layers in each pallet place (one pallet place contains 2 pallets in this case).

N2. Layer addition (one) - A truck leaving from Nokia IDC currently has 33 pallets, each of which are 2,1m high. These pallets have 10 layers of TRPs each. In this scenario, one more layer will be added during production, which means there will be a total of 11 layers in each pallet.

N3. Layer addition (two) - A truck leaving from Nokia IDC currently has 33 pallets, each of which are 2,1m high. These pallets have 10 layers of TRPs each. In this scenario, two more layers will be added during production, which means there will be a total of 12 layers in each pallet.

N4. Top loading (two) - A truck leaving from Nokia IDC currently has 33 pallets, each of which are 2,1m high. These pallets have 10 layers of TRPs each. In this scenario, two more loose layers will be added on each pallet in the warehouse before/after loading the truck. This would mean there will be a total of 12 layers in each pallet (2 loose layers on top).

N5. Top loading (three) - A truck leaving from Nokia IDC currently has 33 pallets, each of which are 2,1m high. These pallets have 10 layers of TRPs each. In this scenario, three more loose layers will be added on each pallet in the warehouse before/after loading the truck. This would mean there will be a total of 13 layers in each pallet (3 loose layers on top).

For the Non-Nokia goods, the authors propose a total of six scenarios. In 2015, most of the shipments of feminine, baby and low volume tissue categories were LTL, which means they were suboptimal from a cost perspective when comparing with the FTL option. The case company uses a cost scale when establishing the cost paid for one shipped pallet, based on the tariffs negotiated with hauliers for every transportation lane. According to the scale pricing agreed with hauliers, it is much more expensive to ship LTL. Therefore, the authors decided to assess a few scenarios that are meant to reduce the number of LTL: consolidation in Olawa, Poland or in a market warehouse located in the Baltics, crossdocking in the Baltics and multidrops. The scenarios (S1-S6) in this case are described below.

S1. Complete consolidation in Olawa – All the current shipments moving out of Falkenberg, Hoogezand, Gemerska and Manheim will be sent as FTL to Olawa where it will be consolidated. These will then be shipped to customers according to their orders. An inventory with safety stock will be held in Olawa for these SKUs being shipped to the Baltics.

S2. LTL consolidation in Olawa – All the current LTL shipments moving out of Falkenberg, Hoogezand, Gemerska and Manheim will be sent as FTL to Olawa where it will be consolidated. These will then be shipped to customers according to their orders. However, the current FTL and TL shipments from the above mentioned IDCs will be sent as it is now, directly to the customers. An inventory with safety stock will be held in Olawa for these SKUs being shipped to the Baltics.

S3. Complete consolidation in a Market Warehouse in Lithuania – All the current shipments moving out of Falkenberg, Hoogezand, Gemerska, Olawa and Manheim will be sent as FTL to a MW in Lithuania operated by a LSP where it will be consolidated. These will then be shipped to customers according to their orders. An inventory with safety stock will be held in the MW for these SKUs being shipped to the Baltics.

S4. LTL consolidation in a MW in Lithuania – All the current LTL shipments moving out of Falkenberg, Hoogezand, Gemerska, Olawa and Manheim will be sent as FTL to the MW where it will be consolidated. These will then be shipped to customers according to their orders. However, the current FTL and TL shipments from the above mentioned IDCs will be sent as it is now, directly to the customers. An inventory with safety stock will be held in the MW for these SKUs being shipped to the Baltics.

S5. Cross Dock in Lithuania – All the current LTL shipments moving out of Falkenberg, Hoogezand, Gemerska, Olawa and Manheim will be sent as FTL to the cross dock. These goods will then be mixed based on order and destination and then shipped to the customers. The inbound, cross-dock and outbound should be operated by the same LSP. There is no inventory or safety stock in the cross dock.

S6. Multi drops – This would mean loading trucks with multiple orders from a single IDC and dropping them in a sequence to different customers on route.

Out of the six scenarios, S6 is not feasible owing to very low orders from individual customers to specific IDCs. This would also mean that the order pattern of customers need to be regulated which is not customer friendly. This leaves only five out of six left for further analysis.

4.3.3 Nokia goods

4.3.3.1 Framework

In order to decide, in an objective manner, which is the best solution for the Nokia goods, the authors decided to use a multidimensional framework. The framework assesses two kinds of aspects: the financial impact of the solution and the feasibility of the solution, from an implementation perspective. The two aspects are further divided into several parameters.

The parameters under the feasibility aspect are graded on a scale from 1 to 5, depending on how favorable the scenario is towards the parameter. This leads to a maximum of 35 points for the feasibility aspects as there are 7 different parameters. The financial aspect can get double the total of the feasibility aspect, leading up to 70 points. This is due to the fact that cost reduction is one of the main aims in logistics function, as the authors highlighted earlier. This was also reinstated by key stakeholders from the tollgate meetings. The scores for the both financial and non-financial parameters are being summed up and the scenario with the highest score out of 105 is considered part of the final solution, as presented in Figure 4-12.

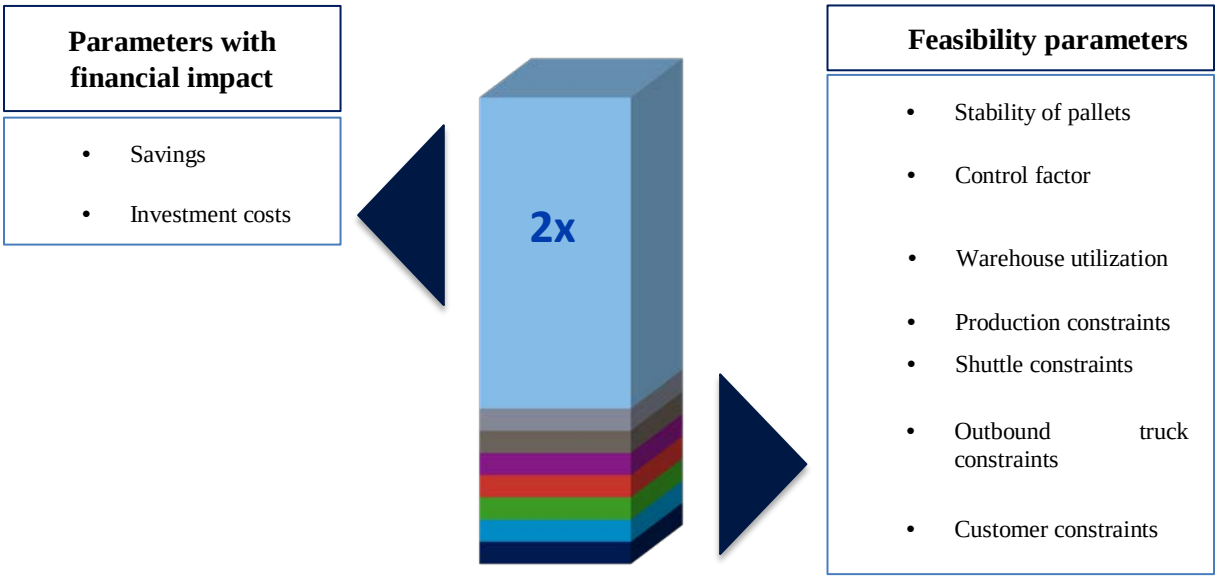

Figure 4-12: Nokia framework

4.3.3.2 Feasibility parameters

The authors used seven non-financial parameters related to the value chain downstream the converting line: stability of pallets, control factor, warehouse utilization, production constrains, shuttle constrains, outbound truck constrains, and customers' constraints. All of these parameters will directly influence the feasibility of implementation.

Stability of pallets is an essential parameter that needs to be secured as the pallet is the main load unit that bundles the goods, from the converting line until reaching the customer's premises. Besides protecting the quality and the integrity of the goods, a stable pallet prevents incidents while handling the goods when storing, loading and unloading the pallets. Generally, an increase in the pallet height, means that the center of gravity moves up, increasing the risk of instability. This is amplified when the pallets are stacked one on top of another up to a stack of three. If the stability is better, the grade is higher.

Control factor is also a global parameter and it is related to the ease of driving the implementation project with the internal resources from the Business Logistics department. It is related to the decision making ownership. If the decision making is inside the department and the need of involving other stakeholders in the process is low, then the grade is higher.

Warehouse utilization is a potential constraint. The warehouse near the Nokia production site is outsourced. SCA rents the entire storage facility from a LSP paying a certain tariff per square meter. As the warehouse part where the consumer tissue is stored is not equipped with racks, the pallets are stored in stacks of 3 layers. This is limited by the actual building height. Moving from a 3 pallets stack to a 2 pallets stack, could mean more space needed to store the goods and therefore an increase in storage costs. A potential increase in the storage space needed in Nokia means a lower value on the 1 to 5 scale.

Production constraints are related to the phase in production where the pallet is being built layer by layer with a palletization machine. A height limitation for pallets of 2,55m it is known to exist in the area and the process of eliminating this bottleneck could mean difficulties in the implementation phase of the project. The closer the new pallet height to the maximum height currently allowed, the lower the grade on the 1 to 5 scale.

Shuttle constraints are related to the phase of transferring the pallets from the production facility to the warehouse, which is situated in the close vicinity of Nokia production plant. The current shuttle trailers' clearance in height is only 2,55m as their bed is provided with rolls that enable easy loading and unloading of goods. The same grading system applies as in the production constraints part.

Outbound truck constraints are a risk that is generated when the goods are be shipped to the customers. Currently, the height of the trailers that has been agreed is above 2,7m, meaning that, after eliminating the constraints upstream, this can become a bottleneck. After investigating the current trailers' characteristics produced by various trailer manufacturers, the authors discovered that there are trailers which might be shorter than the agreed 2,7m. If the scenario implementation might be negatively impacted by the outbound trucks, then the grade on the 1 to 5 scale is lower.

Customers' constraints are represented by any possible extra cost or difficulty in implementing the scenario because of an incompatibility between the customers' logistics systems, i.e. storage rack and the way SCA chooses to ship the goods. This incompatibility might translate into extra cost invoiced to SCA by the customers for so called value added services, i.e. pallet reconfiguration. The higher the risk, the lower is the grade on the 1 to 5 scale.

The five scenarios N1 to N5 are graded based on these 7 parameters. The base for the grading is the data collected through various interviews with relevant stakeholders and other quantitative information. Further, these were verified with a few major stakeholders during tollgate meeting 4. Their suggestions and inputs were incorporated after the meeting in order to ensure a reality check on the scenario grading.

Table 4-8: Overall (feasibility and financial) ratings for Nokia scenarios

	N1	N2	N3	N4	N5
Stability of pallets	5	3	1	4	4
Control factor	2	2	1	4	4
Warehouse utilization	4	3	1	5	5
Production constraints	2	3	2	5	5
Shuttle constraints	2	5	1	5	5
Outbound truck constraints	4	5	3	5	1
Customers constraints	5	5	4	3	2
Financial impact	63	46	70	35	54
TOTAL	**87**	**72**	**83**	**66**	**80**

4.3.3.3 Financial parameters

The financial parameters are divided into two parts: the savings compared to the current set-up and the investment costs needed to implement the scenario. The savings are the outcome of a business case involving freight costs, warehousing costs, pallet return costs and other value added costs in the setup. For every scenario the savings from the respective business case are projected to a period of five years and the one time investments are then reduced. This gives the bottom line impact over five years. Now the value in Euros will be converted to a scale, so that it can be compared with the points from non-financial parameters. The scenario with the highest bottom line impact is equated to double that of total maximum possible points from non-financial parameters.

Scenario with highest bottom line impact = 2 * (total maximum non-financial points)

$$= 2 * 35 = 70$$

The rest of the scenarios are then given points proportionally. These points are then added together with the non-financial points and are presented in table 4-8.

4.3.3.4 Overall scenario assessment

From a financial impact perspective, N3 is more favorable with a total of 70 points, almost 10% more than the next best scenario. However, the feasibility aspects are decisive in changing which scenario is the most favorable. At the outset, N1 scores best when both financial and feasibility aspects are combined.

Scenario N1 means moving from a 2,1m high pallet that has 10 layers of goods to two pallets that are 1,3m high with 6 layers each and placing them on top of each other. This takes place straight at the palletizing stage and leads to a stack that is 2,65m high. This is just 5 cm lower than the typical clearance for the trailers that are supposed to be provided by the hauliers operating on the lane between Nokia and the customers.

From a financial perspective, this approach will bring savings in the freight to customer costs, by reducing the number of trucks shipped to the customers. This is due to maximization in the truck volume utilization. Another cost saving comes from avoiding paying extra to customers for adapting the pallets' height. This is generally done by customers in order to fit their racking systems. As the customers need not re-palletize, there is also an improved service level perceived by them.

The pallets that are formed at the end of the converting line are transferred by roller conveyors to the loading dock. From there the pallets are loaded in the shuttle truck that is equipped with a rollers bed that allows fast automatic loading of pallets. The shuttle truck has a height clearance of 2,55m. The shuttle trailer has the role of transferring the pallets with goods from the production plant to the warehouse, which is located a few kilometers away. A moderate investment is needed in order to eliminate all the height barriers between the palletizer and the warehouse and for adapting the settings for the palletizer.

However, it is important to note that the savings would remain intact only if the empty pallets are shipped back to Nokia IDC. This has also been included in the business case calculation with a rejection rate of pallets at 5%. Currently, the pallets are being sold to the customers at a lower price than SCA's internal price. As there would be two pallets in each pallet place instead of one according to N1, it is important to ship those back to Nokia IDC, which is the closest IDC.

Besides the financial benefits, there are other benefits provided by the solution are mentioned below.

- The pallets are very stable and hence there is improved safety when handling them.
- There is comparatively better warehouse utilization.
- This scenario enables hassle free unloading and storing at customers' end, thereby improving service level.
- The lead time is not affected in the new scenario.

Thus, the most suitable logistics setup in the case of Nokia shipments are to double stack them after adding a layer each to the pallets. This would not only reduce the distribution cost, but will also improve service level to the customers while preserving the lead time.

4.3.3.5 Risk assessment for new logistics setup for Nokia goods

The solution for Nokia goods suggested by the authors has obviously many advantages but it is not risk free. A risk assessment followed by a risk mitigation strategy was suggested in the hope that it will reduce or prevent the impact of unforeseen events on the project success.

A total of 8 risks were identified for implementing N1 scenario. These risks were then rated based on their impact and occurrence probability. Risk impact is the extent to which the identified risk could affect implementation of the new logistics set up. Occurrence probability is the chances that the risk could occur. The identified risks were first graded on a scale of 1-5 based on both these parameters. ''1'' meaning a low risk impact and low occurrence probability of the risk and ''5'' meaning high on both parameters. Now the risks were plotted on a graph with risk impact on the ''y axis'' and occurrence probability on the ''x axis''. The outcome of the plot is shown in figure 4-13.

The base for identifying these risks and scoring them was the information obtained from internal and external interviews. The authors scored the various risks and later discussed with the stakeholders during tollgate meetings to ensure validity of the identified risks and their scoring.

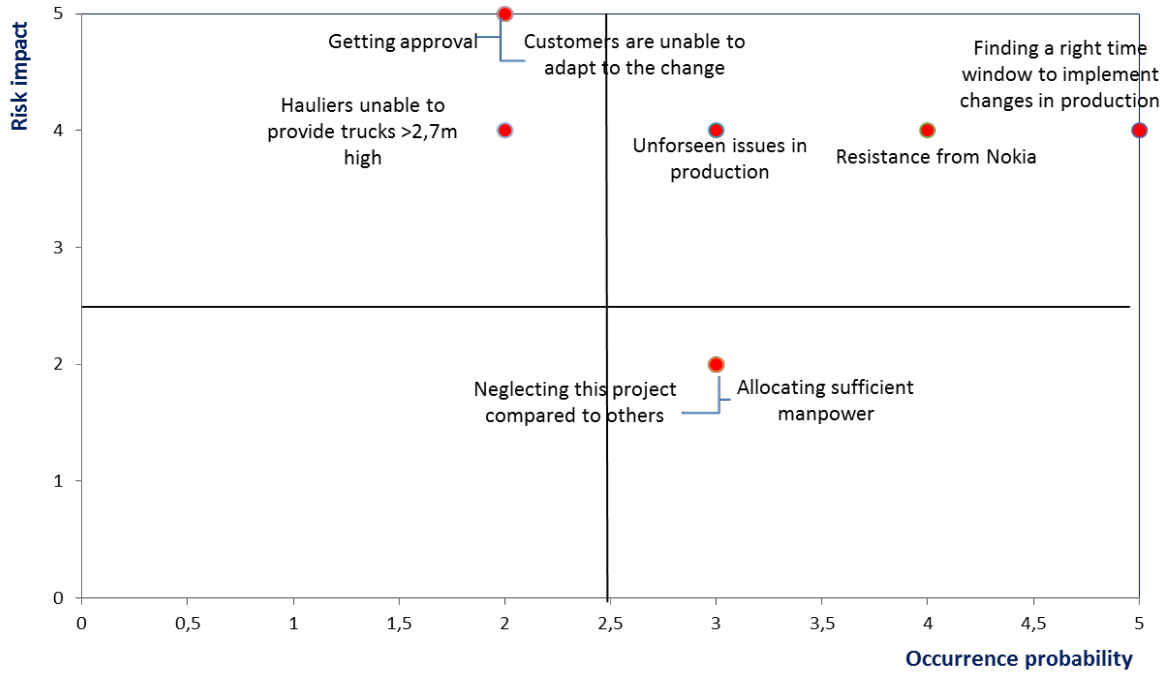

Figure 4-13: Risk assessment for scenario N1

In table 4-9, the risks are sorted based on the descending order of the overall score and a preventive mitigation measure is suggested. As it can be seen in Figure 4-13, there are 3 risks in the danger zone that need special attention as its impact and occurrence probability are high. These are the three risks in the top of table 4-9.

Table 4-9: Risks and mitigation measures for scenario N1

Risk	Mitigation
Finding a right time window to implement changes in production	Plan the project well in advance by coordinating with production
Resistance from Nokia	Top management involvement
Unforseen issues in production	A detailed risk assessment should be done to handle uncertainties
Getting approval	Project sponsors to ensure outcome of this project is communicated to decision makers
Customers are unable to adapt to the change	Inform customers about this change well in advance
Hauliers unable to provide trucks >2,7m high	In the short term, inform hauliers to provide trucks >2,7m high and later include it in the next tender process
Allocating sufficient manpower	Recruit/reallocate personnel and appoint a dedicated resource for project implementation
Neglecting this project compared to others	Top management involvement in the prioritization process

4.3.3.6 Implementation plan for new logistics setup for Nokia goods

In order to claim all the advantages of the final solution for Nokia goods, an implementation plan has been suggested by the authors. This should be used as a guideline for the team that will be in charge of implementing the suggestions into practice. According to the outline of the implementation, this would be completed within 6 months. However, there is a need of a much more detailed plan in order to change the logistics setup which is not covered in the scope of this thesis. The implementation plan has been divided in 6 parts: the initiation phase, the planning phase, the initiate execution phase, the testing and communication phase, the going live phase and the follow-up phase.

Month 1 - Initiation phase

- Getting approval from top management to start implementation;
- Assign a project manager and deliverables for the implementation;
- Decide about the project team members.

Month 2 - Planning phase:

- The project team has the kick-off meeting;
- The project team jointly creates the project plan and performs a risk assessment.

Month 3 - Execution phase:

- Analyze and decide the SKUs to be included in the project;
- Plan and prepare for testing the changes;
- Adapt shuttle trailers;

Month 4 - Testing and communication phase:

- Testing execution on the production line for all selected SKUs;
- Informing the hauliers about the changes.

Month 5 - Going Live phase;

- Update master data which will enable goods movement according to the new pallets specifications
- Going live with all customers

Month 6 - Follow-up phase;

- Receive feedback from hauliers, customers and production
- Improve based on feedback

4.3.3 Non Nokia goods

4.3.4.1 Framework

As in the case of Nokia goods, a similar framework has been applied to evaluate the Non-Nokia scenarios. The two major aspects are financial impact and feasibility of the solution, from an implementation perspective. The parameters under the feasibility aspect are graded on a scale of 1 to 5. These are totally eight in number and hence the maximum can be up to 40 points. The higher the value, the more favorable the scenario is for the parameter.

The financial aspects are majorly assessed through the business case. However, in order to include this in the framework, the savings are translated in terms of points. The weightage for financial aspect is double that of feasibility, for the same reason as that of Nokia segment. Hence the financial aspects can get a maximum of 80 points. This would mean that an ideal scenario with maximum on both aspects would get a maximum of 120 points as shown in figure 4-14.

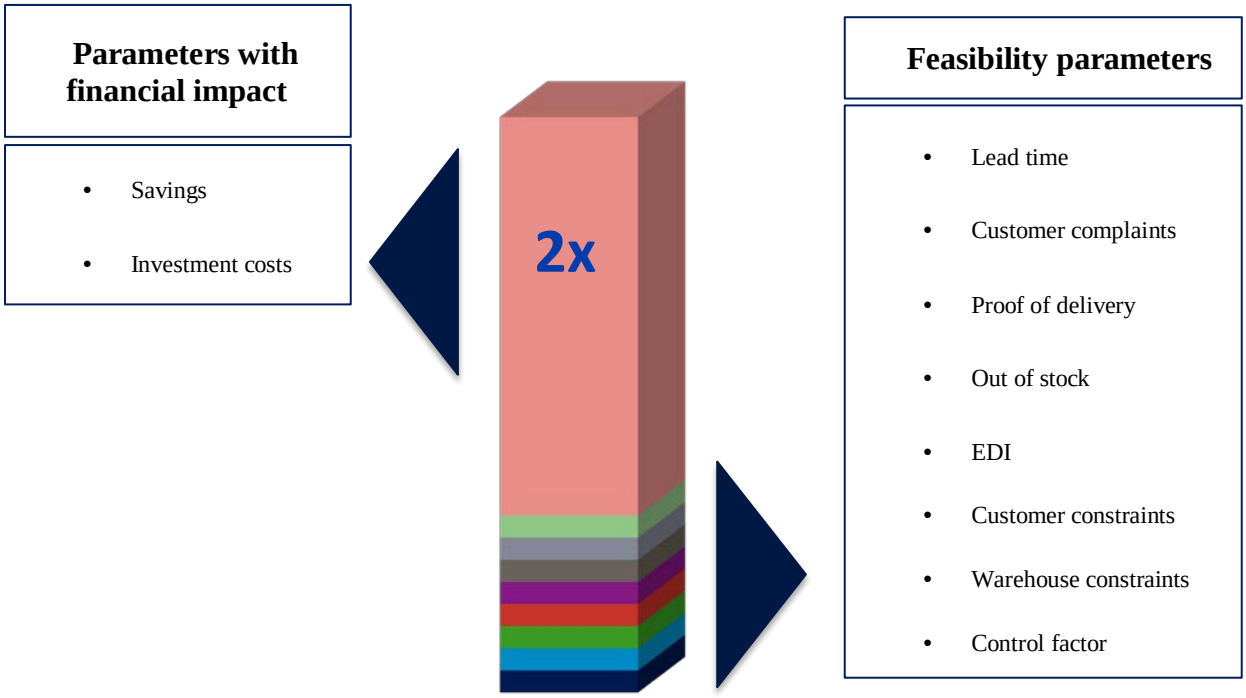

Figure 4-14: Non-Nokia framework

4.3.4.2 Feasibility parameters

The non-financial parameters in this case were eight in total. These were: lead time, customer complaints, POD, out of stock, EDI, customer constraints, warehouse constraints and control factor. Each of these will be explained in this section. These parameters affect the feasibility of implementing each of the scenarios. Each of these parameters is graded on a scale of 1-5 and hence the maximum possible outcome for the feasibility of a scenario is 40.

Lead time is the time taken for the goods to reach the customer's premises once the order is placed. If the lead time taken in the new scenario is similar to the current setup, then the score is 3. If the lead time improves (reduces), the scoring is higher. But if the lead time worsens (increases), then the scoring is below 3.

Customer complaints are a major part of the non-Nokia flow as most of the complaints are caused here. The issues range from incomplete orders due to out of stocks at the IDCs to untimely deliveries by hauliers. Hence if the customer complaints are expected to reduce, the scoring is higher.

POD implementation is key in measuring actual service levels. If not, there is a risk that the SL might be perceived differently by the customer and SCA. Implementing POD is not an easy task as it involves investments from the hauliers, customers and SCA. Hence, if the scenario aids in implementing POD, it is graded higher.

Out of stocks at the customer's shelves is another factor which is caused majorly due to two reasons. It can be attributed either to the inability of the customer to order timely as the MOQ is high or due to out of stocks at the IDCs. If the scenario offers lower chances of out of stocks, then the rating is higher.

EDI implementation is critical in order to reduce the manual handling of data in Customer Service and also to reduce humane errors in the order to billing flow. The created scenarios would help in this, as it might lead to a reduction in the number of hauliers. Thus, if the scenario helps in EDI implementation, it is graded higher.

Customer constraints in the non-Nokia case are mostly related to the reduction in their order flexibility. A change of set up might either lead to reduction or increase in MOQ thereby affecting customers' order patterns. If the flexibility reduces, the rating is lower and vice versa.

Warehouse constraints are those issues which might surface due to an extra warehouse being used for Baltic supplies. An example of this issue could be that either Olawa IDC or the MW might not have the capacity to accommodate the Baltic supplies. If there is such a risk, then the rating is low else it is high.

Control factor as described in the Nokia case, is the ease with which the project can be implemented. It is directly related to the number of decision makers involved in the process. If there is a necessity to involve fewer stakeholders, then the rating is higher.

The five scenarios were then graded according to the above parameters and combined with a financial parameter and the results are shown in table 4-10.

4.3.4.3 Financial parameters

The financial parameters are divided into two parts: the savings compared to the current set-up and the investment costs needed to implement the scenario. The savings are the outcome of a business case involving freight costs, warehousing costs and other value added costs in the setup. For every scenario the savings from the respective business case are projected to a period of five years and the one time investments are then reduced. This gives the bottom line impact over five years. Now the value in Euros will be converted to a scale, so that it can be compared with the points from non-financial parameters. The scenario with the highest bottom line impact is equated to double that of total maximum possible points from non-financial parameters.

Scenario with highest bottom line impact = 2 * (total maximum non-financial points)

$$= 2 * 40 = 80$$

The rest of the scenarios are then given points proportionally. These points are then added together with the non-financial points and are presented in table 4-10. Cases S1 and S5 from the table have a negative financial score, which is indicative of negative savings (or losses) during financial evaluation.

Table 4-10: Overall (feasibility and financial) ratings for non-Nokia scenarios

	S1	S2	S3	S4	S5
Lead time	4	3	5	4	4
Customer complaints	5	5	5	5	5
Proof of delivery	4	3	5	4	5
Out of stock	5	4	4	3	3
EDI	4	3	5	4	5
Customer constraints	5	4	5	4	2
Warehouse constraints	4	5	5	5	5
Control factor	4	4	2	2	2
Financial Score	-26	67	46	80	-7
TOTAL	9	98	82	111	24

4.3.4.4 Overall scenario assessment

From a financial perspective, scenario S4 is the best option. However, from a feasibility perspective, scenarios S1 and S3 seem more favorable. On combining both aspects, scenario S4 scores the maximum points of 111. Thus, this is the most suitable logistics set up for non-Nokia shipments. The strategy behind how this setup would work is described in this section.

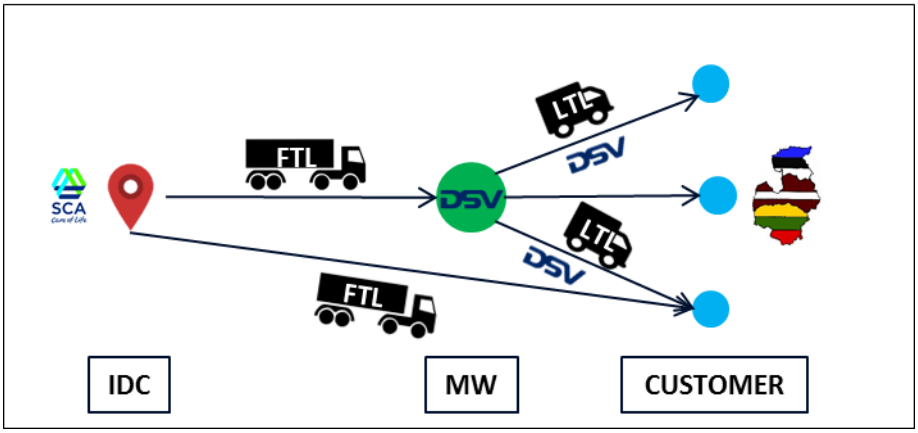

Figure 4-15: Strategy behind LTL consolidation in a MW

Figure 4-15 gives an indication of how this set up would function. It is important to note that the non-Nokia shipments involve the shipments from Hoogezand, Olawa, Falkenberg, Manheim and Gemerska factories. As most of these are to the south western part of Baltics, it would be ideal to have the MW in Lithuania. All the shipments that leave from the IDCs would be FTL. If the customer orders a FTL from a particular IDC, the goods will be shipped directly to the customer. If the customer orders LTL (less than 30 pallet places), then this would be shipped form the MW in Lithuania.

The MW will act as a storage point for the five factories with an average inventory and safety stocks of all SKUs being supplied to the Baltics. The replenishment to the MW is done using FTL from factory IDCs. Hence, the shipments leaving factory IDCs will always be FTL. The MW and the last mile shipments to the Baltic customers will be handled by a single LSP like DSV.

From a financial perspective, the savings majorly arises from the reduction of freight costs. This is due to the fact that there will only be FTL from factory IDCs. The increase in warehousing costs (including inventory and safety stocks) is not very high as the volume handled by the MW is only the current LTL shipments which are quite low. There is a one-time investment cost to integrate the information technology services of the LSP and the host company. In this case too, the empty pallets are returned back to Nokia IDC, which is the closest IDC to the Baltics. At a pallet rejection rate of 5%, this also generates some financial savings.

Besides the overall financial benefit, the other advantages that the MW brings are:

- Possibility for customers to order desired number of pallets, much lower than the current MOQ level;
- Possibility for customers to order tissue, baby and feminine products together;
- Ability for the company to list new low volume products to the Baltic countries;

- Possibility to do value added services like labelling and re-palletizing in the MW;
- Lead time reduction as the products are stored closer to the market
- Risk of out of stocks in the customers' shelves are reduced as the MW is closer to the market than the IDCs and safety stock is also available
- All these would lead to more flexibility for the customer and in turn reduce the number of customer complaints
- There is also an increased possibility to implement EDI and POD as there would be just one LSP to work with
- Working with an LSP will bring flexibility and it also improves the chances of building a strong relationship

Thus, the most suitable logistics setup in the case of non-Nokia shipments is to consolidate the current LTL shipments from Manheim, Hoogezand, Olawa, Falkenberg and Gemerska in a MW in Lithuania. However, the FTL shipments from these IDCs would still be shipped directly to the customers. This would not only reduce the distribution cost, but will also improve service level and lead time (for LTL shipments) to the customers.

4.3.4.5 Risk assessment for new logistics setup for non-Nokia goods

Besides the advantages of the mentioned setup, several risks were identified. These risks were then rated based on their impact and occurrence probability. Risk impact is the extent to which the identified risk could affect implementation of the new logistics set up. Occurrence probability is the chances that the risk could occur. The identified risks were first graded on a scale of 1-5 based on both these parameters. ''1'' meaning a low risk impact and low occurrence probability of the risk and ''5'' meaning high on both parameters. Now the risks were plotted on a graph with risk impact on the ''y axis'' and occurrence probability on the ''x axis''. The outcome of the plot is shown in figure 4-16.

The base for identifying these risks and scoring them was the information obtained from internal and external interviews. The authors scored the various risks and later discussed with the stakeholders during tollgate meetings to ensure validity of the identified risks and their scoring.

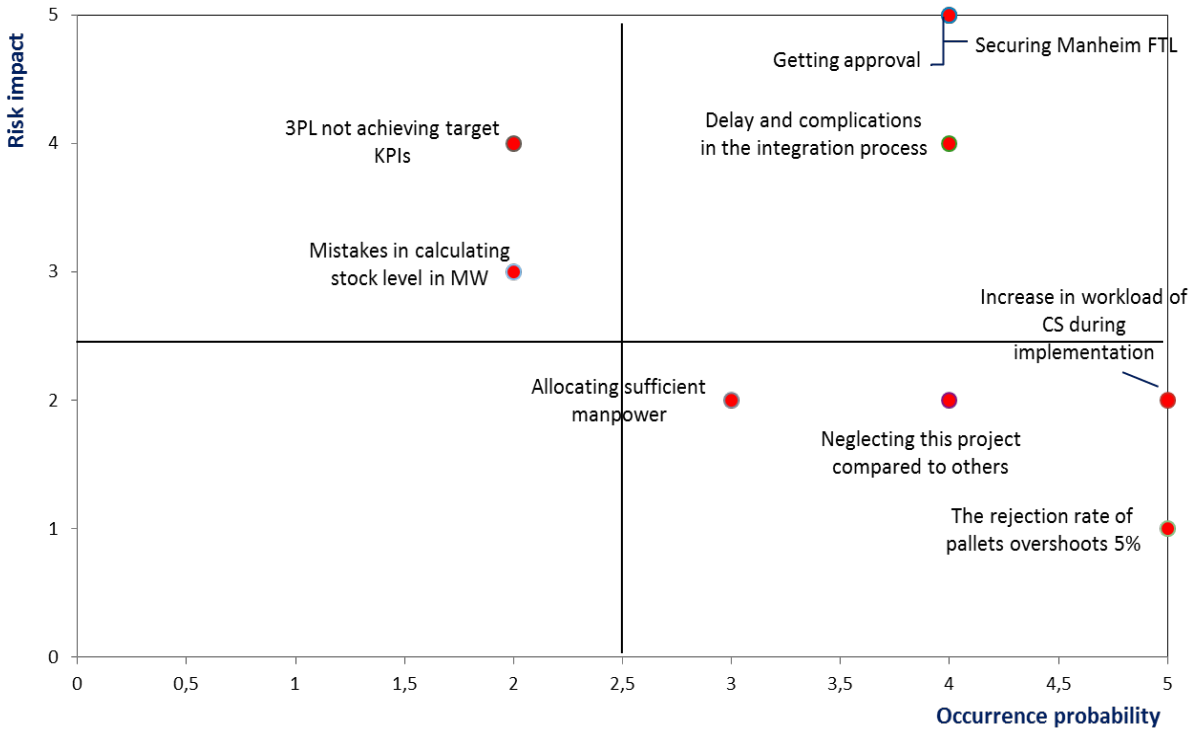

Figure 4-16: Non-Nokia risk assessment

Three of the nine risks identified fall in the zone with high impact and high occurrence probability. These need to be given special importance during implementation. Mitigation measures have been identified for all the risks and are shown in table 4-11.

Table 4-11: Risks and mitigation measures for scenario S4

Risk	**Mitigation**
Getting approval for implementation	Project sponsors to ensure outcome of this project is communicated to decision makers
Securing Manheim FTL	Volume rebates could be offered to customers
Delay and complications in the integration process	Central organization involvement and very close collaboration between SCA and LSP
Increase in workload of CS during implementation	Involve CS in the project and get their input based on their experience while dealing with the Raisio MW in Finland
Neglecting this project compared to others	Top management involvement in the prioritization process
LSP not achieving target KPIs	Effective contract management
Allocating sufficient manpower	Recruit/reallocate personnel and appoint a dedicated resource for project implementation
Mistakes in calculating stock level in MW	In first year, the stock calculation should be

	regularly revised based on demand plan
The rejection rate of pallets overshoots 5%	CS should work closely with logistics organizations in Gemerska and Manheim to ensure good quality of pallets

4.3.4.6 Implementation plan for new logistics setup for non-Nokia goods

The implementation of the new logistics setup has been split into four quarters over one year. This is an outline of the implementation, however there needs to be a much more detailed plan in order to change the logistics setup.

Quarter 1 - Initiation and planning phase

- Get approval from senior managers
- Assign the project manager and deliverables
- Decide project team members
- Arrange a kick-off meeting
- Jointly create the project plan
- Perform a risk assessment
- Estimate volume and services to be handled by MW

Quarter 2 - Initiate execution phase

- Request data creation for new plant in SAP
- Tendering process for LSP
- Decide KPIs to be used to evaluate LSP
- Contract signing with LSP

Quarter 3 - Integration and communication

- Integrating SCAs information system with LSP's
- Inform customers and hauliers about changes
- Negotiate volume discount policies

Quarter 4 - Execution and follow-up

- Update product and plant master data
- Pipeline fill for MW
- Do the first deliveries to customers
- Receive feedback from hauliers, customers, supply services and improve
- Document and write working procedures for the new setup

4.4 Other recommendations

While trying to find answers for the research questions, the authors found out other potential areas that need special attention to enable an enhanced functioning of the recommended logistics setup.

- When it comes to service level improvement, the customers' complaints should be part of the service level calculation, as nowadays the customers' complaints are not impacting the service level in an objective level.
- Another deficiency related to service level is not using POD when calculating the effectiveness of outbound logistics towards the Baltic customers. Currently the last measurement point of the service level is at the IDC that ships the goods, therefore SCA is assuming that the freight to customer is flawless, which is rarely true. In order to enable POD, the host company needs to make sure the hauliers are enrolled in Transporeon network and are being able to provide services such as T-Slot and T-Track. This should happen in the preselection stage of the yearly transportation tender. The implementation of POD would enable effective contract management and it would constitute a powerful KPI for assessing the hauliers performance.
- EDI implementation should be accelerated to avoid manual handling of data in the CS department which would also improve service level.

5 Conclusions

The purpose of this thesis was to evaluate the current logistics set up for consumer goods towards the Baltic countries. It was also to provide solutions to reduce overall distribution costs and at the same time, if not improve at least preserve the current service levels and lead times. In order to fulfil this purpose, three research questions were used and those were:

- ***How is the current setup of outbound logistics towards Baltics structured?***
- ***What are the opportunities available in order to improve the current setup?***
- ***What are the possible outbound logistics scenarios based on identified opportunities? Which scenario suits best for the current context?***

In order to map the current setup of outbound logistics towards the Baltics, various data collection methods were used. These included quantitative data from internal ERP software and BI report module, qualitative data through 15 internal interviews and 2 external interviews, tollgate meetings and plant visits. The data collected corresponded to the year 2015. The host company has two types of plants, tissue mills and personal care factories. Tissue mills produce consumer tissue and the latter produces baby and feminine products. These three categories are combined together and termed as consumer goods. A total of 9 factories cater to the Baltic countries and are located in Finland, Germany, Italy, Slovakia, Sweden, Poland, Belgium and Holland. Approximately 1861 trucks were shipped to customer in Baltics from certain factory IDCs, out of which 1527 were FTL, 222 were LTL and the rest were top loaded. There are currently 4 major customers, out of which 3 are modern retailers and one distributor. 50% of the overall distribution costs is freight costs and about 85% of the costs is incurred by tissue.

The main factory supplying the Baltics is Nokia in Finland. Nokia ships mostly E21 ULVs with about 20% of the truck volume being unutilized. Further, majority of SKUs produced for Baltics in Nokia are dedicated for this market. On the other hand, most of the shipments from factories other than Nokia are LTL. This is majorly caused due to low MOQs and out of stocks in a few factories. Although the current SLs in the range of 97-98% are perceived as good within the company, the SL measurement is not done using POD at the customer's end. The order management at the CS is majorly manual and time consuming. At the outset, the current logistics set up is not cost efficient and is not flexible and hence does not cater timely to the needs of customers.

In order to assess the current setup and identify suitable areas of improvement, a SWOT and RCFA was done using the collected data. The consequence was a list of 18 opportunities through SWOT and 32 countermeasures for the weaknesses subjected to RCFA. These were consolidated into 15 opportunity groups which were assessed using two factors: ease of implementation and impact on targets. This resulted in a focus group of five opportunities which had the maximum impact on targets and comparatively easy to implement as well. These opportunity groups were MOQ, multi drops, top loading, pallets and consolidation. Other opportunity groups which were used to assess softer aspects of lead time and service level were: agile logistics, communication,

customer complaints, data handling in CS, hauliers, invoices, out of stocks, POD, roles and responsibilities and having a supply chain perspective.

As a next step, Fisher's model was used to broadly split the products into two categories namely Nokia and non-Nokia. The former included all the supplies from Nokia plant in Finland which needed an efficient supply chain, while the latter included all the other supplies (except those from Italy) which needed a more responsive supply chain. A total of five scenarios were identified for the Nokia case and six in the case of non-Nokia. All these scenarios were evaluated based on financial and non-financial parameters.

The most suitable logistic setup for Nokia goods to improve truck utilization is by double stacking with layer addition (N1). This means moving from a 2,1m high pallet that has 10 layers of goods to two pallets that are 1,3m high with 6 layers each and placing them on top of each other. Besides the financial benefits, the solution provides better pallet stability and safety, better warehouse utilization and enables hassle free unloading and storing at customers' end. The most suitable setup for non-Nokia goods is to have a MW in Lithuania where all the current LTL shipments will be consolidated, while the FTLs will be shipped directly to customers (S4). The MW and the last mile shipments to the Baltic customers will be handled by a single LSP like DSV. Besides financial savings, the other major benefits include flexibility for customers to order LTL shipments with a combination of all products, ability to list new products, reduced lead time, out of stocks and customer complaints. Overall, this setup would improve flexibility yet bring about savings in distribution cost.

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7 Appendix

Appendix 7-1 - Detailed split of opportunity groups

OPPORTUNITIES GROUP	OPPORTUNITIES
Agile logistics	Usage of mixed pallets from Gemerska
	A better (Agile) logistics set-up
Communication	To make sure the procedures in place for communication are being used
	Sales should communicate well with CS about promotions calendar
Consolidation	Reduce LTL shipments for personal care
	Explore the option of a market warehouse
	Avoid LTL exceptions in CT and try to top load wherever possible
	Evaluate the possibility to consolidate PC category
	Consolidate low volume CT with PC
	Tap the potential of Olawa IDC's capacity being increased
Customer complaints	Using complaints as a source of continuous improvement
	Quantify the impact of customer complaints
	Compare SCA's SL with customer's SL
	Have a system to integrate all the customer complaints into the SL measurement
Data handling in CS	Increase usage of EDI
	Reduce manual handling of data
	CS and sales should promote the implementation of EDI
	Review the order allocation system and reasons for manual intervention
Hauliers	Ensure timely submission of invoices by hauliers
	Specify the usage of Transporeon tools T-Slot and T-Track at the RFI stage
	Measure hauliers with respect to service level, exceptions, agility and customer satisfaction
Invoices	Set up a system to issue the invoice according to the delivery date
	Modify the payment term period according to the lead time
MOQ	Optimize MOQ to reduce costs and improve lead time
	Reevaluate MOQ and only dispatch FTL for CT
Multi drops	Evaluate the possibility of multi drops
	Improve or put a system into place for multi drops
Out of stocks	Quantify out of stocks
	Forecast accuracy should be a part of the KPIs for sales force
	Maintain optimal level of safety stocks for all products
Pallets	Improve the overall management of pallets
	Evaluate other pallet deals (CHEP, non-returnable, etc)
	Haulier should not accept bad quality pallets from the IDCs
	Sales force should challenge customers

	Have a project on pallets and decide which is the best way to handle them
	SCA's internal pallet rate should be reevaluated and probably decentralized
POD	Measuring POD will give real SL and LT
	Implement a system to measure actual POD
	Implement a POD/T-track or another system to register all customer complaints
Roles and responsibilities	The way roles and responsibilities are assigned in the CS
	Have optimal safety stock and handle emergencies
	Revise the roles and responsibilities of CS and supply services
	Technical training (Excel) can be given to relevant personnel
Supply chain perspective	Have a Supply Chain perspective
Top Loading	Challenge the top loading cost in Nokia
	Convert FTL to TL in Nokia

Appendix 7-2 - Overall ratings of opportunity groups

No	OPPORTUNITIES GROUP	Ease of Implementation			Impact on targets			
		Investment Cost	Time to Implement	Total	Savings in DC	Lead time	SL	Total
1	Agile logistics	3	2	**5**	6	4	4	**14**
2	Communication	5	1	**6**	6	3	4	**13**
3	Consolidation	3	3	**6**	15	4	5	**24**
4	Customer complaints	4	3	**7**	3	3	5	**11**
5	Data handling in CS	2	2	**4**	3	4	4	**11**
6	Hauliers	5	3	**8**	3	3	4	**10**
7	Invoices	3	4	**7**	3	3	4	**10**
8	MOQ	5	4	**9**	9	4	3	**16**
9	Multidrops	4	3	**7**	12	2	4	**18**
10	Out of stocks	5	3	**8**	3	3	5	**11**
11	Pallets	3	3	**6**	12	3	4	**19**
12	POD	2	2	**4**	3	4	5	**12**
13	Roles and responsibilities	4	3	**7**	3	4	4	**11**
14	Supply chain perspective	5	3	**8**	6	3	3	**12**
15	Top Loading	3	3	**6**	15	3	4	**22**