2007:100 CIV

MASTER'S THESIS

Customer Management
at Sony Ericsson
Reverse Logistics Operations

Andreas Engberg

Luleå University of Technology

MSc Programmes in Engineering
Industrial Business Administration
Department of Business Administration and Social Sciences
Division of Industrial Logistics

2007:100 CIV - ISSN: 1402-1617 - ISRN: LTU-EX--07/100--SE

Customer Management at Sony Ericsson Reverse Logistics Operations

Andreas Engberg

January 2007

Preface

This master's thesis has been written during the fall of 2006 as the final ingredient in my university degree MSc in Industrial Management and Engineering at Luleå University of Technology, division of industrial logistics. The thesis has been conducted at Sony Ericsson Mobile Communications AB, Reverse Logistics Operations, in Lund, Sweden.

I would like to thank Ulf Gustavsson and Joacim Petersson for taking an interest in my idea and for giving me the opportunity to do the thesis at the Reverse Logistics Operations department. Joacim Petersson has also been a great support acting as my supervisor. And the rest of the people I have met at Sony Ericsson have been most sympathetic and helpful. The visit at Elcoteq and Péter Künstler's time and knowledge provided an appreciated example of the customers' field of work and point of view. My thanks also go to my supervisor at Luleå University of Technology, Anders Sörqvist, who has assisted me with his time and knowledge.

Lund, January 2007.

_____

Andreas Engberg

Abstract

The market for mobile telephones is fast and tough. In order to keep customers in such a competitive market, it is important to have an excellent customer service. To improve the customer service for the end customer, Sony Ericsson Mobile Communications has decided to become "World class" when it comes to customer service. The repair process for a malfunctioning telephone is one of the processes which constantly need to be improved, in order to achieve a "World Class" customer service. Reverse Logistics Operations is the department within Sony Ericsson Mobile Communications that manages all distribution of spare parts to the outsourced service centers which repair Sony Ericsson telephones.

The purpose of the thesis has been to map the management of the supply chain for spare parts, focusing on the link between RLO and the contracted service centers. This is done in order to find possibilities for improvement.

A qualitative research approach has been used in the study, with a few quantitative features. Primary data has been gathered through interviews and secondary data has been collected through studies of literature, process flow charts and statistics.

The mapping has been made in three steps. A general mapping of the whole supply chain was followed by an investigation of the relations between Reverse Logistics Operations and the service centers. Finally, the total logistics activities for Reverse Logistics Operations were mapped, based on the customer service offered to the service centers. During the mapping, several improvement possibilities were noticed.

The conclusion of the thesis was that Reverse Logistics Operations needs to make sure that the service centers and Reverse Logistics Operations works according to the same strategy. Because even if a world class customer service is provided to the service centers, it is of no use for the end customers if the service centers do not do the same. In order to improve the effectiveness of the supply chain, Reverse Logistics Operations needs to work closer with its customers. The present customer service policy that is offered is very generous. But it results in high costs for Reverse Logistics Operations and can be made much more effective. The customers should be categorized and be given customer service levels according to the categorization. The largest customers should be involved in a deeper cooperation where information sharing and process alignment is imperative. Only then can Reverse Logistics Operations achieve the goal to create a world class supply chain for spare parts.

Sammanfattning

Marknaden för mobiltelefoner är snabb och hård. För att behålla kunder i en så pass konkurrenskraftig marknad är det viktigt att kunna erbjuda en utmärkt kundservice. För att öka sin kundservice gentemot sina kunder har Sony Ericsson Mobile Communications beslutat att bli en aktör av världsklass när det gäller kundservice. Reparationsprocessen för trasiga telefoner är en av de processer som ständigt måste förbättras, om en kundservice av världsklass ska uppnås. Reverse Logistics Operations är den avdelning inom Sony Ericsson Mobile communications som hanterar all distribution av reservdelar till de kontrakterade serviceverkstäder som reparerar Sony Ericssontelefoner.

Syftet med examensarbetet har varit att kartlägga hanteringen av värdekedjan för reservdelar, med fokus på interaktionen mellan Reverse Logistics Operations och de kontrakterade serviceverkstäderna. Kartläggningen har gjorts för att hitta och lyfta fram möjligheter till förbättring.

En kvalitativ undersökningsmetod har använts i studien, med vissa kvantitativa inslag. Primärdata har samlats in genom intervjuer och sekundärdata har samlats in genom litteraturstudier samt studier av processflöden och statistik.

Kartläggningen har genomförts i tre steg. Inledningsvis genomfördes en generell kartläggning av hela värdekedjan, följt av en undersökning av relationen mellan Reverse Logistics Operations och serviceverkstäderna. Slutligen genomfördes en totalkostnadsanalys av Reverse Logistics Operations, baserad på den kundservice som serviceverkstäderna erbjuds. Under kartläggningsarbetet noterades flera förbättringsmöjligheter.

Slutsatsen av examensarbetet var att Reverse Logistics Operations måste se till att serviceverkstäderna och Reverse logistics Operations arbetar enligt samma strategi. För även om Reverse Logistics Operations erbjuder serviceverkstäderna en kundservice av världsklass så är detta inte till någon nytta för slutkunden, om inte serviceverkstäderna kan erbjuda slutkunden det samma. För att öka effektiviteten i värdekedjan bör Reverse Logistics Operations samarbeta mer med sina kunder. Den nuvarande kundservice som erbjuds är väldigt generös men resulterar i väldigt höga kostnader för Reverse Logistics Operations och kan bli mycket mer effektiv. Kunderna bör kategoriseras och få en kundservice som motsvarar den kategori de placeras i. De största kunderna bör involveras i ett djupare samarbete med bättre informationsutbyte och koordinerade processer. Det är endast när detta uppfylls som Reverse Logistics Operations kan uppnå målet med att skapa en värdekedja för reservdelar som är av världsklass.

Abbreviations

CEEMEA	Central Eastern Europe Middle East Africa region
CSPN	Customer Service Partner Network
DDP	Delivery Duty Paid
FIFO	First In, First Out
HVC	High Volume service Center
IMEI	International Mobile Equipment Identity
LVC	Low Volume service Center
QR	Quick Response
RLO	Reverse Logistics Operations
SEMC	Sony Ericsson Mobile Communications
TAT	Turn Around Time
WCMS	Warranty Claims Management System
WE	Western Europe region

Table of Contents

1 Introduction

This first section gives the reader the background to the thesis and the purpose is set. This section also describes the delimitations of the thesis, and how the report is structured.

1.1 Problem background

Sony Ericsson Mobile Communications, henceforth written SEMC, is a multi national organization that provides mobile multimedia devices like telephones, accessories and PC cards. The market for mobile telephones is fast and tough and in order to keep customers in such a competitive market, it is important to have an excellent customer service.

Reverse Logistics Operations, henceforth written RLO, is a department within Sony Ericsson's customer service organization. RLO sells and distributes spare parts to authorized service centers all around the world, which in turn repair the end customers' telephones if they malfunction.

A shortage of spare parts is very expensive for SEMC. If a service center is not provided with the spare parts it needs, SEMC has to give the end customer a new telephone instead. A telephone that could have been sold to another customer. So a shortage of a spare part that costs less than one € could result in a sales loss of about 145 €, which is the average sales price for a Sony Ericsson telephone.

In order to improve the customer service for the end customer, SEMC and RLO has decided to become "World class" when it comes to customer service. This is not an easy task, and it requires new and different processes and procedures than those existing today. But SEMC and RLO cannot only improve their internal processes to reach a customer service that is world class. The whole supply chain, both upwards and downwards, needs to be improved in order to increase the customer service to the end customer.

This thesis has appeared since there is a need for RLO to find out how the supply chain for Sony Ericsson spare parts can reach what is internally called "World class".

1.2 Purpose

The purpose of the thesis is to map the management of the supply chain for spare parts, focusing on the link between RLO and the contracted service centers. This is done in order to find possibilities for improvement.

1.3 Delimitations

It is important to declare the delimitations of the thesis. Otherwise it risks being too extensive and thereby exceed the time limit.

- This thesis will only include the material and information flows regarding spare parts between RLO and the contracted service centers. No financial flows will be investigated.
- Sony Ericsson Mobile Communications is a world wide organization. Due to a restricted time frame the thesis will focus on the regions WE and CEEMEA.
- Except for the general mapping of the whole supply chain, no other parts than the connection between RLO and the service centers will be included in the thesis.

1.4 Report structure

The structure of the report is described below.

Chapter 2 gives an introduction to Sony Ericsson and the customer service organization.

Chapter 3 presents the methods used and the course of action that the thesis has had. The purpose of the chapter is to give the reader an idea of how the thesis has been conducted.

Chapter 4 provides the reader with the theories the author considers to be relevant and necessary to fulfill the purpose of the thesis.

Chapter 5 provides the reader with the results from the empirical study. This chapter is shaped like a funnel, starting with an overview of the supply chain and narrowing down to the relations between two members of the supply chain; RLO and the service centers. Finally RLO's total logistics activities are described.

Chapter 6 contains the analysis of the empirical study, based on the theories in chapter four. Different improvement suggestions arise as a result of the analysis.

Chapter 7 sums up the improvement suggestions and includes a brief discussion about each suggestion.

Chapter 8 includes a conclusion, and a discussion of the thesis' quality.

2 Company presentation

Sony Ericsson Mobile Communications (SEMC) was established in October 2001 by the telecommunications company Ericsson and the consumer electronics company Sony Corporation. The company is owned equally by Ericsson and Sony and announced its first joint products in March 2002.

SEMC is a multi national organization that provides mobile multimedia devices like telephones, accessories and PC cards. The products the company sells combine advanced technology with innovative applications for mobile imaging, communications and entertainment. The mission for SEMC is to establish Sony Ericsson as the most attractive and innovative global brand in the mobile handset industry.

SEMC employs approximately 7,000 employees worldwide. It undertakes product research, design and development, marketing, sales, distribution and customer services. Global management is in London, and R&D is in Lund and Kista Sweden, Tokyo Japan, Beijing China, Raleigh USA, and London UK. Regional sales offices and marketing units are spread all over the world.

SEMC has three company values that should be included in everything that the company does:

- Passionate about success
- Innovative in our thinking
- Responsive to our customers

2.1 Customer service

It is important for SEMC to continue to serve the customer even after he/she has bought a Sony Ericsson product. In order to do so, a large service structure has been created, where the customer can receive service in all kinds of ways. The Sony Ericsson website (www.sonyericsson.com) is one example, where all kinds of services exist. Update options are available online, in stores and even in the telephones themselves.

Unfortunately, there are times when a customer damages a product, or a production error appears. Therefore, it is also important for SEMC to have a well functioning repair service available for its customers. The repair process usually develops as follows:

1. A consumer purchases a SEMC mobile telephone.

2. Due to some reason, the telephone malfunctions.
3. The consumer brings the telephone back to the place of purchase or directly to a service center. If the telephone is brought to a store, they will send the telephone to a service center.
4. The service center receives the telephone, repairs it if possible, and sends it back to the consumer. If there is a warranty issue, SEMC covers the costs for the repairs. Otherwise the consumer has to pay for the repairs. If the telephone is non-repairable and within warranty, the consumer will receive another telephone in replacement for the broken one.
5. The consumer receives a functional telephone.

Many people are surprised that Sony Ericsson repairs malfunctioning telephones and not just gives the user a new telephone. The repairs are done for two reasons:

- The cost for replacing a malfunctioning telephone with a new one is very high for SEMC. The cost for repairing a telephone compared to the cost for replacing a telephone with a new one is about 1:4.
- Nowadays, telephone users usually have made their own adjustments to their telephones. They want to keep the different themes, ring signals and other content that they have installed in their telephones.

2.1.1 Reverse Logistics Operations

In order to secure spare part availability for the service centers which make the repairs, SEMC has a department called Reverse Logistics operations (RLO). RLO is the function that handles the procurement and distribution of spare parts, from the spare part suppliers to the service centers. It consists of about 30 employees and functions like any other distribution company. RLO procures spare parts from the same suppliers that provide parts to the telephone projects, and then sells these to the service centers. When Sony Ericsson was founded, the procurement of spare parts was outsourced and RLO only handled the sales of spare parts. But about two years ago, the procurement function was brought into the organization, in order to take control of the whole flow of spare parts.

It is very important for RLO to ensure availability of spare parts for the service centers. If RLO cannot sell spare parts to the service centers due to a stock out situation, the service centers have to give the end customer a new telephone instead of repairing the old (if it would have been an in warranty repair). So a stock out of i.e. a keypad that costs about € 2 can result in that SEMC has to offer the end customer a new telephone, which would have an average sales price of € 145 (fourth quarter 2006) if it was sold to a new customer instead. A shortage of parts used for out of warranty repairs results in that the customer

has to wait longer before he/she receives the telephone again. This results in bad publicity for SEMC.

3 Method

The section presents the research approach that has been used in the thesis. The data collection methods are presented together with the reliability and validity of the thesis. Finally the section presents how the thesis has developed from purpose to final conclusions.

3.1 Research approach

3.1.1 Deduction and induction

Olsson and Sörensen (2001), claim that scientific research can be approached in two ways; deductively or inductively. If a deductive approach is used, the researcher uses relevant existing theories as a foundation to make conclusions about empirical findings. An inductive approach is the opposite of a deductive approach. Then the researcher studies the research object without first having established the study with some generally accepted theories. From the empirical findings he/she then formulates a theory.

In this thesis the deductive approach is used. Relevant theories were examined before the empirical study was started and the findings of the study were later analyzed based on the appropriate theories.

3.1.2 Qualitative and quantitative research

The information that has been collected is processed and analyzed either qualitatively or quantitatively. Qualitative research uses verbal analyzing methods while quantitative research uses statistical processing and analyzing methods. (Davidson and Patel, 1994) It is common that a mainly qualitative research has quantitative features in it, and vice versa.

In this thesis the focus has been on using a qualitative approach with a few quantitative parts included. Strategies and processes have been handled qualitatively while some customer and sales data have been handled quantitatively.

3.2 Collection of data

When searching for information to solve a problem, some kind of data collection needs to be done. Lekvall and Wahlbin (2001) mention two different kinds of data that can be collected, depending on what kind of information is needed. These are primary data and secondary data.

According to Lekvall et al. primary data is the data that the researcher collects him/herself, in order to solve a task. Examples mentioned are interviews, observations and questionnaires.

Secondary data is data that already exists, collected for other purposes. Lekvall et al mention i.e. existing statistics or earlier studies.

This thesis has parts of both collection methods. Primary data has been collected through interviews with the people involved in the different processes and activities. Secondary data in this thesis comes from i.e. statistics from order patterns and sales statistics. The secondary data has been available in Sony Ericsson's enterprise resource planning system, in flowcharts and in process descriptions. All literature read during the theoretical studies is also secondary data.

3.3 Validity and reliability

According to Ejvegård (2003), parameters, gauges, tests and research methods need to be reliable and valid to be useful and appropriate. The results have no scientific value if those demands are not fulfilled. Davidson et al state that validity and reliability has a relation to each other that makes it important to focus on both and not just on one of them. Complete reliability is a prerequisite for complete validity. In order to know what to measure, the measurement must be reliable. (ibid)

The validity is dependent on whether the method of measurement really measures what is intended to measure (Ejvegård). This makes it important to check the methods that have been used in the measurements.

Reliability states the trustworthiness and usefulness of a gauge and a unit of measurement (Ejvegård). According to Davidson et al all observed values include both the true value and a deviation from the true value. The deviation is affected by the trustworthiness of the gauge. With a reliable gauge, the deviation is minimized and the observed value is much closer to the true value.

In order to achieve high validity, several respondents have been interviewed during the thesis. The interviews had a semi-structured layout, based on relevant literature. When possible, several respondents with different roles in the company were interviewed about the same areas, to receive input from different angles and to ensure that the author had understood correctly.

Statistics used in the thesis was retrieved with assistance from people well versed in the area. This ensured that relevant and up to date information was retrieved.

Qualitative data is usually harder to judge than quantitative data, since there is a greater risk of being subjective when judging qualitative data. This might have decreased the reliability of the thesis. To avoid this, every interview was scheduled in advance. Notes were taken during the interviews and the answers were checked with the respondents. The author also tried to avoid asking leading questions. When the results of the interviews had been written down, they were checked with the respondents and with the supervisor, to guarantee trustworthiness. But this does not ensure that another person, conducting the same kind of work, comes to the same conclusions.

When the author started the thesis, the purpose was different than the purpose that is written in this report. It is possible that the change in purpose may have affected the reliability of the thesis, since there was a different focus in the beginning. Another issue that may have decreased the reliability of the thesis is that it was made by just one person instead of two. The author thinks that one person is more easily influenced and affected by the respondents' thoughts and answers. Two people can probably stay more neutral and objective, and will not be affected in the same way.

3.4 Course of action

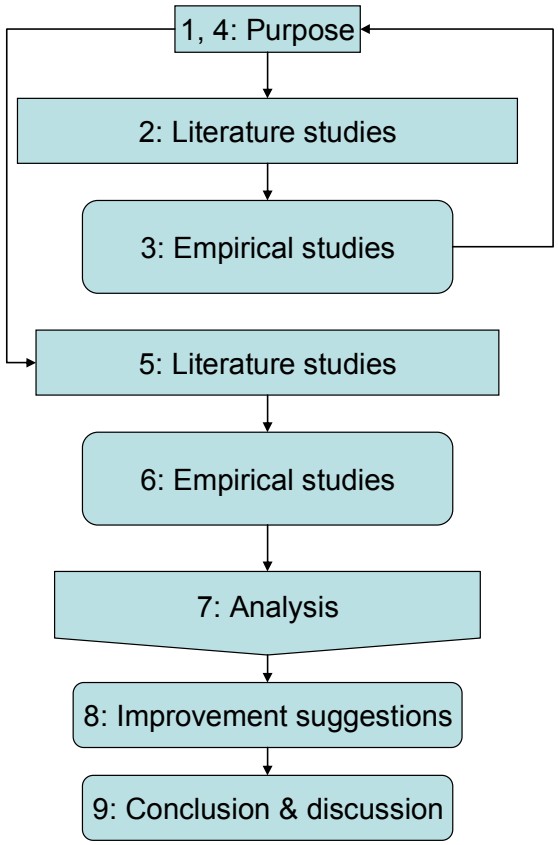


Figure 3.1. Course of action

1. The study started with establishing a purpose together with the supervisors at RLO and Luleå University of technology.
2. Literature studies were made about total cost logistics, relations within supply chains and different automatic replenishment programs.
3. An empirical study was made of the total logistics at RLO. Visits were made at Elcoteq to study the inventory management there.
4. A quick analysis resulted in a change of purpose, in order to continue the thesis.
5. New literature studies were made, focusing on supply chain management and the relations between customers and suppliers in a supply chain.
6. Further empirical studies were made to map the supply chain for spare parts and the relations between RLO and its closest customers – the service centers.
7. The supply chain was analyzed, together with the relations between RLO and the service centers, and a total cost analysis were made on RLO's logistics activities.
8. The analysis resulted in a number of recommendations for improvement.
9. Finally, conclusions were made and the results discussed.

4 Theory

In this chapter, a theoretical point of reference is presented. A predisposition shows the reader how the chapter is structured. Recommendations on what kind of supply chain to use depending on product and demand is followed by how relations with customers and suppliers should be handled. Finally, the total cost concept of a company's logistics activities is described.

4.1 Predisposition

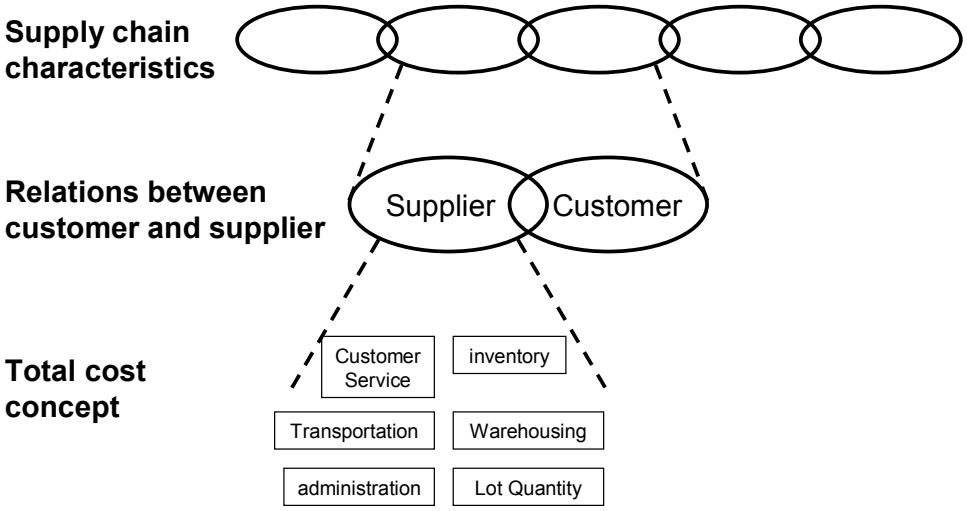


Figure 4.1. Disposition of the theoretical frame of reference, where connections between the different sections are shown.

4.2 Supply Chain characteristics

4.2.1 Efficient vs. Responsive supply chains

Fisher (1997) points out that a company should consider what kind of environment its products are best suited for, before devising what kind of supply chain to use. When devising an effective supply chain for the products, aspects like product life cycles, demand predictability, and product variety are important to take into consideration. Fisher has found that, depending on the products, two different types of supply chains occur; an efficient or a responsive. The efficient supply chain is suitable for functional products, which have predictable demand and long life cycles. Innovative products, with unpredictable demand and short life cycles, are suitable for a responsive supply chain.

According to Krajewski and Ritzman (2005), companies in an efficient supply chain should coordinate the flow of service and materials to minimize inventories and maximize the efficiency within the supply chain. Responsive

supply chains on the other hand, should be designed to react quickly to the demands of the market. This is done by positioning inventories and capacities to be prepared for uncertainties in demand. Table 4.1 describes which environment would suit each supply chain design.

Table 4.1: Environments for efficient and responsive supply chains

Factor	*Efficient supply chain*	*Responsive supply chain*
Demand	**Predictable, low forecast errors**	**Unpredictable, high forecast errors**
Competitive priorities	**Low cost, consistent quality, on-time delivery**	**Development speed, fast delivery times, customization, volume flexibility, variety, top quality**
New-service/ product introduction	**Infrequent**	**Frequent**
Contribution margins	**Low**	**High**
Product variety	**Low**	**High**

After "Environments best suited for efficient and responsive supply chains". (Krajewski & Ritzman, pp 420, 2005)

Table 4.2 describes the most suitable design features for efficient and responsive supply chains:

Table 4.2: Design features for efficient and responsive supply chains

Factor	*Efficient supply chain*	*Responsive supply chain*
Operation Strategy	**Make-to-stock or standardized services or products; emphasize high-volumes**	**Assemble-to-order, make-to-order, or customized services or products; emphasize variety**
Capacity cushion	**Low**	**High**
Inventory investment	**Low, enable high inventory turns**	**As needed to enable fast delivery time**
Lead time	**Shorten, but do not increase costs**	**Shorten aggressively**
Supplier selection	**Emphasize low prices, consistent quality, on-time delivery**	**Emphasize fast delivery time, customization, variety, volume flexibility, top quality**

After "Design features for efficient and responsive supply chains". (Krajewski & Ritzman, pp 421, 2005)

Reverse supply chains

Blackburn, Guide, Souza and Van Wassenhove (2004) claim that Fishers opinion about different supply chains also correspond when looking at reverse supply chains. By classifying products by time value, Blackburn et al state that innovative products with short life cycles, i.e. laptop computers, have high marginal time values, while functional products, i.e. power tools, have low marginal values of time, since they are less time-sensitive. It is therefore important to also use a responsive reverse supply chain when working with innovative products. An efficient reverse supply chain should in turn be used for functional products.

4.2.2 Supply chain strategies

Christopher (2005) describes a way to identify what kind of supply chain strategy to use, depending on the products supply and demand characteristics (figure 4.2).

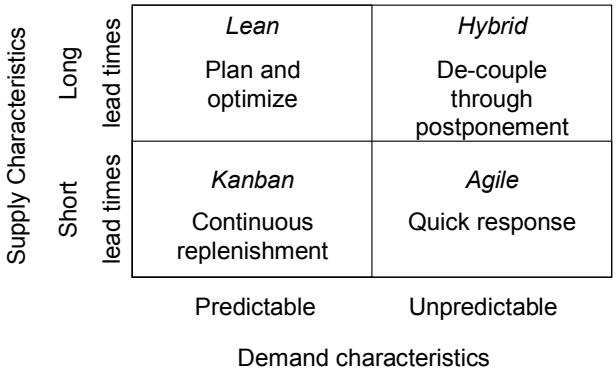


Figure 4.2. Generic supply chain strategies (Christopher, 2005)

- When demand is predictable and the lead times are long, a "Lean" approach may be appropriate. Lumsden (2006) means that Lean is to avoid waste of resources and optimize its use. Then products can be ordered before demand occurs and manufacturing and transportation can be planned to optimize costs and utilization (Christopher).
- When demand is predictable but the lead time is short, a "Kanban" solution is recommendable. Kanban is a type of continuous replenishment where the ultimate solution would be to refill a product as soon as it is used or sold.
- When demand is unpredictable and lead time is short, an "Agile" supply chain with quick response solutions could be the key. The extreme case would be make-to-order processes. Lumsden points out that an agile

supply chain requires flexible partners to work with, in order to cope with a demand that is almost impossible to predict.

- Unpredictable demand and long lead times calls for a hybrid solution. If there are no possibilities to reduce the lead time, a mix of the agile and lean solutions may be appropriate. Then the supply chain should be de-coupled through holding strategic inventory at one location, using the lean approach mentioned above if possible. Some kind of quick response solution can be used, with express transportation to the final point of use, when the actual demand is known.

The agile supply chain

When a company operates in an environment with unpredictable demand and short lead times, an agile supply chain strategy is recommended by Christopher. He describes four subjects that are required to create an agile supply chain. These four subjects are:

- Market sensitivity. This means that the supply chain should be able to read and respond to real demand. Companies are usually forecast driven rather than demand driven today. Since they do not know the end customers actual requirements, they have to make forecasts based on past sales and keep inventory to meet the forecast. But by using the information technology that exists on the market today, demand data can be caught directly from the point of sale or point of use, by all companies in the supply chain. Childerhouse and Towill (2000) state that information sharing is obligatory in an agile supply chain, since all members of the supply chain need to understand the demand from the end consumer.
- Virtual supply chains. Sharing data through the use of information technology is creating a virtual supply chain that is information based rather than inventory based.
- Process alignment. Through collaborative working, suppliers and buyers can make full use of the information they share with each other. Cooperation within the supply chain is becoming more important when companies focus more and more on their core competencies and outsource other activities.
- Networks. Christopher finally states that with agile supply chains, individual businesses compete as supply chains rather than on their own. This makes it even more important to strive for higher levels of collaboration and synchronization. By making the best use of the strengths and competencies of each network partner, it is possible to achieve better responsiveness.

Quick Response (QR)

According to Mattsson (2002), this is a concept for cooperation and information exchange between manufacturers, wholesalers and retailers in a supply chain. The Primary objective is to react faster to alterations in the market and to do business in a more cost effective way, all to better satisfy the end consumers needs. Christopher (2005) states that QR can be seen as an umbrella term for the information systems and logistics systems that combine to provide "The right product in the right place at the right time", one of the requirements for an agile supply chain.

With QR the demand is captured as close to real-time as possible and as close to the end consumer as possible. That information sets the logistics response in motion. Directly when a sale has been made, registered by electronic point of sale systems at the store, this information is sent further back in the supply chain. (ibid)

The extensive information sharing that QR requires implies that the supply chain members commit to perform certain activities. The supplier takes responsibility for meeting performance criteria like service levels, fill rates and stated inventory turnover, using for example Vendor Managed Inventory (see appendix I). The customer on the other hand has to provide the supplier with accurate information about demand and inventory levels. (Coyle, Bardi & Langley, 1996)

Christopher claims that even though the initial investment in a Quick Response system is significant, the payback of QR can be expected within two years. Figure 4.3 below shows the advantage of QR compared to traditional inventory systems, when higher service levels are demanded:

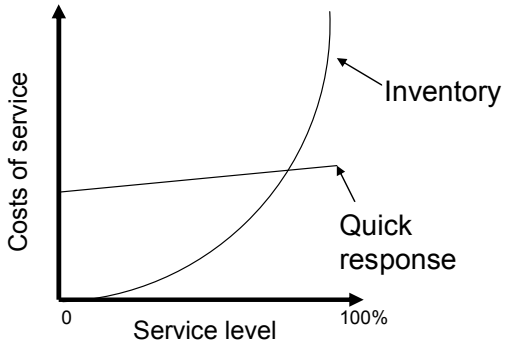


Figure 4.3. QR vs. Inventory-based system (Christopher, 2005)

4.3 Customer – supplier relations

4.3.1 Relations between customers and suppliers

The relationship between customers and suppliers usually fit the traditional description that they act in a competitive nature. They compete about the marginal income that exists in the supply chain. So what one part wins the other looses and both parts try to reduce the other parts position of strength (Mattsson, 2002).

Barratt (2004) points out that many organizations have improved the efficiency of their internal supply chains activities, resulting in a redistribution of costs and inventory towards customers and suppliers, both up and down the supply chain.

Mattsson states that during the recent years however, the need for more integrated and effective relations between suppliers and customers have increased. This is due to the fact that it is the end customer that is the most important actor in the supply chain. It is the end customer who feeds the supply chain with its resources - money. All measures taken within the supply chain should in the end gain the end consumer, because keeping and gaining customers increase the resources for the supply chain.

This new attitude, more based towards partnership than conflict, is characterized by Mattsson in the following way:

- Customer and supplier has a partner relationship
- The goal is to create win-win situations for both partners
- The partners' goal is to increase the supply chains combined competitiveness.

Krajewski et al mention that companies with a cooperative orientation to supplier relations focus on helping each other as much as possible, in order to improve the supply chain. With a cooperative orientation the buyer shares information with the supplier about i.e. future inventory replenishment. That can allow the supplier to make better forecasts of future demand. And a better forecast improves the availability for the customer.

Both competitive and cooperative relations towards companies' suppliers have advantages and disadvantages. According to Krajewski et al the key is to manage this correctly. A company can i.e. use competitive relations towards smaller, infrequent suppliers and customers, and more cooperative relations towards suppliers and customers of higher volume services and materials. But even though a more cooperative approach is used it does not mean that it

excludes demands on the other part. Krajewski et al mention the car industry as an example where long-term commitments are made with suppliers. But then the suppliers need to deliver annual price reductions through continuous improvement programs.

Both Barratt and Mattsson point out that organizations should focus on a small number of close relationships rather than trying to collaborate with everyone, because collaboration could be very resource and time demanding. Some relationships may basically be better suited for a competitive approach. So a company probably only needs to collaborate with a small number of strategically important customers and suppliers. Mattsson further points out that the 80/20 rule usually applies. This means that it is usually about 20% of the customers who purchase 80% of all sales a company has. So cooperating with the top 20% of the customers would affect 80% of all sales.

4.3.2 Balance of power in customer - supplier relationships

Disregarding whether the relationship between customer and supplier is traditional (competitive) or partnership based (cooperative), it is affected by the balance of power between the involved parts. (Mattsson)

Van Weele (2002) states that factors like the numbers of customers or buyers in the market, the numbers of suppliers, market structure and stock situation, affect the balance of power between customers and suppliers. Monopoly occurs when there only is one supplier but a large number of buyers, which gives the supplier much power, since he/she can decide who can buy and at what price. The opposite is monopsony, where there is only one buyer but a large number of suppliers. Then the buyer can choose the supplier that suits his/her needs best at the moment.

Mattsson agrees with Van Weele's thoughts and points out that if one part is more dominant then it usually is he/she who dictates prices and delivery terms. The inferior part has no option but to oblige. But if they cooperate anyway, it is probably because the stronger part knows that he/she will gain on it in the long run.

4.4 Total cost concept

According to Lambert & Stock (2001), a total cost analysis is a solution to manage the logistics costs in a company. Usually, each logistics activity is viewed in isolation when cost reductions are sought. So when reducing the costs for one activity, the costs for the other activities almost always increases.

A reduction of the total cost of logistics should be the goal for an organization. Christopher (2005) agrees and mentions that it often happens that decisions taken in one area leads to unexpected results in other areas. Aronsson, Ekdahl and Oskarsson (2003) points out that when there is a choice between different alternatives, it is important to find the alternative that has the lowest total cost.

Lambert et al use a model (figure 3.4) to show how the different logistics activities drive the total logistics costs. The major cost categories are customer service, transportation, Warehousing, order processing and information, lot quantity, and inventory carrying. The different categories are described below:

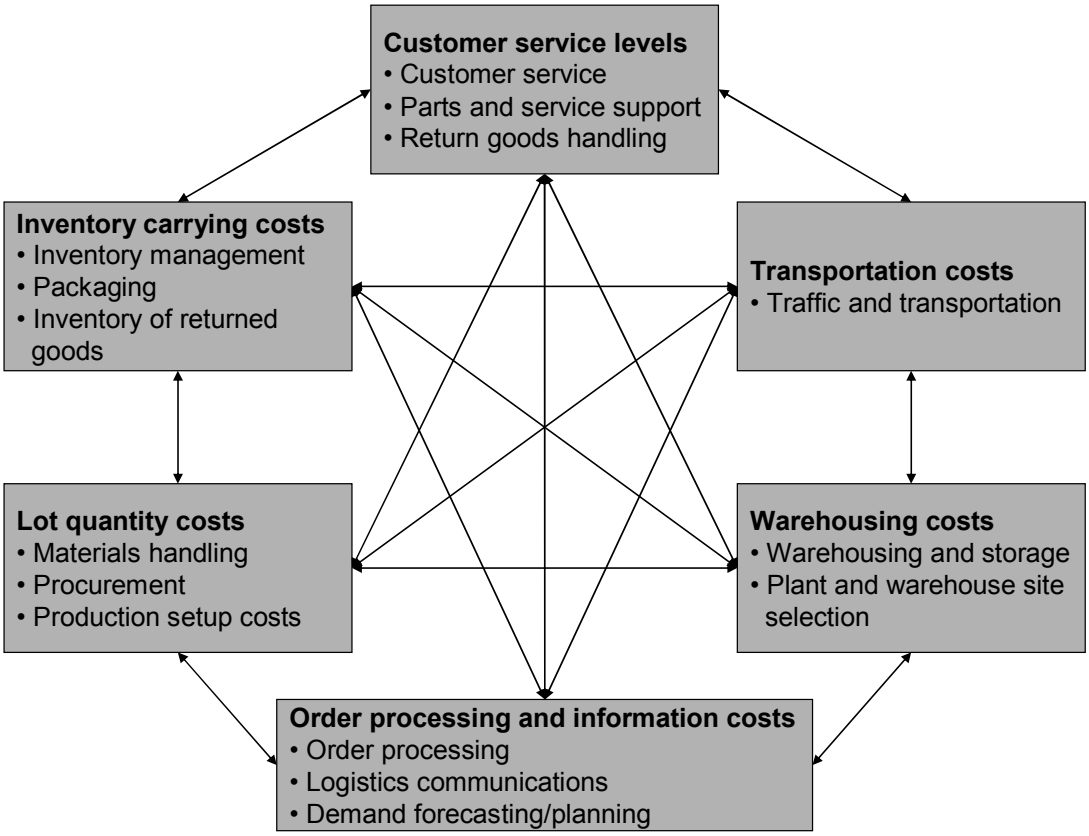


Figure 4.4. Total cost model (Lambert et al, 2001).

4.4.1 Customer service

Lambert et al claim that customer service has the largest impact on the total costs for logistics. It is the given customer service objectives a company has that the other logistics activities within the company has to adapt to.
The best way to compete on the market for many companies is to provide an excellent customer service. Market shares and profitability can be improved a lot by spending more than the competitors on customer service and logistics.

Aronsson et al mention three elements of customer service:

- Before delivery. It is important to be clear about what customer service the customer can expect. Lambert et al point out the importance of written statements of customer service policies, an organizational structure that can fulfill the service level, system flexibility and management services. Those are all essential components of a successful marketing strategy.
- At delivery. The ability to live up to lead times, deliver the right products in correct amounts, at the right time and without errors, are all important matters. Information about delays should be sent as soon as possible (Aronsson et al). Segerstedt (1999) refers to a study where the lead time and delivery precision was deliberately decreased while the information to the customer was improved. This resulted in that the customer felt that the customer service actually had increased. Lambert et al point out product availability, order information, and order convenience as some of the elements normally associated with customer service.
- After delivery. At this time it is important to have the necessary spare parts available, and to have a well developed system for claims and returned goods (Aronsson et al).

Christopher points out that it is important to know that a company's customers usually are more or less profitable. They buy different quantities and different products, and the costs to service them vary. Customer service results in both costs and benefits, which makes it important to find an appropriate level and mix of service that varies according to customer type.

4.4.2 Order processing and information costs

These costs are related to activities like handling customer orders, demand forecasting and distribution communications. Advanced order processing and information systems are very important if a company wishes to maintain or increase customer service levels and control costs (Lambert et al). Quick response is one example where a system integrates several information based technologies to reduce order cycle times, speed up the responsiveness and lower inventory levels (ibid). Aronsson et al points out that every order carries a cost, for example administrative work when ordering or receiving an order, arrival control, invoicing and payment.

The order process

According to Mattsson (2002), operative relations between a customer and a supplier in a supply chain are usually characterized by the traditional order

fulfillment process. Mattsson describes the traditional order fulfillment process as follows (figure 4.5):

- A need of materials arises at the customer, to restock an inventory or to add material for production.
- The materials planning function decides what quantity to order and when it should be delivered.
- The procurement function then selects a suitable supplier.
- When the supplier receives the order, it is registered and the requested materials become reserved.
- A materials planner makes sure that the requested materials will be available when it is time for delivery.
- The ordered materials are manufactured or picked from inventory to be delivered.
- Finally, the ordered material is packed and delivered to the customer.

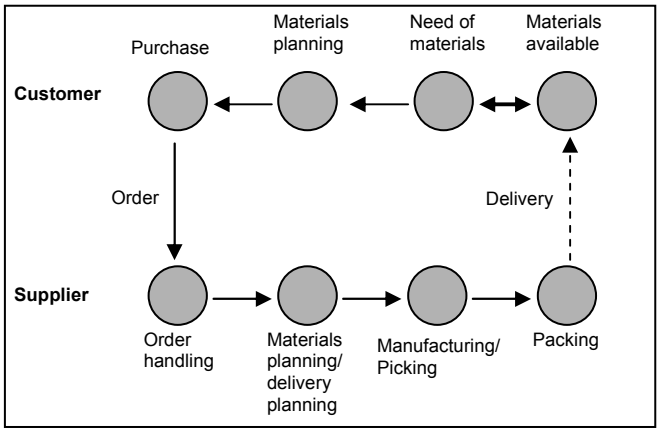


Figure 4.5. Traditional order fulfillment process (Mattsson, 2002)

4.4.3 Warehousing costs

Lambert and Stock states that warehousing plays a crucial role in providing the customer service levels a company strives for. Warehousing of inventories is necessary to in example achieve transportation and production economies, to maintain a source of supply, to meet fluctuations in demand and to decrease the differentials in time and space between producers and consumers. According to Aronsson et al, this area covers the costs for facilities, personnel, equipment and transports within the facilities. All these are necessary to keep some kind of inventory. To have good control over what and how much inventory a company has usually requires some kind of warehouse management system.

4.4.4 Lot quantity costs

These costs occur, according to Lambert and Stock, due to the production and purchasing activities within a company. The costs change when there are changes in production lot sizes, order sizes or order frequency. Included are setup costs, the cost for lost capacity when the setups occur, materials handling, scheduling and expediting, and finally price differentials when different order quantities are used.

4.4.5 Inventory carrying costs

Aronsson et al defines the inventory carrying costs as the costs for keeping the stock in an inventory. Capital cost is the money tied up in inventory, inventory risk costs are costs for obsolescence, damage and pilferage. The inventory carrying costs depends on the inventory volume. Lambert and Stock add inventory service costs, i.e. insurance and taxes on the inventory. If a company increases its customer service it usually results in higher inventory carrying costs (figure 4.6).

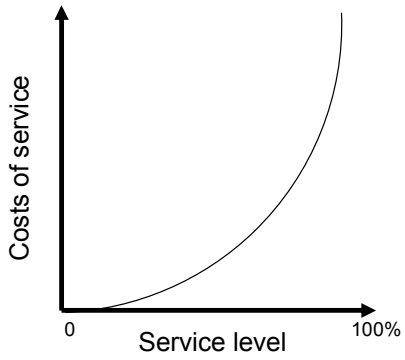


Figure 4.6. The costs of service (Christopher, 2005)

According to Lambert et al, companies hold inventory due to:

- It makes economies of scale possible.
- It balances supply and demand.
- Specialization in manufacturing is made possible.
- It decreases the risks with uncertainties in demand and order cycle.
- It can buffer critical interfaces within the supply chain.

Fortuin and Martin (1999) claim that spare parts are usually manufactured at the same facilities as where the parts for the main item are manufactured. And since the demand for spare parts is relatively low compared to the parts used for the main item, the spare parts receive low priority. But at the same time a stock out of a spare part may have serious consequences for a company. This may

cause a necessity to keep spare parts in stock at all times, or to increase stock levels to compensate for long delivery times.

4.4.6 Transportation costs

According to Aronsson et al, all costs for administration and execution of transports are included in the transportation costs. Decreased costs for transportation usually have a negative impact on the customer service level. Many companies outsource the transports to certain transport companies that have higher knowledge in that area. Even though the transports are outsourced, it is still important to include the costs for it when conducting a total cost analysis. Coyle, Bardi and Langley (1996) mention that high customer service levels usually results in high transportation costs, because smaller shipments are made more frequently. And increasing the customer service levels almost always increases the transportation costs.

5 Empirical studies

This chapter begins with a disposition of how the chapter is constructed. The characteristic of the supply chain for spare parts to Sony Ericsson telephones is followed by how the relations are between RLO and the service centers. Finally, the total logistics activities at RLO are mapped.

5.1 Predisposition

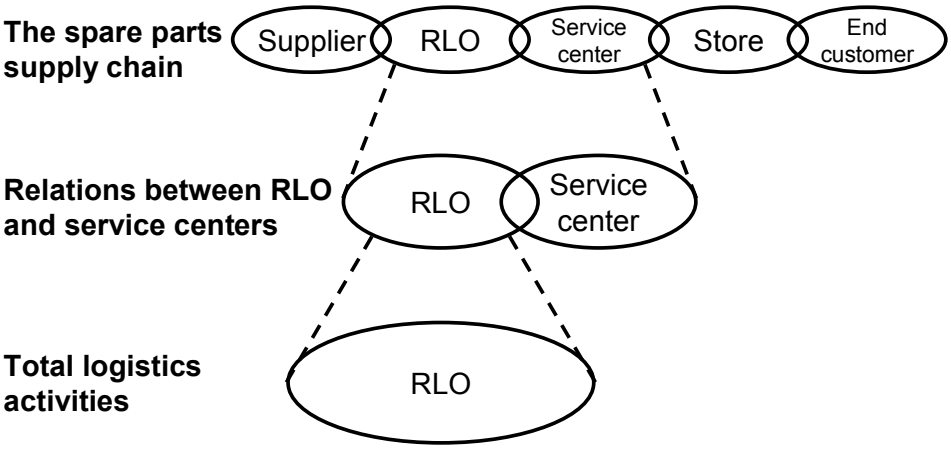


Figure 5.1. Predisposition of the empirical findings with connections between the different sections.

5.2 Spare parts supply chain

The structure of the spare parts supply chain is in general structured as follows (Figure 5.2):

- Suppliers
- Reverse Logistics Operations
- Service centers/stores
- End customer

Suppliers

RLO purchase spare parts from many different suppliers. These suppliers are in general contracted by SEMC's sourcing department to produce parts for the different telephone models that SEMC sell. Those contracts also state that RLO should be able to buy spare parts from them after the production of the telephones has ended. The lead time between the suppliers and RLO differs from a couple of days to several months, all depending on where in the products life cycle the required parts are. The suppliers are mostly large multinational companies like Sandisk, Sony, Foxconn etcetera.

Sony Ericsson Reverse Logistics operations
RLO has its office in Lund, Sweden. All administrative work regarding the inbound and outbound flow of spare parts is administered here. RLO has a central warehouse that receives, keeps and distributes all spare parts that are purchased. It is located in Zalaegerszeg, Hungary. The spare parts are later distributed to the service centers in the WE and CEEMEA regions. RLO's logistics activities will be described in detail in section 5.4.

Service centers
In the Western Europe (WE) and Central Eastern Europe, Middle East and Africa (CEEMEA) regions, about 300 service centers repair SEMC telephones. These service centers are not owned by SEMC but are separate companies that SEMC outsource the repairs of Sony Ericsson telephones to. The service centers consist of everything from a couple of employees sitting in a basement to regular factory like mass repair centers. Most of the service centers also repair other brands, i.e. Nokia, Samsung and Motorola. All spare parts that are used during the repairs should be original spare parts, provided by RLO. So these service centers only purchase spare parts from RLO, and the service centers own their own inventories. The lead time between RLO's warehouse and the service centers is generally between two to four days.

The service centers are generally divided into three major categories; Low Volume service Centers (LVC), High Volume service Centers (HVC) and Factory Repair. Depending on countries and regions, different setups occur.
Generally, the low volume centers take care of easier, mechanical repairs, like changing plastic covers and updating software for the telephones. If they cannot repair the telephones they send them to a High volume center.
The high volume centers use more advanced equipment, and may therefore also do more advanced repairs, i.e. electrical errors and soldering. There are about 85 High Volume Centers of different sizes in the WE and CEEMEA regions. In many countries different electronic goods store chains and operators have service contracts with certain High volume centers. So when the store receives a malfunctioning telephone, it is sent to the HVC for repair, or to be replaced by another telephone if it is impossible to repair it. In other countries it is more common for the customers to go directly to a low volume service center with their malfunctioning telephones. The European market is slowly going towards a consolidation of the market with larger but fewer service centers.

All telephones that cannot be repaired by either low or high volume centers are sent to SEMC´s service partner Elcoteq, in Hungary. Elcoteq has more

advanced equipment and can therefore salvage some of the phones that the other service centers fail to repair. By doing so, more phones can be sent back to the market, and quality checks can be made of how good the service centers actually operate.
Even though Elcoteq can repair and refurbish some of the telephones, all cannot be saved. Elcoteq then stores those telephones so that the material can be recycled by recycling companies.

End customer
The end customer who has a malfunctioning telephone would of course like to have his/her telephone back as soon as possible. When the service centers receive a telephone they generally have three days to repair the telephone and send it back to the customer or store that has sent it.

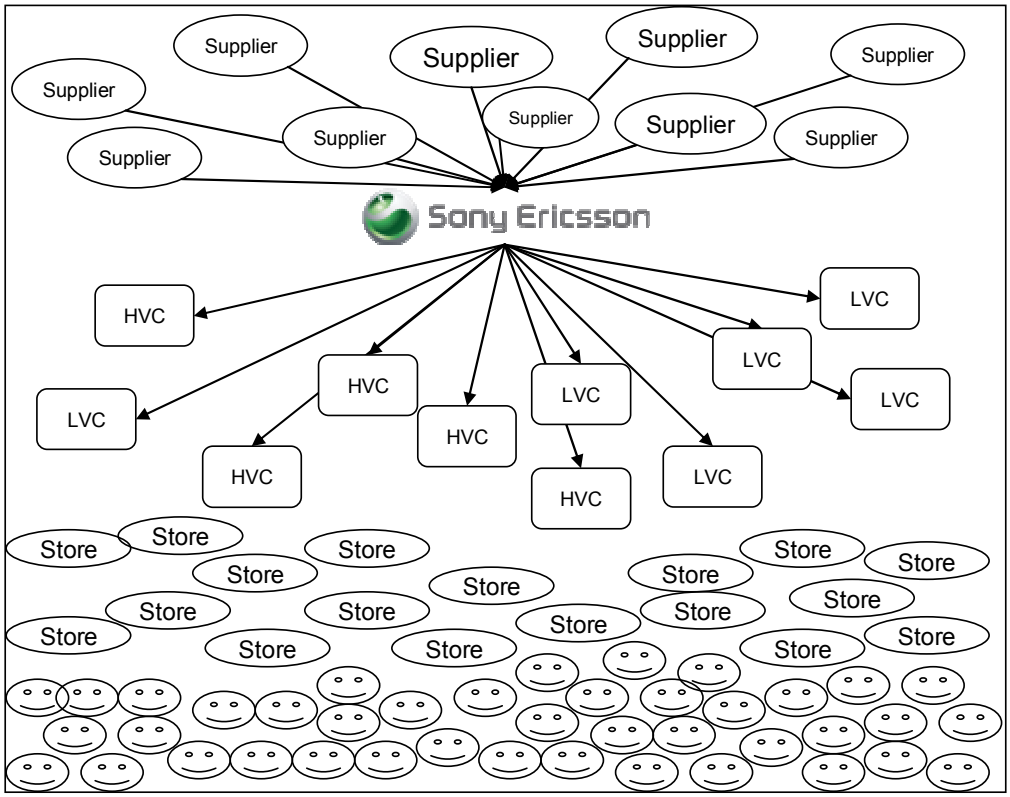


Figure 5.2. The spare parts supply chain for Sony Ericsson telephones

5.3 Relations between RLO and service centers

As mentioned in section 5.2, all repairs of malfunctioning telephones are outsourced by SEMC to different service centers located all over the world. The service centers need to fulfill a lot of demands to become authorized Sony Ericsson service suppliers. The contracts state i.e. repair time, staff requirements, quality assurances, etcetera. SEMC conducts technical audits at

the service centers from time to time, to check that they fulfill the contracts. If a service center does not fulfill the contract, it risks loosing SEMC as a customer and will then no longer be authorized to repair Sony Ericsson telephones.

The relation between SEMC and the service centers is a bit more complex than the regular relations between buyers and sellers. SEMC provides the service centers with the information needed to make repairs on the end customers' telephones. And SEMC's RLO department acts as a supplier to the service centers, providing them with the spare parts necessary to make the repairs. But SEMC also acts as a buyer of the repair services that the service centers provide, whenever there is a warranty repair made on a Sony Ericsson telephone. Then the end customer receives the repaired telephone while SEMC pays the service center for the repairs and the spare parts used. In general, about 60% of the repairs are in warranty repairs that SEMC pays and the other 40% is out of warranty repairs that the end customers have to pay.

5.3.1 Communication

The communication between SEMC and the service centers can be split up according to general communication, sales, repair information and claims.

General communication

Most of the communications with the customer is made through the Marketing Units that cover different geographical areas. Every region (i.e. WE, CEEMEA) has a Regional Office that the Marketing Units report to. So the service centers communicate with the marketing units via e-mail, and if the Marketing Units cannot answer the questions they forward the e-mails to the Regional offices. And if the Regional Offices cannot answer the questions they send them to RLO. The high volume service centers usually contact their Regional Office directly. The only customer that has continuous contact with RLO is the factory repair facility in Hungary that Elcoteq runs. There are weekly meetings between Elcoteq, the regional offices and RLO. But Elcoteq works on a different level than the other service centers since they are involved in other operations as well.

Spare part sales

The actual sales of spare parts from RLO to the service centers are made through an internet application, a so called web shop, and handled by SEMC's enterprise resource system SAP (see section 5.3.2 below for more detailed information). RLO strives for a "No-touch" order process, where it does not have to be involved in the ordinary order handling. The physical order handling is outsourced to a logistics partner that handles all warehousing activities.

Appendix II shows a graph of how the spare part sales are split up according to customers.

Spare part claims
There are times when the service centers receive faulty spare parts, wrong orders or have other issues regarding the order process. Then they will turn to RLO for assistance. RLO handles all claims regarding spare parts from the service centers.

Repair information
All service centers have access to the Customer Service Partner Network (CSPN). CSPN is an internet application where the service centers can retrieve information about each model of every product. CSPN provides the service centers with information such as exploded views of each telephone (where all spare parts are shown), repair instructions etc. Sometimes it can be necessary for the service centers to enter a Master Data system, which has more information about each telephone. When a service center experiences issues with the CSPN, it turns to the marketing unit for assistance, which escalates the issue if necessary.

Warranty Claims
When the service centers repair telephones with warranty faults, SEMC is invoiced for the repairs. About 60% of all repairs are due to warranty faults. A system called WCMS (Warranty Claims Management System) is used to do this. In WCMS all telephones that have had a warranty fault can be traced. Each telephone is registered through its IMEI code (International Mobile Equipment Identity - an exclusive number code for each manufactured telephone). The service centers enter what they have done to repair the telephone and what spare parts have been used. This is done on a daily basis. Based on this information they receive payment from SEMC. All spare parts used for warranty repairs are purchased back by SEMC at the same price as they were sold for to the service centers.

5.4 Total logistics activities

If SEMC is to provide the customer service levels that is decided, certain activities must be done. In this section, those activities are split up according to the total cost concept described in the theory chapter.

5.4.1 Customer service

Since Sony Ericsson as an enterprise acts as both supplier and customer to the service centers, paying for about 60% of all repairs, a high customer service level is the highest priority concerning the spare parts. More money is saved on having spare parts available for the service centers than the money spent on giving the end customers new telephones and keeping high service levels towards the service centers.

To be able to provide good customer service, some commitments are made towards the service centers:

- RLO strives for a 99% availability of spare parts in stock when the customers make their orders.

- In time for the release of new telephone models and accessories, RLO should have 100% availability of the spare parts needed for those models. This makes it possible for the service centers to stock up on those spare parts and be prepared when the new models arrive at the service centers.

- RLO must provide spare parts availability and support for a telephone for 39 months after the production of that particular telephone has ended. This is due to several reasons, i.e. different warranty times due to national laws (i.e. Turkey has a five year warranty time).

- The lead time for the customer orders should be one day (for order processing, picking and packing) plus the transportation time from RLO's warehouse to each customer. This gives a lead time that is i.e. about two to four days in the European market.

These commitments are made towards all service centers, not taking into account sales volumes or geographical placement of the service centers.

The Service centers' obligations towards SEMC/End customer

The service centers are obliged to fulfill the contract that is made with SEMC if they are to be classified as authorized service centers for Sony Ericsson telephones. Among other things, the contract states the Turn Around Time (TAT) for a telephone. This means that whenever a customer (the end customer who has bought a Sony Ericsson telephone) sends a telephone to the service center, the service center must repair the telephone within the TAT and send it back to the customer. In general, the TAT is three days. There are no demands from SEMC about the size of the inventory that each service center needs to

keep except that they shall carry enough inventory to fulfill the TAT agreement.

5.4.2 Order processing and information

RLO has invested in an order system that automates many of the administrational functions that an order process includes.
When a customer needs to restock its inventory, the order process usually goes as follows:

1. A customer needs to restock the inventory. RLO offers its customers to use an internet application, a web shop called E-Star, where they can place their spare parts orders in. Some restrictions are made depending on what service level the service center has approval to operate in (See section 4.2). Except for that, no other order restrictions are made. The orders are then sent via EDI to SAP, SEMC´s enterprise resource planning system.
2. SAP generates a credit check on every sales order, and if the credit status is approved the order is released and the customer receives an order acknowledgment. The order delivery date is independently calculated for each customer, based on where the customers reside. Thereby each customer can see when their preliminary delivery date is. It is also possible for the customers to enter a desired delivery date later than the delivery date the system suggests. This is however only used in about 25% of all orders.
3. When an order is approved the warehouse receives a delivery request from SAP. The delivery request includes all information the warehouse needs to ship the goods to the customer. A “dummy picking” is made in the inventory management system at the warehouse, to make sure that all spare parts are available. If that is not the case, a new delivery request is created for those products that are not available. RLO also receives information about it, so the customer can be notified.
4. The warehouse then picks and packs all goods, preparing it for delivery. From receiving an order, this should all be done within one day, according to the lead time commitment.
5. At the warehouse the shipment is planned and prepared for transport. Depending on which country the shipment goes to, different forwarders, transport companies, are used. They deliver the shipment to the customer, along with an invoice from RLO. The usual delivery date in Europe is two to four days after RLO has received an order. Each customer can follow orders they have made via the internet.

6. When the customer has received the shipment, a proof of delivery is sent to RLO.

The administration of the web shop is handled by the Order Fulfilment and Customer Support function at Reversed Logistics Operations. It is responsible for the customer orders, data maintenance of the system and possible claims from the customers.

The order process described above makes it easy for customers world wide to make purchase orders whenever they like. And together with the possibility to order without restraints on how much to order and being able to order how often they like, it makes it possible for the customers to respond quickly to demand alterations from the end customers. Appendix III shows statistics of how often orders are made by the companies which makes the most orders.

Demand forecasting/planning

The delivery time for spare parts from the suppliers to the warehouse in Zalaegerszeg can differ from a few days up to several months. It all depends on what contracts are made and where in the product life cycle the parts are. Since the demand for spare parts is delayed and lags behind the sales of the telephone, the suppliers often produce parts to later telephone models at the same time as spare parts are needed for earlier models. This results in complex operations for the supplier, when they need to restart the manufacturing of previous parts again.

All purchases are based on forecasts. RLO uses forecasts for spare parts that are split up in three parts; Phase in, Ongoing, and Phase out (figure 5.3):

- As mentioned in the customer service section (5.4.1), all spare parts should be available in the web shop and orderable from the warehouse in Zalaegerszeg, in time for a new product to be released on the market. The service centers usually buy a few pieces of each part to fulfill the contract towards SEMC.
  This forecast is fixed and will cover the first three months, which is the so called “Phase in” period. This is based on previous models since there are no prior sales data available for that certain model. After five or six weeks, the forecast is checked against the actual sales to the service centers, and revised if necessary.
- During the “Ongoing” period, the forecast is based on the sales data of sales to the service centers. RLO does not receive any sales information or forecasts from the service centers about i.e. stock levels, even though

the service contracts state that the service centers should provide RLO with a rolling three month forecast for the spare parts. The forecast data is based on weekly sales for each component.

- RLO has to, as mentioned in section 5.4.1, provide the market with spare parts for 39 months after the production of the telephone model has ended (after EOP). No spare parts are manufactured for such a long time after the production of the telephone model has ended. This means that RLO has to purchase spare parts that cover the demand for the remaining months, before the manufacturer ends the production of those spare parts. The time between the last time for RLO to buy parts and the end of sales to the customers is called the Phase out period.

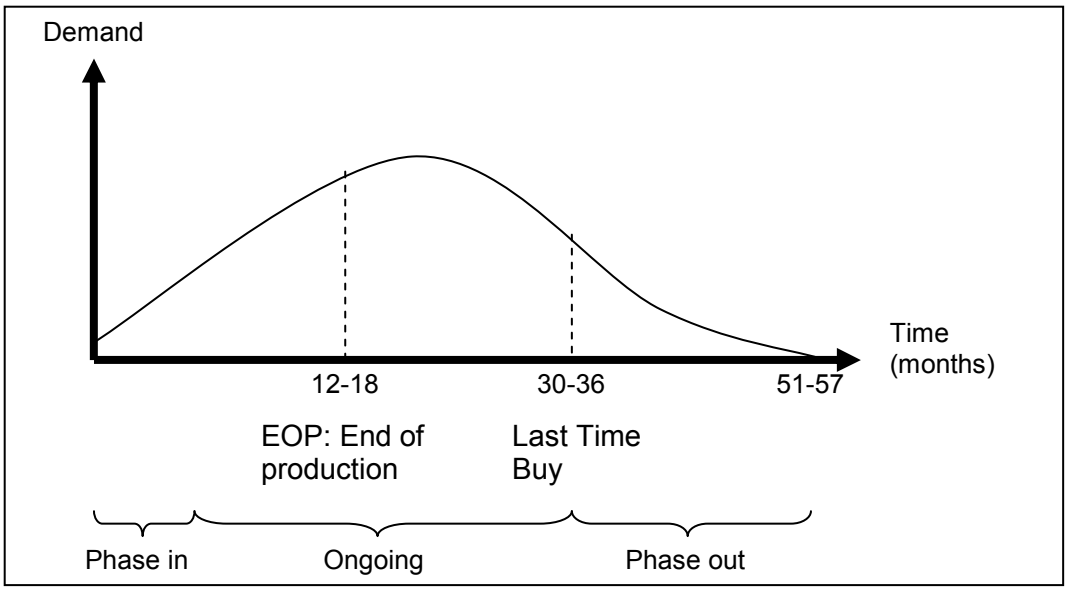


Figure 5.3. General spare part demand.

5.4.3 Warehousing

The warehousing and physical inventory handling is outsourced to Flextronics, a provider of electronics manufacturing services. RLO owns the spare part stock while Flextronics owns the storage space and the manpower. The warehouse that supplies the WE and CEEMEA regions is located in Zalaegerszeg, Hungary. The warehouse is a huge facility which also holds inventory for i.e. Hewlett Packard, and RLO's spare parts only take up a few percent of it. Flextronics works 24 hours a day to handle both the inbound deliveries from the suppliers and the outbound deliveries to the service centers. Every fifteen minutes SAP sends customer orders to Flextronics, in the form of delivery requests. Each delivery request is processed by hand by the operators, and they take care of the requests using a FIFO-rule. This means that every order is being handled as it arrives, First in First Out.

It is Flextronics that executes steps three and four in the order fulfillment process (see section 5.4.2). So apart from the physical inventory handling, Flextronics also plans and books the transports from the warehouse to the customers.

5.4.4 Lot quantity

Since the Reverse Logistics Operations department at SEMC does not manufacture anything, the lot quantity consists of purchasing activities.

The Planning and Procurement function at SEMC Reverse Logistics Operations handles all procurement of spare parts from suppliers. Almost all purchases are made from suppliers that already have contracts with SEMC to provide parts for the manufacturing of the telephones (not included i.e. repair tools, which is done by the Planning and Procurement function themselves). Thereby prices and delivery times are, in general, already settled and focus can be aimed at the actual replenishment. The amount of components that RLO orders are very small compared to the amount that is used when manufacturing the telephones. The spare part demand is generally only a few percent of the total part demand. So RLO usually order according to the smallest lot quantities possible. But those quantities are usually quite large compared to the quantities that the service centers order from RLO.

5.4.5 Inventory carrying

RLO has almost 4000 different spare parts in the warehouse (September 2006). The values of the parts are generally not high. The most expensive spare parts, i.e. a camera module or a display, cost less than 50 Euro/piece.
RLO is keeping rather high safety stocks, mainly due to the following reasons:

- The effects of not having spare parts available. It is much cheaper to secure availability of spare parts than to be out of stock of the spare parts and give the end customers new telephones. (See Customer service, section 5.4.1). Even though the safety stock is rather high, it is hard to predict which components may malfunction, and shortages may still occur.
- The lead times for procurement of different spare parts vary a lot. Some items have lead times in days while others have lead times in months. And since RLO strives for a safety stock that will cover at least half the lead time from the supplier, the stock levels vary and can be quite large for some parts.

- RLO must keep inventory of a spare part for 39 months after the production of that particular telephone has ended. This becomes an issue, since the suppliers of spare parts do not manufacture spare parts for that long. After the production of a certain telephone model is done, they usually start manufacturing parts for the next model. Even though they manufacture spare parts after the production of the particular model has ended, this is usually not made for as long as RLO has commitments to the service centers. So RLO must keep a spare parts inventory that must cover almost two years of demand for a telephone that was released on the market about two and a half years earlier. (See figure 5.3)

5.4.6 Transportation

All transportation issues, like planning and contracting different forwarders to deliver the sales orders, are outsourced by RLO. This is done by Flextronics (see section 5.4.2). The trucks usually leave Flextronics every afternoon, so orders that have been handled before that time will be sent with those trucks. There is always a possibility to use express shipments that will be shipped as soon as the packing of the order is done, but this is just for special events, i.e. shortage situations.

The transport companies deliver the goods to the customer, usually with the delivery terms Delivered Duty Paid (DDP). DDP is an Incoterm where the seller pays for the transportation costs and bears all risk until the goods have been delivered. Incoterms are a set of rules for the international commercial terms that define costs, risks and obligations between buyer and seller in international transactions. So it is RLO who pays for all transports to the customers, which is one reason to why express shipments are avoided if possible.

6 Analysis

This section contains an analysis of the empirical findings, based on the theories stated earlier. The section start with an investigation of the spare part supply chain's design and strategy. The Relations between RLO and the service centers are then analyzed. Finally, the customer service policy that RLO offers is analyzed from the customers' point of view and the effects of it for SEMC is then analyzed, according to the total cost concept.

6.1 Predisposition

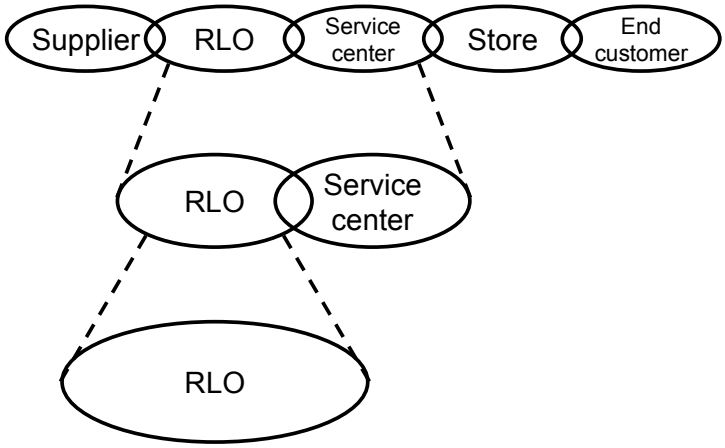


Figure 6.1. Predisposition of the analysis with connections between the different sections.

6.2 Supply chain characteristics

This section analyzes the design of the supply chain from end customer back to the suppliers. The choice of supply chain strategy is also analyzed.

6.2.1 A responsive supply chain

Fischer (1997), states that companies which produce innovative products, with unpredictable demand and short life cycles, should use responsive supply chains. Mobile telephones fall into that category. They have short product life cycles, rather unpredictable demand and high contribution margins. All of the attributes in the right column of table 4.1 fits in on a mobile telephone.

As mentioned in chapter two, SEMC's company values include that it should be responsive to its customers. Blackburn et al (2004) point out that if a responsive supply chain is used for innovative products, it is important to use a responsive supply chain for the reverse logistics activities as well. Otherwise the products will loose too much of their value just waiting to be repaired or refurbished. The solution that SEMC has for the reverse logistics of telephones

is similar to a responsive supply chain. Comparing table 4.2 with SEMC's strategy shows that several of the features match;

- Considerable investments in inventory are made to avoid shortages of spare parts and enable fast delivery time.
- The capacity cushion at the warehouse is high, in order to be able to deliver to every customer even at demand peaks.
- The lead time towards the service centers is short, to provide them with the required spare parts as soon as possible.

The end customer is supposed to receive a repaired telephone as soon as possible after it has been turned in to a store or a repair center. It is possible for the service centers to achieve that with the given customer service that RLO provides.

But the short lead time, combined with the low ordering cost for the service centers, also makes it possible for the service centers to keep very low safety stocks. The requirements on inventory at the service centers are quite low; they only need to keep a safety stock that covers a couple of days. This creates a risk, where some service centers might become bottlenecks if they do not focus on the same things as RLO (figure 6.2). So if there is a sudden increase in demand of a certain spare part, it may arise a shortage situation at the service center even though there is excess inventory of that spare part at RLO. Therefore it is important for RLO to make the service centers aware of RLO's strategy, and to make them think and act in the same direction. Because the end customers will not blame the service center if the repair takes a long time, they will probably blame SEMC, which could lead to a future sales loss for SEMC.

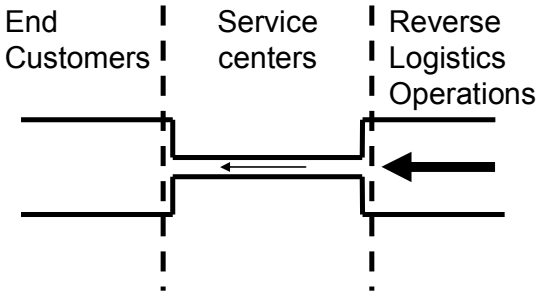


Figure 6.2 The risk for bottleneck situations exists.

6.2.2 Supply chain strategies

The spare parts supply chain for SEMC telephones could be compared with Christopher's (2005) generic supply chain strategies (figure 4.2). The demand and lead times between the different members are:

- End customer – Store/Service center: The demand is unpredictable and the lead time is short, which calls for a quick response solution. The service centers should respond to the customers needs as quickly as possible. This is very important, according to Blackburn et al (2004), when working with innovative products like mobile telephones, since they have a high marginal time value. That means that a telephone which people use for maybe two to three years maximum, looses its value much faster than i.e. a power tool that a consumer uses for a lot more years. It is therefore also important that the store which receives a telephone sends it to a service center, and does this quickly, to avoid decreasing the telephone's time value more. Lambert et al (2001) also point out that it should be taken into account that the end customer easily can decide to switch brand if he/she is not pleased with the customer service received. This makes it even more important for SEMC that the stores and the service centers are responsive when a telephone malfunctions.
- Service center – RLO: The demand is, due to the demand earlier in the supply chain, unpredictable here as well. RLO has made it possible for the service centers to receive spare parts rather quickly, which would position this part of the supply chain in the lower right quadrant of Christopher's figure 4.2, with a quick response strategy. This is to ensure that the service centers can be as responsive as possible towards the end customers. However, just by making it possible for the service centers to respond quickly does not assure that they actually adapt to this and do so. Some service centers order spare parts daily, but other order more infrequently (this will be discussed more later on). It also makes it possible for the service centers to keep low inventory levels if they only care for themselves. If RLO directed the service centers more about how they should order, a more balanced material flow could be achieved.
- RLO – suppliers: The demand is still rather unpredictable but now the lead times are much longer. To deal with this, RLO has to purchase large amounts, to cover for the demand during the lead time. This solution is comparable with Christopher's *Hybrid* supply chain, to be used when demand is unpredictable and the lead times are long. RLO has a central warehouse where a strategic stock is kept. This enables the orders to the suppliers to be of economic order quantities and created from a more generic forecast.

6.2.3 Summary of the supply chain characteristics

RLO seems to have understood the importance of being responsive towards its customers. High capacity cushions and stock levels combined with short lead

times enable a fast response to the service centers' demands. But it is important for RLO that the service centers also act responsively towards the end customers. Otherwise RLO's responsiveness looses much of its value, since it does not reach the most important customer, the user of a Sony Ericsson mobile telephone.

In general, RLO uses a supply chain strategy for the spare parts supply chain that fits with Christopher's description of how to resolve unpredictable demand with varying lead time. If RLO wants to improve the supply chain, and be even more effective, it is necessary to be more responsive to the demands of the end customer. This way RLO can react faster to changes in demand and thereby reducing the lead times for the end customer. But the only way RLO can reach the end customer is through the service centers. So if RLO wants to improve the performance of the supply chain, it is necessary to make sure that the service centers are as responsive as RLO is.

6.3 Relations between RLO and the service centers

This section covers the relations between RLO and the service centers. The balance of power between them, the communication and finally incentives for cooperation is analyzed.

6.3.1 Monopoly situation

Looking at RLO's relations with its customers, the service centers, it shows that the parties act in a competitive nature towards each other. RLO is pleased for every spare part sold to the service centers because it generates income for RLO. At the same time the service centers (in general) try to have as high inventory turnover rate as possible by keeping low inventory levels and place orders often. Just like Mattsson (2002) states, what one part wins the other part looses. But RLO has a big advantage against its customers. RLO acts as the sole supplier to the service centers since they only may order spare parts from RLO in order to be authorized service centers. This results in the monopoly situation that Van Weele (2002) discusses. And just like Van Weele points out, RLO decides what the prices are and the service centers have no choice but to accept them. This also makes it easier for RLO to make demands on many of the service centers. So RLO could use its position to control some of the service centers' order patterns.

6.3.2 Communication

Lambert et al (2001) claim that communication is the imperative link between a company's entire logistics process and its customers. A basis for successful logistics management is accurate and timely information. But RLO and the service centers are quite far apart from each other when it comes to communication. The communication that exists between RLO and the service centers goes through the marketing units and the regional offices before it arrives at RLO. The only direct communication RLO has with the customers is when there are claims for i.e. faulty spare part shipments. In order to be more responsive towards the end customer, RLO should try to approach some of the service centers and increase the communication with them. A continuous dialogue with the largest service centers, about spare part demands, repair processes and inventory management, could result in big improvements for all involved.

6.3.3 Incentives for cooperation

Excess inventory is one of the results due to the lack of communication and cooperation between RLO and the service centers. When no spare parts are needed for a certain telephone model and when a model is outdated, this inventory is worthless and both RLO and the service centers have components that never will be used. The service centers must have the inventory to fulfill the contracts made with SEMC and RLO has to have the inventory to fulfill the commitments to the service centers and to avoid giving the end customers new telephones instead of having them repaired.
The lack of cooperation and communication also result in shortage situations of components from time to time. When RLO does not notice sudden demand increase for a particular spare part (or notices it too late), it has double effects. The income for the service centers decrease since they cannot perform the repairs and SEMC has to provide the end customer with a new telephone free of charge, which is very costly. And a shortage usually results in an excess inventory situation later, since both the service centers and RLO purchase more parts to secure availability and notice the demand decrease too late.

The risk for shortages and the risk for excess inventory are both incentives for a closer collaboration between RLO and the service centers. Mattsson states that the goal when collaborating with other companies is to create win-win situations, which is just the case when it comes to the issues mentioned above. Both parties would make/save money by always ensuring that there are spare parts available and informing each other about sudden increase in demand. Increased cooperation and information sharing would give RLO information

earlier if there is an increase in demand for a certain spare part, which would make it possible to react faster and hopefully avoid the risk of stock out. Shared information could also lead to a decrease of excess inventory in the supply chain.

If RLO were to cooperate more with the service centers it would, according to both Barratt (2004) and Mattsson (2002), be very time and resource demanding to cooperate with nearly 300 service centers. Looking at the sales statistics in appendix II shows that the 80/20 rule that Mattsson mentions, is applicable; about 15% of the customers purchase 80% of all spare parts RLO sell. Then it would be wise to try to work closer to the customers that purchase the largest amount of spare parts, since it would include a larger percentage of the spare part consumption.

In order to use some kind of VMI solution, which Christopher (2005) mentions as a powerful way to improve responsiveness through cooperation, better relations are required. At the moment there is only one customer that RLO communicates with directly, Elcoteq in Hungary. Elcoteq fulfills the technical requirements necessary to be involved in a VMI partnership. But in order to receive better effects and profits from a VMI solution, which according to Christopher has substantial investment costs, more customers need to be involved. And since the 11 largest customers purchase about 50% of all spare parts RLO sell, it might be wise to increase the collaboration with these to start with, and find out if they fulfill the requirements that are necessary for a VMI solution.

The Warranty Claims Management System (WCMS) makes it available for RLO to receive point of use information for some of the consumption of spare parts. According to Christopher (2005) and Childerhouse et al (2000), this kind of information sharing is obligatory in an agile supply chain. But the WCMS only include about 60% of all spare parts consumed by the service centers, making the other 40% hidden for RLO, which also is the reason why it is not used in RLO's forecasting process. But if the service centers were to register all repairs in WCMS, RLO would receive information about the actual consumption of spare parts on a daily basis. By collecting this information and using the information about how many telephones are sold, RLO can calculate the repair rate and summarize the spare parts demand. Then this information could be used in the forecasting process and the service centers could receive information about repair rates on the spare parts for all telephone models. So the service centers would know i.e that in 15% of all telephones they receive of a certain model, a change of joystick is necessary. By sharing this kind of

information within the supply chain, inventories can be decreased and demand fluctuations can be observed earlier.

6.3.4 Summary of the relations between RLO and the service centers

Since RLO is the only supplier the service centers are allowed to use, a monopoly situation occurs and RLO is free to set almost whatever price it thinks is reasonable. But it is important to remember that more than 50% of the spare parts actually are paid by SEMC, due to the in warranty repairs.

The communication between RLO and the service centers is almost none existing. This needs to be improved if RLO wants to decrease the amount of shortage situations and at the same time avoid the opposite, large excess inventory. Increased communication could lead to a decreased bullwhip effect between the members of the supply chain.

It is too expensive and time consuming to try to communicate and cooperate with all service centers that RLO has contract with. By focusing on the largest customers, most of the demand is covered, since the 20/80 rule applies. Increased cooperation with these customers could result in improved responsiveness for the supply chain.

6.4 Total cost analysis

The customer service commitments that RLO has towards its customers will first be analyzed briefly in section 6.4.1, from the customers' point of view. Then the effects those commitments have on each of RLO's different activities in the total cost concept will be analyzed.

6.4.1 Customer service

The customer service commitments that RLO has towards the service centers can be summed up like this;

- RLO strives for 99% availability of all spare parts in stock.
- The lead time to the service centers is only a few days.
- Orders can be placed at any time.
- There are no restrictions regarding lot quantities.
- All customers are treated the same, no matter how much they purchase.
- All ordering costs are paid by RLO.

This makes it possible for all service centers to be responsive towards the end customer, since they can react quickly to demand fluctuations. But the same

customer service policy also makes it possible for the service centers to have high inventory turnover rates and low safety stocks.
The lead time is usually longer than the turn around time the service centers needs to comply with, so each service center needs to keep at least a small amount of all components in stock in order to fulfill the contract. But even though the service centers are supposed to have enough components to cover the Turn around Time, there is no way for SEMC to check if they do so, except for at the occasional audits. This makes it possible for the service centers to avoid carrying inventory of the really slow moving components, and only order those when a need arises.

Since there are no restrictions on when and how much each service center may order, every service center can order how much they like, whenever they like, at almost no cost at all. The only cost for the service centers is the time they have to put on sending the order. It is possible to send an order for i.e. three screws in the morning and then later the same day order twenty more screws together with a couple of displays and some plastic covers. It is all up to each and every customer to decide how they want to handle their spare parts replenishment, as long as they fulfill the demand from SEMC; that they have to have a stock of spare parts to cover the turn around time.

Every customer has the same priority. So a customer that repairs five telephones per day receives the same customer service as a customer that repairs 300 telephones per day. There are some prioritizations in the event of stock outs, but no customer is higher prioritized in the event of i.e. capacity issues at the warehouse in Zalaegerszeg. This strategy is quite the contrary to what Christopher (2005) states when he points out that it is important to find an appropriate level and mix of service that varies according to customer type. It is much more expensive for RLO to maintain its customer service towards a small low volume center that is located far away from the warehouse, than to a large high volume center that is located much closer to the warehouse.

6.4.2 Order processing and information costs

RLO has a quite advanced ordering system where there is no need for human contact between RLO and the service center if an order develops as it should. And just like Lambert et al (2001) points out, this advanced order process has resulted in a decrease both in costs for the order process and in the lead time towards the customer. But every sales order that is made still creates a cost for RLO. The order system was not free of charge and every order still needs some administrative activities in the steps that are not automated, i.e. the

warehousing activities. Maintenance of the web shop is also resource demanding.

There are no ordering costs for the service centers, except for the time it takes to place an order in the web shop. All other costs regarding every order are covered by RLO. Due to this some of the service centers create many small orders, which increase the order costs for RLO even further. A symbolic order cost for the service centers would probably decrease the number of orders received by RLO. But it is important that the order cost is not too large, since it may result in stock out situations at the service centers because they want to save money on the orders. A few service centers even order more than once a day, which can indicate the lack of a reasonable inventory management, since they only receive one delivery per day. Appendix III shows a table of the customers that make the most orders. They are sorted by total number of orders between January and October 2006. The first column states in which place each of those customers are regarding the total amount of products sold in WE + CEEMEA during the same time. A comparison is made with Elcoteq, which is the largest customer in the CEEMEA region. Elcoteq makes approximately one order per day. The comparison shows that it is not the largest customers that make the most orders. A rough estimate, based on 22 working days per month, gives about 750 excessive orders that have been placed by customers who already have placed one order/day, during January to October. An average total logistics cost for an order is about € 430 for RLO, which gives a hint about the costs for servicing the customers. Appendix III also shows that some of the biggest customers do not order on a daily basis. It would be better for RLO if the bigger customers ordered on a daily basis and the smaller customers ordered more infrequently. Since the larger customers repair more telephones than the smaller ones, that would justify more frequent orders from them.

Demand planning

A lot of factors affect the demand planning at RLO. The effect of a shortage makes it cheaper to increase the forecast in order to secure availability of the components needed. And since the lead time from the supplier generally is quite long, this creates more excess inventory. The short lead time and availability commitment towards the service centers requires that there always is inventory available. It is extra hard to make accurate forecasts in the beginning of a telephone models life cycle (at the phase in period) and in the end (at the phase out period). During the phase in period, the demand will increase for some parts, but it is hard to predict which parts, since no historical data exists. And during the phase out period, RLO does not know how much parts will be necessary when it is time to make the last purchase from the

supplier, since the demand curve decreases. RLO does not know how much inventory the service centers have and how much they will need during that time. And this usually results in that both the service centers and RLO have excess/obsolete inventory for a model when there is no more demand for the spare parts.
In order to improve the forecasts, more information is needed, at an earlier stage. At the moment RLO base all forecasts on sales to the service centers and not on the actual usage of the parts. If RLO had access to the consumption of spare parts at the service centers, this information could be compiled to find out how much the actual usage is. And then the forecasts would be made on real demand from the end customers. But this would require better cooperation with the service centers, which is discussed in section 6.3.

6.4.3 Warehousing costs

Lambert and Stock point out that warehousing is an essential part of the logistics system and it is important when a company wants to provide desired customer service levels at lowest possible total cost. The customer service policy that RLO offers its customers results in high costs for the warehousing activities, costs that are quite obvious since the warehousing activities is outsourced and RLO has to pay Flextronics for each action made. And the result of these costs does not add much value to the end customer.

Every order the customers make will result in work for Flextronics even if it does not result in much work for RLO. Flextronics has to administrate, pick and pack every order. This is especially obvious in the cases where some customers order several times a day, according to appendix II. And whenever there is a shortage of a material that a customer needs, this material will be rescheduled to a new delivery request that will be handled as soon as that material arrives at the warehouse. So when shortages occur, the only negative effect is not that SEMC may have to give the end customer a new telephone. Many extra delivery requests are created as well, which will require increased capacity usage when the material finally arrives at the warehouse, since all orders of that material must be handled as fast as possible.

Since the customers can order with no restrictions regarding time or size, there is no way of knowing when the customers will make their orders and how small/large the orders are. Taking into account RLO's commitment that each order should be shipped within 24 hours; it results in that Flextronics has to be very flexible when there are fluctuations in the ordering. This in turn leads to increased costs for RLO when Flextronics wants to be compensated for its flexibility in capacity. In table 4.2 from Krajewski et al (2005) it is stated that a

responsive supply chain should have high capacity cushions to deal with fluctuations in demand. But even though RLO has a high capacity cushion at the warehouse, costs could be decreased if the customers were to make their ordinary orders following some kind of pattern. Then the capacity cushion could be used for emergency orders during a surprising demand increase.

Most of the components are delivered to the warehouse in trays or containers of some sort (i.e. plastic covers for a certain model can arrive in trays of 20 pieces). This is not taken into account when the customers place their orders, partly because the customers can order whatever quantity they want, and partly because they probably do not know the size of the trays or containers. So the staff at Flextronics has to remove or add components from the containers and pack them separately, which results in more work, increased usage of packing material and an increased risk that the goods will be damaged during the handling or shipment. If RLO were to sell all components in fixed amounts, based on how they are packaged, the time for picking an order would decrease, the usage of packing material would decrease and less goods would be damaged during transport. It would also help the service centers if they could use the original packages when they store the components. Another positive effect would be that if RLO were to buy back some components, it would be easier for the service centers to send them back.

6.4.4 Lot quantity costs

The lot quantities that RLO uses when purchasing components from the suppliers will not be discussed in this thesis since focus lies on RLO's relations with its customers, not its suppliers.

6.4.5 Inventory Carrying costs

Since RLO promises 99% availability of all spare parts at all time and have a short lead time towards the service centers while the lead time from the suppliers is much longer, the inventory levels are high. This is exactly what Fortuin et al (1999) states as an issue with spare parts, when long lead times and low priority results in high inventory levels to ensure availability. The risk for having to give away new telephones (the cost of lost sales), combined with the customer service that RLO offers to the service centers, results in high inventory carrying costs. And that is just what Lambert et al point out; generous customer service usually results in high inventory carrying costs. And since the lead time from the suppliers is much longer than the lead time to the customers, it is also necessary to keep a safety stock that covers the lead time from the suppliers, resulting in even higher inventory carrying costs.

75% of all orders are requested at earliest delivery date possible, which means that an order must be picked and packed as soon as possible after it has been received. Due to this there are not many other options for RLO but to keep large inventories. Otherwise the commitment of 99% availability in stock will not be achieved. If the service centers were to make orders more in advance, without requesting earliest delivery date, it would be easier for RLO to plan how much inventory would be necessary to keep in stock. This might be difficult for the service centers to do when it comes to emergency orders at sudden demand fluctuations, but it should be possible to do with the spare parts which have a rather even demand.

Coyle et al (1996) state that when companies try to meet customer needs timely, it is important to have the inventory to be able to do so. But then it is also important to work closely with the customers, to avoid excess inventory, which results in extra expenses (ibid). This is another reason for RLO to cooperate more with its customers (discussed in section 6.3); to reduce the excess inventory that arises in the supply chain. And increased cooperation with the customers would probably also have the same effect regarding the risk for shortages. If RLO worked closely with the customers, it would be easier to avoid shortages as well, since information about sudden demand increase would be received earlier.

6.4.6 Transportation costs

Looking at the table in appendix III, it shows that the customers' order patterns vary quite much. Some order daily while others order weekly or even biweekly. Comparing the order patterns with the delivery schedules shows one obvious issue. Even though there are only deliveries made once a day, in the afternoon local Hungarian time, several customers order more than once a day, as pointed out in section 6.4.2. This means that many transports leave with i.e. two boxes of spare parts that will go to the same customer. So even if the customers order several times a day they will only receive one delivery per day, probably with the same truck. It might be possible that the customers do not know that there only is one shipment a day sent from the warehouse. Informing the customers about this and ensuring that each customer only can make a maximum of one order a day will decrease both ordering and transportation costs for RLO (see also section 6.4.2).

Another issue that arises when each and every customer may order whenever they like is that it is very hard to consolidate transports. This makes it more expensive to serve the smaller customers, since they are not as profitable as the

larger customers. Transportation savings could be made if i.e. all customers in a certain geographical area where to order the same day (Coyle et al). And if the customers would have fixed order dates, i.e. that all customers in Germany may order Monday, Wednesday and Friday, then Flextronics can make better plans about how much capacity is needed, for both warehousing and transports, each day.

6.4.7 Summary of the total cost analysis

The existing customer service, that RLO provides all its customers, is very costly for RLO. It enables the service centers to be responsive towards the end customers, but the demands on the service centers are not on the same level, which makes it possible for them to take advantage of the situation.

Since a 99% availability in stock is offered at all times, the inventory carrying costs are high, and a lot of resources are used to maintain that level of availability.

The short lead time towards the service centers results in high warehousing and transportation costs.

A lot of unnecessary orders are made, resulting in high costs for administration, warehousing and transportation.

Since there are no restrictions regarding lot quantities, it is resource demanding for the warehouse to pick each order, a lot of unnecessary packaging material is used and the goods has a higher risk of being damaged during the transports.

Smaller customers receive the same customer service as the larger customers, resulting in higher costs for the smaller service centers, in relation to the amount of telephones they repair.

Since all ordering costs are covered by RLO, there are no incentives for the service centers to use more regular order patterns, in order to decrease the ordering costs.

7 Recommendations

This chapter highlights some improvement possibilities that RLO can make use of. Some are easier to implement while others are more difficult. The chapter ends with a summary of the recommendations.

7.1 Predisposition

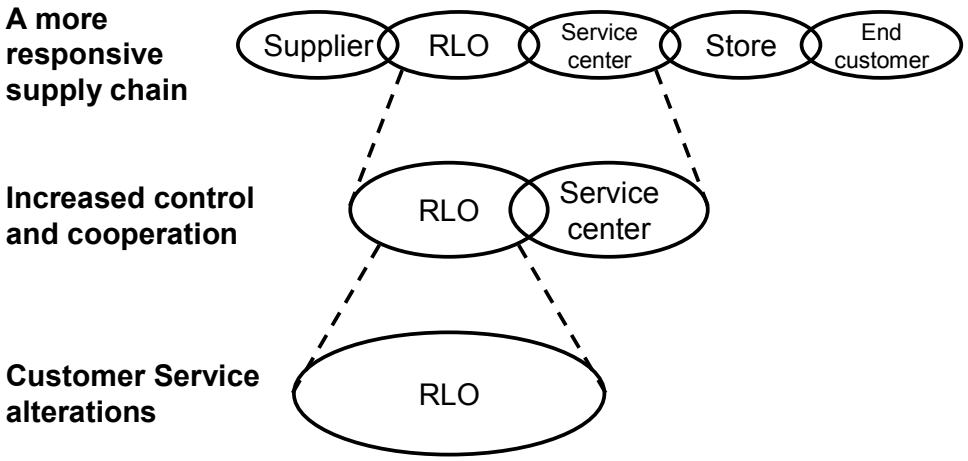


Figure 7.1. Predisposition of the recommendations chapter

7.2 A more responsive supply chain

If RLO is to succeed in becoming world class, it is a necessity that the service centers are world class as well. Otherwise there is no use for RLO to be world class, since the end customers will not notice it. So RLO needs to inform the service centers about its strategy and explain why it is important for the service centers to use the same strategy. The service centers also need to have capacity cushions, fast delivery time and safety stock levels that can handle sudden demand increase.

Chapter 5.2 mentions that SEMC conduct technical audits at service centers all over the world, to ensure that they work according to the contract that exists between each service center and SEMC. These audits could also include inventory management. Understanding the service centers strategies when it comes to inventory management can be of big help for RLO when striving towards world class. It can give information about which service centers that might need assistance with their inventory management and which service centers that are well developed and has good control over their inventory. Since the service centers main competence area is repairing telephones and RLO's main competence area is logistics, RLO should assist the service centers to improve their inventory management. This should be made, in order to secure

availability of spare parts, when these are required by the end customer. Because the way the service centers handle their inventory has a direct effect on how RLO needs to handle its own inventory. Christopher (2005) mentions supplier development teams as a solution. A supplier development team could help the service centers improve their inventory management, so that the irregular, and for RLO expensive, ordering procedures could be avoided.

7.3 Increased control and cooperation

There is a possibility for RLO to use its monopoly situation to incorporate the service centers with RLO's strategy. Alterations in the contracts can force the service centers to i.e. increase their safety stock and capacity cushions. If RLO wants to continue to work competitively towards its customers, this could be a solution. But it is important to remember that the service centers probably would oppose to such alterations if they do not see the benefits of them. They also repair other brands and may not care if SEMC increases its market position, since they repair the other brands as well. And if the costs increase for the service centers, so will the costs for SEMC, since the service centers probably want to be compensated for i.e. increased safety stocks. This is important to keep in mind when striving for world class.

If RLO wants to be more responsive towards the end customer, it is necessary to reach them through the service centers. The agile supply chain strategy that Christopher recommends could be an appropriate strategy for RLO to use in order to achieve this. Increased cooperation with the service centers could give RLO more and faster information about the real demand from the end customers. But as stated in the previous chapter, it would be too expensive to involve all service centers. According to appendix II, 15% of the service centers purchase 80% of the spare parts. Cooperating with these service centers would consequently cover the majority of the spare parts consumption. Christopher points out that more and more companies notice that the way to sustained profitability is through building long term relationships with selected customers. This is just what RLO should focus on.

In a longer perspective, some kind of VMI solution might be applicable with the customers RLO chooses to cooperate with. The more expensive spare parts, i.e. cameras and displays, are interesting to have good control over, since they are quite expensive to keep in stock. This makes it interesting for both service centers and RLO since both parts appreciate low inventory carrying costs. With a VMI solution, RLO will achieve better control over the spare parts. It is also a way to ensure availability of spare parts at the service centers and to avoid situations with excess inventory at both service centers and RLO. Then both parts will gain advantages of the cooperation.

The WCMS is a system that could be developed into something extremely valuable for RLO. If the service centers entered all spare parts consumption in WCMS, RLO could use that information to receive spare parts consumption rates on a daily basis. Sudden increase in demand could be noticed on a global level and actions can then be taken earlier than today, to ensure stock availability at RLO's warehouse. The information received from WCMS could also be used to calculate the general spare parts need for every telephone model.

7.4 Customer Service alterations

In order to improve the effectiveness and at the same time lower the costs, RLO needs to do something about the customer service it provides to the service centers.

7.4.1 Categorize the customers

Since all service centers do not repair the same amount of telephones, there is no reason why all service centers should receive the same customer service. Giving all service centers the same service results in high costs maintaining the smaller customers. Usually, customers are categorized after how profitable they are for a company. The goal for RLO however, is not to make profit on the spare part sales but to ensure that the telephones can be repaired with the necessary spare parts. But this does not justify large costs for servicing all customers. Both Lambert et al (2001) and Christopher recommends dividing the customers into different segments and give them different customer service. This is another incentive to altering the relations with the customers. The author recommends that RLO increase the communication and cooperation with the largest customers. These customers are also the ones that should receive the best customer service. It gives them incentives for cooperation. Segmenting the customers could also give other customers, which are not in the top segment, incentives to increase their repair amounts in order to reach a higher segment, resulting in better customer service.

7.4.2 Alter the customer service commitments

There are several small and large alterations that can be made to the customer service that RLO offers to its customers, in order to decrease the total logistics costs but still not decrease the customer service too much. This should be done, regardless of if or how the customers are categorized. These alterations are listed below:

Order frequencies
There is no point in letting the customers order more than once a day since the normal deliveries only leave the warehouse once a day. Every order creates costs for RLO (order processing, warehousing, and transportation) even though it does not cost the service centers much. If there would have been a restriction for the service centers to only order once a day between January and October 2006, there would have been about 800 orders less from the WE and CEEMEA regions. So the author recommends RLO to implement a restriction for the service centers to order once a day at the most. Emergency orders at special occasions can be approved manually by each Region, in order to keep the ordering costs at a lower level.

In a more long term view, it is recommended that the customers should be divided into different segments, as mentioned in 7.4.1. Size and geographical position should be included as parameters when deciding which segment a customer should belong to. Then the larger service centers could have deliveries made to them on a daily basis and the smaller could have fixed delivery dates. That would also make it possible to consolidate transports to the customers. RLO should discuss the best transportation solutions with Flextronics and the forwarding companies to find appropriate delivery routes. This would probably decrease the total logistics costs for RLO. And if the costs decrease for RLO, the price of spare parts for the service centers can in turn be decreased, resulting in lower inventory carrying costs for them.

Lot quantities
If RLO were to sell all components in fixed amounts, based on how they are packaged, the time for picking an order would decrease, the usage of packing material would decrease and fewer goods would be damaged during transport. It would also be easier for the service centers to handle the spare parts if they were delivered in containers made for the spare parts, which may not be the case at the moment. Smaller, low cost parts should be sold in larger quantities while bigger and more expensive parts should be sold in smaller quantities. But in order for this to be possible, RLO needs to find out how every spare part is being delivered to the warehouse by the suppliers.

7.5 Summary of the recommendations

Below (table 7.1) is a summary of the recommendations made in this chapter. It mentions what effects each recommendation would have if implemented, and the time it would take to implement the recommendation. The time to

implement column is based on the authors own assumptions and is not to be interpreted as certain to 100%.

Table 7.1: Summary of the recommendations

Action	Effect	Time to implement
Synchronize strategies with service centers	Improves the effectiveness of the supply chain	Months, years (continuous work)
Inventory management audits	Improves understanding of customers' inventory management	Weeks (continuous work)
Supplier development teams	Improves customers' inventory management	Months (continuous work)
Contract alterations	Increases safety stocks and capacity cushions at service centers	Months (can be done when contracts are renewed)
Work closer with the customers	Decreases excess inventory, shortages can be avoided	Months, years (continuous work)
Develop the WCMS	Reveals real demand from the end customers	Months, years
Categorize the customers	Decreases total logistics costs	Months (continuous work)
Restrict order frequencies	Decreases total logistics costs	Weeks
Implement lot quantities	Decreases total logistics costs	Weeks

As the reader can see, most of the recommendations are not possible to implement within a short time frame but are recommendations of a more strategic nature. But a few of the recommendations are possible to implement within a couple of weeks and would have quite large effects on the costs for RLO.

8 Conclusion and Discussion

This final chapter includes the conclusion that is drawn from the results of this thesis and a general discussion about the realization of the thesis.

8.1 Conclusion

After mapping the customer management at RLO, the author has come to two major conclusions:

- RLO needs to make sure that the service centers operate according to the same strategy as RLO. Because even if RLO provides a world class customer service, this is of no use for the end customers if the service centers do not provide the same for the end customers.
- In order to improve the effectiveness of the supply chain, RLO needs to work closer with its customers. The present customer service policy that RLO has towards its customers is very generous. But it results in high costs for RLO and can be made much more effective. RLO should categorize its customers and give them a customer service according to this categorization. The largest customers should be involved in a deeper cooperation where information sharing and process alignment is imperative. Only then RLO can achieve the goal of creating a world class supply chain for spare parts.

8.2 Discussion

When the author started to work on this thesis, the purpose was different than what is mentioned in the first chapter of the report. The purpose was to investigate how increased cooperation between RLO and its customers would affect the total logistics costs for RLO. A pilot study between RLO and Elcoteq would present answers if a VMI solution would be effective. But the lack of contact and communication with other customers made it hard to find out if they were ready for such a solution and interested in it. And Elcoteq works under different conditions than the other service centers. Since Elcoteq receives information about what telephones to repair several days before they arrive at the factory, orders can be made proactively, so the deliveries of spare parts arrive at just about the same time as the telephones arrive. The other service centers do not receive this kind of information and must therefore act in a more reactive manner when ordering spare parts, and should always keep inventory on hand in order to achieve the turn around time requirements in the contracts with SEMC. As mentioned in chapter 6.3, Elcoteq fulfills the technical requirements necessary for a VMI solution. But just implementing Elcoteq in a

VMI cooperation would not give much benefit for RLO, since the costs for it would exceed the profits.

Since the author investigated such a wide area, it was difficult to do an in depth mapping of individual areas. The mapping was made on a global level in order to catch as many angles as possible, starting wide and narrowing downwards. It would have been interesting to follow up some of the qualitative findings with studies of a more quantitative nature.

References

Written literature

Aronsson, H., Ekdahl, B., & Oskarsson, B., (2003), *Modern Logistik,* 1 Ed, Liber Ekonomi, Malmö

Coyle, J. J., Bardi, E. J., & Langley, C. J., (1996), *The Management of Business Logistics*, 6 Ed, West Publishing Company, St. Paul MN.

Christopher, M., (2005), *Logistics and Supply Chain Management,* 3 Ed, Pearson Education Limited, Dorchester.

Davidson, B. & Patel, R., (1994), *Forskningsmetodikens grunder*, 2 Ed, Studentlitteratur, Lund.

Ejvegård, R., (2003), *Vetenskaplig metod*, 3 Ed, Studentlitteratur, Lund

Krajewski, L. J. & Ritzman, L.P., (2005), *Operations Management, Processes and Value Chains,* 7 Ed., Pearson Education, Inc, Upper Saddle River, New Jersey.

Lekvall, P. & Wahlbin, C., (2001), *Information för marknadsföringsbeslut*, 4 Ed., IHM Förlag, Göteborg.

Lumsden, K., (2006), *Logistikens grunder,* 2 Ed, Studentlitteratur, Lund.

Mattsson, S-A., (2002), *Logistik i försörjningskedjor,* Studentlitteratur, Lund.

Olsson, H, & Sörensen, S., (2001), *Forskningsprocessen : kvalitativa och kvantitativa perspektiv,* 1 Ed, Liber, Stockholm.

Segerstedt, A., (1999), *Logistik med Fokus på Material- och Produktionsstyrning,* 1 Ed, Liber Ekonomi, Malmö.

Stock, J. R. & Lambert, D. M., (2001), *Strategic Logistics Management,* 4 Ed, McGraw-Hill, New York NY.

Van Weele, A., (2002) *Purchasing and supply chain management*, 3 Ed, Thomson, London.

Articles

Barratt, M., (2004), Understanding the meaning of collaboration in the supply chain, *Supply Chain Management: An International Journal*, Vol 9, pp. 30-42.

Blackburn, J. D., Guide, V. D., Souza, G. C. & Van Wassenhove, L. N., (2004), Reverse Supply Chains for Commercial Returns, *California Management Review, Winter,* Vol 46, pp 6-22.

Childerhouse, P. & Towill D., (2000), Engineering supply chains to match customer requirements, *Logistics Information Management*, Vol 13, pp 337-345.

Fisher, M. L., (1997), What is the Right Supply Chain for Your Product?, *Harvard Business Review, March-April*, pp 105-116.

Fortuin, L. & Martin, H., (1999), Control of service parts, *International Journal of Operations & Production Management*, vol 19, pp 950-971.

Respondents

Backman, Johan. SEMC CS RLO, autumn 2006

Dalén, Daniel. SEMC CS RLO, autumn 2006

Gustafsson, Ulf. SEMC CS RLO, autumn 2006

Kandell-Wang, Cathrine. SEMC CS RLO, autumn 2006

Klingberg, Linda. SEMC CS RLO, autumn 2006

Kunsztler, Peter. Elcoteq Hungary Ltd, November 2006

Naumov, Attila, SEMC CS RLO, autumn 2006

Obrell, Torbjörn. SEMC CS, Low Volume Repair & Experience Store, autumn 2006

Olsson, Liselott. SEMC CS RLO, autumn 2006

Pettersson, Joacim. SEMC CS RLO, autumn 2006

Skoog, Peter. SEMC CS, October 2006

Tollander, Henrik. SEMC CS RLO, autumn 2006

Törnqwist, Klas. SEMC CS RLO, autumn 2006

Appendix I – Vendor Managed Inventory (VMI)

VMI is, according to Waller, Johnson and Davies (1999), one of the most widely discussed initiatives for improving efficiency within the supply chain. Christopher (2005) points out VMI as a powerful way to improve responsiveness through collaboration.

With Vendor Managed Inventory (VMI), the customer shares information instead of placing orders to the vendor (see figure 1). The information shared is actual usage or sales of the products, current inventory levels and information about marketing activities like promotions. Based on this information, the vendor is responsible for the replenishment of the customer's inventory. (Christopher, 2005)

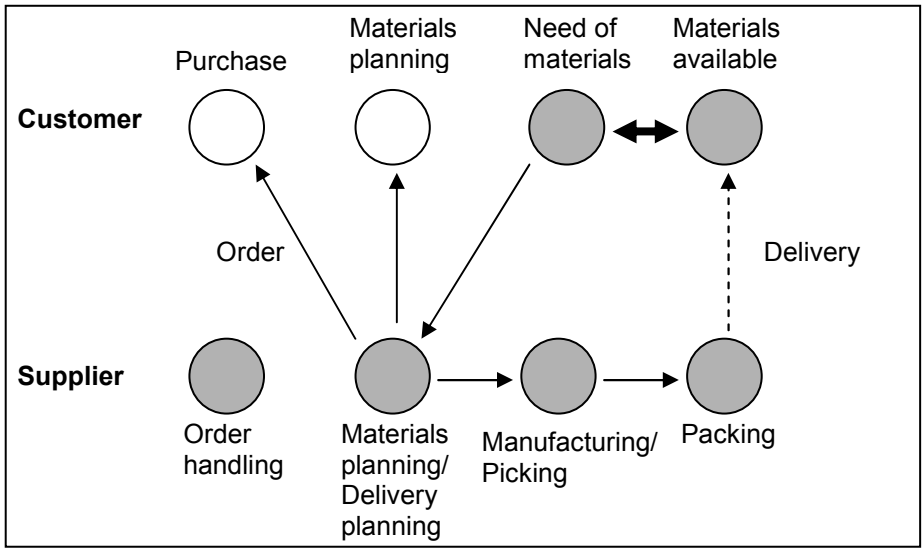


Figure 1. VMI replenishment process (Mattsson, 2002)

According to Mattson (2002), several different setups of VMI occur:

- Co-managed Inventory: The vendor does the operative replenishment, but the replenishment orders have to be approved by the customer. The customer owns the inventory but they have a shared responsibility for the size of it.
- Vendor Managed Replenishment: As in Co-Managed inventory, the vendor does the operative replenishment and the customer owns the inventory. The difference here is that the customer does not have to approve every order. All orders depend on the inventory's maximum and minimum levels for each article, levels the two companies have agreed upon earlier.

- Vendor managed inventory: In this setup the vendor owns the inventory. He has the full responsibility for the inventory management. The inventory is usually based on what service levels the vendor and customer has agreed upon.

In all VMI setups above, the vendor receives information from the customer about actual sales, forecasts, delivery schedules and other demand information. The same information the vendor has when planning his own inventory. (ibid) So a prerequisite for VMI is good information exchange between the members of the supply chain (Angulo et al, 2004).

References

Angulo, A., Nachtmann, H. & Waller, M., (2004), Supply Chain Information Sharing in a Vendor Managed Inventory Partnership. *Journal of Business Logistics,* Vol 25, pp101-120.

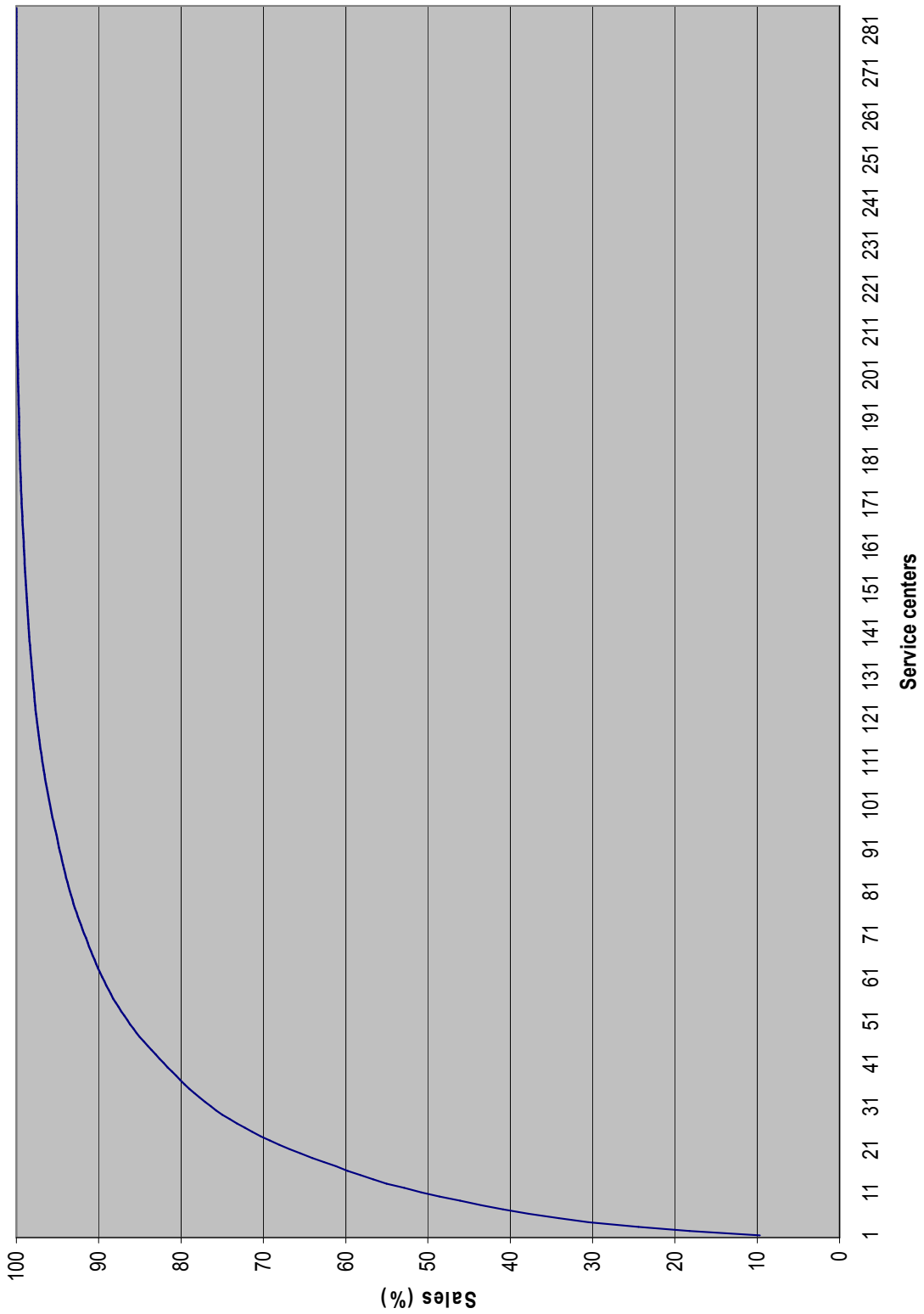
Christopher, M., (2005), *Logistics and Supply Chain Management,* 3 Ed, Pearson Education Limited, Dorchester.

Mattsson, S-A., (2002), *Logistik i försörjningskedjor,* Studentlitteratur, Lund.

Waller, M., Johnson, E. & Davis, T., (1999), Vendor Managed Inventory in the Retail Supply Chain, *International Journal of Logistics Management*, Vol 6, pp 1-10.

Appendix II – Sales according to customer

Percentage of sales according to amount of components, Jan – Oct 2006.



Appendix III – Order patterns

The amount of orders from the customers that ordered most frequently during Jan – Oct 2006. (WE + CEEMEA regions)

"Sales pos"	Customer	2006-jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	total
24	Confidential	36	34	51	43	52	48	42	39	52	48	445
20	Confidential	36	30	36	30	26	41	37	31	36	31	334
4	Confidential	20	35	34	31	36	28	25	29	31	34	303
23	Confidential	33	18	23	30	25	29	40	28	30	34	290
15	Confidential	8	15	13	29	35	33	25	29	40	61	288
22	Confidential	27	25	33	27	23	29	23	24	28	24	263
29	Confidential	25	24	20	19	30	24	29	26	30	36	263
48	Confidential	25	27	31	34	24	25	24	10	25	33	258
59	Confidential	26	20	30	11	27	26	15	47	26	25	253
2	Confidential	14	33	23	25	23	24	24	25	27	27	245
36	Confidential	24	19	25	28	24	26	26	20	18	20	230
11	Confidential	15	18	16	16	19	25	16	26	35	30	216
17	Confidential	4	14	13	12	19	25	22	33	36	33	211
1	Confidential	13	12	26	19	25	24	24	22	19	23	207
38	Confidential	24	13	23	17	20	23	17	16	20	22	195
53	Confidential	8	8	8	13	17	24	27	23	23	34	185
71	Confidential	23	21	23	20	20	23	20	24	9	-	183
14	Confidential	14	16	11	17	25	15	26	21	21	16	182
6	Confidential	17	16	16	15	16	18	15	23	22	23	181
9	Confidential	-	1	14	15	19	19	26	33	20	22	169
26	Confidential	11	15	15	11	14	13	21	27	18	26	171
5	Confidential	8	16	17	19	15	17	16	15	22	19	164
204	Confidential	18	22	14	20	20	9	20	11	13	17	164
30	Confidential	7	21	19	13	19	11	13	20	14	16	153
66	Confidential	23	15	19	7	21	11	12	19	12	14	153
25	Confidential	11	17	20	11	14	14	13	21	19	15	155
104	Confidential	3	12	22	17	23	21	16	14	12	11	151
42	Confidential	5	15	16	11	17	18	14	13	23	17	149
13	Confidential	9	-	2	10	23	22	16	18	21	17	138
34	Confidential	23	13	13	11	14	11	10	15	10	16	136
75	Confidential	7	-	-	4	7	6	26	22	36	26	134
10	Confidential	12	13	13	12	14	9	10	22	12	14	131
52	Confidential	14	17	18	11	11	15	8	12	14	11	131
86	Confidential	9	13	12	14	16	15	12	14	10	13	128
19	Confidential	8	13	16	18	15	12	13	9	7	11	122
3	Confidential	14	10	16	8	10	10	7	10	16	19	120
65	Confidential	25	21	21	16	10	18	7	3	-	-	121
138	Confidential	9	8	15	11	13	9	8	16	16	13	118
81	Confidential	4	10	10	10	10	12	13	9	15	26	119
76	Confidential	13	9	24	20	26	24	-	-	-	-	116

The leftmost column shows the size of the customer, 1 being the customer purchasing the largest amount of components.