

MASTER'S THESIS

Ordering Routines at Scania Deutschland GmbH

*A case study with focus on improving
the spare-part order process*

ANNACARIN SVENSSON

MASTER OF SCIENCE PROGRAMME

Department of Business Administration and Social Science
Division of Industrial Logistics

Abstract

With a decreasing market for trucks and low volumes of sales, service and maintenance has come to constitute an important source of income for truck manufacturers. A further tendency in the business is that the general interest in service quality, for instance within sales warranties and maintenance, has increased considerable. Hence, it has become extremely important to focus on handling and improving service quality. Nowadays, when the customer perceives little technical difference between competing offers, manufacturing companies need to create differential advantages through added value. For Scania Deutschland GmbH, this implies focusing on the customers, as well as improving the section of service and maintenance.

An important factor within service and maintenance is to secure supply of spare-parts to the retailers. It has further been shown essential to maintain a stable inventory management at the central warehouse as well as at the retailers. Hence, the order routines must function smoothly. This thesis work is a product of the endeavour for lowering costs and improving the order process, with focus on the order placement between the retailers and the central warehouse. The aim for Scania Deutschland GmbH is to increase the orders placed on a daily basis, i.e daily stock orders, implying an increased inventory planning at the retailers. Consequently, the purpose of this thesis is to identify factors that restrain an increased level of daily stock orders.

I have explored and described the order process at Scania Deutschland GmbH, and as a result identified factors that restrain the level of daily stock orders. The findings show that an increased level of daily orders would lower the transportation costs for Scania Deutschland GmbH. It can also be concluded that placing daily stock orders involve lower costs for the retailers than for other types of orders. A strict inventory control including control of problem spare-parts, together with a higher safety stock, will secure the supply of spare-parts. Finally, it was found that increased feedback and improved information flow would have a positive impact on the usage of daily orders.

Sammanfattning

Med en sjunkande marknad för lastbilar och låga säljvolymerna, har service och underhåll kommit att utgöra en stor del av lastbilsföretagens intäkter. En ytterligare tendens är att det generella intresset för service, särskilt inom garantier och underhåll, har ökat avsevärt på senare tid. Detta leder till att det är väldigt viktigt för företagen att fokusera på och förbättra servicegraden. Som det är idag erbjuds kunderna en väldigt liten skillnad i teknik mellan olika konkurrenters erbjudanden, därför måste företagen hela tiden arbeta för att erbjuda fördelar i form av extravärde för kunden. För Scania Deutschland GmbH, betyder detta att de behöver fokusera på kunden och framför allt förbättra företagets service och underhåll.

En viktig faktor inom service och underhåll är att säkerställa leverans av reservdelar till återförsäljarna, innefattande en stabil lagerhållning hos så väl centrallager som hos återförsäljarna. För att kunna genomföra detta krävs att orderrutinerna fungerar väl. Det här examensarbetet är en produkt av en strävan att minska kostnader och viljan att förbättra orderrutinerna, med fokus på orderläggning mellan återförsäljarna och centrallagret. Scania Deutschland GmbH:s önskan är att öka orderantalet av den ordertyp som läggs på en daglig basis, eg. daily stock orders. Därav följer att syftet för mitt examensarbete är att identifiera faktorer som hämmar en ökad andel av dessa daily stock orders.

Jag har undersökt och beskrivit orderprocessen på Scania Deutschland GmbH och som resultat har jag identifierat faktorer som hämmar återförsäljarnas användande av daily stock orders. Resultatet visar att en ökad andel av daily stock orders skulle leda till mindre transportkostnader för Scania Deutschland GmbH. Vidare visar resultatet på att daily stock orders innebär lägre kostnader, i jämförelse med andra ordertyper, även för återförsäljarna. Med en bättre kontroll av lagret hos såväl centrallagret som återförsäljarna, tillsammans med en höjning av säkerhetslagret, kommer leveransen av reservdelar kunna säkerställas. Slutligen, med bättre feedback och ett förbättrat informationsflöde skulle andelen daily stock orders kunna öka.

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Furthermore I would like to thank the personnel at the department of After-sales spare-parts services at Scania Deutschland GmbH, as well as the respondents, for patiently answering all of my questions.

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1 INTRODUCTION

This chapter presents the background, problem discussion, purpose, demarcations and the outline of this thesis work at Scania Deutschland GmbH.

1.1 BACKGROUND

The turbulent business environment of the late 20th century has produced a higher awareness amongst managers of the financial dimension of decision-making, (Christopher 1998). Decision-making is an essential aspect of all management activities, including operations management. There are five types of decision areas within the concept of operations management, of both strategical and tactical nature. These types of decisions concern the company's process, product quality, capacity, location and layout as well as operational decisions. Operational decisions constitute supply-chain management, material requirements planning, just-in-time systems and inventory management, (Krajewski & Ritzman, 1999).

Transportation and inventory management is often connected with logistics and material administration. Since these activities represent the core of the subject area, Persson & Virum (1998), claim that:

“Logistics is the science of efficient material flow.”

Logistics emphasizes the need of a co-ordinated material flow into, through and out of the company. Logistics can be considered as a homogenous process and as a co-ordinated, coherent chain within the organisation. According to Persson & Virum (1998), quality, service and costs are central parts within the area of logistics. The authors further claim that the primary cause for developing a logistical function within an organisation is to improve the effectiveness of the material flow through cost reduction and increased income with the support of improved delivery service. (Ibid.)

Logistics is a subject area in change - a wide variety of new ideas and solutions, novel conceptions, methods and techniques constantly develop (Persson & Virum, 1998). Globalisation and the increased level of specialisation have raised the need of internal transportation and transportation between companies as well as between different countries. This change factor puts logistics in focus, (Carlsson & Persson, 1998).

According to Carlsson & Persson (1998), strategic efficiency is another factor that emphasises the importance of logistics. This can be achieved through an organisation's ability to offer a differentiated and customer-adapted service. In addition, the authors also claim that the main part of the production within companies tend to be organised after the principle of customer order management, i.e. it is the order of the end customer that initiates the production process. One company that has a mainly customer oriented production, is Scania CV AB. (Ibid.)

1.2 PROBLEM DISCUSSION

Scania CV AB, from now on denominated as Scania, develops, manufactures and sells heavy trucks and buses as well as engines for industrial main use. Scania is the world's fourth largest make, both in the heavy trucks as well as the heavy bus segment. The company has more than 28,000 employees in over 100 countries in continents as Europe, Asia, Australia, Africa and Latin America, (www.scania.com, 2003-05-06).

One of Scania's subsidiaries is Scania GmbH, headquartered in Koblenz, Germany. Scania GmbH, from now on denominated as Scania GmbH, has 10 subsidiaries and some 180 retailers in Germany, (www.scania.de, 2003-05-06).

In order to obtain an even and stable inventory management with frequently small orders, Scania GmbH changed their retailer order routines in 2001. Instead of making orders on a weekly basis the retailers now place orders on a daily basis to the central warehouse in Belgium, from now on referred to as CW2 (Central Warehouse 2). With a more frequent order system the individual retailer, as well as CW2, can keep their stock at a desired level without any peaks.

Another advantage with the new daily order routine is that the system automatically checks up backorders on a daily basis. A backorder occurs when CW2 does not have the requested spare-part in stock and needs to order it from Scania's other central warehouse located in Sweden, from now on denominated as CW1 (Central Warehouse 1). As soon as CW2 has the desired item in stock again, they send it to the retailer. A backorder has a higher priority than the original DSO-order and will thus be served first.

Of Scania GmbH's in total 184 retailers, approximately 120 are connected by a computer system with CW2. This system enables the connected retailers to place three types of orders:

Daily Stock Order (DSO). All retailers have the possibility to place daily orders. This type of order constitutes items with a high turnover. The delivery time, i.e. in general the time elapsed from order placement until the ordered items are delivered to the retailer, is three days, and Scania GmbH fully covers the transportation cost for DSO-orders. The second order type available for the 120 retailers connected by the computer system with CW2 is **Daily Order (DO).** This type should only be used if the retailers need the spare-part within one day. The spare-parts are transported over night and imply higher transportation costs than DSO. In order to cover some of the extra transportation costs involved, the retailers pay 3% of the net price of the ordered items. The DO-order has a higher priority by CW2 than a DSO-order and will therefore be supplied first.

The third and final type of order is **Vehicle Off Road (VOR)** order. VOR-orders are used either for low frequency orders or when ordered items are not available at CW2. When this out-of-stock situation occurs, and the retailer need the spare-part quickly and cannot wait for an original backorder, the retailer's original order need to be changed to a VOR-order and sent to CW1 in Sweden. Both CW1 and CW2 set highest priority on these orders and deliver the requested items by airfreight from CW1. Due to the airfreight transport, the retailers need to pay 4% of the net price of the ordered spare-parts in order to cover some of the additional transportation costs involved. Figure 1.1 illustrates the different types of orders that can be placed by the retailers and CW2 respectively.



Figure 1.1: Different types of orders.

Source: Author's own construction.

The new order routine should, as previously mentioned, facilitate an even and stable stock management both for the retailers as well as for CW2. However, since the transition into the

new routine, it has occurred that the retailers frequently place DO-orders consisting of typical DSO spare-parts. This leads to higher transportation costs both for Scania GmbH as well as for the retailers. It further complicates CW2's inventory management by creating peaks, which is just what the new order routine should be avoiding. In order to deal with these problems Scania GmbH needs to obtain a description of the order routine from the perspective of the retailers, as well as from the central warehouse in Belgium, CW2. In order to lower the DO frequency and aiming for improvements within the order routines, this thesis shall, with collected information, provide a description of the current order routine including an identification of problem areas within the process. Further more, the thesis will provide suggestions as to solve these problems and will later work as a basis for future improvement.

1.3 PURPOSE

The purpose of this thesis is *to analyse the order placement at Scania Deutschland GmbH. The thesis shall result in an identification of factors that restrain an increased usage of Daily Stock Orders, as well as suggestions of improvement.*

1.4 DEMARCATIONS

It is beyond the scope of this study to cover all aspects of my research purpose. As a consequence, I have limited my research to view the After-Sales spare-parts department with focus on Scania GmbH's business area. I have also limited my research area to only cover selected retailers that are directly connected by computer to Scania GmbH's central warehouse in Belgium, CW2. Economical factors, except from logistical costs, will not be taken into consideration within analyses or recommendations.

1.5 OUTLINE OF THE THESIS

This thesis is divided into eight chapters; introduction, methodology, company background, theoretical review, empirical data, analysis, conclusions and discussion. To start with, the first chapter has provided the background of the problem area as well as a problem discussion. The content of the following chapters will be briefly discussed below.

Chapter 2 describes how the researcher has proceeded in the research work. This chapter also present a description, as well as the supportive statements, of the methodology used in this thesis.

Chapter 3 provides background information of Scania and Scania GmbH, as well as information about the organisational structure of the After-Sales department.

Chapter 4 contains a review of relevant theories within the problem area.

Chapter 5 describes the current order routines and it accounts for the collected empirical data.

Chapter 6 includes, with help of relevant theories, an analysis of gathered empirical data.

Chapter 7 present the overall conclusions, drawn from the analysis of the research.

Chapter 8 contains a short discussion regarding drawn conclusions and further research.

Figure 1.2 illustrates the outline of the thesis.

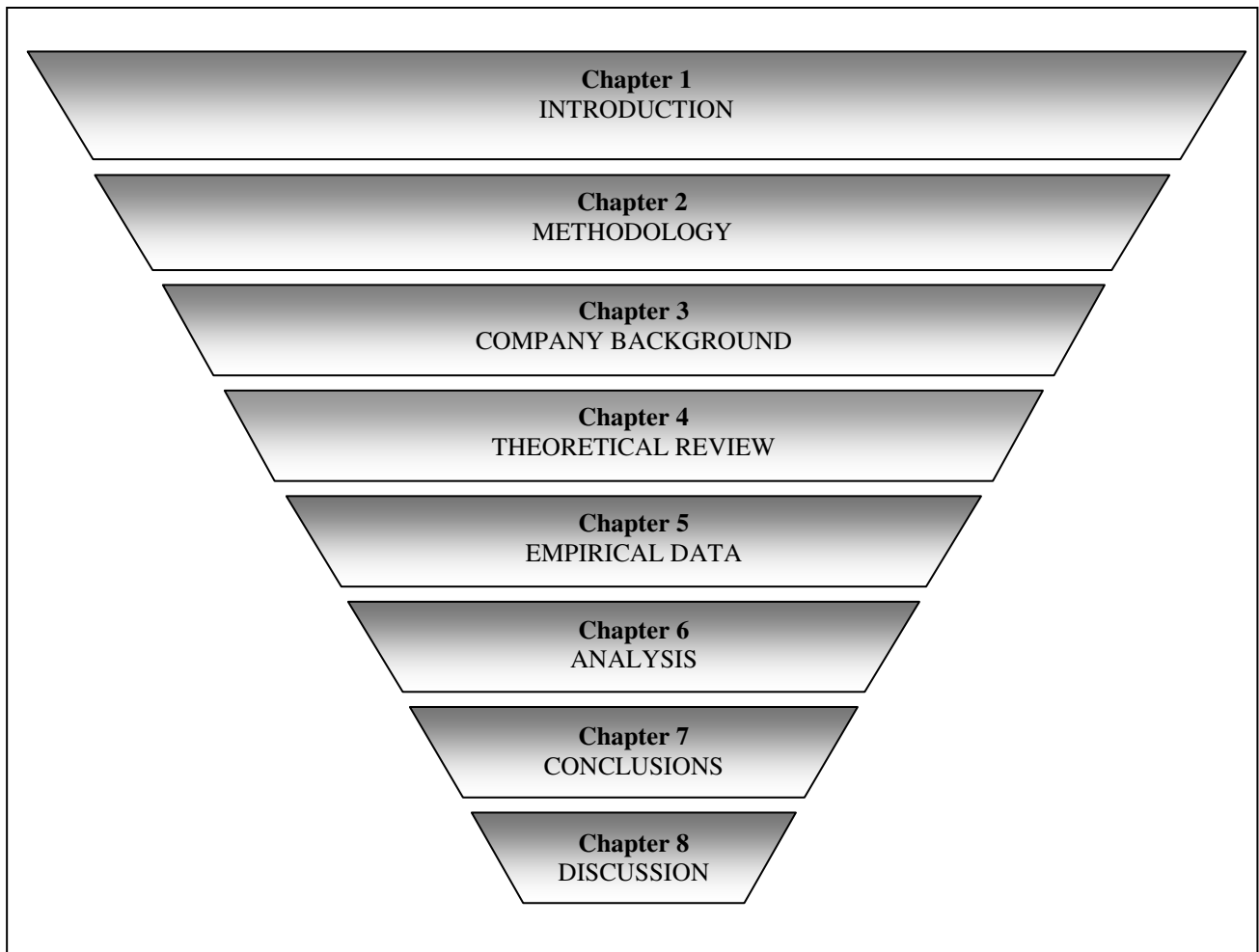


Figure 1.2: Outline of the Thesis

Source: Authors own construction

2 METHODOLOGY

This section serves as a means to describe the research methodology used in this thesis. This section shall also work as a guideline showing how the research purpose of the thesis is approached.

2.1 RESEARCH PURPOSE

Academic research strategies can be used for three purposes; explore, describe and explain (Eriksson & Wiedersheim-Paul, 1997) and (Yin, 1994). At which stage a research belongs to depend on ambition and knowledge within the area (Wallén, 1996). This thesis will explore and describe the current situation of Scania GmbH's retailers order routines. Explorative studies aim for basic knowledge within the problem area, (Wallén, 1996), and are useful when the problem area is difficult to demarcate as well as when important characteristics and relations are hard to determine (Eriksson & Wiedersheim-Paul, 1997). Descriptive studies mainly determine the research objects characteristics and its relevant surroundings, (Wallén, 1996), and are appropriate to use when a problem is clearly structured but the intention is not to conduct research about causes and symptoms (Eriksson & Wiedersheim-Paul, 1997). Due to the above discussion the research purpose of this study is both explorative and descriptive.

2.2 RESEARCH APPROACH

The approach of this thesis will be of a qualitative nature. The reason of choosing this approach is that I want to gain a deeper understanding of Scania GmbH's order situation. I do not intend to make any generalisations, but instead study a relatively small sample of retailers more deeply. The purpose of a qualitative method is to make descriptions of situations within the research area as a whole, without making generalisations. During a qualitative research one or few objects are studied in depth in order to gain a deeper understanding of the problem studied. (Holme & Solvang, 1991)

A case study implies investigating many variables on few entities, in order to gain a deep understanding of the problem area. This can be done by questionnaires or interviews and is appropriate in the case of describing and explaining the problem area, (Eriksson & Wiedersheim-Paul, 1997). Based upon the above discussion I will choose a qualitative case study as approach for this thesis work.

2.3 DATA COLLECTION

When conducting case studies the data collection can rely on six different sources, (Yin, 1994). These sources are documentation, archival records, interviews, direct observation, participant observation and physical artefacts. Yin (1994) also highlights the importance of using multiple sources of evidence, so called triangulation, i.e. evidence from two or more sources.

In this thesis the sources of documentation, questionnaires as well as interviews will be used, allowing for multiple sources of evidence. The documentation used will mainly be in form of company material such as brochures, annual reports and the Internet, as well as statistics from the company's business system. In order to gain a thorough understanding of the current order situation interviews will be performed. Interviews allow flexibility and closeness to the respondent, which is an important factor within qualitative studies. (Yin, 1994)

Since there are specific and clearly specified questions that need to be answered, in a short period of time, a focused interview technique will be used within this study. In a focused interview the respondent is interviewed for a short period of time and the researcher follows certain questions, even though it can be in a conversational manner, (Yin, 1994). In order to collect additional data, questionnaires will be sent out to 30 retailers. Moreover, some of the respondents will be followed up with a telephone call with the aim of covering personal judgement and opinions.

2.4 METHODOLOGY DISCUSSION

There are two important criteria that can be used to determine the quality of a research according to Eriksson & Wiedersheim-Paul, (1997). These are validity and reliability.

In order to increase the validity, I have collected evidence from multiple sources, triangulation, (Yin, 1994). The respondents selected for the surveys are employees with good knowledge within the order routines; this due to the fact that having the most suitable respondent increases the validity, (Ibid.). The interviews were conducted in German in order to make sure that the respondents clearly understood the questions. However, the collected information where translated into English, which includes the risk of translation errors.

In order to establish a chain of evidence, this thesis is built upon existing theories related to the problem area, (Yin, 1994), collected from search engines as Libris, Comendex and INSPEC. However, there can be relevant literature that has been overlooked, which can have an impact on the validity. My supervisor and fellow students have reviewed this study throughout the process in order to increase the validity. Feedback from these reviews has allowed adjustments of the study. In order to further increase the validity of the collected data, my supervisor at Scania GmbH has reviewed the interview guides as well as the thesis.

Since it is of importance to document a research in order to increase the reliability (Eriksson & Wiedersheim-Paul, 1997), I have tried to map out the procedure in order to visualise the process of the thesis. Studies of the order situation have been done from different perspectives, this in order to cover several aspects of the problem area and in the purpose of increasing the reliability. However, despite this, personal prejudices are present to some extent when conducting interviews. Hence, there can be influences of attitudes and values of the respondents as well as from me as a researcher in this study.

3 COMPANY BACKGROUND

This chapter presents a general company background, a presentation of Scania GmbH and the organisational structure of the After-Sales department.

3.1 SCANIA

Scania, founded in 1891, is systematically concentrating on the heavy transport segment and is today one of the world's leading manufacturers, both for heavy trucks and buses. Scania also markets and sells a broad range of service-related products and financing services. (www.scania.com, 2003-05-06)

Since its foundation the company has built and delivered more than 1.000.000 trucks for heavy transport work. Scania has an integrated product concept that combines vehicles, service-related products and financing. Scania has over 1500 service workshops in over 90 countries that enable assistance and professional advice - quickly and efficiently. Due to the fact that today's customers expect maximum vehicle availability with a minimum of unplanned stoppages, Scania offers their customer an assistance service that help get the vehicle back to work again as quickly as possible. This service is primarily designed to handle breakdowns and technical problems.

Scania's core values include placing their customers first, respecting the individual and maintaining a high quality. The strength and value of the brand has assisted Scania in becoming one of the most profitable companies in its industry. For more than seven decades Scania has reported annual profit, even during periods of sagging markets for trucks. Thanks to its technologically advanced modular system Scania has gained vehicle industry leadership in terms of profitability. This modular system enables the production of a large number of different truck models with a limited number of parts and components in the construction phase. Hence, the customer is able to order exactly the vehicle he or she wants. (www.scania.com, 2003-05-06)

The company's production is divided into 7 production units, situated in Sweden, Netherlands, France, Poland, Brasilia, Argentina and Mexico. The end productions are located in ten different countries situated in Africa, Australia and Asia. For the European market Scania has two main central warehouses. Central warehouse 1 (CW1) is situated in Sweden and provides the Scandinavian countries with spare-parts, and Central warehouse 2 (CW2) is situation in Belgium and has the responsibility to provide European countries apart from the Scandinavian market with spare-parts. There are also three Regional warehouses (RW), RW1 is situated in England, RW2 is situated in Spain and RW3 is situated in Austria. These three Regional warehouses are supplied with spare-parts from CW2 in Belgium.

3.2 SCANIA GMBH

Scania GmbH is a subsidiary to Scania and was founded in 1968. The company is situated in Koblenz, Germany, and has some 116 employees. With 10 own subsidiaries, 20 private retailers, 27 branches and 127 service partners, Scania GmbH provides a flexible and wide-spreading service net, (www.scania.de, 2003-05-06). The total amount of retailers in Germany is divided into three retailer segments, illustrated in figure 3.1.

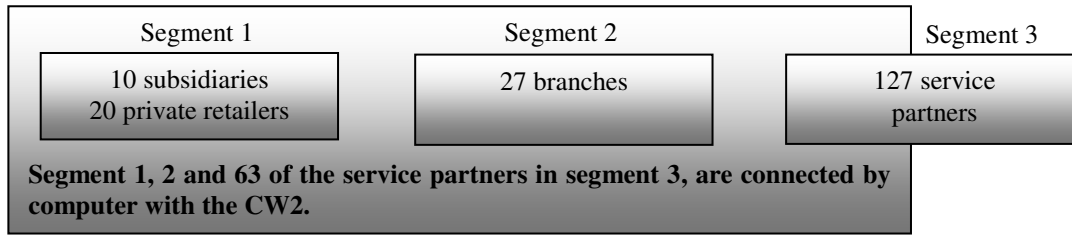


Figure 3.1: Illustrates the different retailer segments at Scania GmbH.

Source: Author’s own construction.

The first segment is the 10 subsidiaries and the 20 private retailers. Every retailer within this segment has a sales department, inventory and workshop. The second segment consists of the branches, which also have the same departments as the retailers in the first segment, but are in general smaller. Finally, the third segment is the 127 service partners. The service partners are only workshops with small inventories. Most of these service partners do not have computer connection to CW2. Each of the 30 retailers in segment one is parent company to the branches and service partners within their nearby geographical area. As a consequence, these parent companies provide the service partners in their area with spare-parts among other things.

In 2002, with 7% of the German market share, Scania GmbH reached the fourth place among the competitive organisations. The best product quality as well as the highest customer satisfaction is the company motto and the company constantly strive to find individual transportation solutions as well as high service support, (www.scania.de, 2003-05-06). Scania GmbH is divided into five main departments; Sales, After-Sales services, Finances & Administration, Communication & Marketing, and Network Structures. This thesis focuses on the department of After-Sales services; hence a more detailed description of the department will be presented.

3.2.1 After-Sales services

The department of After-Sales services, which organisational chart is illustrated in figure 3.2 below, always works close to the subsidiaries and private retailers.

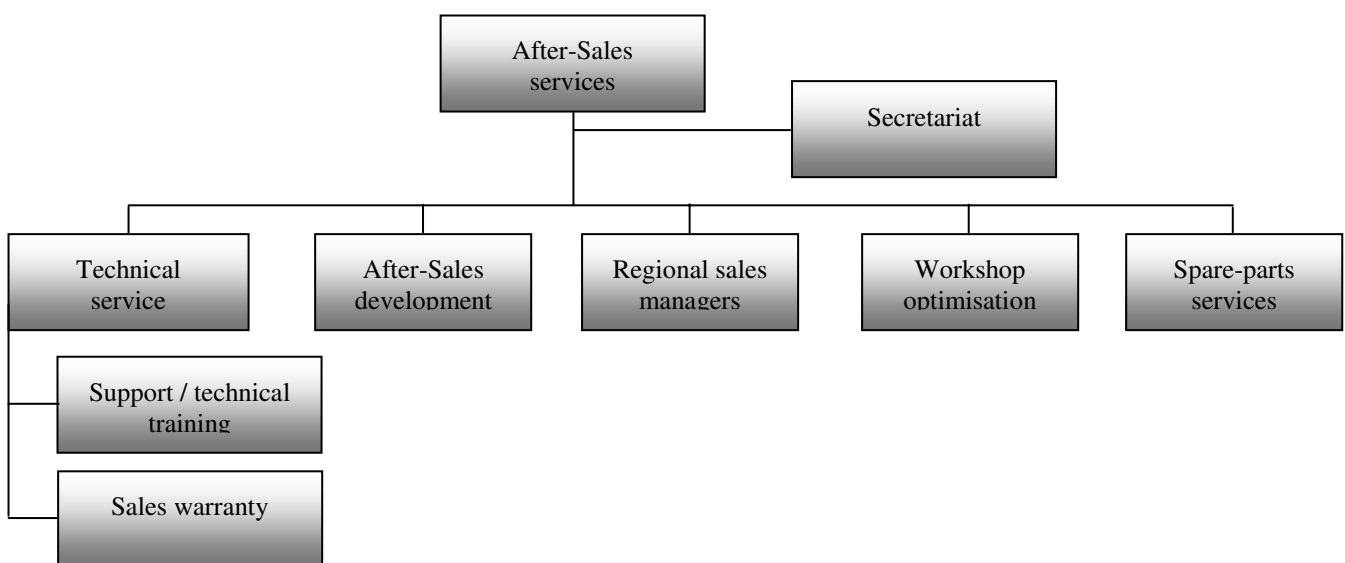


Figure 3.2: Organisational chart, After-Sales services at Scania GmbH.

Source: Scania GmbH

It is important to constantly develop and optimize every retailer; as to perform follow-ups and develop action plans to achieve the main goals. It is further essential to ensure the right expertise in Scania's service network. Consequently, due to new advanced technology built into coming generations of vehicles, technical training is frequently arranged for the workshops. Furthermore, to make sure that all customers receive the same high level of service and quality, there is a constant development and optimisation of the workshops.

A function within the After-Sales department is the Spare-parts services. To fully guarantee availability of Scania parts, the company has established a sophisticated distribution system that supplies all Scania workshops with parts. The most frequently required spare-parts should always be in stock at each retailer, and those that are not available off the shelf can be delivered quickly via Scania's distribution system with its central and regional hubs. The department of Spare-parts services control approximately 27.000 different spare-parts, in 836 product groups. The tasks of the team include order system maintenance, price-setting spare-parts and customer service, i.e. responsibilities within the order routine.

Customer Service

Scania GmbH's customer service provides solutions of different problems that can occur regarding deliveries of ordered spare-parts. For instance, when ordered items for some reason cannot be delivered to the retailers from CW2 in time, and there is a customer that need to get back on the road as soon as possible, Scania GmbH help their retailers to quickly solve the problem. One solution could be to buy the requested items from another retailer nearby, or get the spare-parts transported with express delivery.

Pricing

Price-setting articles concerns register prices on new spare-parts, or updating already existing spare-parts. Since there is a heavy competition between different companies, it is of importance to have competitive prices on the spare-parts. Price simulations, i.e. setting a price for a spare-part, is also done for certain campaigns, for instance a lower campaign price for air-condition during summer.

4 THEORETICAL REVIEW

In this chapter a review over previous studies within the research area is presented. This chapter aim to provide relevant theories in the field of Supply chain management, customer satisfaction, inventory management and transportation.

4.1 SUPPLY CHAIN MANAGEMENT

We are now entering the era of “supply chain competition“. The fundamental difference from the previous model of competition is that an organisation no longer can act as an isolated and independent entity in competition with other similarly ‘stand-alone‘ organisations. One of the most visible changes of recent years has been the way in which time has become a critical issue in management. Product lifecycles are shorter than ever, industrial customers and distributors require just-in-time deliveries, and end users are willing to accept a substitute product if their first choice is not available. (Christopher, 1998)

Supply chain management is a relatively new field of integrated management study (Ballou, 1999), but is according to Christopher (1998), in fact no more than an extension of the logic of logistics. Logistics management is primarily concerned with optimising flows within the organisation, whilst supply chain management recognises that internal integration by it-self is not sufficient, (Christopher, 1998).

In addition, Christopher (1998), claims that there is a crucial and important distinction to be made between logistics and supply chain management. Logistics is essentially a planning orientation and framework that seeks to create a single plan for the flow of product and information through a business. Supply chain management builds upon this framework and seeks to achieve linkage and co-ordination between *processes* of other entities in the pipeline, i.e. suppliers and customers, and the organisation itself. Ballou (1998), claims that the newness with supply chain management results from the concept of co-ordinated management of the supply chain, rather than the historical way of managing them separately. For instance, one goal for supply chain management might be to reduce or eliminate the buffers of inventory that exist between organisations in a chain through the sharing of information of demand and current stock levels, (Christopher, 1998).

One definition of supply chain management is according to Christopher (1998):

“The management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole.”

Thus the focus of supply chain management is upon the management of *relationships* in order to achieve a more profitable outcome for all parties in the chain, (Christopher, 1998). For manufacturers this represents the single largest opportunity for increasing sales, profits, and competitiveness in the global arena. In the ideal supply chain management scenario, companies along the chain together rethink the value that each contribute, then restructure their practices to serve the end consumer better, faster and cheaper than ever before, (Verdon, 2001).

For many firms there is a reverse logistic channel that must be managed as well. The life of a product, from the logistics point of view, does not end with the delivery to the customer. On

the contrary, products become obsolete, damaged or non-functioning and are returned to their source points for repair or distribution. The reverse logistic channel may utilise all or a part of the forward logistical channel or it may require a separate design. The supply chain terminates with the final disposition of a product, and the reverse channel must be considered to be within the scope of logistics planning and control. (Ballou, 1999)

4.1.1 Time as a competitive means

There is without any questions a great potential to make use of time in the best way possible. Time and material flow have a close relation to each other and to make use of this time in a good manner involve faster and/or better deliveries to the customers to a lower price. To have the right information available at the exact place is a constant desire. One area where the information has gained a lot of attention is the information flow between suppliers and the suppliers customers, but also between different units within the own company. It is important to quickly and efficiently be able to transfer information to the concerned parties. (Storhagen, 1997)

4.2 CUSTOMER SATISFACTION

According to Christopher (1998), the change to the 21st century seems to have been accompanied by even higher levels of turbulence in the business environment, than in the late 20th century. The author further claims that due to many fusions and take-overs, markets and global competition have changed, leading to a growing demand from the market for higher levels of service and quality. These types of development forces companies to be alert for changes. To be able to manage that, it is of importance to put the customer demands in focus. (Christopher, 1998)

4.2.1 Total Quality Management

According to Bergman & Klefsjö (2003), Total Quality Management, from now on referred to as TQM, implies:

“a constant endeavour to fulfil, and preferably exceed, customer needs and expectations at the lowest cost, by continuous improvement work, to which all involved are committed, focusing on the processes in the organisation”.

The basis for TQM relates from the fact that, nowadays, quality issues are concerned as an integral part of the activities of an increasing number of private as well as public companies and organisations. The authors claim that TQM is a matter of active prevention, change and improvement rather than control and repair. The quality work is a continuous process, and not an on-off project. Furthermore, TQM concerns developing products and processes but also supporting the personal development of those involved within these processes. (Bergman & Klefsjö, 2003)

TQM is a whole concept, where values, methodologies and tools combine to achieve higher customer satisfaction with less or equal resource consumption, (Bergman & Klefsjö, 2003). TQM especially stresses three principles: customer satisfaction, employee involvement, and continuous improvements in quality, (Krajewski & Ritzman, 1999). Bergman & Klefsjö (2003), claims that a quality strategy in a company must be built on the top management's continuous and consistent commitment to quality issues. The top management must include quality aspects in the company vision, and support activities regarding quality financially,

morally and with management resources. With the top management involved a successful work with quality improvement can be built, based on the following values:

- *focus on customer*; quality has to be valued by the customers, and put in relation to their needs and expectations.
- *base decisions on facts*; do not let random factors be of decisive importance. To do this, factual data, knowledge about variation and the ability to separate between natural deviation and variation due to identifiable causes, is required.
- *focus on processes*; the purpose of the process is to satisfy its customers with the end result produced, using as little resources as possible
- *improve continuously*; this is an important element in a successful quality strategy. Since external customer demands for quality frequently increase, it is of importance that companies constantly improve their goods and services.
- *let everybody be committed*; for the quality work to be successful, it is important to involve the employees in decision making and improvement work.

(Bergman & Klefsjö, 2003)

Let everybody be committed

In order for the co-workers to take responsibility in their work it is of importance that everyone reaches relevant information as well as participates in decision making. It is also important to create ways of working so that the co-workers continuously active participate in the work of improvement. Changing the attitudes from “ I have to “ to “ I want to ” can be of significant importance within the improvement work. When wanting something to be done instead of be obliged to do anything, increases the motivation. (Eklund & Lund, 1998)

4.2.2 Important factors in the work of improvement

The flow of material and the management of this material flow consist of a wide range of activities within an organisation. The material flow includes the whole organisation from supplier to customer and concerns several of the traditional departments, as well as strategical decisions and routines for operations. Due to that the flow of material concerns several parts within the organisation there will always be a chain reaction when changing an operation within the supply chain. Therefore, awareness about the different relations within the flow of materials in the supply chain is of importance. (Storhagen, 1997)

When working with improving the flow of material it can be hard to determine who or what department that will be benefitted from the effects of the new situation. For instance, something that affects one department adventurously may affect another department negatively. Therefore it is of importance that the results of a change can be measured in a correct way. (Storhagen, 1997)

4.2.3 Services

According to Bergman & Klefsjö (2003), services are very important in the traditional manufacturing industries, and the general interest in service quality has lately increased considerably. Traditional manufacturing companies are increasingly turning into service producers, a trend that is very likely to grow. This trend is moving towards producing functions rather than goods. This implies that it is extremely important to focus on handling and improving service quality. Services within a company include for example sales warranties, complaint processing and maintenance. (Bergman & Klefsjö, 2003)

4.3 CUSTOMER SERVICE

As more and more markets become in effect “commodity” markets, where the customer perceives little technical difference between competing offers, the companies need to create differential advantage through added value. Increasingly a prime source of this added value is customer service. (Christopher, 1998)

Customer service may be defined as the consistent provision of time and place utility. In other words products do not have value until they are in the hands of the customer at the time and place required, (Christopher, 1998). According to Ballou (1999), customers view the offerings of any company in terms of price, quality, and service. Service, or customer service, is a broad term that may include many elements ranging from product availability to after-sales maintenance. From a logistics perspective, customer service is the outcome of all logistics activities or supply chain processes. Therefore, the design of the logistics system sets the level of customer service to be offered. Deciding the level of customer service to offer customers is essential to meeting a company’s profit objectives, (Ballou, 1999).

The primary elements of customer service that the logistician can control are captured within the concept of order cycle time. The order cycle time contains all the time-related events that make up the total time required for a customer to receive an order. These events are: order transmittal time, order-processing time; order assembly time and delivery time. Another important factor that affect the order cycle time is stock availability, since it often forces product and information flows to move out of the established channel. For example, a back order for the out-of-stock item would be transmitted to the plant and be filled from the plant stock. If there is no plant stock available, a production order is prepared and stock is produced. The delivery is then made directly from plant to customer. (Ballou, 1999)

4.3.1 Order processing

Time to complete the activities of the order cycle is at the very heart of customer service. If a high level of customer service is to be provided through short and consistent order cycle times, it is essential that these order-processing activities is carefully managed. (Ballou, 1999)

According to Ballou (1999), order processing is represented by a number of the activities included in the customer order cycle. These activities are further described in table 4.1 below.

Activities	Description
Order preparation	Order preparation refers to the activities of gathering information needed about the products or services desired and formally requesting the products to be purchased. For example filling out an order form and determining stock availability.
Order transmittal	Transmitting the order information involves transferring the order request from its point of origin to the place where the order entry can be handled. This can be done either manually or electronically.
Order entry	Order entry refers to a variety of tasks that take place prior to the actual filling of an order. These include (1) checking the accuracy of the order information such as the item quantity and price, (2) checking the availability of the requested items, (3) preparing back order or order cancelling documentation, if necessary, (4) checking the customer’s credit status, (5) transcribing the order information as necessary and (6) billing.

Order filling	Order filling is represented by the physical activities required to (1) acquire the items through stock retrieval, production, or purchasing, (2) pack the items for shipment, (3) schedule the shipment for delivery and (4) prepare the shipping documentation. A number of these activities can take place in parallel with those of order entry.
Order status reporting	These activities assure that good customer service is provided by keeping the customer informed of any delays in order processing or delivery of the order. Specifically, this includes (1) tracing and tracking the order throughout the entire order cycle, (2) communication with the customer as to where the order may be in the order cycle and when it may be delivered.

Table 4.1: Order processing activities.

Source: Ballou (1999)

The order process is of interest for various reasons, since it is probably the best example of a cross-functional process within an organisation. Such a process normally crosses several functional boundaries and contains a range of essentially different activities and functions. In many organisations, the order process has moderate to high repetivity, occurring over and over again. As a consequence, even small improvements can be highly rewarding for the effectiveness and the efficiency they bring. Furthermore, the design of the order process affects some key characteristics of a company, as service quality and customer satisfaction. Due to its basic characteristics, the order process constitutes a managerial challenge. (Ljungberg, 1998)

4.3.2 Total lead time

According to Christopher (1998), the concept of logistics lead-time is simple: How long does it take to convert an order into cash? Management has long recognised the competitive impact of shorter order cycles, (Christopher, 1998), and lead-time is an important concept that requires definition and reflection, (Segerstedt, 1999). The lead-time for a product is the elapsed time between receiving a customer's order and filling it, (Krajewski & Ritzman, 1999).

Delivery time is the time the customer needs to wait from placing an order until receiving the part. The total lead-time for a product is the time it takes from order start, through every structure level, to a finished buying product. (Segerstedt, 1999)

4.3.3 Ordering cost

Each time a new order is placed, an ordering cost occurs, or the cost of preparing the purchase order for a supplier or a production order for the shop. Regardless of the order size, the ordering cost is the same. Therefore, a decision needs to be taken regarding how much to order. Time is spent on paper work, follow up and receiving, which also correspond to a cost. (Krajewski & Ritzman, 1999)

4.3.4 Out-of-Stock Costs

Out-of-stock costs occur when an order is placed but cannot be filled from the inventory. There are two kinds of out-of-stock costs: lost sales costs and back order costs. Each presumes certain actions on the part of the customer, and, because of their intangible nature, they are hard to measure precisely. (Ballou, 1999)

According to Ballou (1999), a lost sales cost occur when the customer, faced with an out-of-stock situation, chooses to withdraw the order. The cost is the profit that would have been made on this particular sale and may also include an additional cost for the negative effect that the stock-out may have on future sales. (Ibid)

A backorder is a customer order that cannot be filled when promised or demanded. The customer order is not lost but will be filled later. Customers can be willing to wait for the products, but next time, the customer may buy the products elsewhere. It happens that customers are given discounts for the inconvenience of waiting, (Krajewski & Ritzman, 1999). Backorders can create additional clerical and sales costs for order processing, and additional transportation and handling costs when such orders are filled through the distribution channel. These costs are quite tangible, so it is quite easy to measure them. There can also be a cost of lost future sales, which is very hard to measure, (Ballou, 1999).

4.4 TRANSPORTATION

Transportation involves the various methods of moving goods outside a company's buildings. For most firms, transportation is the single highest cost in distribution, (Arnold & Chapman, 2001). Ballou (1999), agrees with Arnold and Chapman (2001), and further claim that transportation usually represents the most important single element in logistics costs for most firms. Freight movement has been observed to absorb between one-third and two-thirds of total logistics costs. Thus, it is important with good understanding of transportation matters. The user of transportation has a wide range of services at disposal. A transport service is a set of performance characteristics purchased at a given price, (Ballou, 1999).

According to Arnold and Chapman (2001), transportation is an essential ingredient in the economic development of any area. It brings together raw materials for productions and distributes the products of industry to the market place. Ballou (1999), states that one mode of transporting goods is by truck. The author further claims that trucking is a transportation service for semi finished and finished products. The inherent advantage of trucking is its door-to-door service, meaning no loading or unloading is required between origin and destination. Other advantages are frequency and availability of service and its door-to-door speed and convenience. A drawback, using trucks for transportation, is that they cannot handle all types of goods. This is mainly due to highway safety restrictions that limit the dimensions and weight of the shipment, (Ballou, 1999).

4.4.1 Transportation costs

Transportation is a key decision area within the logistics mix. Transportation service costs are often keyed to cost characteristics of each type of transportation service as well as the cost of producing the service. Transportation services encounter a number of costs, such as labour, fuel, maintenance, roadway, administration and others, (Ballou, 1999). According to Arnold & Chapman (2001), these costs can be divided into variable costs, i.e. costs that depend on the use made of the truck, and fixed costs, i.e. costs that do not change with the volume of the goods carried. Ballou (1999) claims that determining these types of costs can be difficult. The author further claims that the fixed costs for highway transportation are the lowest of any carrier because motor carriers do not own the roadway on which they operate. The trailer represents a small economic unit, and terminal operations do not require expensive equipment. On the other hand, variable costs tend to be high, this due to that highway construction and maintenance costs are charged to the users in form of fuel taxes, fees and

weight-mile taxes. Total unit trucking costs do decrease with shipment size and distance as terminal costs and other fixed expenses are spread on more tonne-miles, (Ballou, 1999).

4.5 INVENTORY MANAGEMENT

Inventory management is an important concern for all managers in all types of business. The challenge with inventory management is not to lower inventories to the bone in order to reduce costs or to have plenty around to satisfy all demand, but to have the right amount to achieve the competitive priorities for the business most efficiently. (Krajewski & Ritzman, 1999)

One commentator has suggested that ‘uncertainty is the mother of inventory’, meaning that since there are an uncertainty of future demand, the organisations must carry inventory to buffer themselves against that uncertainty, (Christopher, 1998). According to Ballou (1999), firms use inventories to improve supply-demand co-ordination and to lower overall costs. The author further claims that maintaining inventories produces the need for warehousing and, to a large extent, the need for materials handling as well. Furthermore, storage becomes an economic convenience rather than a necessity, (Ibid.).

Ballou (1999), claims that a firm uses storage for four basic reasons:

Transportation-Production Cost Reduction; warehousing and the associated inventory are added expenses but may be traded off with lower costs from improved transportation and production.

Co-ordination of Supply and Demand; Firms with highly seasonal production along with reasonably inconstant demand have a problem co-ordinating supply with demand. Those firms that must supply a product or service to a seasonal and uncertain demand typically produce at a constant level throughout the year in order to minimise production cost and to build inventories needed to meet the demand. Commodity price considerations may also produce a need for warehousing.

Production needs; warehousing may be part of the production process. Warehouses serve not only to hold the product during the phase of manufacturing but, in the case where products are taxed, the warehouse can be used to secure the product until time of sale.

Marketing Considerations; Warehousing is used to put value to the product. That is, by warehousing a product close to customers, delivery time can often be reduced or supply is made readily available. Through faster deliveries both increased customer service as well as increased sales can be achieved.

4.5.1 Supply chain inventory management

Supply chain inventory management, from now on referred to as SCIM, is an integrated approach to the planning and control of inventory throughout the entire network of co-operating organisations, from the source of supply to the end user. SCIM is focused on the ultimate customer demand and aims at improving customer service, increasing product variety and lowering cost. (Giannoccaro & Pontrandolfo, 2002)

Giannoccaro & Pontrandolfo (2002), further claim that an effective management and control of the material flow across the boundaries between companies and their customers is vital to the success of companies but is a difficult task due to the demand amplification effect. This

effect is decreased through, for example, the fine-tuning of existing ordering policies, the reduction of delays and a better use of the information flow through the supply chain. A tight co-ordination among inventory policies of the different actors in the supply chain can reduce the ripple effect on demand. Due to this an appropriate information structure is necessary that allows all the actors within a supply chain to make decisions synchronised and coherent among each other. Such an infrastructure is referred to as networked inventory management information system. Small and frequent orders and the co-operation among the supply chain partners can reduce demand variability. (Giannoccaro & Pontrandolfo, 2002)

4.5.2 Inventorying spare-parts

Having spare-parts for maintenance of main selling-products in stock conveys a problem situation regarding what service level to provide the customer with, (Storhagen, 1997). The requirements for planning the logistics of spare-parts differ from those of other materials in several ways, service requirements are higher as the effects of stock-outs may be financially remarkable, the demand for spare-parts may be extremely sporadic and difficult to forecast, and the prices of individual spare-parts may be very high, (Huiskonen, 2001). Huiskonen (2001), further claims that the material and time buffers in the production systems and supply chains, on the other hand, is decreasing, which set pressures for streamlining the logistic systems of spare-parts. Storhagen (1997), states that the most significant difference between spare-parts and finished products is the difficulty of forecasting the use of spare-parts since they are dependent on the main product. Furthermore, the spare-part is often not needed until the main product is used for a certain amount of time, and that time is hard to determine. The control opportunities are limited due to the fact that the assortment of spare-parts cannot be decreased without considering the consequences for the earlier sold main products, (Storhagen, 1997).

A significant factor for what type of spare-parts that is to be hold in stock and what service level to keep, concerns the security level of operations. Depending on what service level that is promised to the customers the organisation needs to decide what type of spare-parts to keep in stock. In order to obtain an opinion about the different spare-parts significance in consideration to operations, it is important to collect information about frequency of error, causes and consequences. As a means, in order to perform correct forecasts, it is necessary to perform frequent follow-ups. (Storhagen, 1997)

4.5.3 Inventory interest rate

According to Persson & Virum (1998), the inventory interest is a mathematical factor used for calculating the costs of having spare-parts in inventory. Many companies separate the costs of operating the inventory and the costs for keeping the spare-parts in stock, i.e. the inventory interest rate. The interest rate then only covers the costs directly connected to the value of inventory. Additional costs are inventory-operating costs such as rent and salaries. The advantage of the interest rate is that companies most commonly already have invested in costs for employees, for instance, and can be seen as independent of the value of the spare-parts in inventory. Other companies choose to include costs as rent and salaries within the interest rate, and in these cases the interest usually is higher and lies often around 20-30%. (Persson & Virum, 1998)

4.5.4 ABC analysis

The ABC analysis is a common approach for how to balance inventory costs and the delivery service level. The method has its starting point in the so-called 80/20 rule, i.e. 80% of the company's products correspond to 20% of the products turnover, and vice versa. The ABC

analysis is the process of dividing the company's products into the three classes; A, B and C, depending on what extent of the turnover the product constitutes. The products that correspond to the majority of the turnover, i.e. the 20% of the products that corresponds to 80% of the turnover, belongs to category A. From the delivery service level, this category is of greatest significance. These products should be able to carry the costs for high availability in inventory as well as short delivery time, i.e. be stationed near the end customer. C products with a lower turnover can be placed at a central warehouse, with a lower availability in inventory and delivery time than for the A products. The B products should lie between the A and C products regarding the service-level for delivery. The result from an ABC analysis shows how to adjust the inventory with the three categories in focus. The A products should be strictly controlled and should be able to carry the cost for this control. (Storhagen, 1997)

4.5.5 Safety-stock inventory

In order to avoid customer service problem and the hidden costs of unavailable components, companies hold safety-stocks. Safety-stock inventories protect against uncertainties in demand, lead-time and supply. Safety-stocks are desirable when suppliers fail to deliver the desired quantity on the specific date with acceptable quality, and ensures that operations are not disrupted when such a problem occur, allowing subsequent operations to continue. (Krajewski & Ritzman, 1999)

4.5.6 Pipeline inventory

Inventory moving from point to point in the materials flow system is called pipeline inventory. Materials move between suppliers to a plant, from one operation to the next in a plant, from the plant to the distribution centre, and from the distribution centre to a retailer. Pipeline inventory consists of orders that have been placed but not yet received. (Krajewski & Ritzman, 1999)

5 EMPIRICAL DATA

The previous chapter presented a brief theoretical review of this thesis. In this chapter, the empirical data collected from three investigation areas, Scania GmbH, selected retailers and the Central Warehouse in Belgium, will be presented.

In order to gain information about the total order process as well as the attitudes around the process, interviews have been done together with questionnaires. The interview guide for the retailers is presented in appendix 1, followed by the questionnaire sent to CW2, which is presented in appendix 2. Moreover, additional follow-ups have been done with some of the questionnaire-respondents in order to catch up personal judgement and attitudes that the questionnaire cannot capture. In order to increase the validity of the information, the chosen respondent for the interviews as well as the questionnaires is the inventory manager at each retailer. The answers from the respondents are presented in appendix 3 and appendix 4. Other information is collected from Scania GmbH and their business system, AS400.

5.1 THE DIFFERENT ORDER TYPES

The new order system involves placing orders on a daily basis instead of on a weekly basis, and was introduced in 2001 with the intent to obtain an even and stable stock management. Having a good inventory management hopefully implies both lower inventory costs as well as the customer receiving the truck repaired without any unnecessary delays, i.e. an increased customer service. An advantage for CW2 in Belgium with the new routines is that their peaks in demand will smoothen out due to smaller orders placed more often. In order to focus on an increased usage of DSO-orders, Scania GmbH offers its retailers two advantages with DSO. One of these advantages is a discount on spare-parts when placing orders. This discount is calculated by a price-matrix that generates the retailers' selling price including discount, and is based on three factors;

- Size of the retailer which places the order, i.e. a small retailer becomes less discount than a subsidiary when placing an order,
- The type of spare-part that is ordered, i.e. spare-parts that can be bought at a competitive company have a higher discount.
- And the type of order the retailers place, DSO, DO or VOR. In order to focus on the usage of the DSO, Scania GmbH offers an enhanced discount for this type of order.

The price of a spare-part that is generated in SPAS from the price-matrix has been calculated with these three factors as basis. The other advantage for Scania GmbH's retailers, besides the enhanced discount for the DSO, regards the transportation costs for the ordered DSO-parts. When placing a DSO-order the retailers do not pay anything for the delivery of the ordered spare-parts, but Scania GmbH does. For the DO and VOR type of order there is an agreement between Scania GmbH and the retailers stating that the retailers only provide a part payment of the transportation cost corresponding to 3% and 4% of the spare-parts net value respectively. Scania GmbH pays the rest of the transportation costs.

The majority of the larger asked retailers in segment one and two state that they have great knowledge about the discounts and freight costs for DSO and DO, respectively. During the first six months of 2003, the subsidiaries and private retailers have in general a DSO-usage of 77%, measured in order-lines, i.e. an order-line consist of one specific type of spare-part in different quantities. The branches have an average DSO-usage of 78% and the service

partners 66%, also measured in order-lines. The total DSO-usage, calculated for Germany in total, is on average 73%, see appendix 5. Figure 5.1 illustrates the percentage of DSO, measured in order lines from the first six months, 2003.

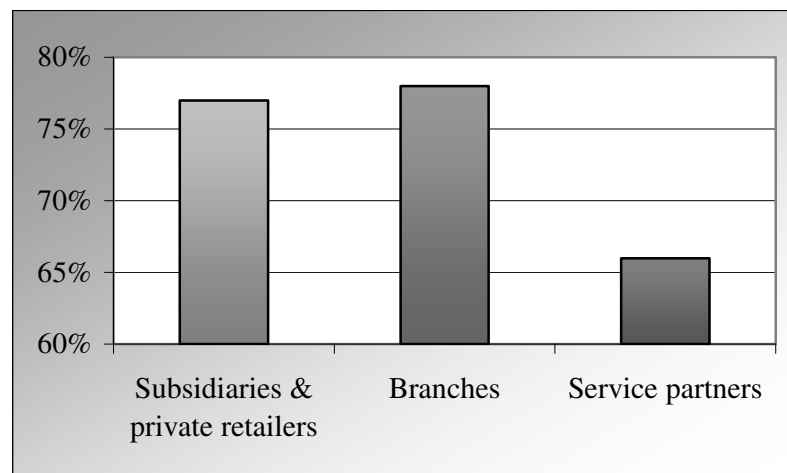


Figure 5.1: Percentage of DSO for the three retailer segments.

Source: Author's own construction.

Scania GmbH has a target of achieving a DSO-usage of 80% for the three retailer segments, during 2003 and 85% during 2004.

5.2 DESCRIPTION OF ORDER PROCESS

There are, as mentioned earlier, three order types, DSO, DO and VOR. The DSO-order is the basic order type for everyday use, with a delivery time of three days. When CW2 does not have a spare-part ordered as DSO in stock, the spare-part is backordered from CW1 in Sweden to CW2. The backordered spare-part will be delivered to the retailer as soon as CW2 has obtained the spare-part from CW1. The DO-order is to be used when the retailer needs the requested spare-parts quickly, and is therefore delivered over night, and a VOR-order is placed when CW2 does not have the requested DO spare-parts in stock. The spare-parts will then be ordered from Sweden and transported by airfreight to Germany and thereafter directly to the retailer by truck. For these three order types respectively, there are specific deadlines when placing an order to CW2. If the retailer does not keep this deadline, CW2 will handle the late order as if it was placed the next day. The delivery time for a DSO-order is normally three days, but when not keeping the deadline, the parts will be delivered four days after placing the order, i.e. there is still a delivery time of three days but the delivery is delayed due to missing the deadline. A DO-order is normally delivered over night, which implies, placing a DO to late can have a tremendous effect for the customer, and therefore, it is of extreme importance that these deadlines are kept.

The majority of the retailers answer that they place their DSO-orders once a day, in the afternoon between 16.00 and 18.00. By this time the in- and output in inventory are registered. Furthermore, the majority place their DO-order once per day, in the afternoon between 15.00 and 18.00. Moreover, there are also several retailers that places their DO-orders continuously during the day as demand occur. Another reason for that the retailers place their orders in the afternoon is that a truck often enters the workshop after lunch. When arriving, the truck needs to be diagnosed and a cost proposition is presented to the truck driver. Often the truck driver needs to wait for an authorisation from the truck owner before

the reparation can be started. Due to this factor, the retailer often waits for the authorisation before placing orders.

Order system

Scania GmbH provides the 120 retailers with online contact to CW2, with two order systems, SPAS - Scania Part Administration System and AROS¹. The retailers utilise these systems when placing orders. The 64 retailers without direct computer connection to CW2 are supplied with spare-parts, among other things, from their parent company in segment one. SPAS and AROS consist of several different functions.

SPAS offer the retailers functions such as placing orders and making inquiries concerning a spare-part's price, availability, discount and how the orders are being packaged. There is also a stock exchange service enabled for the retailers, concerning rarely used spare-parts. Another function, enabled for the retailers in SPAS, is the Buy Back inquiry. Once per year, the retailers have the possibility to sell back low frequency spare-parts to CW2. Via SPAS, the retailer sends an inquiry to Scania GmbH containing a list of the spare-parts that the retailer wants to sell back.

Scania GmbH registers, for instance, new spare-parts in the system as well as updating an already existing spare-part. They further register new selling prices and new retailers as well as deregister old retailers. Moreover, Scania GmbH has the option to make certain inquiries regarding the retailers' orders. Additionally certain campaign-prices can be registered.

Within the AROS system, which is directly connected to CW1 and CW2 respectively, the 120 retailers with direct computer connection to CW2, as well as Scania GmbH can obtain order information from CW1 and CW2. Information available is backorder status, order status, inquiries for returned spare-parts and information about spare-parts in stock at CW1 and CW2 respectively. The retailers and Scania GmbH has the same functions within AROS. The only difference is, that when a partner uses either SPAS or AROS, they are only able to place orders concerning their own customer number and they can only see their own data. Scania GmbH at the other hand has the opportunity to both place an order in a retailers name and search for specific information regarding retailers without any restrictions.

Order placement

Every month there is an update registered in SPAS from CW1 in Sweden regarding new spare-parts or updates of existing spare-parts. There can also be a change in actuality of the spare-part, meaning that the spare-part is not so frequently ordered. The spare-parts registered in SPAS in this update from CW1, are deactive spare-parts, i.e. they do not have a registered selling price in the system. In order for a retailer to place a DSO-order within SPAS, the spare-part need to be active, i.e. have a registered selling price. When a spare-part is deactive, the retailer need to wait with the ordering until the spare-part is registered as active by authorized personnel at the department of Spare-parts services. The only opportunity to place an order with spare-parts that is deactive in SPAS is to place a DO-order or a VOR-order via AROS directly to CW2, or CW1 if CW2 does not have the spare-part in stock. At present, it is unknown how many spare-parts that these updates consist of.

Placing DO- or VOR-orders via CW1 or CW2 implies direct delivery for the retailers. The drawback is that the retailers cannot obtain a confirmation of the order until it is active in SPAS, meaning the spare-part is often delivered before the confirmation of the order arrives.

¹ AROS: order system directly connected to CW2 in Belgium and CW1 in Sweden

Furthermore, the personnel at Scania GmbH first need to register the spare-part as active and then see to that the retailers obtain the confirmation of the order, hence a lot of extra work is done.

According to the questionnaire, most of the retailers place five DSO and five DO per week, i.e. one DSO and one DO per day. The total number of order-lines, between 2003-01-01 and 2003-06-30, is 217.785 DSO, 76.382 DO and 2.342 VOR, which is illustrated in figure 5.2 below. In addition see appendix 6 and appendix 7.

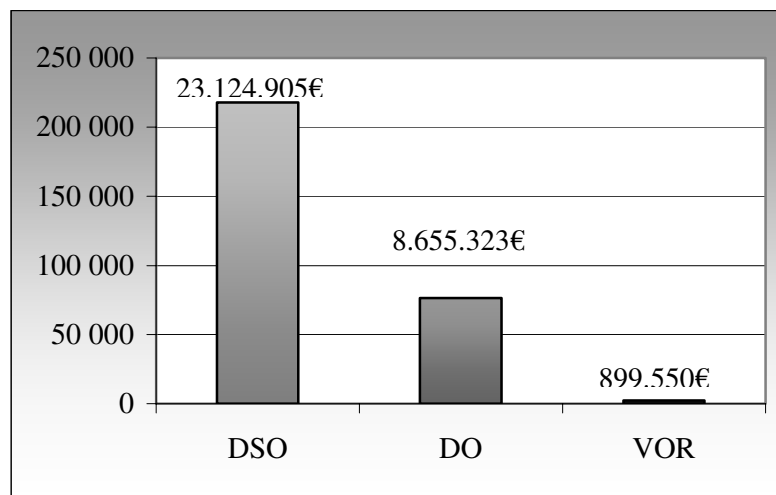


Figure 5.2: Total number of DSO, DO and VOR respectively.

Source: Author's own construction.

Delivery

CW2 in Belgium provides several countries in Europe with spare-parts, including Germany. When CW2 has received a DSO-order, it will be picked from inventory and packed in retailer-specific pallets, which later will be transported by truck to a large split point situated in Germany. Normally, there is one 80 m³-truck that transport the DSO-ordered spare-parts from CW2 every day. On occasion, due to an increased demand during the weekend there are two trucks that transport the DSO-ordered spare-parts at Wednesdays. The truck, provided by a separate delivery company, arrives at CW2 at approximately 08.00, and leaves approximately at 11.00. This 80 m³-truck can hold a maximum weight of 25 tonnes. The size of the pallets varies depending on how much is ordered, but the basic size is 80*120 cm with the opportunity to change the height. At present, there is no possibility to calculate the total volume for every pallet that is to be transported in the truck. When arriving to the split point the pallets will be organised according to geographical areas and repacked into smaller trucks and thereafter transported to the retailers.

Regarding DO-ordered spare-parts, with delivery over night, there are three trucks leaving CW2 at 17.30, 19.15 and 19.30, which are 80m³, 35m³ and 13m³ respectively. These three trucks, provided by another delivery company, transport the pallets to two different split points in Germany. As for the DSO-orders, the pallets of DO-orders will be reorganised according to geographical areas and transported to the retailers in smaller trucks. As a consequence, two different delivery companies handle the DSO-orders and DO-orders separately.

Most of the retailers state that they have good knowledge about the order process in total. They further claim that they are aware about their company's role within the order process as well as the consequences of their own actions.

Return of spare-parts

When an ordered spare-part is defect or when there is something else wrong in the delivery, for instance false quantities or incorrect spare-parts, the retailer is able to return these spare-parts within 30 days after delivery. The retailer also has the ability to return old, used, spare-parts that will be renovated and then reused, as well as spare-parts that will be repaired or exchanged within the warranty. A return of spare-parts can be made by the retailer two times per month, via inquiries in SPAS. The 64 retailers without computer connection with CW2 send their returns of spare-parts via their parent company. Scania GmbH has divided their retailers within Germany into four groups, group one is able to send their returns week 1 and 5, group two sends their returns week 2 and 6, group three week 3 and 7, and finally group four week 4 and 8. When an inquiry is made in SPAS and the retailer receives a confirmation that the specific spare-part can be returned to CW2, there is a special truck that picks these spare-parts up by the retailer, twice per month. The majority of the retailers have approximately between one and three returns of spare-parts per week, and they further state that they have good knowledge about the routines for returning spare-parts to CW2. Scania GmbH pays for the transportation costs regarding the returns of spare-parts of any kind. These costs were, from 2003-01-01 to 2003-06-30 137.600 €, and during the same time period 2002, 119.800 €, and is illustrated in figure 5.3.

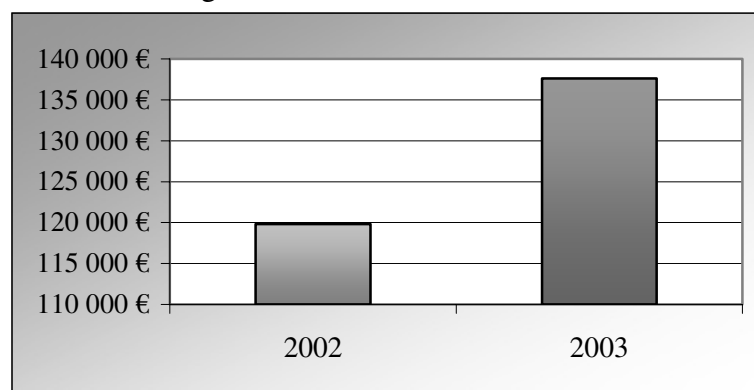


Figure 5.3: Transportation costs for returns, 2002 and 2003.

Source: Author's own construction.

5.2.1 Logistics costs

The transportation cost for DSO-orders consists of both a fix cost as well as a variable cost. The fix cost concerns the transport of the spare-parts between CW2 and the split point, which is 295 € per truck. The transport between the split-point and the partners though, is calculated per kilo. For DO-orders, the transportation costs are always based on the weight of the ordered spare-parts, and are therefore always calculated per kilo, i.e. a variable cost.

Between 2003-01-01 and 2003-06-30 the transportation cost at Scania GmbH totalled 953.800€. Specifically for the three order types, the transportation cost for DSO reached 522.500€, DO 363.900€ and VOR 67.400€. During the same time period 2002, the transportation cost totalled 971.300€. For DSO the transportation cost where 471.400€, for DO 432.750€ and for VOR 67.150€. Figure 5.4 illustrates the change in transportation costs between 2002 and 2003.

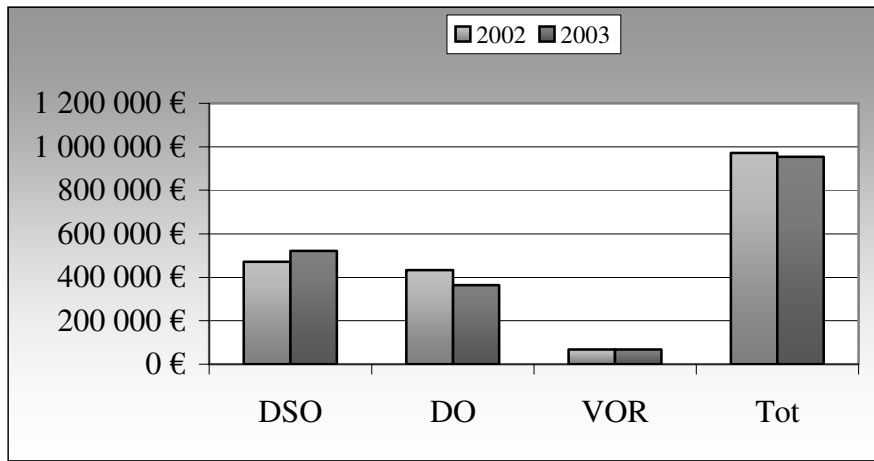


Figure 5.4: Change in transportation costs between 2002 and 2003.

Source: Author's own construction.

Benefits when ordering DSO-orders

Due to the complexity of the price-matrix, it is difficult to collect valid data from AS400 regarding the separate costs for DSO and DO in general. In order to investigate what type of costs the two different order-types convey, specific data has been collected. Moreover, to cover every factor within the price-matrix with a valid approach, one specific retailer has been selected. Additionally, a specific type of spare-part with a specific value has been selected and to illustrate the benefits with placing DSO-orders, the investigation area includes both the DSO and the DO order type in the price-matrix.

For this selected subsidiary, the ratio of ordered spare-parts from 2003-01-01 to 2003-06-30, was 61% of Scania original spare-parts and 39% of spare-parts from competitive organisations. The Scania original spare-parts have a value of approximately 800.000€. The total number of order-lines was during the same period of time 10.136, 6.500 DSO, 3.560 DO and 54 VOR. Moreover, the total value of these order-lines was 1.475.851€, 993.167€ for DSO, 459.057 for DO and 23.627€ for VOR.

The difference in discount between DSO and DO is in the price-matrix, for this subsidiary, 7% calculated of the spare-parts original price. Hence, placing DO-orders implies an increase of 7% of the original price plus 3% of the net price in transportation cost, i.e. an increase of in total 10% of the original price. The cost of having DSO-orders in stock is 6% interest rate of the spare-part's net price, per year. The inventory turnover for this subsidiary is approximately 4 times per year, meaning an average time in stock of 3 months. No extra cost for transportations is added. As presented, DSO implies less cost than DO.

5.3 INVENTORY MANAGEMENT

Scania GmbH focuses all its efforts on the needs and activities of its customers. Customer satisfaction is therefore an important factor within all company activities both for Scania GmbH as well as for the retailers. The retailers are in general of the opinion that the customer satisfaction is good at their company and in order to maintain this, it implies, among other things, minimising the time that the customers needs to spend in a workshop. The less time a Scania truck spends in the workshop, the more money it earns. Scania GmbH provides many features to be able to shorten the time in the workshop, but to be able to serve the truck quickly the requested parts need to be in stock.

5.3.1 Retailers

The retailers plan their inventories in both short and long term, and the majority of the asked retailers have computer support for this inventory planning. With a specially designed formula, available for the 120 retailers with computer system, they can calculate both how much to order and when it is time to order again. The result from the formula is then used when placing orders to CW2. However, this inventory-planning tool can only be used in terms of DSO-orders. Moreover, the 64 retailers without computer system do often plan their inventory by experience, and place orders via their parent company. The majority are aware of what value of inventory turnover that is invoiced per year, but many retailers do not give an answer on the question.

Having an inventory costs money, and having low frequency spare-parts in stock, cost even more. In order for the retailer to obtain an optimised and more economic inventory, Scania GmbH offers their retailers to sell back spare-parts that have not been used and only cost money, i.e. Buy Back. Every retailer has a special date, once per year, when the retailer is able to send in an inquiry in SPAS with the specific spare-parts registered. Regulations for the spare-part to be bought back to CW2 are;

- the spare-part cannot be consumed or assembled
- the spare-part must be clean
- the spare-part cannot be damaged, i.e. the spare-part must be reusable
- the spare-part's price must exceed 60€.

If these requirements are fulfilled the spare-part can be bought back to CW2. Scania GmbH handles the entire Buy Back process and tries whether these spare-parts can be used again or not. When the retailer obtains a confirmation of what items that have been accepted and will be bought back to CW2, they must send these items to CW2 within 20 days after the confirmation. The transport of the Buy Back spare-parts back to CW2, is made by the same truck that pick up returns of spare-parts, meaning the retailer need to wait until the nearest return transport.

5.3.2 CW2

At CW2 there are 140 employees in the inventory and 60 employees at the office, during the whole year. The inventory is divided into four sections. The first section consists of high frequency articles, the second section consists of special spare-parts as batteries. The spare-parts within this section need special treatment due to fire risks, for instance. Heavy components constitute the third section, and the fourth consists of bulky spare-parts. The ordered spare-parts are packaged at the four sections respectively, meaning that a retailer can have four different pallets in a truck.

In the section for the high frequency articles, there is an automatic picking system. The customer number and the requested part number are registered into a computer system and the part will automatically be picked from inventory. The other sections are handled manually.

Normally, CW2 handles approximately 60.000 DSO order-lines and 6.500 DO order-lines per week, which correspond well to the capacity. CW2 has, according to the respondent, a certain capacity and handles the orders that arrive within the deadline, packs the truck and send it to the split-point in Germany. In order to fully utilise CW2's capacity the retailers should, according to the respondent at CW2, place their DSO-orders during nighttime and the DO-orders before 15.00. CW2 always give highest priority to VOR-orders, thereafter DO-orders

and finally DSO-orders. Backorders have the same priority as DSO-orders. And they do not have a specific priority for First-in-first-out handling or per partner. The DSO-orders are picked order per order from inventory and DO-orders are picked spare-part per spare-part.

CW2 handles approximately 1000 backorders and 1000 return inquiries per week. When delivering the backorders to the retailer, the backorders are marked with a special delivery blanket and packed into a pallet containing normal DSO-orders. CW2 plans for the volumes in a truck on historical order patterns in daily departures. Approximately once per week pallets are left over at CW2 due to lack of space in the truck.

Most of the retailers have approximately between 9 and 10 order-lines that are backordered per week. The retailers further claim that they have relatively good knowledge about the routines for the backorders. Mostly, a backorder is derived from a problem part, meaning there is a quality problem, capacity problem or delivery problem at one of the suppliers. The most frequent problem spare-parts is shown in table 5.1, below.

Product group	Article number	Name
00312	287505	Strap
00149	1482069	Bumper
00816	0574380	Unit injec
00819	1515555	Kitchen module
00082	1376913	Oil cooler
00010	0570070	Cylinder h
00098	1377345	Fuel tank
00316	0369478	Seal ring
00135	1485717	Knob
00312	0370798	Strap
00816	0574393	Unit injec

Table 5.1: The most frequently backordered spare-parts.

Source: Registered problem spare-parts at CW2.

The summary of the most frequent problem spare-parts has been conducted by analysing the registered problem spare-parts at CW2, during a time period of four months. Every week there are approximately 3 lists of registered problem parts, arriving from CW2 to Scania GmbH. From these in total 12 lists per month, two lists per month have been chosen, one in the beginning of the month and one at the end of the month. Every problem part from the selected lists has been summarised in a table, including the number of appearance. The most frequent problem spare-parts in total have been illustrated above. Beside the problem spare-parts, a backorder can further be derived from a certain campaign in the management of Scania GmbH to their retailers. When the demand is too high for the spare-parts in the campaign, the orders become backorders.

5.4 INFORMATION

Having the right information within the after-sales is very important in order to lower standstill time and as a means obtain satisfied customers. Hence is it important that the retailers quickly gain information both regarding campaigns and sales material, as well as information about system updates and updates within the order routines.

The department of Spare-parts service provides their retailers with information regarding price updates, technical updates and sales actions etc. There are no specific routines for the circulation of information. Instead the personnel decide when and what to send out to the retailers.

The majority of the retailers are of the opinion that the information from Scania GmbH is of very high importance. They further claim that the information is sufficient, but the quality can be better.

6 ANALYSIS

The previous chapter provided the empirical data collected within the three investigation areas. In this chapter an analysis of the gathered data will be conducted.

At present, with a decreasing market for trucks and low volumes of sales, service and maintenance constitute an important source of income, i.e. the reversed logistic channel. Ballou (1999) claims that the reverse logistic channel implies that the life of a product, from the logistics point of view, does not end with the delivery to the customer. On the contrary, products become obsolete, damaged or non-functioning and need to be repaired. According to Bergman & Klefsjö (2003), services are very important in the traditional manufacturing industries. The authors further claim that the general interest in service quality, for instance within sales warranties and maintenance, has increased considerable. Hence, this implies that it is extremely important to focus on handling and improving service quality. In addition Christopher (1998), claims that as more and more markets become in effect “commodity” markets, where the customer perceives little technical difference between competing offers, the companies need to create differential advantages through added value. For Scania GmbH, this implies that focus need to be on the customers, but also on service and maintenance. As a means, focusing on the order placement between the retailers and CW2, action is taken to improve the routines for ordering and as an outcome lower the number of unnecessary DO-orders.

6.1 DSO VERSUS DO

To achieve the benefits of the new daily order routine, the retailers need to increase the usage of the Daily Stock Order – DSO, and not place unnecessary DO-orders. According to Ballou (1999), freight movement has been observed to absorb between one-third and two-thirds of total logistics costs. For Scania GmbH and the retailers, a high usage of DO implies higher transportation costs, and should therefore be decreased.

According to the answers from the retailers within segment one and two, the general opinion is that they have great knowledge about the freight costs as well as the discounts for DSO and DO respectively. These statements are in accordance with the numbers of order-lines registered for the three retailer segments. For segment one - subsidiaries and private retailers, the usage of DSO were 77%, for segment two – branches 78%. However, segment three – service partners, only have 66% DSO-usage in general, which is too low. Furthermore, there is a large spreading between the retailers’ DSO-usage within the segments respectively. Some retailers have a very low DSO-usage, and these factors make it difficult to reach the target of 80%.

6.1.1 Discounts

A factor that does not emphasise an increased DSO-usage is the different discounts within the price-matrix for the three retailer segments. Today the three segments get different discounts depending on what type of retailer that places the order. Christopher (1998), claims that, supply chain management focus on the management of *relationships* between all parties in the supply chain, in order to achieve a more profitable outcome. This should be taken into consideration within the process towards an increased DSO usage. Today the service partners get lower discounts than the subsidiaries on DSO-orders; therefore it is not so favourable for a service partner to order DSO as for a subsidiary. Instead the retailers should have the same

starting point regarding the advantages with the DSO, which can lead to a greater understanding of the benefits of DSO for the whole organisation.

6.2 PROBLEM AREAS WITHIN THE ORDER PLACEMENT

A further factor that does not facilitate an increased DSO-usage is that, in order for a retailer to place a DSO-order in SPAS, the spare-part need to be active in the order system. Ballou, (1999) has described the order cycle as five different activities. The first activity concerns the order preparation, including gathering information about, for instance, stock availability, and then filling out the order form. The second step, according to Ballou (1999), is transmitting the order. When the spare-part is deactive in SPAS, the order preparation for the retailers also includes notifying Scania GmbH that the requested spare-part needs to be active. When this is done, the retailer is able to continue the process and transmitting the order. A drawback, though, is when no authorized personnel are able to activate spare-parts; the retailer must place a DO- or a VOR-order in AROS directly via CW2, or CW1 if the spare-part is not available at CW2. As a consequence, this implies starting the order cycle process from the beginning and filling a new order form for the new order. This is time-consuming and costly both for Scania GmbH as well as for the retailers.

The orders placed as DO or VOR via CW2, when the spare-part is deactive in SPAS, will be sent directly to the retailer as normal for these order types. As soon as the spare-part is active, the confirmation of the order is sent to the retailer, meaning that the confirmation of the order arrives after the spare-parts are delivered. Every order made of a deactive spare-part is, on a daily basis, registered on a list at CW2 and sent to Scania GmbH. The specific spare-parts on this list then need to be activated in SPAS, meaning a lot of extra work for the personnel at Scania GmbH.

6.2.1 Lack of feedback

Another factor that does not emphasize an increase of DSO-orders is the left over pallets at CW2. As Ballou (1999), describes the last activity of the order cycle; in order to assure a good customer service the customer needs to be informed about delays in the order process or delays in the delivery. Due to capacity problems as well as that there is no possibility to measure the volume of the pallets, it often occurs that there is lack of space in the truck and pallets are left at CW2. The problem derived from when this occurs is lack of information to customer service and the retailer, which leads to that nobody knows where the pallets actually are.

According to Krajewski & Ritzman (1999), an ordering cost occurs each time a new order is placed. Regardless of the order size, the ordering cost is the same. The authors further claims that the time spent on paper work, follow up's and receiving also corresponds to a cost. Therefore, another problem for the retailers and the customer service at Scania GmbH is that there is a lot of extra work, which cost both time and money, searching for the missing spare-parts if the communication is bad from CW2. As a consequence, the retailers with their orders in the left over pallets will get their spare-part later than predicted, due to that the transportation company does not keep the delivery time of three days.

6.2.2 Costs

The total transportation cost for Scania GmbH and the number of order-lines ordered by the retailers, during the first six months of 2002 and 2003, are presented in table 6.1.

	Transportation cost		Number of order-lines	
	2002	2003	2002	2003
DSO	471.400€	522.500€	208.750	217.785
DO	432.750€	363.900€	82.250	76.382
VOR	67.150€	67.400€	1.900	2.342
TOT	971.300€	953.800€	292.900	296.509

Table 6.1: Total transportation cost and total number of order-lines.

Source: Author's own construction, with information from AS400.

In table 6.1, the trend of a lower quantity of DO and an increased DSO-usage can be seen. This trend, towards an increased DSO-usage, is affecting Scania GmbH's total transportation cost in a positive way. Moreover, with the use of these figures, the transportation cost per order-line that Scania GmbH pays for the different order-types can be calculated, and is illustrated in the table 6.2, below.

Year	Transportation cost/order-line	
	2002	2003
DSO	2.26€	2.40€
DO	5.26€	4.76€
VOR	35.34€	28.78€

Table 6.2: Transportation cost per order-line.

Source: Author's own construction.

As seen, the transportation cost/order-line for DO is twice as high as for DSO.

The total net price of the order-lines ordered by the retailers between 2003-01-01 and 2003-06-30, together with the average price per order-line, is demonstrated in table 6.3 below.

	Total net price of order-lines	Price per order-line
DSO	23.124.905 €	106.18€
DO	8.655.323€	113.32€
VOR	899.550€	384.09€

Table 6.3: The total net price of order-lines, and the price per order-line.

Source: Author's own construction

The transportation cost of 3% is derived from the average price of the DO-orders. In average, the retailers pay approximately 3.40€ per DO-order.

In order to specify the exact amount of the increase needed to reach the target of 80% DSO-usage, calculations have been done. For the total amount of retailers in Germany, a decrease of the DO order-lines of 25% is needed to reach the target. A 85% usage of DSO corresponds to a 45% decrease of DO order-lines, for the German retailers in total. The calculations have been done with the intention of keeping the same total number of order-lines, but instead changing the ratio between the DSO and DO. In order to increase the DSO-orders to reach the target, the order-lines for DO have been decreased by 10%, 20%, 30%, 40% and 50%.,

and that amount of order-lines is then added to the DSO-orders. In table 6.4, the needed increase for the German retailers in total, to reach the goal of 80% and 85% respectively, is presented. In addition, see appendix 5, for information about the background information.

Total Germany	DSO	DSO %	DO	DO %	VOR	VOR%	Decrease of DO %
296.509	217.785	73	76.382	26	2.342	1	Present
296.509	225.423	76	68.744	23	2.342	1	10%
296.509	233.061	79	61.106	21	2.342	1	20%
296.509	236.881	80	57.287	19	2.342	1	25%
296.509	240.700	81	53.467	18	2.342	1	30%
296.509	248.338	84	45.829	15	2.342	1	40%
296.509	252.157	85	42.010	14	2.342	1	45%
296.509	255.976	86	38.191	13	2.342	1	50%

Table 6.4: Calculations for the needed increase of DSO order-lines.

Source: Author's own construction.

The needed increase, in order-lines, for the three retailer segments respectively, to reach the target of 80% 2003 is demonstrated in table 6.5.

	Total	DSO	DSO %	DO	DO %	VOR	VOR %	Decrease of DO %
Subsidiaries & private retailers	127.653	102.206	80	24.741	19	706	1	15%
Branches	74.526	59.354	80	13.934	19	1.238	2	10%
Service partners	94.330	75.492	80	18.440	20	398	0	42%

Table 6.5: Needed decrease of DO for the retailer segments to reach target, 2003.

Source: Author's own construction.

Table 6.6 illustrates the increase, in order-lines, needed for the three retailer segments to reach the target of 85%, 2004.

	Total	DSO	DSO %	DO	DO %	VOR	VOR %	Increase %
Subsidiaries & private retailers	127.653	108.610	85	18.337	14	706	1	37%
Branches	74.526	63.380	85	9.908	13	1.238	2	36%
Service partners	94.330	80.579	85	13.353	14	398	0	58%

Table 6.6: Needed decrease of DO for the retailer segments to reach target, 2004.

Source: Author's own construction.

This change in ratio between DSO and DO affect the transportation costs for the order types respectively. According to Ballou (1999), transportation services encounter a number of costs, and Arnold & Chapman (2001), claim that these costs can be divided into variable and fix costs. Regarding the transportation cost for DO-orders, the cost is dependent on the weight of the orders, i.e. a variable cost. Hence, the transportation cost for DO will decrease linear to the number of order-lines.

Regarding the DSO order-lines on the other hand, the transportation cost is both divided into a fix cost as well as a variable cost. Hence, the fix cost per order-line will decrease with an increased DSO usage, i.e. the transportation cost per order-line will decrease. Moreover, the total transportation cost for the DSO order-lines will not increase with the same rate as the DO order-lines decreases. Instead, a more realistic increase of the transportation cost for DSO-orders is approximately 50% of the total value that the increase corresponds to, i.e. if the DSO-orders increase with 1000 order-lines, the cost will only increase by the value of 500 new order-lines. The reason for this is that the variable cost of the transportation for DSO-orders depend on weight and is calculated in weight classes, meaning that there are economical advantages with a higher rate of DSO-orders transported.

The transportation costs for VOR-orders is calculated to be the same due to that there will be no specific increase or decrease for this order type since this emergency order is hard to change.

At present the retailers pay 3% of the net price in transportation cost of the DO-ordered spare-parts illustrated in table 6.3. This payment implies an income for Scania GmbH, i.e. the transportation cost for DO-orders reduces. In table 6.7 below, the new transportation costs when changing the ratio between DSO and DO, including the income of 3% for DO-orders, is presented. In addition, see appendix 8, for more specific information about the calculations.

	New transportation cost caused by new amounts of DSO & DO					
	Present	-10% DO	-20% DO	-30% DO	-40% DO	-50% DO
DSO	522.500€	531.663€	540.825€	549.988€	559.150€	568.313€
DO	363.900€	327.510€	291.120€	254.730€	218.340€	181.950€
VOR	67.400€	67.400€	67.400€	67.400€	67.400€	67.400€
Summary	953.800€	926.573€	899.345€	872.118€	844.890€	817.663€
- 3%, transport cost	-259.660€	-233.694€	-207.728€	-181.762€	-155.796€	-129.830€
Total	694.140€	692.879€	691.617€	690.356€	689.094€	687.833€

Table 6.7: Transportation costs caused by new amounts of DSO & DO order-lines.

Source: Author's own construction.

These calculations demonstrate the same trend as illustrated in table 6.1. When changing the ratio between DSO and DO to an increased level of DSO, the total transportation cost for Scania GmbH will decrease. From these new theoretically transportation costs, together with the new number of order-lines from table 6.4, the new transportation cost/order-line for DSO can be calculated. Table 6.8 demonstrates how the transportation cost/order-line will decrease with an increased DSO usage.

	Present	-10% DO	-20% DO	-30% DO	-40% DO	-50% DO
DSO	2,40€	2,36€	2,32€	2,28€	2,25€	2,22€

Table 6.8: The new transportation cost per DSO order-line.

Source: Author's own construction.

Moreover, the problem with the high transportation costs arise from the fact that there are a large difference between the transportation cost that Scania GmbH pays and the income from the retailers. Therefore it is of interest investigating how the income from the retailers would increase with a higher transportation cost, i.e. an increased percentage of the net price. Such

an increase would have positive affects on the transportation cost for Scania GmbH. Table 6.9 illustrates the increased transportation cost for the retailers DO-orders, together with the increased DSO-usage. In addition, see appendix 8, for background information about the calculations.

	Present	-10% DO	-20% DO	-30% DO	-40% DO	-50% DO
Summary	953.800€	926.573€	899.345€	872.118€	844.890€	817.663€
-3%, transport cost	-259.660€	-233.694€	-207.728€	-181.762€	-155.796€	-129.830€
Total	694.140€	692.879€	691.617€	690.356€	689.094€	687.833€
-4%, transport cost	-346.213€	-311.592€	-276.970€	-242.349€	-207.728€	-173.106€
Total	607.587€	614.981€	622.375€	629.769€	637.162€	644.557€
-5%, transport cost	-432.766€	-389.490€	-346.213€	-302.936€	-259.600€	-216.383€
Total	521.034€	537.083€	553.132€	569.182€	585.290€	601.280€

Table 6.9: Change in total transportation cost for Scania GmbH.

Source: Author's own construction.

The summary-line represents the total transportation cost for Scania GmbH during the first six months of 2003, calculated in table 6.7. The percentage of the net price in transportation costs for the retailers is calculated from the prices presented in table 6.3. As illustrated, a raised transportation cost for the retailers' DO-orders, implies a reduced transportation cost for Scania GmbH.

DSO-costs versus DO-costs

Another cost, interesting to investigate, is the inventory cost for having DSO-orders in stock, in comparison with the transportation cost for DO-orders. As mentioned in section 5.2.1 *Logistics costs*, the discount calculated in the price-matrix is very complex. From the data collected in the same section, an example can be created. In this example the value of the Scania original spare-parts of 800.000€ is used. A comparison is then made between ordering every spare-part as DSO, with an inventory interest of 6% per year, and ordering every spare-part as DO, including an cost increase of 10% of the net price, i.e. 3% in transportation cost plus 7% cost increase from the price-matrix. .

Based on facts presented by the subsidiary, an inventory turnover rate of 4 times per year is used for the DSO-orders. This inventory turnover implies an average time in stock of three months for spare-parts ordered as DSO. There is, however, also a possibility of a longer or shorter time in stock. The inventory interest rate corresponds to a cost increase of 6% on the net price during one year, and is a mathematical factor that is used in order to calculate every cost that arise having a spare-part in stock, according to Persson & Virum (1998). The interest rate does not include costs for rent and salaries, while these costs are seen as independent of the value of spare-parts in stock.

The difference in discount between DSO and DO for this type of retailer is, as described in section 5.2.1 *Logistics costs*, 7%, i.e. the DO provides 7% less discount than a DSO. The DO type of order further conveys an increase of the net price of 3% in transportation cost. Table 6.10, below, illustrates the comparison between the two order-types, with the value of 800.000€ for six months as start value for the both order-types.

Time period	DSO conditions	DSO costs	DO conditions	DO costs
6 months	800.000€, 3% stock rate	824.000€	800.000€, 10% cost increase	880.000€
3 months	800.000€, 1,5% stock rate	812.000€		
2 months	800.000€, 1% stock rate	808.000€		
1 month	800.000€, 0,5% stock rate	804.000€		

Table 6.10: DSO costs versus DO costs.

Source: Author's own construction.

It is always a risk having inventory in stock, and the time periods are used in order to illustrate the cost for the different periods. The cost for DO-orders will remain the same no matter of the time periods, this due to the fact that the basic value is constant. Figure 6.1 present the savings for this subsidiary placing DSO-orders instead of DO-orders.

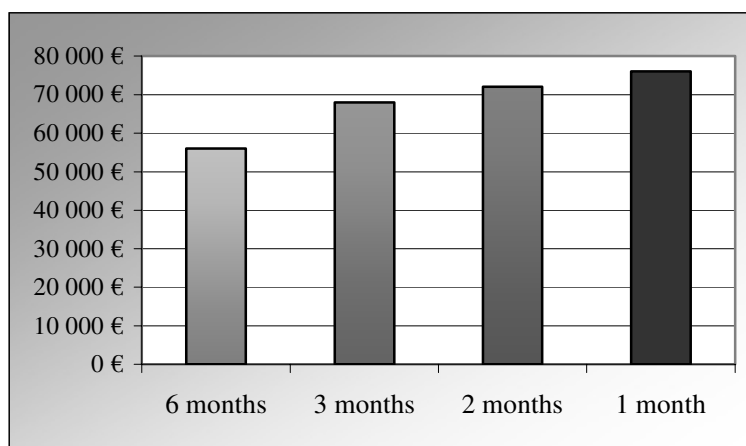


Figure 6.1: Cost savings using DSO instead of DO.

Source: Author's own construction.

Further interesting to investigate is how an increased transportation cost would affect the retailers. A further example is created with the same conditions as described in section 5.2.1 *Logistics costs*. The price of the subsidiary's DO-orders between 2003-01-01 and 2003-06-30 was 459.057€, and is used as basic value. Table 6.11 illustrates the present transportation cost of 3% as well as an increase to 4% and 5% in transportation cost, respectively.

Total price of DO-orders	3% Transportation cost	4% Transportation cost	5% Transportation cost
457.057€	13.772€	18.362€	22.953€

Table 6.11: Different transportation costs for a subsidiary's DO.

Source: Author's own construction

Increasing the transportation cost by 1%, from 3% to 4%, implies a cost increase for the subsidiary with 4.591€, i.e. 9.181€ per year. Moreover, increasing the transportation cost with 2%, implies a cost increase corresponding to 9.181€, 18.362€ per year. In comparison with what Scania GmbH would save in transportation costs, the cost increase for this subsidiary is reasonable. As the situation is today there will always, due to emergency repairs at the retailers, exist DO-orders. As a consequence, the percentage cannot be raised with too much. An increase of one or two percent, though, could further imply that the unnecessary DO-orders would decrease.

6.3 HIGH NUMBER OF BACKORDERS

According to Krajewski & Ritzman (1999), a backorder is a customer order that cannot be filled when promised or demanded, and will therefore be filled later. Ballou (1999), claims that backorders can create additional sales cost for order processing, as well as additional transportation and handling cost when such orders are filled through the normal distribution channels. Krajewski & Ritzman (1999) further claim that customers can be willing to wait for the backordered spare-parts, but the next time the customer may buy the products elsewhere. The extra costs that the backorders convey, as well as the risk for that the customers turn elsewhere, are two factors that implies that the backorders need to be reduced.

Backorders at Scania GmbH are often created by quality and delivery problems at the suppliers, i.e. problem spare-parts. This type of spare-parts often vary week to week, and due to that it is mostly the problem spare-parts that cause the backorders, it is very hard to fully avoid backorders. The twelve most common problem spare-parts are presented in section 5.3.2 CW2, and the net value that these spare-parts constitute, was from 2003-01-01 to 2003-06-30 236.606€. This sum corresponds to approximately 1% of the total net value for all ordered spare-parts. Hence, this 1% constitutes most of the problems for the retailers in the form of late deliveries due to backorders and dissatisfied customers.

Storhagen (1997), claims that having spare-parts for maintenance of main products in stock conveys a problem situation regarding what service level to provide the customer with. If the retailers at Scania GmbH have a high number of backorders, the service level at the retailers will decrease. A service level of 97%, for instance, implies 3% backorders of the total amount of orders, i.e. with a lower rate of backorders the service level would increase. Storhagen (1997), further claims that depending on what service level promised to the customer, the organisation needs to decide what type of spare-parts to keep in stock and also knowing what significance to operation the spare-parts have. The author further highlights the importance of collecting information about frequency of error, causes and consequences as well as forecast follow-ups. Despite the fact that the problem spare-parts constantly changes it is important to keep control over these spare-parts. The problem with not doing follow-ups of this list of problem spare-parts is that there can be several spare-parts existing on the list for a long time, creating higher handling costs due to the backorders.

Scania GmbH's retailers have an average of 8 backorders per week, which is too much according to the retailers. They further claim that there exists several false deliveries from CW2 and the survey shows that there are a high number of late deliveries of DSO-orders in particular. One of the retailers states that as much as 40% of the deliveries are not delivered within the predicted three days.

6.3.1 ABC-analysis

According to Krajewski & Ritzman (1999), inventory management is an important concern for all types of business. The authors further claim that the challenge with inventory management is not to lower inventories to the bone in order to reduce costs or to have plenty around to satisfy all demand, but to have the right amount to achieve the competitive priorities for the business. In order to establish what type of product groups to be kept and controlled in stock at the retailers, an ABC analysis has been made, see appendix 9. The analysis has been done in the perspective of Scania GmbH, including the turnover for each product group that retailers in total have conveyed, between 2003-01-01 and 2003-06-30. Figure 6.2 presents the result of the analysis.

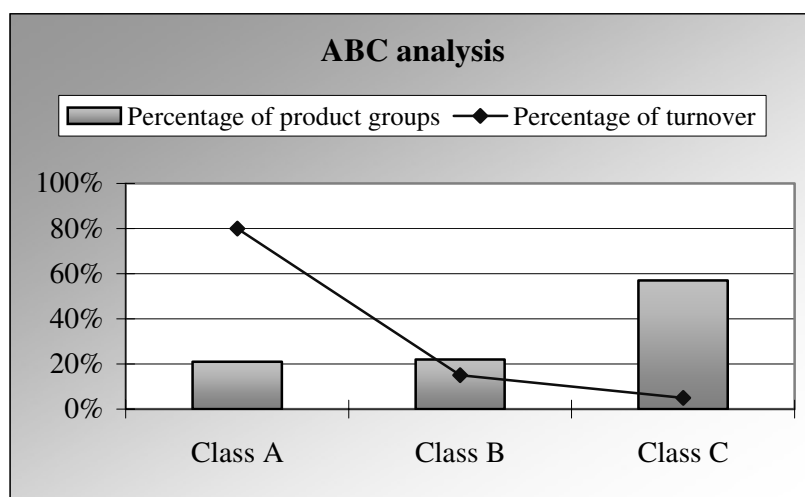


Figure 6.2: ABC analysis of product groups.

Source: Based on facts from AS400.

The result shows that from the in total 570 product groups, class A constitute 120 product groups, i.e. 21% of the total number of product groups, and this class further represent 80% of the total turnover. Due to that there is a high usage of the product groups in class A, the retailers should, in order to maintain a high availability, try to keep the spare-parts within these product groups in stock, or at least keep control over these spare-parts so that out-of-stock can be avoided. The product groups within class C, with a lower usage, is to be held in warehouses and class B constitutes product groups that could either be in stock at the retailers or at the warehouse.

Further interesting is that seven of the eleven most common problem spare-parts, is registered in class A. Due to the fact that the problem spare-parts constitute the highest risk for backorders, this could be considered as a highly negative factor both in the term of aiming for an increased DSO-usage as well as customer service.

6.3.2 Priority

According to Ballou (1999), one reason for warehousing is to put value to the product. The author further claims that, by warehousing a product close to the customers, supply is made readily available. Through faster deliveries an increased customer service as well as increased sales can be achieved. CW2 provide several countries with spare-parts, including Germany, this in order to provide their retailers with a supply near the customers. When supplying the

retailers with spare-parts, CW2 has a certain priority list when handling the orders. These priorities are highly significant when it comes to the problem parts and lack of stock in general. With a low quantity in stock of a specific spare-part at CW2, together with a high demand on the specific spare-part, the VOR-orders will be served first, followed by DO-orders. The orders placed as DSO have the lowest priority. Hence, with low level in stock, every DSO-order of this spare-part will be backordered with a delivery date calculated from when CW2 will receive the spare-parts from CW1 or the supplier. A problem with this priority system is that the retailers need to place either a VOR-order or a DO-order in order to receive the requested spare-part. Hence, this is a further factor that does not improve the usage of DSO-orders.

6.3.3 Inventory planning

Inventory management is very important according to Krajewski & Ritzman (1999). Good inventory management is of importance at the retailers, and one factor that emphasises a better inventory management is the Buy Back. This opportunity of selling back low frequency articles provides the retailers a tool for keeping a good inventory. According to some of the retailers, there is a problem regarding the routines for the Buy Backs. For instance, the average opinion is that the minimum value of 60€ is too high and it takes a long time from sending the spare-parts back to CW2 until the invoicing is finished and the retailer receives the money.

Another important factor regarding keeping an optimised inventory is to thoroughly register the in- and output in inventory. The retailers with direct computer contact to CW2 orders, as mentioned above, via SPAS with the help of a specific planning tool. The retailers not connected via computer to CW2, do not have the same planning support and need to keep track of the flow in other ways, for instance by experience. According to Storhagen (1997), the inventory control is limited due to the fact that the assortment of spare-parts cannot be decreased without considering the consequences for the earlier sold main products.

Placing DSO-orders implies having spare-parts in stock, and keeping a stock is costly. Having a too large inventory will create higher costs, especially for the service partners. The desire is to have the spare-parts in stock for as short time as possible, meaning less costs. In order to help the retailers, as well as CW2, keeping an optimised stock-level, Scania GmbH has implemented the DSO-orders. It seems, though, that some of the retailers do not understand the advantages with DSO, instead they seem to believe that DSO convey too high inventory costs. The retailers rather place DO-orders, which implies having the spare-parts in pipe-line inventory, i.e. pipeline inventory is an inventory moving from point to point in the materials flow, for example between the distribution centre and the retailer, according to Krajewski & Ritzman (1999). The pore knowledge about the advantages with DSO could be a possible cause of the high DO-usage at the service partners.

6.4 LACK OF INFORMATION

When analysing the statistics of the frequency with which the retailers place DSO-orders, it shows that most of the subsidiaries and private retailers order DSO with a relatively high frequency, 77%, on average. The branches and private retailers have, during the first 6 months in 2003, ordered DSO with an average frequency of 78% and 66%, respectively. It also shows that there exists a large difference between different retailers within the three segments. Several within each section have a very low frequency of DSO-orders, while others have a relatively high frequency. In order to obtain a stable usage of DSO the retailers must realise that, as Christopher (1998) argues that, an organisation cannot longer see themselves as an

isolated organisation. Instead it is of importance that every entity, i.e. retailers, see themselves as a component in a chain of operators who together work towards the same goals of profitability. The problem seems to be too much focus on the own company. It further seems as the larger subsidiaries and private retailers have good knowledge about the advantages with the new daily order routines, in difference to the service partners. The problem that arises for the service partners in specific is, due to the low DSO-usage, it will be hard to reach the targets well as higher costs.

The majority of the asked retailers answered that receiving information is of great importance. The majority further answered that the information is enough but that the quality can be better. It also seems to be a problem regarding the information flow between Scania GmbH and the retailers regarding technical updates as well as the problem spare-parts. Moreover, it often occurs that the concerned personnel do not receive the information, which is a great problem in the flow of information.

The answers from the retailers originally show an average usage of five DSO and seven DO, respectively, per week. When removing the extreme values, i.e. not a normal DO-usage, the new value shows on an average value of five DSO and five DO respectively, per week.

Noticeable is that it is different number of order-lines in the two order types respectively. The total number of order-lines stated in section 5.2 *Description of order placement*, shows on a higher number of order-lines within the DSO type of order. The problem, though, is that it should not be necessary to order DO once per day. With the special formula they should be able to plan the inventory better.

7 CONCLUSIONS & IMPLICATIONS

In the previous chapter the collected data was analysed. This chapter will present findings and conclusions of this thesis.

7.1 INCREASE THE USAGE OF DSO

As shown in section 6.2.2 *Cost*, an increased usage of DSO will decrease the transportation cost both for Scania GmbH as well as for the retailers. For every 10% decrease of DO, the savings of the total transportation cost for Scania GmbH would be 27.227€, 54.454€ per year.

In order to reach the target of an average DSO-usage of 80% for the retailers in Germany, a decrease of approximately 25% of DO-order is needed. These 25% correspond to a decrease of the total transportation costs for the three order types of 40.841€, i.e. 81.700 € per year. For the three retailer segments respectively, the decrease needed is approximately 15% for segment one, 10% for segment two and approximately 40% for segment three. Moreover, in order to reach a DSO-usage of 85% in 2004, an decrease of over 40% for the German retailers is needed, based on today's number of order-lines. This decrease corresponds to a saving of approximately 81.700€, i.e. 163.400 € per year. For the three retailer segments the needed decrease is 37% for segment one, 36% for segment two and almost 60% for segment three, based on the DSO-usage from the first six months 2003. Hence, it will take a lot of work increasing the DSO-usage to the desired level, especially for the service partners. Due to the savings in transportation costs, it is recommended to continue the work of increasing the DSO-usage by reducing the DO-orders.

Further, placing a DSO implies a lower cost than placing a DO. In the example illustrated in section 6.2.2 *Costs* it clearly shows that ordering as DSO and keeping the spare-part maximum a half year in stock, implies a lower cost than placing orders as DO. In fact, with the basic value of 800.000€ of ordered Scania original spare-parts, the difference between ordering as DSO, and keeping the spare-parts in stock for 6 months, and order every spare-part as DO, is as high as 56.000€ and even more with a shorter time in stock. In table 7.1 the total difference between the two order types, DSO and DO, is illustrated. The time period correspond to keeping the spare-parts in stock for 6 months, 3 months, 2 months and finally 1 month, in comparison with order everything as DO.

Time period	DSO versus DO with 3% in transportation cost.
6 months	56.000€
3 months	68.000€
2 months	72.000€
1 month	76.000€

Table 7.1: Savings ordering as DSO versus DO, with 3% in transportation costs.

Source: Author's own construction.

7.2 FOCUS ON SERVICE PARTNERS

Due to the low DSO-usage at the service partners, the needed decrease of DO-orders to reach the target is 40%, 2003. In order to help the service partners to reach this target, Scania GmbH could focus a lot on the service partners and help them in their work towards an increased DSO-usage. As Eklund & Lund (1998), claims; changing attitudes from “I have to” to “I want to” can be of significant importance in the work of improvement. Focusing on the service partner including information and improving their conditions could enhance their understanding about the advantages with DSO as well as facilitate an increased DSO-usage. The goal should be creating an own desire of ordering with DSO-orders by the service partners.

7.2.1 Smoothen out the discounts

One further way of focusing on the increase of DSO-orders at the service partners could be to smoothen out the difference in the discount for the different retailers. A higher discount for the service partners may enhance the willingness of ordering DSO. Another change within the discounts that could affect the usage of DSO-orders in a positive direction is a decreased discount of spare-parts when placing DO-orders. Due to that there always will exist DO-orders, this decrease of discount cannot be too high. However, as a consequence the unnecessary DO-orders could reduce, and as a means affect the DSO-usage in a positive way.

7.3 RAISE THE TRANSPORTATION COST FOR DO

Due to that transportation costs have been observed to absorb between one-third and two-thirds of the total logistics costs, according to Ballou (1999), it is of importance to lower these costs as much as possible. Increasing the DSO-usage for the retailers in Germany with 25% will both correspond to the target for 2003 as well as a saving of 68.000€, i.e. 136.000€ of the total transportation cost during one year. A further method for Scania GmbH to decrease their transportation costs is to increase the transportation cost for DO-orders. At present, the 3% of the net price in transportation cost for the retailers does not imply a large difference in costs between DSO and DO. In order to enhance the DSO-usage, and lower the unnecessary DO-orders, it should be a larger difference in costs for the two order types. Due to that a higher transportation cost does not imply a tremendous increase of the total costs for the retailers, but instead a relatively high saving in costs for Scania GmbH, I recommend that the transportation cost for the retailers is raised.

7.4 UPDATE DEACTIVE SPARE-PARTS ONCE EVERY MONTH

Deactive spare-parts do not facilitate an increased DSO-usage. Instead a DO-order or a VOR-order must be placed which, as shown in above illustrated calculations, imply higher costs for the retailers as well as for Scania GmbH. After the update is made, it should be possible to obtain a list of the current deactive spare-parts. As a consequence, the deactive spare-parts can be activated directly and the retailers are able to order DSO-orders when needed. However, the drawback is that as a result of low frequently spare-parts, there is no need of activating every spare-part. In order to avoid activating these non-necessary spare-parts the personnel at Scania GmbH could exclude these either by recognizing the name and type of the spare-part, or through the date registered for the spare-part. However, the recommendation is to update the deactive spare-parts once per month in order to lower extra work, and delete one factor that restrains the DSO-usage.

7.5 BETTER FEEDBACK FROM CW2 TO RETAILERS

The left over pallets at CW2 are a result of lack of space in the truck as well as capacity problems. In order to solve this problem, a possible solution could be investigating what a new module within the inventory system could convey. The purpose of this module should be measuring the volume of ordered spare-parts. Due to that there the different sections at CW2 pack the orders in section-specific pallets, there is no control over the total quantity or volume of the pallets. With a module that calculates the volume of every spare-part package, it could be measured exact how many pallets the orders convey. As a consequence, a comparison can be made with the space in the truck, and as a means quickly notice when space is lacking and if needed an extra truck can be called in.

As the situation is today, when pallets are left at CW2, it is of very high importance that the information flow works correctly. The retailers need to obtain the information about the delayed delivery as soon as possible, this in order to change their order to a DO or just inform the customer about the delay as soon as possible. The delayed delivery is most certain a factor that increases the DO-usage and not the DSO-usage. Placing DO-orders imply delivery the next day, but placing DSO-orders with a delivery time of three days, which is delayed one day due to lack of space in truck, imply an insecurity of the real delivery date. As a consequence, it must be better feedback from CW2 to the retailers.

7.6 INVENTORY CONTROL

According to the retailers, there are problems regarding the routines for Buy Backs. Ljungberg (1998), states that even small improvements within the order process can be highly rewarding for the effectiveness and the efficiency they bring. As a consequence, it is recommended to investigate the Buy Back routines in order to find areas that could be improved. Desired by the retailers is that the minimum value of 60€ is decreased as well as a shortened time for invoicing. Improving the routines for Buy Backs should imply an improvement in the inventory management at the retailers.

For the retailers to protect themselves against stock-outs at CW2, as well as occasional peaks in demand, one solution is to increase their own safety-stock. Even though it is expensive having a large inventory, these costs will hopefully not exceed the out-of-stock costs that Ballou (1999), mentions. Having too low stock-level also imply the risk of loosing customers. Having a higher safety stock, on the other hand, imply that the required service-levels can be kept as well as a lower quantity of backorders.

Further it is of importance that the retailers place their DSO-orders and DO-orders after the in- and out-put has been registered in inventory. Furthermore, the spare-parts in pipeline should be taken into consideration when ordering. Having the right inventory level registered should decrease the number of false orders and as a means the ordering costs. As a consequence, the service partners should also have the inventory-planning tool. Providing the service partners this tool could help improving their inventory management and in addition the DSO-usage.

7.6.1 Reduce number of backorders

According to Ballou (1999), backorders can create additional costs when such orders are filled through the normal distribution channel. Backorders can also imply costs of lack of future sales. Lowering the backorders should, as a consequence, imply both lower costs as

well as maintaining a satisfying customer satisfaction. Furthermore, a lower quantity of backorders should also imply a higher service-level.

Due to that the problem parts often convey backorders, it is important to control these specific spare-parts. It often happens that the different problem spare-parts vary week to week, but there are also spare-parts that occur more often and more continuously. These spare-parts should be controlled better so that actions can be taken in order to deal with the reason for the problems regarding a specific spare-part. A possible way of solving the trouble of the common problem spare-parts could be an increased safety stock at CW2. According to Krajewski & Ritzman (1999), safety stock is held in order to avoid customer service problems and hidden costs of unavailable spare-parts. Safety stocks further protect against uncertainties in demand, lead-time and supply, according to the authors. However, it is very hard to increase the inventory level when there are constantly new problem spare-parts registered with a high demand. Despite this, I recommend a better control of these problem spare-parts as well as considering a higher level of security stock.

Scania GmbH's desire is an increased DSO-usage. CW2 prioritize the different order types so that backorders and DSO-orders have the lowest priority. In order to act supportive on the retailers' usage of DSO, the priority by CW2 could be different.. A certain priority list is definitely needed when there is a low stock-level of certain spare-parts. Due to that DSO-orders are actually to be used as a means for inventory planning, this order type cannot have as high priority as DO. However, one solution of increasing the DSO-usage is, instead of letting the retailers wait for their backordered spare-parts, the priority of backorders could be equal to the priority for DO.

Huiskonen (2001), claims that the planning for the logistics of spare-parts differs from those of other materials, for instance, due to difficulty of forecasting the demand. In addition, Storhagen (1997), claims that in order to perform correct forecasts, it is necessary to perform frequent follow-ups. Therefore, another way of reducing backorders could be by continuously performing thorough follow-ups of demand and outcome, and changing the stock-level at CW2 after the demand that these follow-up's shows.

7.7 IMPROVE THE FLOW OF INFORMATION

Due to the low number of DSO-orders at the service partners, and the needed increase in order to reach the target of 80% DSO in 2003, and 85% in 2004, it is, as mentioned above, recommended that Scania GmbH focus on their service partners. Storhagen (1997), highlights the constant desire of having the right information available at the right place, especially between supplier and customer but also with the own company. As a consequence, another step towards an increased DSO-usage could be an improved information flow regarding the order process and the advantages with DSO. As Giannoccaro & Pontrandolfo, (2002) claim, an effective management and control of the material flow between companies and their customers is vital to the company's success. This can be achieved by fine-tuning existing ordering policies, by reducing delays and a better use of the information flow through the supply chain, and a tight co-ordination among inventory policies of the different actors with the supply chain. Therefore, with the same planning tools as for the rest of the retailers together with an improved information flow through the supply chain, an increased DSO-usage can be achieved as well as an improved inventory management. By informing the retailers about the whole supply chain, and their own cause and actions in the total process a better understanding could be achieved. Doing so, and with focus on the DSO-usage, a better co-operation in the supply chain can be accomplished. In this improved information flow,

faster information from the suppliers regarding problem parts would be included. It is of importance that the retailers are informed as soon as possible regarding delays in delivery, this in order to be able to re-plan their ordering. When there are problem spare-parts that exist during a longer time, the retailers need to receive information about these problem spare-parts. A possible suggestion could be an Internet link, available for the retailers, showing current problem spare-parts.

The survey shows that the retailers are of the opinion that there is a need of faster information regarding technical updates of spare-parts, or updates of spare-parts in general. It is also stated that the information can be easier formulated and better structured. Furthermore, it seems that relatively often the information does not reach the concerned personnel, instead there is a stop in the distribution line in the sense of that further personnel either thinks the information is interesting and keep the information for themselves or the fact that it is forgotten. To make sure that the concerned person at the retailer receives relevant information, there should be an attention on the envelope.

7.8 SUMMARY CONCLUSIONS

Based upon previous discussion, the recommendations to Scania GmbH how to increase the DSO-usage can be summarised as follows:

- Increase the usage DSO-orders
- Focus on service partners
- Smoothen out discounts
- Increase the retailers' transportation cost for DO-orders
- Update deactive spare-parts once every month
- Better feedback from CW2 to the retailers
- Keep control of problem spare-parts
- Change priorities at CW2
- Forecast follow-up's
- Improve information flow

8 DISCUSSION

In this chapter the conclusions will be discussed. Moreover, desirable further research is presented.

8.1 CONCLUSIONS

As the market for trucks is decreasing, including low volumes of sales, it is important that Scania GmbH profit in service and maintenance. An important factor within service and maintenance is to make sure that the supply of spare-parts is secured. As Scania GmbH aims at lowering costs and keeping a good customer service, the purpose of this thesis was to analyse the order process of today, with focus on the order placement, and as a result, give suggestions on how to improve the order routines.

Storhagen, (1997) claims that, due to that the flow of material concerns several parts within the organisation there will always be a chain reaction when changing an operation within the supply chain. In this thesis I have tried to cover every problem area within the order process with consideration to each concerned part. However, I found it difficult to satisfy all parties involved and thus some of the conclusions are favouring the perspective of Scania GmbH.

In order to further collect relevant data regarding the order process in the perspective of the retailers and CW2, interviews and questionnaires have been carried out. Two interviews have been carried out and the rest of the information has been collected in the form of questionnaires. It would have been preferable to carry out more interviews in order to catch up personal judgements etc. However, the questionnaires were followed up with supplementary questions when needed.

When conducting a case study including several aspects it is, as mentioned above, hard to improve the situation for everyone. Instead this thesis has focused on finding factors that can generate compromises between the different parts in the order process and hence creating win-win situations.

8.2 FURTHER RESEARCH

Some of the conclusions include supplementary studies of the order process in order to further improve the routines. These suggestions have been made due to certain wishes from the retailers. Bergman & Klefsjö, (2003) claim that quality work is a continuous process, and not an on-off project. Therefore it is important that Scania GmbH make follow up's and further investigate areas that can be improved. Something that definitely should be investigated is the possibility of implementing a module at CW2 that calculates the total volume of pallets. Knowing what volume ordered spare-parts packed in pallets need in the truck could definitely decrease the number of left over pallets by CW2. Another area that needs to be improved, according to the retailers, is the routines for the Buy Backs. As a means, a study of these routines should be made in order to detect flaws and how to shorten the process.

According to Christopher, (1998) there seems to be a growing demand from the market for higher levels of service and quality. The author further claims that the customer nowadays perceives little technical difference between competing offers. In order to add value for the customers, it is of importance to know the customers' opinions about the service etc. within the organisation. As a consequence, Scania GmbH could do customer surveys in order to obtain knowledge about the customer satisfaction as well as what should be improved.

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APPENDIX 1

- Interview guide - Retailers

General Information

- Company name:
- Name and position of the respondent:

- Number of employees:
- Years of company establishment:
-

Part A – Questions about information and knowledge

1. Please rate the relative importance of the following questions:

Remark: The score 5 is the highest rate (greater importance) whereas 1 stands for the lowest rate (lesser importance)

	1 Low	2	3 Average	4	5 High
How important is the information from Scania Deutschland GmbH?					
How important is customer satisfaction in your company?					

2. Are you of the opinion that the information from Scania Deutschland GmbH is sufficient?

Yes: ___ No: ___

3. What is your opinion about the quality of the information?

Bad: ___ Not good: ___ Average: ___ Good: ___ Very good: ___

4. Do you have any suggestions of something that need to be better regarding the information from Scania Deutschland GmbH?

5. Do you think that the end-customer satisfaction is good at your company?

Yes: ___ No: ___

6. Do you have any suggestions how to achieve an increased end-customer satisfaction?

7. Do you have anything to add regarding the above questions?

8. Please rate the relative importance of the following questions:

Remark: The score 5 is the highest rate (greater knowledge) whereas 1 stands for the lowest rate (lesser knowledge)

	1 Low	2	3 Average	4	5 High
How would you rate your knowledge about the order process in total?					
How much do you know about your company's role in the total order process?					
Are you aware of the consequences of your company's actions within the total order process?					
How would you rate your knowledge regarding discounts and freight costs for DSO and DO respectively?					
How would you rate your knowledge regarding backorder routines?					
How would you rate your knowledge regarding the routines for returning articles to CW2?					

9. Do you have anything to add to the above questions?

Part B – Order routines

10. How often do you place an order to CW2?

DSO: __ times per week DO: __ times per week

11. Approximately, what time during the day, do you place the orders?

DSO: __ pm DO: __ pm

12. Approximately, how many returns of different articles are there during one week?

Quantity: __ per week

13. Approximately, how many backorders are there during one week?

Quantity: __ per week

14. Are you of the opinion that the Buy-back routines functions good?

Yes:___ No: __

When no, what can be better?

15. Is there any problems regarding the routines of placing orders?

Yes: __ No: __

When yes, please describe these problem/problems:

16. Do you have anything to add to the above questions?

Part C – Inventory

17. How large is your inventory in net value?

18. Please name the five largest assortment groups in your inventory.

19. What inventory turnover does your company invoice per year?

20. For how long does your company plan the in-deliveries of the inventory (predisposition time)?

Short term: __ weeks Long term: __weeks

22. Does your company have software support for the inventory planning?

Yes: __ No: __

23. Do you have anything to add to the above questions?

APPENDIX 2

- Interview guide – CW2

General Information

- Company name:
- Name and position of the respondent:
- Years of company establishment:

- Business objective:

- Business strategy:

Part A – Capacity

1. How many people are employed at CW2?
In inventory: _____ In office: _____
2. In summer, how many people are employed at CW2?
In inventory: _____ In office: _____
3. How many order-lines per week does CW2 typically handle?

4. Are the numbers of order-lines in accordance with CW2's capacity?
Yes: _____ No: _____

5. How many of the weekly order-lines are DO-orders?
Quantity: _____ DO per week

6. Are the DO-orders affecting your capacity? If yes, please describe how.

7. Please specify what type of costs a high DO-order frequency conveys?

8. In order to fully utilise CW2's capacity, at what time during the day should the retailers place their order and which quantity should they preferably order?

Time: ____ pm

Quantity: ____ per day (DSO)

9. When during the day should the retailers place their DO-orders?

Time: ____ pm

10. Do you have anything to add to the above questions?

Part B – Priority

11. Please rate the relative importance of how CW2 prioritises the different order types used by Scania retailers. *The score 5 is the highest rate (greater priority) whereas 1 stands for the lowest rate (lesser priority)*

	1 Low	2	3 Average	4	5 High
VOR					
DO					
DSO					

12. Please rate the relative importance of how CW2 attends to (handle) different orders during one day. *The score 5 is the highest rate (greater priority) whereas 1 stands for the lowest rate (lesser priority)*

	1 Low	2	3 Average	4	5 High
VOR					
DO					
DSO					
First-in-first-out					
Per retailer					

13. Do you have anything to add to the above questions?

Part C – Order routine

14. Approximately, how many backorders are handled by CW2 per week?

Quantity: ____ per week

15. Approximately, how many returns of articles are handled by CW2 per week?

Quantity: ____ per week

16. In total, how much does the handling of backorders cost per week? Please specify in €.

17. In total, how much does the handling of returned articles cost per week?

Please specify in €.

18. Could the quantity of the backorders be lowered?

Yes: __

No: __

When yes, please provide suggestions of how to lower the quantity of backorders.

19. Could the quantity of the returns be lowered?

Yes: __

No: __

When yes, please provide suggestions of how to lower the quantity of returned articles.

20. What type of logistical system does CW2 have in the warehouse?

21. Is there anything that could be better regarding the logistical system?

22. Are all Scania organisations in Europe using the same order system?

Yes: ____

No: ____

25. Do you have anything to add to the above questions?

Part D – Transport

26. How does CW2 plan the volumes for the transport of articles to the retailers?

27. How often is the situation so, that the ordered articles do not reach the retailer in time?

Quantity: ____ per times week or Quantity: ____ per times month

28. Please mention the most common reasons for late deliveries to retailers.

29. Do you have any suggestions to how this can be solved?

30. Do you have anything to add to the above questions?

31. Do you have anything in general to add?

Thank you for your co-operation!

APPENDIX 3

- Data collection, retailers

Of the in total 28 questionnaires, 15 retailers have answered.

Information and customer satisfaction

Concerning the first two questions, the respondents where able to rate the importance of information and customer satisfaction. The scale used where 1 to 5, where the score 1 stands for the lowest rate (less importance) and the score 5 stands for the highest rate (greater importance).

Table 1 illustrates the answers from the question “*How important is the information from Scania GmbH?*”.

Number on scale (1-5)	Number of respondents
1	0
2	0
3	2
4	0
5	13

Table 2 demonstrates the answers from the question “*How important is customer satisfaction in your company?*”.

Number on scale (1-5)	Number of respondents
1	0
2	0
3	0
4	1
5	14

The retailers where also asked, “*Are you of the opinion that the information from Scania GmbH is sufficient?*”. 9 retailers of 15 answered that the information is sufficient.

On the question “*What is your opinion about the quality of the information?*”, the answers are illustrated in Table 3.

Number on scale (1-5)	Number of respondents
1	0
2	0
3	9
4	6
5	0

The retailers gave the following suggestions of how to improve the information:

- Easier formulated and better-structured information.
- Faster, more understandable and more objective information.

- Regarding technical spare-part updates, the retailers need the information quicker.
- Faster information regarding bottlenecks in spare-part support.
- More training opportunities for the inventory personnel.
- Quicker information regarding late deliveries.
- In order for the concerned personnel to receive the information, write, for instance, an attention on the envelope.
- The information should be more adjusted to German retailers.

On the question “*Do you think that the end-customer satisfaction is good at your company?*”, several of the asked retailers find that question hard to answer. However, 9 retailers believe that end-customer satisfaction is good and 2 retailers believe that the end-customer satisfaction is not good.

The following suggestions where provided by the retailers, how to improve the end-customer satisfaction:

- Price adjustments, lower prices.
- Better service level.
- More customer care.
- Better quality on spare-parts.

On the question “*Do you have anything to add to the above questions?*”, one retailer states that the sales activities, from Scania GmbH to the retailers, need to be better adjusted to the retailers. When there is a sales activity regarding a certain spare-part, the retailer has no possibility to filter out what customers that this campaign concerns. The other retailers have no comments.

Knowledge

Concerning the questions about knowledge, the respondents where able to rate their knowledge within the order routines. The scale used where 1 to 5, where the score 1 stands for the lowest rate (less knowledge) and the score 5 stands for the highest rate (greater knowledge).

Table 4 illustrates the answers from the question “*How would you rate your knowledge about the order process in total?*”.

Number on scale (1-5)	Number of respondents
1	1
2	0
3	0
4	4
5	10

The retailers where also asked “*How would you rate your knowledge about your company’s role in the total order process?*”. Table 5 demonstrates the answers.

Number on scale (1-5)	Number of respondents
1	0
2	0
3	1
4	2
5	12

Concerning the retailer's knowledge about the consequences of their own actions, "*Are you aware of the consequences of your company's actions within the total order process?*", the retailer's answers were spread as 12 retailers have great knowledge about their actions within the total order process, 2 retailers have good knowledge and 1 retailer has average knowledge.

The majority of the asked retailers, 13 retailers, have great knowledge (5 on the scale) about the discounts and freight costs for DSO and DO. 2 retailers answered that their knowledge are good (4 on the scale).

The retailers were also asked to rate their knowledge about the backorder routines and the routines for returning spare-parts. Table 6 illustrates the ratings regarding the backorder routines; one retailer has not answered the question.

Number on scale (1-5)	Number of respondents
1	0
2	1
3	2
4	2
5	9

Table 7 illustrates the rating over the retailers' knowledge regarding the routines for returning spare-parts.

Number on scale (1-5)	Number of respondents
1	0
2	1
3	2
4	1
5	11

One retailer had something to add regarding the above questions. The retailer claim that a cancellation of a return-inquiry cannot be done within the SPAS-system.

Order routines

On the question "*How often do you place an order to CW2?*", the retailers answers are illustrated in Table 8 below.

Ordered DSO/week	Ordered DO/week
5	30
1	5
5	4
5	5
5	1
5	5
5	5
2	4
2	5
5	5
5	4
5	4
5	-
5	5
5	5

On the question “*Approximately, what time during the day do you place the orders?*”, the majority of the retailers says that they place their DSO-orders once a day, in the afternoon between 16.00 and 18.00. The majority further place their DO-order once per day, in the afternoon between 15.00 and 18.00. Moreover, there is also several retailers that places their DO-orders continuously during the day as demand occur.

Furthermore, the retailers where asked “*Approximately, how many returns of different spare-parts are there during one week?*” and “*Approximately, how many backorders are there during one week?*”. The answers on these questions are illustrated in Table 9, below.

Returned Spare-parts/week	Backorders /week
5	10
1	5
3	4
1	10
1	10
1	2
1	-
3	15
0	10
1	3
2	5
-	9
3	5
1,5	-
4	10

Regarding the delivery of these backorders, one retailer comments that when the backorders, often from many different orders, finally are delivered they are delivered in small separate cartons, one for each backorder.

On the question “*What is your opinion regarding the buyback routines?*”, the retailers comment as follows:

- The time it takes for us (the retailers) to receive the money from the spare-parts that are sold back, is too long.
- The routines could definitely be better.
- As the routines are now, it is not good.
- Buyback is a very good thing, which make it possible not having an unnecessary increase of inventory.
- The price limit of 60€, for a spare-part to be bought back, is too high!
- The routines for buybacks could function as the routines for returning spare-parts, i.e. allowing for selling back spare-parts more often, twice a year up to every four weeks.
- At the moment too expensive.

At the question “*Is there any problems regarding the routines of placing orders?*”, the retailers comment as follow:

- The delivery of spare-part is often to late.
- DSO-orders are very often not complete delivered.
- DSO-orders are often delivered one day later than predicted.
- Dissatisfied customers, with an increased standstill time, due to late delivery of spare-parts.
- Several false deliveries.
- 40% of the ordered DSO is not delivered within the predicted 3 days.
- There are a lot of backorders on updated spare-parts.

Inventory

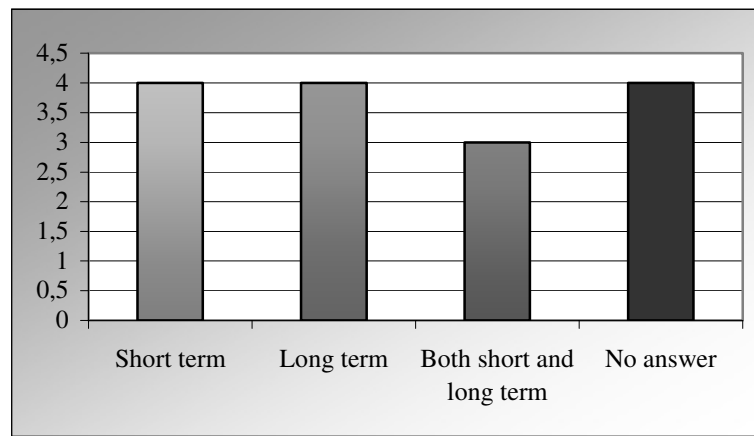
When asked “*How large is your inventory in net value?*”, 12 retailers answered the question. These 12 answers demonstrate an inventory value between 307.000 € and 1.280.000 €.

The answers on the question “*Please name the five largest assortment groups in your inventory*”, the retailers mainly lists the following spare-parts:

- Filters
- Breaks
- Scania-original spare-parts
- Service- & maintenance spare-parts
- Exchange parts

On the question “*What inventory turnover does your company invoice per year?*”, 8 retailers answered the question. The answers indicate an invoice-turnover between 900.000 € and 6.000.000 €.

Regarding inventory planning, the retailers where asked “*For how long does your company plan the in-deliveries of inventory?*”, 11 retailers answered the question. These answers are illustrated in Figure 1.



When asking the question “*Does your company have software support for the inventory planning?*”, 10 retailers answer that they do have software support. 2 retailers say that they do not have a software support for the inventory planning; instead they calculate their inventory by experience. 3 retailers have not given an answer.

APPENDIX 4

- *Data collection, CW2*

The respondent claim that “customer first” is the business objective. 96% of ordered parts should be available at order booking.

The business strategy is eliminating waste, customer first and respect for the individual.

Part A – Capacity

On the question “*How many people are employed at CW2?*” the respondent answers that there are 140 people that works in inventory and 60 people at the office, during the whole year.

Normally, CW2 handle approximately 60.000 DSO order-lines per week, which correspond well to the capacity, according to the respondent. The number of DO order-lines that normally are handled by CW2 is 6.500 per week. This does not affect the capacity at CW2.

The respondent mention the higher transportation cost for the retailer on the question “*Please specify what type of costs a high DO-order frequency conveys?*”.

In order to fully utilise CW2’s capacity the respondent would like the retailers to order the DSO-orders during night-time, one per day. The DO-orders would preferably be placed around 15.00 according to the respondent.

Part B - Priority

When rating the relative importance of how CW2 prioritises the different order types, the respondent answers as follows:

VOR – highest priority
DO – high priority
DSO-average priority

When asked “Please rate the relative importance of how CW2 attends to different orders during one day”, the respondent rate as follows:

VOR – highest priority
DO – high priority
DSO-average priority
First in first out – average priority
Per retailers – average priority

Part C – Order routine

Approximately 1000 backorders and approximately 1000 return inquiries are handled per week at CW2. The handling cost for this is hard to determine, according to the respondent, this due to the fact that it constantly changes week to week.

The respondent is of the opinion that both the backorders and the return inquiries can be reduced. The backorders could be reduced through better stock availability and forecast follow-up's. And the return inquiries could be decreased through the motto "right from me" meaning that everyone should try to do things right from the beginning.

The order picking in inventory is done order per order regarding DSO orders, and spare-part per spare-part regarding DO orders. The respondent is pleased with this way of working but also states "improvements are always possible". The Scania organisations in Europe do not have the same order system.

Part D- Transport

CW2 plan for the volumes in a truck on historical order patterns in daily departures. Once per week pallets are left at CW2 due to lack of space. The reasons for this lack of space is, according to the respondent, transport capacity problems and due to that the order is picked and packed too late. The respondent claims that smother order intake should solve this problem.

APPENDIX 5

– Percentage of DSO, measured in order lines, 2003.01.01 – 2003.06.30.

Retailers	Total	VOR	VOR	DO	DO	DSO	DSO
			in %		in %		in %
Total, subsidiaries & private retailers	127.653	706	1	29.107	23	97.840	77
Branches							
Total, branches	74.526	1.238	2	15.482	21	57.806	78
Service partner							
Total, Service partners	94.330	398	0	31.793	34	62.139	66
Total Germany	296.509	2.342	1	76.382	26	217.785	73

Source: AS400

APPENDIX 6

- *Total number of DSO, DO and VOR respectively, 2003.01.01-2003.06.30.*

Retailer	DSO	DO	VOR	Total
Total, subsidiaries & private retailers	97.840	29.107	706	127.653
Branches				
Total, branches	57.806	15.482	1.238	74.526
Service partner				
Total, Service partners	62.139	31.793	398	94.330
Total Germany	217.785	76.382	2.342	296.509

Source: AS400

APPENDIX 7

- *The total value of DSO, DO and VOR respectively, in €, 2003.01.01 – 2003.06.30.*

Retailer	DSO	DO	VOR
Total, subsidiaries & private retailers	11.554.965	3.410.710	419.857
Branches			
Total, branches	6.299.859	1.746.756	306.046
Service partner dSP			
Total, Service partners	5.270.081	3.497.858	173.647
Total Germany	23.124.905	8.655.324	899.550

Source: AS400

APPENDIX 8

- Calculations

Transportation costs, €					
	2002	2002		2003	2003
	Jan - Jun			Jan - Jun	
DSO	471.400	942.800		522.500	1.045.000
DO	432.750	865.500		363.900	727.800
VOR	67.150	134.300		67.400	134.800
Summary	971.300	1.942.600		953.800	1.907.600
Returns	119.800	239.600		137.600	275.200
Tot	1.091.100	2.182.200		1.091.400	2.182.800

Scenarios: Change in Transportation costs of DO and DSO					
		2003	Jan - Jun		
	10%	20%	30%	40%	50%
DSO	531.663	540.825	549.988	559.150	568.313
DO	327.510	291.120	254.730	218.340	181.950
VOR	67.400	67.400	67.400	67.400	67.400
Total	926.573	899.345	872.118	844.890	817.663

The cost for DSO corresponds to 50% of the increased number of order-lines. This due to that there are economical benefits with DSO, therefore is the Transportation cost per order-line decreases.

Scenarios: Increase of DSO and decrease of DO					
		2003	Jan - Jun		
	10%	20%	30%	40%	50%
DSO	225.423	233.061	240.700	248.338	255.976
DO	68.744	61.106	53.467	45.829	38.191
Total	296.509	296.509	296.509	296.509	296.509

Scenarios: New total value of the new DO and DSO share in €					
		2003	Jan - Jun		
	10%	20%	30%	40%	50%
DSO	23.935.946	24.746.988	25.558.029	26.369.071	29.006.244
DO	7.789.791	6.924.258	6.058.726	5.193.194	4.327.662

Scenarios: Change in income with a 3% transportation cost for the retailers						
		2003	Jan - Jun			
	today	10%	20%	30%	40%	50%
3%	3,40	3,40	3,40	3,40	3,40	3,40
	259.660	233.694	207.728	181.762	155.796	129.830

Scenarios: Change in income with a 4% transportation cost for the retailers						
		2003	Jan - Jun			
	today	10%	20%	30%	40%	50%
4%	4,53	4,53	4,53	4,53	4,53	4,53
	346.213	311.592	276.970	242.349	207.728	173.106

Scenarios: Change in income with a 5% transportation cost for the retailers						
			2003	Jan - Jun		
	today	10%	20%	30%	40%	50%
5%	5,67	5,67	5,67	5,67	5,67	5,67
	432.766	389.490	346.213	302.936	259.660	216.383

APPENDIX 9

- ABC analysis, turnover of product groups in €, between 2003.01.01-2003.06.30

Class A	Product group	Name	Category	Turn-over, €	Turn-over, %
PP *2	00816	Unit injector exchange	Service Exchange	955.745	
	00112	Release Bearing	Parts	897.990	
	00636	Cab Suspension	Parts	607.709	
	00770	Maintenance kit	Parts	582.869	
	00211	Alternator cpl exch	Service Exchange	575.715	
	00450	Mirrors serie 4	Parts	519.602	
	00134	Valves	Parts	509.270	
	00110		Service Exchange	480.964	
	00247	Front Grill/Cab Corn	Parts	480.623	
10	00209	Starter cpl exch	Service Exchange	477.936	19,24%
	00081	Intercooler exch	Service Exchange	459.054	
	00283	Original Cab Heater	Parts	458.219	
	00192	Air Susp Bellow	Parts	446.986	
	00600	Hydraulic Equip exch	Service Exchange	407.919	
	00776	Brake yoke assy exch	Service Exchange	371.670	
	00220	Misc Electrics	Parts	367.556	
	00058	Turbocharger cpl exc	Service Exchange	366.970	
	00304	Brackets	Parts	353.069	
	00079	Radiators exch	Service Exchange	343.453	
20	00502	Scania Retarder	Parts	330.777	31,58%
	00296	Air Filter	Parts	311.491	
	00179	Short brake linings	Parts	309.277	
	00106	Clutch Cover exch	Service Exchange	308.631	
	00157	Steerin Column/Wheel	Parts	305.701	
	00743	Sensors	Parts	290.471	
26	00140	Synchronizing	Parts	286.034	

Class A	Product group	Name	Category	Turn-over, €	Turn-over, %	
PP	27	00316	Seal Rings	Parts	280.482	
		00837	SX-Motoren		278.250	
		00151	Steering Gear cpl ex	Service Exchange	276.907	
	30	00281	Central Gear cpl exch	Service Exchange	257.817	40,76%
		00073	Coolant Pumps exch	Service Exchange	254.134	
		00253	Mudguards	Parts	251.868	
		00545	Misc Cab	Parts	242.551	
		00168	Valves	Parts	241.482	
PP		00096	Fuel Tanks	Parts	240.922	
		00418	Hub	Parts	239.126	
		00449	Fog Lights serie 4	Accessories	231.370	
		00166	Air Compressor exch	Service Exchange	230.080	
		00329	Air Hoses	Parts	219.588	
	40	00236	Cab Frame	Parts	217.088	48,24%
		00046	Pulleys	Parts	215.641	
		00796	Radio & Communication	Accessories	212.851	
		00301	Ball Bearing	Parts	204.099	
		00271	Seat Parts	Parts	203.845	
		00315	O-Rings	Parts	198.335	
		00781	Brake pads disc br	Parts	195.714	
		00040	Flywheels	Parts	193.527	
		00829	Valves high competition	Parts	192.852	
		00042	Camshafts	Parts	189.571	
	50	00745	Wind Screen	Parts	187.956	54,54%
PP		00082	Oil Coolers	Parts	185.186	
	52	00200	Wiring Harness	Parts	183.476	

Class A	Product group	Name	Category	Turn-over, €	Turn-over, %
53	00160	Spring Br Chamb ech	Service Exchange	179.868	
	00141	Misc Gearbox	Parts	170.707	
	00777	Misc disc brake	Parts	163.940	
	00182	Brake Drum	Parts	159.678	
	00115	Hydraulic Cylinder	Parts	159.480	
	00426	Engine/Cab Heater	Accessories	156.383	
	00300	Roller Bearing	Parts	156.327	
60	00826	Irizar parts	Accessories	151.892	59,81%
	00251	Bumper Plastic	Parts	149.911	
PP	00135	Hydraulic Cylinder	Parts	146.253	
	00730	Cab Air Filter	Parts	146.247	
	00025	Cylinder Block	Parts	143.873	
	00099	Silencers	Parts	137.638	
	00256	Door Parts	Parts	136.059	
	00305	Screws	Parts	135.400	
	00098	Pipes	Parts	135.094	
	00612	Rubber Gaskets	Parts	135.041	
70	00214	ABS/ASR	Parts	133.286	64,23%
	00328	AC Hoses	Parts	129.858	
	00255	Doors GPRT	Parts	128.702	
PP	00149	Bumper cpl	Parts	128.552	
	00198	Misc Suspension	Parts	128.078	
	00199	Switch	Parts	126.087	
	00317	Gaskets	Parts	122.703	
	00333	Gasket Kit	Parts	121.709	
	00393	Draglink	Parts	120.306	
	00391	Track Rod	Parts	117.297	
80	00405	Rear Axle Housing	Parts	116.560	68,15%

Class A	Product group	Name	Category	Turn-over, €	Turn-over, %
81	00481	Roof/Side Air Deflec serie 4	Accessories	116.539	
	00044	Valve Tappets	Parts	112.767	
	00778	Spr br chamber disc br	Parts	112.575	
	00194	Shock Absorber	Parts	112.501	
	00749	Piston/Cyl Liner Kit	Parts	111.460	
	00310	Clamps	Parts	111.156	
	00327	Coolant Hoses	Parts	110.173	
	00722	Misc Central Gear	Parts	108.024	
	00298	Fuel Filter	Parts	103.993	
90	00416	Differential	Parts	103.873	71,63%
	00007	14 Litre exch	Service Exchange	101.113	
	00440	Transmission Filters	Parts	100.799	
	00287	Hydraulic Equip	Parts	100.732	
	00306	Nuts	Parts	99.769	
	00311	Suspension Rubber	Parts	99.319	
	00171	Air Dryer cpl	Parts	98.399	
	00148	Misc Frame Parts	Parts	97.787	
	00634	Glass	Parts	97.588	
	00137	Gearbox Gears	Parts	95.619	
100	00472	Spring/Autumn Jacket	Accessories	95.202	74,75%
	00022	Air Cleaner	Parts	94.313	
	00444	Sideskirt	Accessories	93.118	
	00365	Misc Tools	Workshop Products	92.435	
	00331	Unions	Parts	91.667	
	00353	Drive Belts	Parts	91.078	
	00774	Brake disc	Parts	89.784	
	00203	Head Lamps	Parts	87.754	
108	00549	Fuel Tank Parts	Parts	86.854	

	Product			Turn-	Turn-
Class A	group	Name	Category	over, €	over, %
	00113	Misc Mechanism	Parts	82.471	
110	00548	Misc Injection Equip	Parts	81.340	77,56%
	00633	Tail Lights	Parts	81.025	
	00016	Valve Rocker Arms	Parts	79.421	
	00257	Window Regulator	Parts	79.263	
	00313	Misc Bracket Element	Parts	78.408	
	00231	Misc Instrument	Parts	77.489	
	00020	Flywheel Housing	Parts	77.176	
	00480	Fender Rear	Parts	76.185	
	00669	Service Exch Cores	Service Exchange	73.868	
	00132	Lever	Parts	73.265	
120	00721	Lever aut cpl	Parts	73.167	79,99%

Class B	Product group	Name	Category	Turn-over, €	Turn-over, %
121	00493	Sun Visor Exterior serie 4	Accessories	72.528	
	00065	Engine Parts	Parts	71.795	
	00616	Half Shaft	Parts	71.639	
	00190	Parabolic cpl	Parts	71.641	
	00074	Fan	Parts	69.708	
	00288	Mechanical Equip	Parts	68.533	
	00123	Excl Plan Gear exch	Service Exchange	68.166	
	00381	Driver	Parts	68.135	
PP*2	00312	Straps	Parts	67.623	
130	00270	Seat Cush/Back Rest	Parts	66.605	82,19%
	00292	Engine oil filter	Parts	65.649	
	00460	Bulbs/Kits	Parts	63.892	
	00243	Step Well Plate	Parts	63.449	
	00435	Dryer reservoir	Parts	62.028	
	00462	Lock Fuel Filler Cap	Accessories	60.871	
	00023	Intake Manifold	Parts	60.335	
	00126	Planetary Gear exch	Service Exchange	59.770	
	00024	Exhaust Manifold	Parts	59.199	
	00831	AC compressor exchange	Service Exchange	58.460	
140	00245	Running Board	Parts	58.207	84,13%
	00075	Fan exch	Service Exchange	57.588	
	00041	Ring Gears	Parts	57.127	
	00205	Exterior Lighting	Parts	56.748	
	00264	Wiper Blades	Parts	56.460	
	00509	Mudflaps	Accessories	53.691	
	00431	Misc Extra Lights	Accessories	50.758	
147	00060	Accelerator Control	Parts	48.474	

Class B	Product group	Name	Category	Turn-over, €	Turn-over, %
148	00413	Central Gear cpl	Parts	48.433	
	00088	Injectors exch	Service Exchange	48.209	
150	00822	Clutch servo exchange	Service Exchange	47.906	85,79%
	00038	Connecting Rods	Parts	47.828	
	00363	Misc ACL	Accessories	47.401	
	00169	Foot Brake exch	Service Exchange	46.852	
	00278	Roof Shelf	Parts	46.214	
	00366	Workshop equipment	Workshop Products	46.092	
	00238	Spare Cab	Parts	46.072	
	00394	Ball Joints	Parts	45.275	
	00286	AC Condenser	Parts	44.633	
PP	00010	Cylinder Head exch	Service Exchange	44.150	
160	00325	Hydraulic	Parts	43.828	87,23%
	00414	Gear Set	Parts	43.500	
	00265	Misc Wiper Equipment	Parts	43.167	
	00307	Washers	Parts	43.066	
	00507	Mirrors serie 3	Parts	42.854	
	00269	Seat cpl	Parts	42.124	
	00341	Repair Kit Air Dryer	Parts	41.213	
	00824	Screws std	Parts	40.651	
	00068	Fan Cowling	Parts	39.236	
	00834	Clutch kits	Service Exchange	38.800	
170	00716	Misc Hoses	Parts	38.378	88,54%
	00724	Relay exch	Service Exchange	38.201	
	00037	Crankshafts exch	Service Exchange	38.153	
	00404	Misc Rear Axle	Parts	37.883	
174	00364	Subscribed Tools	Workshop Products	37.361	

Class B	Product group	Name	Category	Turn-over, €	Turn-over, %
175	00183	Exhaust Brake	Parts	37.353	
	00622	Repair Kit Compresso	Parts	36.990	
	00155	Hydraulic Pump exch	Service Exchange	36.969	
	00227	Fuel Gauge	Parts	36.067	
	00321	Misc Steel Pipes	Parts	35.507	
180	00017	Valve Rocker Mechani	Parts	35.327	89,71%
	00034	Piston Rings	Parts	35.201	
	00146	Studs/Nuts	Parts	35.134	
	00027	Oil Sump	Parts	34.970	
	00290	Mounting Parts	Parts	34.532	
	00303	Bushings	Parts	34.502	
	00174	Misc Air Dryer	Parts	33.862	
	00259	Windows	Parts	33.444	
	00262	Wiper Motor	Parts	32.968	
	00390	Steering Knuckle	Parts	31.810	
190	00605	Brackets	Parts	31.063	90,77%
	00244	Misc Steel Parts	Parts	31.040	
	00569	Air Susp Bellow	Parts	30.942	
	00348	Power Take-Off	Parts	30.881	
	00102	Heat Shields	Parts	30.158	
	00133	Link Arms	Parts	30.067	
	00055	Misc Lubric System	Parts	29.822	
	00511	Wind Deflector	Accessories	29.530	
	00748	Cyl Liner/Ring Kit	Parts	29.453	
	00437	Wheel Equipment	Accessories	29.430	
200	00456	Misc Ext	Accessories	29.322	91,72%
	00630	Joint Cross	Parts	29.231	

Class B	Product group	Name	Category	Turn-over, €	Turn-over, %
202	00090	Delivery Pipes	Parts	29.173	
	00428	Misc Int	Accessories	28.921	
	00422	Seat Cover Fibre	Accessories	28.856	
	00261	Washing Equipment	Parts	28.724	
	00339	King Pin Kit	Parts	28.333	
	00197	Spring Bracket	Parts	27.143	
	00043	Push Rods	Parts	26.434	
	00742	Misc Electrics,competition	Parts	25.463	
210	00069	Thermostats	Parts	25.113	92,60%
	00782	12 Liters	Parts	24.800	
	50307			24.750	
	00067	Expansion Tank	Parts	24.399	
	00029	Pistons	Parts	23.938	
	00441	Air Horn	Accessories	23.862	
	00752	Opticruise	Parts	23.613	
	00396	Misc Front Axle	Parts	23.555	
	00299	Coolant Filter	Parts	23.489	
	00279	Panels	Parts	23.408	
220	00489	Refridgerator	Accessories	23.341	93,36%
	00551	Misc Coolant Pump	Parts	23.315	
	00196	Anti-Roll Bar	Parts	22.807	
	00352	Misc Power Take-Off	Parts	22.743	
	00835	Information system	Accessories	22.668	
	00686	Rubber Parts	Parts	22.646	
	00006	11 Litre exch	Service Exchange	22.455	
	00433	AC	Accessories	21.855	
228	00276	Seat Belts	Parts	21.787	

	Product			Turn-	Turn-
Class B	group	Name	Category	over, €	over, %
	00699	Misc Brakes	Parts	21.773	
230	00615	Boggie Lift Parts	Parts	21.683	94,06%
	00702	Misc Cooling System	Parts	21.285	
	00116	Clutch Servo Parts	Parts	21.150	
	00534	Misc Chemicals	Accessories	29.844	94,29%
	00717		Parts	20.717	
	00031	Cylinder Liner	Parts	20.564	
	00097	Misc Fuel System	Parts	19.725	
	00241	Roof Panel	Parts	19.515	
	00504	Misc Transfer gear	Parts	19.487	
	00121	Excl Plan Gear	Parts	19.483	
240	00546	Pneumatic Parts	Parts	19.384	
	00085	Injection Pump	Parts	18.867	
	00277	Instrument Board	Parts	18.789	
	00595	Misc Alternator	Parts	18.554	
	00613	Turbocomp Parts exc	Service Exchange	18.453	
	00821	Wood/leather steering wheel	Accessories	18.038	
246	00403	Torque Rod	Parts	17.927	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
247	00377	Prop Shaft cpl P600	Parts	17.869	
	00158	Misc Steering	Parts	17.770	
	00093	Feed Pump	Parts	17.511	
250	00536	Trailer Brake	Accessories	17.476	95,30%
	00606	Connect Rod Bearing	Parts	17.446	
	00057	Turbocharger cpl	Parts	17.373	
	00454	Spot Lights	Accessories	17.098	
	00201	Cables	Parts	16.711	
	00181	Brake-Shoe	Parts	16.546	
	00369	Prop Shaft cpl P400	Parts	16.142	
	00170	Valve Parts	Parts	16.047	
	00728	Brake Shield	Parts	16.003	
	00289	Plates	Parts	15.989	
260	00373	Prop Shaft cpl P500	Parts	15.437	95,82%
	00490	Misc Cooling System	Parts	15.242	
PP	00819	Storage module	Accessories	15.103	
	00619	Brake Camshaft	Parts	14.939	
	00225	Tachometer	Parts	14.747	
	00285	Scania retarder exch	Service Exchange	14.700	
	00628	Input Shaft	Parts	14.675	
	00084	Coolant Pipes	Parts	14.673	
	00206	Interior Lighting	Parts	14.252	
	00446	Panels	Accessories	14.200	
270	00525	Misc Turbo	Parts	14.189	96,29%
	00089	Nozzles	Parts	13.887	
	00468	Anti-Corrosive	Accessories	13.875	
273	00597	Plain Bearing	Parts	13.809	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
274	00415	Housing	Parts	13.212	
	00389	Front Axle Beam	Parts	13.232	
	00195	Mounting Parts	Parts	13.140	
	00047	Main Bearing	Parts	12.739	
	00239	Front Piece	Parts	12.714	
	00189	Misc Sleep Equipment	Parts	12.258	
280	00280	Insulating Mtrl	Parts	12.198	96,70%
	00442	Stripes	Accessories	12.166	
	00167	Air Compressor Parts	Parts	11.499	
	00789	VPS	Parts	11.354	
	00340	Misc Axles	Parts	11.301	
	00039	Connecting Rod Bolts	Parts	11.219	
	00314	Cyl Liner Gaskets	Parts	11.077	
	00053	Oil Filler	Parts	11.062	
	00751	Oil Pumps exch	Service Exchange	11.029	
	00086	Injection Pump exch	Service Exchange	11.020	
290	00520	Working Light	Accessories	10.932	97,06%
	00222	Tachograph	Parts	10.886	
	00186	Multi Leaf cpl	Parts	10.740	
	00019	Timing Gear Housing	Parts	10.681	
	00051	Oil Pumps	Parts	10.592	
	00420	Rubber Mats	Accessories	10.448	
	00746	Bonnet	Parts	10.341	
	00552	Misc Coolers	Parts	10.285	
	00204	Reflectors	Parts	10.273	
	00698	Misc Electrics	Parts	10.121	
300	00252	Door Extension	Parts	10.092	97,39%

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
301	00066	I/M Engine Parts	Parts	10.057	
	00587	Radiator Hoses	Parts	9.993	
	00114	Clutch Housing	Parts	9.797	
	00775	Brake yoke assy	Parts	9.783	
	00463	Trailer Brake Coupli	Accessories	9.714	
	00626	Ball Joint	Parts	9.572	
	00338	Gasket Kit	Parts	9.456	
	00820	Equipment for storage module	Accessories	9.358	
	00637	Clutch Servo cpl	Parts	9.327	
310	00635	Shock Absorber	Parts	9.272	97,69%
	00350	Gears	Parts	9.135	
	00139	Gear Housing	Parts	9.108	
	00045	Gears	Parts	9.031	
	00345	Gasket Kit	Parts	9.001	
	00387	AM70 cpl	Parts	8.892	
	00012	Exhaust Valves	Parts	8.856	
	00284	Extra Cab Heater	Parts	8.705	
	00028	Oil Sump Parts	Parts	8.694	
	00272	Cover	Parts	8.621	
320	00421	Fibre Mats	Accessories	8.505	97,97%
	00180	Long brake linings	Parts	8.489	
	00711	Misc Suspension	Parts	8.466	
	00476	Diagram Blade	Parts	8.377	
	00500	Cab	Parts	8.258	
	00783	EBS	Parts	8.246	
	00080	Intercooler	Parts	8.223	
327	00572	Steering Equipment	Parts	8.102	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
328	00624	Gear Shift Bar	Parts	8.055	
	00522	Marker Light	Parts	7.916	
330	00268	Batteries	Parts	7.914	98,23%
	00324	Fuel	Parts	7.828	
	00598	Thrust Bearing	Parts	7.610	
	00753	ELC	Parts	7.414	
	00402	Trunnion	Parts	7.305	
	00193	Misc Air Suspension	Parts	7.262	
	00725	Park Brake exch	Service Exchange	7.159	
	00274	Bunks	Parts	7.157	
	00018	Rocker Cover	Parts	7.141	
	00355	Absorbers	Parts	7.086	
340	00124	Incl Plan Gear exch	Service Exchange	6.985	98,46%
	00473	Winter Jacket	Accessories	6.757	
	00582	Bus Chassi Parts	Parts	6.731	
	00417	Hubs Reduction	Parts	6.378	
	00623	Filter Parts	Parts	6.332	
	00741	Aut Gear Select	Parts	6.292	
	00714	Electric Motor	Parts	6.264	
	00215	ABS/ASR	Parts	6.239	
	00457	Roof Rack	Accessories	6.121	
	00836	HPI misc parts (Cummins)	Parts	6.014	
350	00143	Tubeless	Parts	5.952	98,66%
	00695	Retarder	Parts	5.907	
	00323	Air	Parts	5.904	
	00188	Spring Leaf	Parts	5.897	
354	00578	Instrument	Parts	5.807	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
355	00464	Spare Wheel Carrier	Accessories	5.747	
	00492	Misc Exhaust System	Parts	5.714	
	00147	Frame cpl	Parts	5.680	
	00242	Floor Plate	Parts	5.669	
	00263	Wiper Arm	Parts	5.597	
360	00515	Storage Bin	Accessories	5.543	98,84%
	00187	Side Plate	Parts	5.537	
	00430	Extra Instrument	Accessories	5.474	
	00599	Vibration Insulator	Parts	5.332	
	00547	Flanges	Parts	5.268	
	00594	Misc Starter	Parts	5.255	
	00162	Diaphragm Brake	Parts	5.196	
	00302	Needle Bearing	Parts	5.170	
	00445	Alum Rim	Accessories	5.148	
	00570	Shock Absorber	Parts	4.988	
370	00540	Misc Electrics	Accessories	4.912	99,01%
	00138	Main Shaft	Parts	4.830	
	00474	Waist Coat	Accessories	4.704	
	00443	Roof/Side Air Deflec serie 3	Accessories	4.684	
	00164	Misc Brake Chamber	Parts	4.654	
	00275	Curtains	Parts	4.561	
	00349	Shafts	Parts	4.535	
	00240	Rear Piece	Parts	4.509	
	00156	Hydraulic Pump Parts	Parts	4.496	
	00294	Power Steer Filter	Parts	4.386	
380	00159	Spring Br Chamb	Parts	4.332	99,15%
	00425	Engine Heater Electr	Accessories	4.285	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
382	00087	Injectors	Parts	4.273	
	00815	Unit injector	Parts	4.271	
	00827	Interior exclusive	Accessories	4.241	
	00011	Intake Valves	Parts	4.225	
	00586	Misc Bus Chassi Part	Parts	4.203	
	00320	Fuel	Parts	4.135	
	00357	Absorbers	Parts	4.021	
	00249	Wind Deflector	Parts	4.001	
390	00161	Spr Brake Parts exch	Service Exchange	3.987	99,28%
	00629	Output Shaft	Parts	3.893	
	00021	Covers	Parts	3.881	
	00562	Air Pressure Parts	Parts	3.764	
	00379	Support Bearing	Parts	3.754	
	00118	Pedal Mechanism	Parts	3.731	
	00533	Lubricants	Accessories	3.647	
	00412	Trailing Axle Parts	Parts	3.572	
	00009	Cylinder Head	Parts	3.548	
	00627	Counter Shaft	Parts	3.287	
400	00436	Scotches	Accessories	3.266	99,40%
	00512	Dirt Deflector	Accessories	3.257	
	00632	Bumper Parts	Parts	3.196	
	00638	Steering Gear Arm	Parts	3.169	
	00374	Tube Shaft P510	Parts	3.159	
	00221	Combinated Instr	Parts	3.133	
	00309	Misc Rivets	Parts	3.095	
	00514	Fuel Heater	Accessories	2.959	
408	00526	Cruise Con/Speed Lim	Accessories	2.919	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
	00733	Misc Torque Conv	Parts	2.890	
410	00062	Cold Start Unit	Parts	2.879	99,50%
	00152	Steering Gear Parts	Parts	2.850	
	00378	Tube Shaft P610	Parts	2.828	
	00175	Lever man cpl	Parts	2.825	
	00538	Trailer Brake Connec	Accessories	2.814	
	00150	Steering Gear cpl	Parts	2.808	
	00071	Coolant Pumps Vehicl	Parts	2.788	
	00757	Bodywork	Parts	2.700	
	00544	Reversing Alarm	Accessories	2.665	
	00455	Fog Lights serie 3	Accessories	2.615	
420	00282	Mats	Parts	2.597	99,58%
	00565	Brake Parts	Parts	2.582	
	00737	Repair Kit Lever	Parts	2.568	
	00817	Working clothes	Workshop Products	2.557	
	00076	Housing	Parts	2.522	
	00453	Misc Heater/AC	Accessories	2.505	
	00467	Locking Fluid	Accessories	2.498	
	00497	Misc SBAT	Parts	2.494	
	00335	Gasket Kit	Parts	2.452	
	00566	Brake Parts	Parts	2.438	
430	00063	Speed Limiter	Parts	2.347	99,66%
	00519	Rotating Beacon	Accessories	2.333	
	00700	Misc Steering	Parts	2.295	
	00465	Touch-Up Paint	Accessories	2.284	
	00308	Rivets	Parts	2.192	
435	00015	Valve Guides	Parts	2.150	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
436	00070	Thermostat Housings	Parts	2.098	
	00590	Misc Standard Assort	Parts	2.111	
	00048	Guide Bearing	Parts	1.985	
	00691	Levers	Parts	1.972	
440	00609	Turbocomp Parts	Parts	1.964	99,73%
	00740	Misc Brake System	Parts	1.915	
	00078	Radiators	Parts	1.899	
	00692	Springs	Parts	1.846	
	00050	Camshaft Bearing	Parts	1.792	
	00580	Misc Instruments	Parts	1.786	
	00077	Shaft	Parts	1.776	
	00471	Summer Jacket	Accessories	1.764	
	00710	Gearbox Control	Parts	1.693	
	00588	Hydraulic Hoses	Parts	1.681	
450	00336	Repair Kit	Parts	1.679	99,78%
	00560	Draglinks	Parts	1.667	
	00064	Parts	Non-Scania Products	1.593	
	00191	Signs	Advertising Mtrl	1.584	
	00527	Fuses	Accessories	1.583	
	00554	Radiator	Parts	1.525	
	00395	King Pins	Parts	1.519	
	00153	Hydraulic Cylinder	Parts	1.513	
	00035	Connect Rod Bushing	Parts	1.513	
	00052	Oil Cleaners	Parts	1.509	
460	00809	Rear Axle bus	Parts	1.501	99,83%
	00172	Air Dryer exch	Service Exchange	1.500	
462	00461	Plastic Bags	Accessories	1.400	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
463	00432	Misc Techn Equip	Accessories	1.389	
	00718	Cyl Head Gaskets	Parts	1.365	
	00694	Fan	Parts	1.359	
	00103	Clutch Cover	Parts	1.340	
	00376	Prop Shaft P540	Parts	1.279	
	00768	Fifth wheel spare parts	Accessories	1.196	
	00729	Trailer exch	Service Exchange	1.192	
470	00568	Springs	Parts	1.188	99,88%
	00573	Control unit bus	Parts	1.148	
	00334	Repair Kit	Parts	1.141	
	00107	Clutch Disc	Parts	1.092	
	00344	Repair Kit	Parts	1.059	
	00382	Misc Prop Shaft	Parts	983	
	00602	Misc Wheel Parts	Parts	957	
	00452	Reflectors	Accessories	912	
	00254	Doors L/LB	Parts	896	
	00720	Thermostat Kits	Parts	895	
480	00712	Inlet	Parts	895	99,91%
	00563	Brake Parts	Parts	891	
	00458	Roof Ladder	Accessories	883	
	00163	Diaphragm	Parts	873	
	00756	Exhaust brake	Parts	840	
	00479	Platform MA	Parts	832	
	00621	Repair Kit Brak Cham	Parts	831	
	00697	Accelerator Control	Parts	815	
	00649	Purchased Parts	Parts	777	
489	00601	Draglink Arm	Parts	777	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
490	00368	Tube Shaft P310	Parts	771	99,93%
	00577	Tachograph	Parts	759	
	00611	CAG exch	Service Exchange	742	
	00322	Misc Metal Pipes	Parts	685	
	00392	Track Rod Arm	Parts	680	
	00184	Exhaust Brake exch	Service Exchange	651	
	00688	Links	Parts	633	
	00535	Valve Extension	Accessories	631	
	00557	Pipes	Parts	602	
	00517	Full Beam Lights	Accessories	596	
500	00266	Mirrors	Parts	520	99,95%
	00583	Bus Chassi Parts	Parts	504	
	00246	Bonnet Parts	Parts	488	
	00690	Clevis	Parts	481	
	00094	Pump Coupling	Parts	460	
	00696	Bracket Elements	Parts	449	
	00014	Valve Seats	Parts	433	
	00218	SLD	Parts	413	
	00765	Electrics-bodywork	Parts	410	
	00358	Absorbers	Parts	410	
510	00607	Bearing Shell	Parts	389	99,97%
	00715	Shaft	Parts	377	
	00095	Shim	Parts	371	
	00210	Alternator cpl	Parts	369	
	00351	Housing	Parts	368	
	00693	Unspecified	Parts	360	
516	00470	Misc Safety	Accessories	354	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
517	00343	Spring Bolt Kit	Parts	353	
	00798	Air bag/Beltstretcher	Parts	338	
	00571	Steering Equipment	Parts	325	
520	00207	Bulbs	Parts	318	99,98%
	00766	Fifth wheel cpl.	Accessories	317	
	00033	Gudgeon Pins	Parts	310	
	00818	FMV Heavy tank transporter	Parts	298	
	00755	Trailing Axle Lift	Parts	293	
	00564	Brake Parts	Parts	279	
	00719	Sun Visor Exterior serie 3	Accessories	265	
	00185	Pedals	Parts	228	
	00610	Gas Engine Parts	Parts	227	
	00529	Leakage Detector	Accessories	223	
530	00332	Repair Kit	Parts	215	99,99%
	00780	Diaphragm disc brake	Parts	212	
	00763	Heat/ventilation	Parts	206	
	00736	Repair Kit Valve	Parts	199	
	00803	Wiring harness bus	Parts	195	
	00704	Gasket Elements	Parts	182	
	00685	Unspecified	Parts	179	
	00709	Lubrication System	Parts	168	
	00229	Oil Pressure Gauge	Parts	163	
	00618	Push Rod	Parts	162	
540	00496	Gearbox Parts	Parts	159	99,99%
	00523	Outgoing Accessories	Accessories	156	
	00061	Stop Control	Parts	154	
543	00585	Bus Chassi Parts	Parts	152	

Class C	Product group	Name	Category	Turn-over, €	Turn-over, %
544	00013	Valve Springs	Parts	151	
	00795	Hose bus	Parts	149	
	00506	Labels	Accessories	145	
	00056	Core Assembly exch	Service Exchange	144	
	00689	Link Studs	Parts	142	
	00701	Misc Fuel System	Parts	114	
550	00625	Gear Shift Shaft	Parts	95	100,00%
	00513	Wing Marker	Accessories	94	
	00703	Frame Parts	Parts	81	
	00234	Reduction Gear	Parts	79	
	00176	Lever Parts	Parts	75	
	00054	Valves Relief	Parts	54	
	00447	Storag Box Cab/Frame	Accessories	53	
	00371	Rear Axle P420	Parts	50	
	00232	Driving Cables	Parts	49	
	00330	Metal Hoses	Parts	44	
560	00670	Gift Articles	Advertising Mtrl	37	100,00%
	00603	Repair Kit	Parts	35	
	00202	Fuses	Parts	29	
	00466	Glue/Primer	Accessories	21	
	00342	Gasket Kit	Parts	14	
	00801	Fuses bus	Parts	7	
	00705	Unions	Parts	3	
	00250	Air Deflector Mirror	Parts	1	
	00059	Turbocomp Unit cpl	Parts	0	
	00125	Planetary Gear	Parts	0	
570	00165	Air Compressor	Parts	0	100,00%

	Product			Turn-	Turn-
Class C	group	Name	Category	over, €	over, %
	00361	Distributor	Accessories	0	
572	00591	Drive Belts	Parts	0	

Summary	31.648.855 €
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PP – Problem spare-parts