Study of the Sales-to-Delivery Process for Complete Buses and Coaches at Scania CV

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Foreword

With this master thesis we terminate our studies at the Industrial Management and Engineering programme at Lund Institute of Technology. The thesis comprises twenty academic points, and is commissioned by Scania CV AB in Södertälje. It is performed in collaboration with the division of Production Management within the Department of Industrial Management and Logistics at Lund Institute of Technology.

We would like to thank our tutor at Scania CV AB, Anders Dewoon, for his support and feedback during our work with this thesis, as well as the rest of the staff at the B department for welcoming and helping us. We would also like to thank the rest of the staff, in Södertälje as well as at the sales companies, that we have come in contact with during our work. We also thank Irizar and Omni for receiving us with kindness and answering our questions. Finally we would like to thank our tutor at Lund Institute of Technology, Bertil I Nilsson, for supporting us with an optimistic attitude throughout our work, and for giving us valuable feedback.

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Abstract

Title: Study of the sales-to-delivery process for complete buses and coaches at Scania CV.

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Tutors: Anders Dewoon, BD department at Scania CV, and Bertil I Nilsson, lecturer at Lund Institute of Technology.

Background: Customers for buses and coaches on the European market ask for complete vehicles from one supplier. Since Scania CV are only manufacturing chassis, their sales companies must co-operate with body builders in order to offer a complete product and service back-up. This means that the sales companies in connection with every order have to deal with two order processes, one for Scania CV and one for the body builder. Managing this situation is complicated and time consuming.

To be able to offer short lead-times, Scania's sales companies build up stocks of chassis and completed vehicles. Due to heterogeneity in the specification between markets, safety stock is hard to sell in neighbouring markets and remains over long periods with the sales companies if the market demand decreases.

Purpose: The purpose of this thesis is to find ways for the Scania sales force to spend more time on selling vehicles and less time on administrative tasks. The purpose is also to find ways to reduce the lead-time for delivery of complete vehicles, and to reduce the stock levels.

Delimitation: The study is focusing on Scania's Globally Preferred Partners, Omni and Irizar. It concerns the activities and situation on the West-European market. The study of the sales-to-delivery process has been focused on sales and order.

Methodology: The study is undertaken with a systems approach, since it allows for taking into account the relations between different actors and for considering how the sub-processes should be designed to optimise the Sales to Delivery process as a whole. Qualitative data has been collected through in-depth interviews with key individuals.

Conclusions: Routines for information handling and exchange between the parties in the sales-to-delivery process need to be established. Scania should focus on and enhance the collaboration with the Globally Preferred Partners, and all activities should be performed with a complete vehicle perspective. The sales companies need to have access to proper sales tools, and CESOW could be used to provide such support. Communication between parties should be prompt, and exchanged information must be correct and updated. The sales companies should be allowed to focus on DDD for complete vehicles. By implementing several SD-dates vehicles in pipeline can be accessible for more than one market. Routines for forecasting need to be implemented.

Sammanfattning

Titel: Studie av sales-to-delivery processen för hela bussar och coacher på Scania CV.

Författare: Anna Elmgren och Anna-Josefina Mattmann.

Handledare: Anders Dewoon, avdelning BD på Scania CV, och Bertil I Nilsson, lektor på Lunds Tekniska Högskola.

Bakgrund: Buss- och coachkunder på den europeiska marknaden efterfrågar hela fordon från en leverantör. Då Scania CV endast tillverkar chassier, måste deras säljbolag samarbeta med karossörer för att kunna erbjuda en komplett produkt och service. Detta innebär att säljbolagen i samband med varje order måste hantera två orderprocesser, en gentemot Scania CV och en gentemot karossören. Att styra denna situation är komplicerat och tidskrävande.

För att kunna erbjuda korta ledtider bygger Scanias säljbolag upp lager av chassier och hela fordon. På grund av heterogenitet i specifikationerna mellan marknader är det svårt att sälja säkerhetslager på angränsande marknader. Om efterfrågan minskar blir dessa lager därför kvar hos marknadsbolagen under långa perioder.

Syfte: Syftet med detta examensarbete är att finna sätt för Scanias säljare att lägga mer tid på att sälja fordon, och mindre tid på administrativt arbete. Syftet är också att finna sätt att minska ledtiden för leverans av hela fordon, och att minska lagernivåerna.

Avgränsning: Studien fokuserar på Scanias Globally Preferred Partners, Omni och Irizar. Den behandlar aktiviteter och situationen på den västeuropeiska marknaden. Studien av sales-to-delivery processen har fokuserat på försäljning och orderhantering.

Metodik: Studien har gjorts med ett systemsynsätt då detta tillåter att hänsyn tas till förhållandet mellan olika aktörer, samt hur underprocesserna ska utformas för att optimera sales-to-delivery processen i sin helhet. Kvalitativ data har samlats in med hjälp av djupgående intervjuer med nyckelpersoner.

Slutsatser: Rutiner för informationshantering och informationsutbyte mellan aktörer i sales-to-delivery processen bör etableras. Scania bör fokusera på, och förstärka, samarbetet med sina Globally Preferred Partners, och alla aktiviteter bör utföras med ett helbussperspektiv. Säljbolagen behöver ha tillgång till ändamålsenliga säljverktyg, och CESOW skulle kunna användas i detta syfte. Kommunikation mellan parter bör vara omedelbar, och den information som delas ska vara korrekt och uppdaterad. Det bör möjliggöras för säljbolagen att fokusera på DDD för komplett fordon. Genom att implementera flera SD-datum kan fordon i pipeline göras tillgängliga för mer än en marknad. Rutiner för prognostisering bör implementeras.

1 Introduction

The aim with the introduction chapter is to describe the background from which the need for the study has stem, aspects of the environment in which the work has been performed, and what the goal of the study has been. The introduction chapter also describes which stakeholders that have an interest in the result, as well as the delimitation that set the boundaries for the study. Finally a description and an explanation of the structure of this report is given.

1.1 Background

Scania are a chassis manufacturer, but in a large majority of the European markets Scania meet customers asking for a complete vehicle from one supplier. This forces Scania's sales companies to fulfil the customer demands by completing their chassis offering with a body work (see Appendix B) and complete service back-up. It also means that they have to deal with two sales-to delivery processes from two different industrial systems, Scania's and a body building partner's. Often this means that the sales force spend a considerable part of their available time on different order administrative tasks.

From time to time Scania build up large stocks of complete and partly completed vehicles for the European markets. Time from customer order confirmation to final delivery tend to be long, which the Scania sales companies compensate for by building local stocks. It occurs that the market demand decreases during the order to delivery time, and the safety stock risks to remain with the sales company. Often unnecessary heterogeneity in the specification between the markets makes the products difficult to sell in neighbouring markets.

1.2 Needs Focused on in the Study

There is a need for the Scania sales force to be able to spend more time on sales related tasks. For that to happen, it is necessary to reduce the time currently spent on administrative tasks. There is also a need to reduce stocks of chassis and built-up vehicles, both to lower costs for tied-up capital and to improve the match with the market. To be competitive in the market it is also necessary for Scania to decrease the lead-time of complete vehicles.

1.3 Stakeholders

Stakeholders for this report are the Buses & Coaches department within the Sales and Services division at Scania and the company's European sales companies. Other stakeholders are body builders co-operating with Scania on the European market, primarily Irizar and Omni. The last group of stakeholders consists of Master of Science students close to graduation, with an interest in supply chain management.

1.4 Requirement Specification

This study was initiated by Scania, and a number of requirements for the approach of it, as well as for the result, were set up by the company:

- The study should have a *complete vehicle* perspective.
- The work and result of the study must agree with the Scania Sales & Service's Strategic Plan.
- The study should include an investigation to evaluate whether CESOW (see Concepts and Definitions) could be a system support for improvement of Scania's sales-to-delivery process.
- The study should include an investigation to evaluate the possibility of a SD-date (Specification Definite, see Concepts and Definitions) closer to final delivery of the complete vehicle.

1.5 Delimitation

For the proportions of the study to correspond to the average level of a Master thesis, and for the result of the study to be relevant to the pre-set objectives, a number of delimitations were set up by Scania in collaboration with the investigators:

- The study focuses on activities connected to sales and order in the sales-to-delivery process for buses and coaches at Scania.
- The study focuses on the process for vehicles with bodies built by Omni and Irizar bodies for the Western European market.
- Suggestions for improvements must respect the risk and responsibility limitations set up in the Scania Sales & Service's Strategic Plan. Should drastic possibilities outside these limitations be identified, they should be described in a separate cost-benefit analysis, in order for the bus and coach organisation at Scania to possibly use the material as an input for the next update of the Sales & Service's Strategic Plan.

1.6 Project Aim

The aim of the study is to identify areas within the sales-to-delivery process where the work can be performed more efficiently, and to give suggestions to Scania on how to approach the problems identified in these areas. Suggested improvements should be doable and profitable and if possible include a cost-benefit analysis. The primary focus of the study is on Western Europe with Germany, Sweden, United Kingdom, and Italy as reference markets.

The study should fulfil the specified needs of the company.

The outcome of the study should be a report that presents the result to Scania and that can benefit Master of Science students in their education.

1.7 Disposition

Chapter 1, Introduction

The introduction chapter describes the background from which the need for the study has arisen, as well as aspects of the environment in which the work has been performed.

Chapter 2, Methodology

The methodology chapter describes how the study has been performed, and in what way the specific choices of methods were made.

Chapter 3, Theory

The third chapter presents the main theories that have been considered during the study and the analysis.

Chapter 4, Empirical Studies

In the fourth chapter all relevant data gathered during the study can be found. It contains descriptions of Scania CV, the sales companies and the Globally Preferred Partners, as well as descriptions of the sales-to-delivery process and the bus and coach business in general.

Chapter 5, Analysis

The analysis chapter contains the reasoning of the authors, based on the information found in chapters three and four.

Chapter 6, Conclusions

The conclusions summarise the analysis made by the authors, and suggestions are given to Scania on how to act to improve the efficiency of the sales-to-delivery process.

Chapter 7, Suggestions on Continued Studies

The last chapter presents suggestions from the authors on continued studies and projects to be made at Scania, connected to the problem area studied in this thesis.

2 Methodology

The methodology chapter aims to set the guidelines for how the study is to be undertaken in terms of work procedure, approach, alignment, work process, and the gathering and valuation of data. First the theory of each aspect is presented and explained, and then each choice of methodology made by the authors is presented and motivated. Finally the validity and the reliability of the data used in the master thesis are discussed.

Methods consist of guiding principles of how to conduct a study, and should be chosen in consideration to the fundamental view of reality held by the investigator, as well as to the nature of the problem itself. When these prerequisites are fulfilled, the methods are said to be consequent. Methods used in a study also have to be consistent with each other. If the methods used do not follow these criteria, the results of the study might be of less quality.[1] Consequently it is important to be aware of what methods to use during a study, because the methods will always have impact on the results whether they are chosen deliberately or not. The choice of method determines what data is considered relevant for the solution of the problem, and in what way data is considered to influence the problem. Methods give directions on how to gather data, how to organise it, and how to read from it.[2]

[1] Arbnor & Bjerke (1994)

[2] Darmer & Freytag (1995)

2.1 Work Procedure

The work procedure is illustrated in figure 2.1.

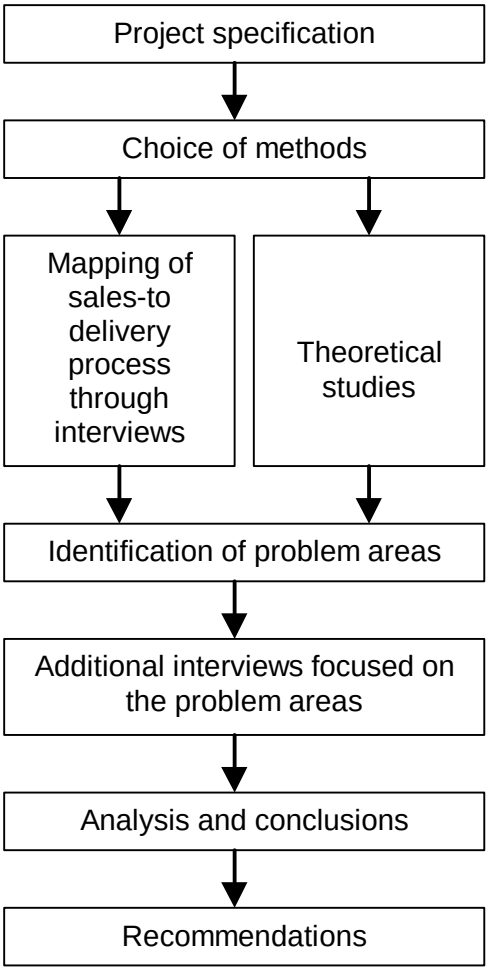

Figure 2.1: The work procedure.

The work procedure started with the approval and study of the project specification, which was already clearly defined by Scania. Through discussion with the tutors, methods for the implementation of the study were decided on. These choices were made considering the nature of the problem as well as the objective of the study.

When the ambition and methods were agreed on, the mapping of the sales-to-delivery process began, and at the same time the theoretical studies were initiated. At first the interviews as well as the theoretical studies were quite general, but as the picture of the process started to form, both interviews and studies became more and more focused. Finally it was possible to identify a limited number of problem areas as objects of interest.

When the problem areas had been identified, the next step was to gain deeper knowledge in these fields. This was done by additional interviews, both with people that had already been questioned and with people new to the project. By now the theory had been worked through, and only a limited amount of additional theoretical studies on the specific subjects was necessary.

The final step was to analyse the gained information in relation to the theory and from this draw conclusions on how to approach the problem areas with solutions. This analysis and the conclusions formed the base from which the recommendations of future actions for Scania were formulated.

2.2 Methodological Approach

Methodological approach means the view of reality, knowledge, and result that is held by the investigator who intends to commence a project. There are three different approaches, each describing an individual view that can be held. The three approaches are analytical approach, systems approach, and actor's approach.[3]

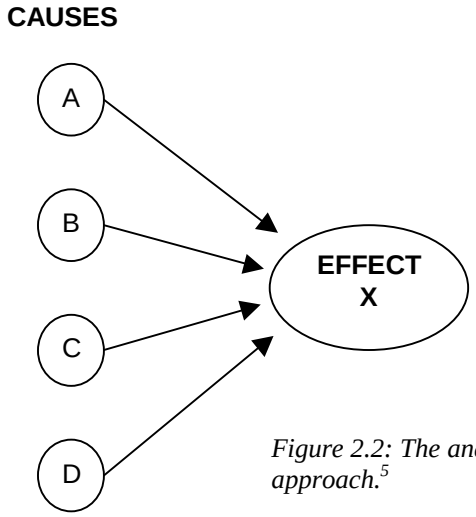

Figure 2.2: The analytical approach.[5]

The ***analytical approach*** describes reality through the assumption that the whole is equal to the sum of the parts (see figure 2.2). The factors of cause can be identified and isolated, and results can be generalised. The analytical approach considers reality to be measurable, objective and independent of individuals.[4]

The ***systems approach*** differs from the analytical approach in that it regards the whole as to differ from the sum of the parts. To be able to explain the system, or a part of it, the entirety has to be considered. This since the relation between components inside the system, and in some cases even relations to external components, might affect each unit (see figure 2.3). Results of a survey are by the systems approach considered to be system-dependent, i.e. it can not be generalised.[7]

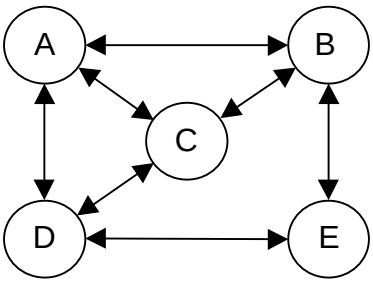

Figure 2.3: The systems approach.[6]

The ***actor's approach*** communicates a view of reality as a social construct based on the characteristics of individuals. Reality consists of a number of different views of reality, where each view is shared by a group of individuals. These views may overlap each other, and thereby form a common reality for a larger group of people, like an organisation or a society (see figure 2.4). The knowledge gained from a study is according to this approach dependent on the individuals at the

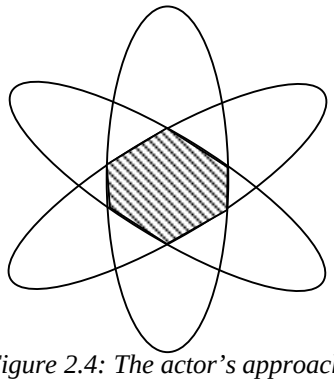

Figure 2.4: The actor's approach.[8]

[3] Arbnor & Bjerke (1994)
[4] Ibid
[5] Ibid
[6] Ibid
[7] Ibid
[8] Ibid

moment involved in the particular process studied. It can only be used as an experience when conducting future studies, and should not be seen as general facts.[9]

2.3 Choice of Methodological Approach

The sales-to-delivery process for buses and coaches at Scania is made up of several sub-processes, such as chassis specification, body specification, order administration, et cetera. In each of the different sub-processes a number of actors are involved, and most actors are involved in more than one sub-process. The sub-processes are interrelated, and the actions of each actor have consequences for other actors and other sub-processes. To optimise the sales-to-delivery process as a whole, it is not sufficient to optimise every sub-process as an isolated unit and even optimising the whole process for individual orders or for all orders from one particular sales company is not enough. If not the entire process, with all its actors and their actions and needs, is considered at once, there is a risk that the needs of different sales companies or of other actors in the process conflict. This will in turn result in a process that does not work as efficiently, and does not provide as good service and support for its stakeholders, as possible. Therefore the analytical approach is not appropriate for the study. Since it is also possible to define general ways to improve the sales-to-delivery process, irrespective to the characteristics of the specific individuals involved in it at the moment, the actor's approach is not suitable either. The most appropriate approach for the study is the systems approach, since it allows investigating, describing, and taking into account the relations between different actors and how they influence each others actions and the process as a whole. It also allows taking into consideration how the sub-processes should be designed in order to optimise the process as a whole. Finally the systems approach will make it possible to apply part of the findings of the study to other sales companies and body builders than those used as references, as long as the characteristics of the actors in the systems and their relations are comparable.

2.4 Project Alignment

Surveys can be classified as *explorative*, *descriptive*, *explaining*, or *predictive*. *Explorative* surveys aim to explain and give a fundamental understanding of a problem area, as well as to produce doable alternatives of action. *Descriptive* surveys aim to describe and map facts, without explaining why things are the way they are. *Explaining* surveys aim to clarify how different factors are interrelated and affect each other, while *predictive* surveys aim to foretell what is likely to happen given certain conditions.[10]

The different alignments of projects are interrelated in the sense that they must follow each other in order. In other words, the information at one level of alignment must be known for it to be possible to proceed to the next level.[11]

[9] Arbnor & Bjerke (1994)

[10] Lekvall & Wahlbin (1993)

[11] Ibid

2.5 Choice of Project Alignment

The study started with the collection of information and the creation of a picture of the problem situation. The aim of this phase was to understand what the problem was, and to come up with initial ideas of how to approach it. This phase of the study had explorative characteristics. When the nature of the problem was more clear, and a few initial ideas arose on which direction to take in order to move towards a solution, more data was gathered to evaluate whether the first loose ideas were interesting or not. This phase had descriptive characteristics. As the project proceeded, more and more reflections over cause and effect relationships came up. At the same time ideas of how to improve the process also started to emerge. This phase had explaining characteristics.

2.6 Work Process

When creating knowledge about a specific subject or phenomenon, the process of drawing inference proceeds in accordance with one of, or a combination of, three "steps"; induction, deduction and verification (see figure 2.5).[12]

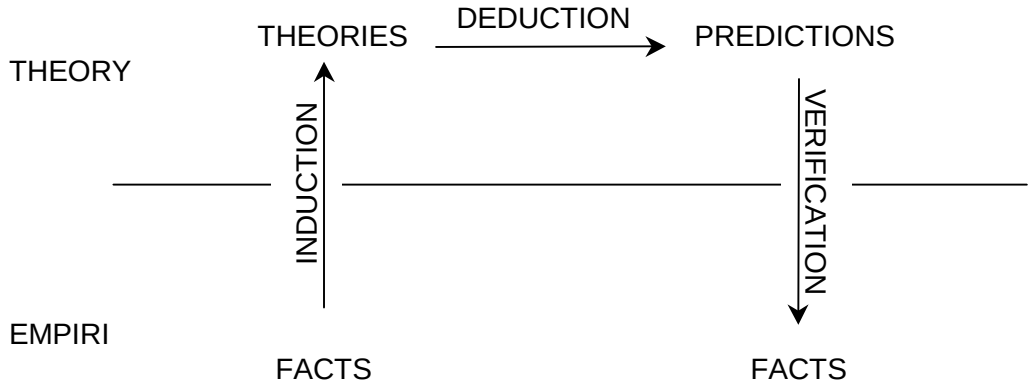

Figure 2.5: The three cyclical steps of work processes.[13]

Induction, also called "the road of discovery"[14], is the development of theories from observations of reality. The application of theories to make predictions on specific cases is called deduction, or "the road of substantiating"[15]. Studying such cases in real-time to make conclusions about the accuracy of the theories is called verification.[16]

An additional kind of inference is abduction, which means the search of hypotheses that explain reality without causing contradictions[17, 18]. A fact is made explicable by

[12] Arbnor & Bjerke (1994)
[13] Ibid
[14] Holme & Solvang (1997)
[15] Ibid
[16] Arbnor & Bjerke (1994)
[17] www.doc.ic.ac.uk/~ban/pubs/qcAbduction.pdf
[18] hem.fyristorg.com/solhem/vteori2/ch2.html

the application of a suitable theory[19], for example when a doctor makes a diagnosis based on the symptoms of a patient[20]. An important difference between abduction and deduction is that deduction provides evidence, while abduction only gives a possible explanation[21]. Induction, in turn, results in general conclusions based on observations[22]. (see table 2.1)

Deduction	***Induction***	***Abduction***
(a) All cats are black	(a) Felix is black	(a) All cats are black
(b) Felix is a cat	(b) Felix is a cat	(b) Felix is black
(c) Felix is black (!)	(c) All cats are black (?)	(c) Felix is a cat (??)

Table 2.1: The difference between deduction, induction, and abduction. The third sentence in each column ((c)), is the inference drawn from the previous sentences.[23]

2.7 Choice of Work Process

Most of the problems present in the sales-to-delivery process for complete buses and coaches at Scania can be analysed by applying existing theories of efficient logistics management. However, there are always a number of characteristics, or combinations of characteristics, that make the situation for an organisation in relation to its environment unique, and thereby the solutions to specific problems sometimes also have to be unique. In such cases, the investigator must not be limited by existing theory when considering a situation or a problem. She must be prepared and unafraid of thinking on new lines entirely. This was also the case when studying the sales-to-delivery process for complete buses and coaches at Scania, and therefore the work process was both abductive and deductive. It was abductive in the explorative phase where data was gathered with the objective to find relations and problems that pointed out potential areas of improvement in the unique situations studied. The work process was also abductive in the descriptive phase, where well known theories were applied on situations to support findings. The process of allocating weaknesses in the process during the explaining phase was deductive, since it was often accomplished by comparing known “best-practice” to the performance of the actual process.

2.8 Approach of Study

The approach of a survey concerns its fundamental technical design. There are three main dimensions of the approach. The first dimension concerns whether to go in-depth on a specific case, do a broader survey over a cross-section at a specific time, or to make a study over time. The second dimension is whether to make a qualitative or a quantitative survey, and the third dimension concerns whether to use data already

[19] www.nous.org.uk/abduction3.html

[20] hem.fyristorg.com/solhem/vteori2/ch2.html

[21] www.hb.se/bhs/b&i-konferens/pdfpaper/kapla.pdf

[22] Ibid

[23] www.uni-heidelberg.de/institute/fak5/igm/g47/bauerabd.htm

collected and put together, so called secondary data, or to collect the data directly from the field, so called primary data.[24]

2.8.1 Depth, Width, or Time Series

In order to decide what technical design to use for a survey it is suitable to reflect over what the aim of the survey, and the analysis of it, is. The choice is between looking deeply into a specific case, a so called case study, considering a large number of cases on a more cursory level but at a specific time, known as cross-section approach, or to study a development over time, i.e. time series approach. A survey can also be made as a combination of these approaches.[25]

Case studies are suitable when a specific process is under investigation, but it is not known in beforehand what aspects will be interesting and important for the result. The investigator returns to the case to go more in-depth into certain questions, when she knows more about what will prove important for the study.[26]

Cross-section studies aim to describe conditions already chosen in beforehand. It is important that the aim of the study is clear in advance, so that the questions asked to the different units are exactly the same and asked in the same manner. The results are presented as tables and diagrams, to point out different characteristics for different groups of units.[27]

In a time series approach data from different points of time is analysed to reflect changes and development over time. This data is interesting for example when trying to predict future development.[28]

2.8.2 Qualitative or Quantitative

When deciding whether to make a qualitative or quantitative survey a trade-off between depth and width in the result from the survey is necessary. There is a distinction between qualitative and quantitative surveys, where qualitative surveys aim to create a holistic view of the problem and investigate a specific problem in depth. They therefore take into consideration a large number of variables from a small sample of objects. Quantitative surveys on the other hand aim to draw conclusions from a large number of representative objects, by gathering data concerning a limited number of variables.[29] Accordingly, the choice of qualitative or quantitative survey is closely related to how data is collected and analysed[30].

Quantitative data is data expressed in figures that can be analysed through statistical methods[31]. For this to be suitable it is necessary that tools for collecting data are well

[24] Lekvall & Wahlbin (1993)
[25] Ibid
[26] Ibid
[27] Ibid
[28] Ibid
[29] Holme & Solvang (1997)
[30] Lekvall & Wahlbin (1993)
[31] Ibid

structured and standardised, so that data collected from different objects can be compared[32]. The relation between the investigator and the object of the survey is characterised by distance, since the development of the tool for data collection, the data collection itself, and the analysis of the data are undertaken during different phases. Since these phases are separated, the critical component in the collection of data is the tool itself[33].

Qualitative data can not be expressed in figures in a meaningful way, and therefore have to be analysed by other than mathematical-statistical methods.[34] The gathering of such data is characterised by flexibility and adjustment to the specific object in focus[35]. The relation between the person gathering data and the object is closer than when collecting quantitative data, since the same person undertakes both the survey and the analysis of the result. The phases are not separated as they are when gathering quantitative data, but form a continuous process that starts as soon as the interaction between the investigator and the object starts. Critical for the result of such a survey is the capability and competence of the investigator.[36]

2.8.3 Primary or Secondary Data

Secondary data, i.e. data that is already collected and accessible, has the advantage over primary data that it is cheap and easy to collect. Usually the only problem with collecting secondary data is to find out what information is relevant and where it is. To collect primary data on the other hand it has to be found out who has access to the information, what the best way to contact this person is, and how the information should be registered. The gathering of primary data is because of these reasons often very resource consuming.[37]

A problem with secondary data is that it is not always appropriate, since it was not collected with the current survey in mind. Therefore it is important to always find out as much as possible about how the data was collected and for what purpose, before using it.[38] There are two main hazards with using secondary data. If the data was gathered for a different purpose, it might be put together in a way that is not suitable for the current survey, or it might be based on definitions that make it incomparable with other data in the survey. The second hazard is the difficulty to appreciate the correctness of data, if there is no detailed information about how it was collected or what definitions and measures were used.[39]

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[32] Holme & Solvang (1997)
[33] Darmer & Freytag (1995)
[34] Lekvall & Wahlbin (1993)
[35] Holme & Solvang (1997)
[36] Darmer & Freytag (1995)
[37] Lekvall & Wahlbin (1993)
[38] Ibid
[39] Arbnor & Bjerke (1994)

2.9 Choice of Approach of Study

2.9.1 Depth, Width or Time Series

When commencing the study of the sales-to-delivery process for complete buses and coaches at Scania, the precise problem areas were not clearly defined. A few ideas of which broad parts of the process that would be suitable for analysis were suggested by Scania, but whether these areas would actually be handled in the final report or not would not show until later. To get an understanding of the process itself, and to find out where problems suitable for analysis in the report occurred, it was necessary to make initial interviews with a lot of individuals within Scania CV. Later in the project process, when the focus of the study became clearer, it became unavoidable to return to many of these individuals for more in-depth questions and more focused retrieving of information. These circumstances made case study the appropriate approach for the investigation. Since the aim of the study was to in real-time deeply investigate a few problem areas of one specific process at one company, both cross-section approach and time series approach were unsuitable.

2.9.2 Qualitative or Quantitative Survey

The aim with the survey of the sales-to-delivery process at Scania was to at first create a holistic view of the problem and then choose a few specific problems to investigate in depth. Since the investigators had very limited knowledge of the process at the start of the study, the natural approach was to interview a number of persons with good knowledge of different parts of the process. To get as much information about the process and potential problems related to it as possible, the persons were allowed to speak freely. They answered in there own words both to questions prepared in advance and to questions that arose spontaneously. Since the persons had different views of, and different insights into, the process, these conversations always focused on different issues and contributed with new knowledge to the project. This approach to the study made qualitative methods the natural choice for the collecting of information. It would have been impossible to create a holistic view of the sales-to-delivery process from scratch, or to locate weaknesses in it, by quantitative methods.

When the areas chosen for deeper investigation in the study were set, the project proceeded with interviews of individuals not previously contacted, as well as complementing questions to persons already heard in the first phase. The nature of the interviews and conversations were still the same as in the initial phase, even if the questions asked were more focused on the specific problem areas identified. Consequently the optimal approach of the survey still was qualitative.

2.9.3 Primary or Secondary Data

The nature of the problem and the collecting of data by interviews with key individuals made primary data the most important source of information for the study. The meetings with individuals face to face were necessary for the creation of a dynamic picture of the sales-to-delivery process, and therefore the time and other resources required for arranging these meetings were well spent. However, secondary data was also used to some extent, in particular to prepare for interviews and meetings by studying documentation concerning the environment of the particular person or

organisation. Statistics and existing reports were also studied to help in the creation of a holistic view of the process, as well as to support findings and statements.

2.10 Validity and Reliability

There are two general requirements when gathering data, namely that the gathering techniques are *valid* and *reliable*. A reliable technique generates the same result if the survey is repeated in the same way on the same object at a different time. In other words, there is an absence of random errors in a reliable survey. A valid technique guarantees that the right things are measured, i.e. that the result of the survey is relevant to the problem.[40]

When the systems approach is used, validity is determined by the investigator and other individuals involved in the process of creating knowledge. These individuals are the most competent for determining whether the methods are used in a suitable way and whether the results are reasonable. An essential question to ask in order to determine validity concerns what effects can be achieved by using the results of the study as guidelines.[41]

The concept of reliability is seldom discussed in studies performed with a systems approach, since the important thing is not how data is collected, or how precise the data is, but what the result of the study can be used for.[42]

2.11 Validity and Reliability of Data used in the Master Thesis

All interviewees were well informed of the purpose of the interviews and the aim of the study before the interviews started. They were free to share their opinions on which areas of the sales-to-delivery process that constitute problems, and this was also the main purpose of many of the interviews. Since the interviewees were clear of the investigators', as well as their own, role in the project and the goal of the project itself, the validity of the interviews should be high.

The purpose of the interviews was to a great extent to get descriptions of the process from the persons', or the organisations' they represented, points of view. Because of this, it was not considered a problem if the answers to the questions were biased. As long as the information collected reflected the opinion and experience of the person interviewed, it constituted a valuable contribution to the study. The prerequisite for this attitude towards the collected information and the interviewed individuals was of course that the conversations focused on issues where the particular person was known to have good knowledge and insight. The information from an interview was always regarded as opinion until it could be proved fact by support from other reliable sources. Because of these circumstances the reliability of the interviews is considered either high or not crucial.

[40] Darmer & Freytag (1995)

[41] Arbnor & Bjerke (1994)

[42] Ibid

3 Theory

The theory chapter presents existing knowledge in a number of areas closely connected to the aspects studied in this report. This knowledge is important to fully understand and to be able to analyse the data gathered during the study. The theory handles lead-time, which is a central concept in this thesis, postponement, which can be used to shorten lead-times while keeping flexibility, centralisation of inventories as a means to lower stock levels, forecasts and finally the role of information technology in supply chain management.

3.1 Lead-time

Lead-time can be defined as the time from order placement to delivery. It is the time a customer has to wait to receive its goods. It might include time for order information transfer, order handling, engineering, planning and scheduling, supply of components, manufacturing order release, manufacturing, assembly, distribution and installation. Depending on type of product, some of these activities are performed outside the actual lead-time. For example supply can be excluded if there is enough inventory of material and components. Of course activities that can be performed in parallel with others do not contribute to the lead-time either.[43]

Lead-time can be divided into value-adding time, that is time when value for the customer is being added, for example through processing or transportation to distributor, and non-value-adding time, which is time spent for example waiting for administrative tasks to be performed, queuing, or in inventory.[44]

The division between value-adding and non-value-adding activities is very unbalanced in most companies, which is illustrated by the 0.05 to 5 rule. This rule claims that a product is exposed to value-adding activities only 0.05 to 5 per cent of the time it is in the value-delivery system of a company. For cross-company supply chain processes this figure is even lower; less than one per cent of the time is value-adding in the context of a total supply chain. Since such a large portion of time consists of non-value-adding activities, lead-time reduction should focus on limiting this kind of activities instead of the value-adding ones.[45]

When lead-times are shortened there are a number of positive effects that follow. For example costs are reduced and productivity is increased, while at the same time quality is improved since the time interval between the discovery of defects and the adjustment of the manufacturing process is shorter. Customer service is improved, and thereby prices can be increased. Capital tied up in inventory and work-in-process is reduced. The combination of these effects results in improved profitability for the company.[46]

[43] Wedel (1996)
[44] Ibid
[45] Mattsson (2000)
[46] Ibid

Lead-time also has an impact on the use of forecasts. If the lead-time is long, a greater number of procurement and manufacturing activities have to be carried out based on speculations in future customer orders. This means greater risks, and higher levels of inventories of completed and semi-completed goods.[47]

3.2 Postponement

Postponement and speculation are opposites when it comes to choosing strategy for manufacturing and stock keeping. Speculation means that value-adding activities are carried out before customer demand is known. The advantages with this strategy are cost benefits through economy of scale, smooth capacity utilisation, reduced order processing and transportation costs, and shorter delivery lead-times. Postponement on the contrary means, from a manufacturing perspective, that the final value-adding steps are postponed as far as possible. This way the risk associated with early commitment is reduced, since the product differentiation is delayed.[48]

To remain competitive in the market place, short lead-times and customisation are musts. Applying the principle of postponement is the key to cost effective customisation.[49]

Postponement can be applied according to three different principles; time postponement, form postponement, and place postponement. Time postponement refers to when the start of value-adding activities is delayed as long as possible, while form postponement means delaying activities that determine the form and function of a product until the customer requirements are known.[50] There are four types of form postponement: labelling, packaging, assembling and manufacturing[51]. Place postponement, at last, means that value-adding activities are performed as close to the customer as possible[52].

Place postponement, and in turn time postponement, can be achieved by letting distributors carry out final value-adding activities. Distributors are closer to the customers' demand, and therefore have better knowledge of it. Lead-times can be reduced since delivery times become shorter when stock of uncompleted products are kept closer to the customer.[53]

Form postponement leads to decreased inventory costs due to the reduced number of product variants that need to be stocked. At the same time both processing costs, due to loss of scale economies, and cost of lost sales, due to longer average delivery time, increase. Also time postponement leads to a decrease of inventory costs, since inventories are centralised and thereby can be reduced.[54]

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[47] Mattsson (2000)
[48] Ibid
[49] Ibid
[50] Ibid
[51] Norelius (2002)
[52] Mattsson (2000)
[53] Ibid
[54] Norelius (2002)

3.3 Centralisation of Inventories

There is a trend towards companies establishing centralised warehouses that can serve more than one market and thereby achieve major bottom-line savings. This is possible thanks to standardisation of products over several markets and deregulation within the European Union.[55]

The total need for inventories is reduced when companies centralise their warehouses and decrease the number of them[56]. The reason for this is that the increase in standard deviation in demand is smaller than the increase in demand when inventories are centralised[57], in other words the variation in total demand is less than the sum of variation in local demand. This is due to the opportunity for the company to balance the demands in different areas when they differ from the average: if demand in one area is greater than average, resources from another area where demand is lower than average can be utilised[58]. This makes it possible for companies to save money, not only on less tied-up capital due to reductions of inventory levels, but also on reduced costs for physical space in warehouses and for elimination of stock handling activities[59].

According to the square root law, the total level of inventory needed in a distribution system is proportional to the square root of the number of warehouses. This means that a reduction of number of warehouses from ten to one would result in a total inventory of $\sqrt{1/10} = 38\%$ of the original inventory level while maintaining the same degree of customer service.[60]

In markets with high amount of product varieties and a demand for short delivery lead-times it is hard for companies to maintain a high degree of customer service and at the same time avoid taking risks attached to large inventories. Centralisation of inventories is a means to keep the necessary risks less significant, since the level of inventory is reduced and the right product always will be available for the right market if in stock.[61]

[55] Mattsson (2000)
[56] Ibid
[57] Norelius, (2002)
[58] Mattsson (2000)
[59] Norelius, (2002)
[60] Mattsson (2000)
[61] Ibid

3.4 Forecasts

Creating value for the customers requires an ability to understand and manage the market demand. An important instrument in this work is forecasting, and the forecasts serve different purposes depending on which time horizon they cover.[62, 63] To reduce the uncertainties associated with forecasts, collaboration between the actors within the supply chain is necessary[64].

All activities within a supply chain should be performed with the utmost objective of creating value for the end customer. Achieving this requires an understanding of what the customers ask for, as well as an ability to communicate that demand throughout the whole supply chain. To be able to deliver the right product at the right time, the information then needs to be used to align the operational plans with the market demand.[65]

One essential instrument in the ambition to provide customers with accurate deliveries of the demanded products is forecasting. Forecasts are used to predict future events and they form part of the input to the development of plans.[66, 67] While the forecasts examine what the future *will* look like, the objective of the planning process is to create basic data for decision-making about that future, i.e. what the future *should* look like[68, 69].

Forecasts of estimated sales are made throughout the whole supply chain. They all primarily stem from the demand as it appears in the market.[70] However, since there are uncertainties associated with appreciating the demand, moving upstream along the supply chain involves a risk of these uncertainties getting amplified. This phenomenon is sometimes referred to as bullwhip effect.[71] Collaboration between the actors in the supply chain enables a reduction of the uncertainty, which may lead to a number of benefits for all parties.[72, 73]

A better communication between distributor and customer leads to more reliable estimations of potential sales, which in turn makes the forecasts to the manufacturer less uncertain. As a result, the manufacturer can lower the safety stock levels and conduct the production planning further in advance, which might lead to a higher capacity utilisation. More frequent and updated information exchange also improves the manufacturer's understanding of customer demand, which increases the

[62] Bjørnland et al. (2003)
[63] Coyle et al. (2002)
[64] Rudberg et al. (2001)
[65] Coyle et al. (2002)
[66] Bjørnland et al. (2003)
[67] Armstrong (1985)
[68] Ibid
[69] Bjørnland et al. (2003)
[70] Coyle et al. (2002)
[71] Rudberg et al. (2001)
[72] Ibid
[73] Coyle et al. (2002)

possibilities of offering products that correspond with customer needs as well as deliver them at the right time. The distributor will also benefit from a more extensive communication. By being able to rely on that the manufacturer will deliver the right product at the right time, the distributor's safety stock levels may be reduced. Improved delivery accuracy may also result in removal of time buffers and consequently shorter lead-times. In the end, all these improvements will be of advantage to the customer in the form of better customer service.[74]

There are different types of forecasts and they serve different purposes depending on which time horizon they are intended to cover. *Long-term forecasts* cover about three to five years and they often estimate sales by product group or division. They are used for strategic issues, such as planning of extensive changes in the production capacity, the inventory levels or the frequency of deliveries. *Midrange forecasts* are made on a one- to three-year horizon, and are used to estimate demand of products as well as material and components with long delivery times. These forecasts serve as basis for planning of purchasing and agreements with suppliers and distributors. *Short-term forecasts* cover up to one year, and they express demand in specific units. These forecasts primarily deal with operational issues such as planning of production capacity and purchasing of raw material.[75, 76]

There are a number of weaknesses that are often discovered when trying to improve the demand management in companies. The communication between departments is often insufficient, which results in uncoordinated response to demand information. There is also a tendency to use the demand information for tactical and operational, rather than for strategic, purposes. Finally, there are not enough efforts put on collaboration and development of strategic and operational plans on the basis of the forecasts.[77]

[74] Rudberg et al. (2001)
[75] Bjørnland et al. (2003)
[76] Coyle et al. (2002)
[77] Ibid

3.5 The Role of Information Technology in Supply Chain Management

Information technology is an important instrument that enables companies to rationalise and make flows of material and information more efficient. Access to easier and faster communication enables a higher degree of information exchange, both internally and externally with suppliers and customers. This may lead to shorter lead-times and lower stock levels, as well as value creation through business development. Information technology can be used to increase a firm's competitiveness and to develop a competitive advantage.

An increased need for information exchange

The need for communication and exchange of information between companies has increased, and will continue to do so, due to the companies' constant ambition to stay competitive and offer the customers products which meet, or even exceed, their expectations[78]. Companies have to focus more on the needs of the customers to be able to meet their increasing demands for service, speed and customisation[79].

For a company to maintain and develop its competitiveness, it is necessary to look at the behaviour of the entire supply chain. In addition to an efficient internal organisation, the relationships with other actors in the chain need to function well in order to attain a maximum of the potential benefits. Value can be created in processes and activities within the boundaries of the company, but also in the links between a company and other actors in the supply chain.[80] A large number of activities and processes undertaken by companies depend on the performance of other actors in the supply chain, such as customers and suppliers. This requires fast, easy and reliable ways to communicate, which can be provided by the use of information technology.[81]

Information technology and logistics

The way logistics and supply chain activities are managed in companies is to an increasing extent considered as strategically important. An efficiently working supply chain is by many companies regarded as a prerequisite to be able to compete in the market. The performance of many logistics activities is closely related to how information is handled and communicated within the supply chain. On-time delivery, stock levels, and order status are examples of activities that require a timely and accurate flow of information.[82]

A logistics information system can be divided into consisting of the four subsystems *planning*, *execution*, *research and intelligence*, and *reports and outputs*, which together have the purpose to provide the logistics management with relevant information. The *planning system* relates to activities such as forecasting, strategic sourcing, and production planning whereas the *execution system* concerns short-term

[78] Gunnarsson et al. (2002)
[79] Coyle et al. (2002)
[80] Gunnarsson et al.(2002)
[81] Coyle et al. (2002)
[82] Ibid

issues such as warehousing, and transportation. The *research and intelligence system* deals with the way information is gathered, and which sources that are used when doing it. It is important to have routines for finding all the people, both within and outside the boundaries of the company, who can contribute with useful information. Suppliers and customers possess information about the market environment, whereas employees working in other divisions of the firm might hold valuable knowledge of supply chain initiatives that have been implemented there. Finally, the *reports and outputs system* stresses the importance of proper communication. It is vital to the integration of activities throughout a supply chain that information is shared and communicated. Therefore, planning reports, operating reports, and control reports play important roles.[83]

Advantages of information technology

Information technology provides an inexpensive and easy way to exchange information, which gives companies great possibilities to bring together and rationalise information flows. Communication can be divided into having different roles, such as *influencing* and *learning*. However, the area where information technology can make the most obvious contribution is within the role of *co-ordination*.[84] A study where executives in North American companies were asked to identify the business processes that were most critical to their business showed that the top three issues were all related to supply chain management (customer service, order processing and delivery/logistics)[85]. These processes would all benefit from a more extensive use of information technology.

In addition to enabling a more efficient handling of traditionally manual tasks, such as acknowledgement and confirmation of orders, information technology provides opportunities to arrange sequences of operations in completely new ways, and to do things that were undoable before. This implies major changes of the conditions for the development of business strategies and operations management. The computerised systems used to be the limiting factor for what was possible to do, while today it is managers' imagination and creativity, rather than the technological prerequisites, that set the boundaries.[86]

Implementation of supply chain information systems

There are many gains to be made by implementing logistics information systems within organisations. Bringing together flows of material and information opens up the possibilities to monitor markets, products, and competitors in real time.[87] A well working internal communication system may lead to rationalisation of processes and stronger links between strategic and operations management[88]. However, as always in the case of changes, there are challenges involved in the implementation. Therefore, a number of factors should be considered beforehand.

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[83] Coyle et al. (2002)

[84] Gadde & Håkansson (2001)

[85] Coyle et al. (2002)

[86] Mattsson (2000)

[87] Gadde & Håkansson (2001)

[88] Gunnarsson et al. (2002)

To begin with, it should be considered a matter of course to have strategies for logistics information. Companies must realise that the firm as a whole benefits from an efficiently managed supply chain and that a prerequisite for that is the presence of an information system. Furthermore, it is important to have an accurate picture of the information requirements that exist among the potential users of the system, such as customers, suppliers and employees within the own firm.[89] A reason for why information technology has not quite met all expectations probably stems from the fact that focus has been on what types of solutions that are technically feasible, rather than on the purpose and content of the information[90]. Another thing to keep in mind is that for communication to take place, the information has to be transmitted but also received and utilised in the other end. This implies that there has to be knowledge about what type of information the recipient expects to obtain, as well as what this person will do with the information. Finally, there is a large number of information technologies that are possible to apply to supply chain processes, but it is the ability to integrate them into the organisation and make the users realise the advantages that determines the level of success.[91]

[89] Coyle et al. (2002)

[90] Gadde & Håkansson (2001)

[91] Coyle et al. (2002)

4 Empirical Studies

In this chapter the information and data gathered during the study is presented. It starts with a description of the bus and coach business and the market situation. A description of Scania CV as a manufacturer of chassis for buses and coaches follows, as well as a description of the Scania bus organisation in relation to Scania CV, and the role of sales companies and body builders. After this the sales-to-delivery process at Scania CV, at the sales companies on the reference markets, and at the Globally Preferred Partners is described together with short presentations of the companies. Explanations of abbreviations and concepts are to be found in the end of the report under "Concepts and Definitions". With respect for the interviewees, no references on information gathered during the empirical studies are given. Instead, the names of all persons who have contributed with data for this chapter can be found in the list of references.

4.1 Bus and Coach

When the term *buses* is used in this report, it refers to vehicles aimed for city or intercity traffic, as opposed to *coaches* that are aimed for tourist transports or long distance travels. The most evident difference between a bus and a coach is the level of comfort and the accessibility for the passengers. An illustration of a bus and a coach can be found in Appendix B.

A city bus is used for public transport with many starts and stops in urban environments, and it should enable a considerable flow of passengers and quick boarding and disembarking. The boarding and disembarking is facilitated by a low-level floor in part of the bus or throughout its entire length. City buses must be capable of transporting a large number of passengers, and also make the bringing of for example prams and wheelchairs uncomplicated. The seat comfort is low, and not all passengers can be seated.

Buses aimed for intercity traffic offer seats in the direction of travel for all or most of the passengers. The floor-level is normal and there might be some exterior luggage capacity. The passenger flow and the number of stops are lower than in city traffic.

Coaches are aimed for public transport between cities with few or no stops, or for transporting tourists. All passengers are seated in the driving direction, and the seats are comfortable and offer more space for the passengers. Exterior luggage capacity is required, and often there is a toilet and video on the coach.

4.2 The Bus and Coach Market

The process of selling buses for public transport differs from the process of selling coaches. Vehicles for public transport are often purchased in connection with an invitation of tenders from authorities on city or intercity traffic. This means that the vehicles do not only have to fulfil the requirements of the customer buying the buses, which is the transport company, but also the requirements of the authorities buying the traffic.

For buses there is a requirement for very little downtime, since a stoppage of the traffic can be very costly. Environmental issues, as well as adaptations for disabled, are important aspects since the purchasing of public transport is influenced by politics. Often a large number of vehicles are bought at the same time.

The desired delivery for buses is commonly in the end of the spring, since that is when most transport companies shift buses and take the newly purchased vehicles into use. Delivery accuracy is important since the new buses have to be available at the date when the old buses are taken out of use, and there are often penalties associated with delayed deliveries. The fact that most buses are wanted for delivery during the same time period makes it difficult for the bus manufacturers to keep an even production rate throughout the year. The tender process is usually initiated in the beginning of the autumn and until it is terminated it is not known which manufacturers that will be given the assignment to produce the buses. Hence, the manufacturers are left with the dilemma of either waiting to start the production until the tender process is terminated, with the risk of not being able to keep the delivery date, or starting the production beforehand, without knowing if the process will result in an order, and in that case the size of it. The latter may result in the manufacturer being left standing with residual buses that are difficult to sell to other customers since the specifications are very detailed.

One of the most important aspects for coach customers is that the vehicle is reliable and does not have a breakdown on the road. Image and design of the vehicle is more important than with buses. The customers are often small private operators that buy one or a couple of coaches at the same time. Coach customers are generally more flexible than bus customers since there are fewer parties involved in the purchasing process and fewer regulations to respect.

The total lead-time for buses and coaches is approximately six months from that an order is placed until delivery of a complete vehicle. This case applies when the production planning of the chassis and the body is initiated when the order is placed. Customers request short lead-times, and therefore manufacturers strive to minimise it, for example by keeping stocks.

To make the sales-to-delivery process more efficient and thereby become more competitive on the markets Scania seek to reduce the number of body builders to co-operate with, as well as to harmonise the product program.

4.3 Scania

Scania was founded in 1891 and operate in the heavy transport segment[92] of trucks, buses and coaches. The company also manufacture industrial and marine engines as well as market and sell a range of service-related products and financing services. The number of employees is over 29000, of which about 25000 work in Europe. Scania delivered about 45000 trucks and 4900 buses and coaches during 2003, and the largest market is Western Europe. The manufacture of buses and coaches is concentrated to the chassis, whereas the bodies are purchased from external suppliers. Approximately 2/3 of the bus chassis are produced in Södertälje, Sweden and the remaining part in Latin America. The products that are sold on the European market are manufactured in Södertälje. Scania has developed a modular production system and a large part of the components used in the production of trucks and buses are common.

A majority of customers today wish to purchase a complete vehicle from one single source instead of buying a chassis from one producer and a body from another and arrange the assembly themselves[93]. Scania manufacture chassis (see Appendix A), and to be able to meet the demand for complete vehicles, the company works together with a number of body builders (see Appendix B). In most cases, Scania administrate the selling of a complete bus or coach to the customer. In some markets, however, the body builder manages the customer relation and Scania act only as a chassis supplier. More detailed descriptions of the structure on the reference markets for this report will be found in chapter 4.4. Chapter 4.3 describes the sales-to-delivery process out of Scania CV's perspective for the former case when Scania handle the customer relation and sell a complete vehicle.

[92] Heavy trucks have a gross vehicle weight of more than 16 tonnes, and heavy buses have a gross vehicle weight of more than 12 tonnes.

[93] According to CSI (Customer Satisfaction Index), eighty per cent of the customers have this opinion.

4.3.1 Scania Bus Organisation

The Sales and Services division at Scania CV is constituted by a number of departments, of which Buses & Coaches is one. It holds the global responsibility within Scania CV for sales of buses and coaches, as well as a function that supports the sales companies in the European, Australian, and New Zealand markets. The support functions for the remaining markets are assigned to the Overseas department, which is also responsible for the truck sales in those areas, and to Scania Latin America. The Services department manages the service function for trucks, buses and coaches.

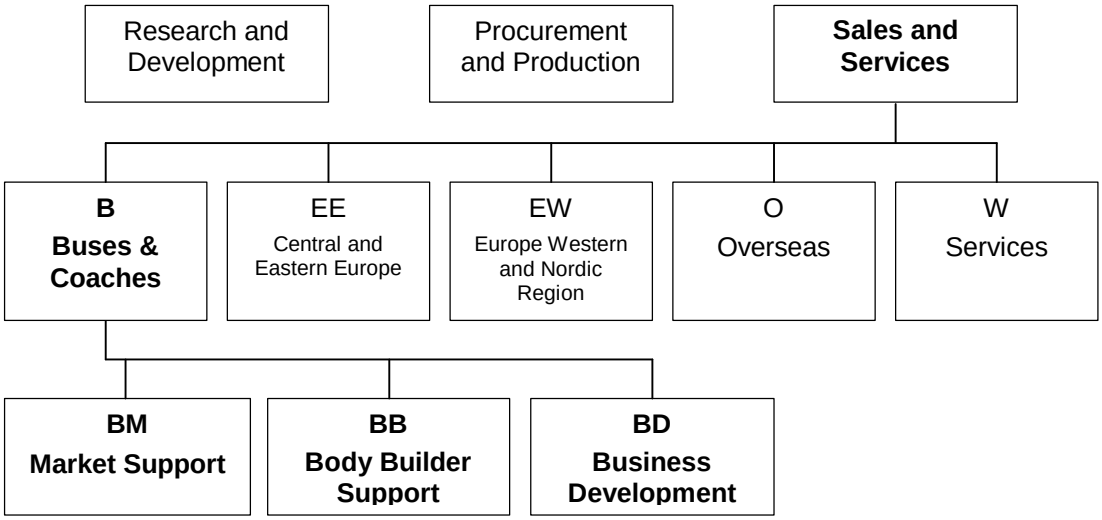

Figure 4.1: A chart displaying the buses and coaches department's place in the Scania organisation.

4.3.1.1 Sales Companies

Scania are present on the markets via their sales companies, which are the customers' primary channels for communication with Scania. All the contact between the customer on the one hand and Scania CV and the body builder on the other goes through the sales companies that work as intermediaries throughout the whole sales-to-delivery process. When a customer wants to purchase a bus or a coach, it turns to a sales company to place an order for the complete product. The sales company administrates the ordering of chassis and body by either creating two separate orders that are sent to Scania CV and the body builder respectively, or by sending the complete order to the body builder. The latter case only applies for one specific body builder, namely Omni, which is a Scania subsidiary. Omni receive an order for a complete vehicle from the sales company, and orders the chassis from Scania CV. The order handling at Scania CV is not affected by whether the order has been sent in by Omni or by a sales company. Figures 4.2 and 4.3 describe the two ways in which an order can be placed.

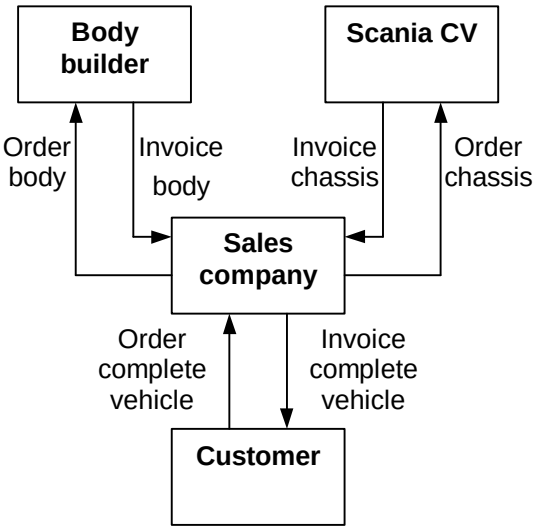

Figure 4.2: The information flow that applies for all body builders except Omni.

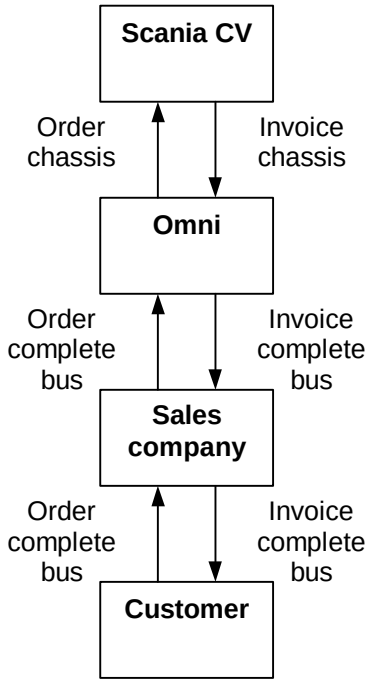

Figure 4.3: The information flow that applies when the customer has ordered an Omni product.

4.3.1.2 Body Builders

Scania manufacture chassis and are consequently dependent on body builders to be able to sell complete buses and coaches on the market. It is part of the company's strategy to not own any body builders, and today Scania globally co-operate with approximately 75 body builders who are divided into three categories (see figure 4.4).

Local partners are mainly small companies, which are chosen due to geographical nearness or personal connections to the customer. Scania's support to these body builders is very limited.

Locally preferred partners are often regionally dominant actors, and are selected or recommended by the sales company with confirmation from Scania. The actors in this category are given active factory support from Scania in terms of, for example, education on how to build on a Scania chassis. Scania communicate either directly or through the sales companies with these body builders.

Globally Preferred Partners operate in several countries and are selected by Scania with the objective of creating strategic alliances and closer co-operation concerning after-sales, product development and optimisation of production and supply. At present, this category consists of only two actors; Omni, which are completely owned by Scania[94], and Irizar. Since Scania need to secure body building capacity in order to reach their sales objectives and to meet the customers' demand of a complete vehicle supplied by one source, it is of great importance that the collaboration with these body builders works well. More detailed descriptions of Omni's and Irizar's operations will be provided in chapter 4.5.

Figure 2: The body builder categories at Scania.

4.3.1.3 Scania Buses and Coaches in Europe

In the past, Scania's bus and coach activities were integrated in the company's truck organisations on all markets. However, in the end of the 1990's the opinion concerning the European market was that there were such major differences between the two business areas that the activities needed to be separated in order to be managed properly. The differences mainly derive from the fact that the sales volume is significantly larger for trucks than for buses and coaches[95], and from the dissimilarities between the customer categories. Furthermore, the sales-to-delivery process is more complex for buses and coaches since the bodies are manufactured by external suppliers. To manage both processes more efficiently, the sales function for

[94] This contradicts the statement made previously that Scania's strategy is to not own any body builders. However, Omni originally belonged to the Scania organisation but was detached in 2002 and turned into an independent company.

[95] Scania's total order bookings for heavy trucks were 27,977 units during 2003 and 4,925 units for buses and coaches.

buses and coaches was detached and separate sales companies were formed, whereas the after-sales and service functions remained within the truck organisation. This structure was kept for about five years, when the decision was made to shift strategies again and make the bus and coach activities an integrated part of the sales and service network for trucks. At present, some of the bus and coach sales companies are integrated within the truck organisations in the respective countries, whereas in a number of other countries the bus and coach activities are still conducted separately. The latter case applies to Sweden, Germany, Great Britain, Italy, France, and Belgium.

4.3.2 The Sales-to-Delivery Process at Scania CV

The sales-to-delivery process can be divided into five main parts, namely sales, order, production, distribution, and delivery, as is illustrated in figure 4.5.

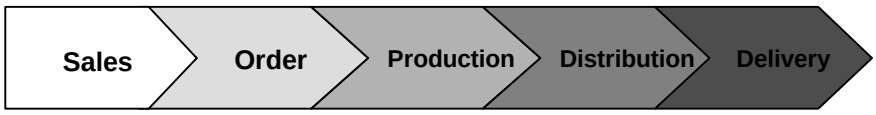

Figure 4.5: The sales-to-delivery process at Scania.

The original purpose of this study was to focus on the complete process. However, the focus was narrowed down along the way into comprising the two first parts: sales and order. The reason was that so many issues and problems were discovered in these parts that were perceived as fundamental and therefore it was necessary to begin the investigation here. Since one of the objectives of the study was to find ways to reduce the stocks of chassis and built-up vehicles, activities with influence on stock levels have been discussed, even though stocks do not occur until later in the sales-to-delivery process.

4.3.2.1 Sales at Scania CV (see figure 4.6)

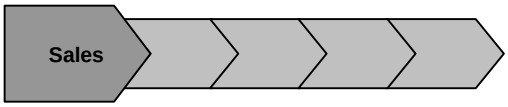

Figure 4.6: The sales-related part of the sales-to-delivery process.

Scania CV support the sales companies through *Area Sales Managers*, each of whom is responsible for a defined market area, either Australia, New Zealand or within Europe. They organisationally belong to the BM department (see figure 4.1). The Area Sales Managers are responsible for volumes, prices, specifications, and products, and they are in constant contact with the sales companies in order to support activities on the markets and to communicate the sales companies' needs and knowledge.

4.3.2.2 Order Handling at Scania CV (see figure 4.7)

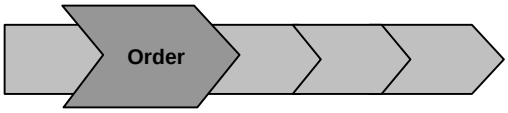

Figure 4.7: The order-related part of the sales-to-delivery process.

Scania CV receive chassis orders from the sales companies by fax or e-mail. An order has to include three points of information, namely a *specification*, a *delivery address* and the *DDD* (Desired Dealer Date, see Concepts and Definitions). The order can

be sent as soon as the sales company knows when the chassis needs to be delivered to the body builder, (see point 1 in figure 4.8).

The *specification* is created in line with discussions between the customer and a salesman at the sales company. The specification form is made in Microsoft Excel and includes all the available options for the chassis (see Appendix C). On many options the same alternative is chosen on a large portion of the orders. To avoid having to fill in the form from basis every time, standard specifications have been prepared by each sales company where the most frequently chosen alternatives have already been marked. There are different standard specifications for each market, adapted to the customers' varying demands. When placing an order, however, there are always some changes that have to be made to make the standard specification suit the requirements of a specific customer. Therefore, an altered specification form (see Appendix D) with a reference to the standard specification as well as a list of all the items that are to be added or deleted from it is sent to Scania CV. It is also possible to refer to a specification made for a previous order.

The *delivery address* is simply the address to where the chassis is going to be delivered when ready, which in most cases is the body builder's production facility.

The *DDD* is the date when the chassis has to be ready for delivery. It is calculated according to when the body builder needs the chassis to go into their production to be able to get the bus ready in time.

If the customer has any requirements that can not be found in the specification form, an S-order (Special order) has to be created and sent in together with the regular order.

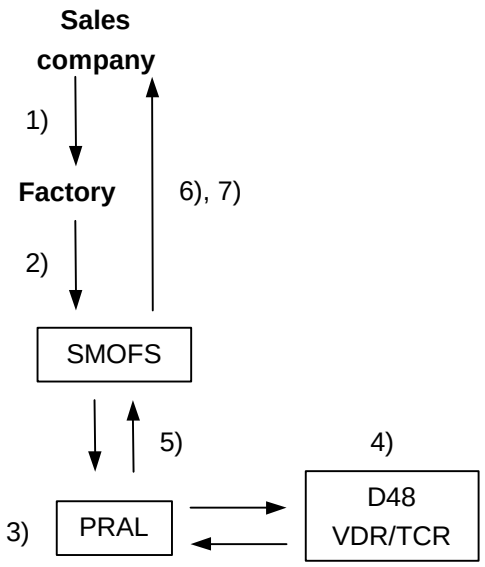

Figure 4.8: The order flow at Scania.

At present, most sales companies have to contact Scania CV before placing an order, either by telephone or by e-mail, in order to get information about where there are vacancies in the chassis production. A system called FAIN (Factory Availability Indication, see Concepts and Definitions) will soon be taken into use where the same information will be available to all sales companies on Outline (see Concepts and Definitions). However, Scania CV are considering to instead of letting the sales companies plan their orders according to available production slots, allow them to focus on the DDD for the chassis.

The order office at Scania CV receives the incoming chassis order and transfers it by hand to Scania CV's internal ordering and invoicing system, SMOFS (Scanias Mekaniska Order och Fakturerings System) (see point 2 in figure 4.8). The order continues to the production allocation system, PRAL (see Concepts and Definitions), where a production slot is allocated according to the DDD. PRAL also calculates a PDD (Promised Dealer Date, see Concepts and Definitions) and an SD-date (Specification Definite, see Concepts and Definitions) (3). The PDD is allowed to deviate a couple of days from the actual delivery date. The SD-date indicates the date

after which it is not allowed to make any further changes in the specification. This date occurs about thirty days before the delivery of the chassis (see figure 4.9). There are separate SD-dates for the S-orders, and these dates occur earlier depending on the characteristics of the affected features.

PRAL is connected to a dependency register, which verifies that all the choices made in the order specification are compatible with each other (see point 4 in figure 4.8). In cases when the dependency register indicates any inaccuracies with the order, the sales company has to be informed. When the error is corrected, the rectified specification is sent back to Scania CV in order to be put through the dependency register again. The procedure continues until no errors are detected.

When the order has passed through the dependency register without any detected inaccuracies, the PDD and the SD-date are transferred to SMOFS (5) from where a confirmation of specified order is sent to the sales company (6). The confirmation is sent shortly after order entry (at the latest within three hours), and it contains the PDD, the SD-date and the specification.

It might seem excessive to use three systems, SMOFS, PRAL and the dependency register, for the order registration at Scania CV. However, the systems are created for different purposes and for different users. SMOFS is intended to be used by ordermen and sales personnel, and therefore has a more developed user interface, whereas PRAL and the dependency register deal with technical issues on a more detailed level.

If the sales company wants to make changes in the specification after having placed the order they do that in a special document, which is then sent to Scania CV by e-mail. The form is similar to the one that is used when placing the original order, with a list of what to add or delete. The changes are registered in SMOFS by hand, and the altered specification passes through the dependency register before a new order confirmation is sent to the sales company.

When the last date for making changes in the specification, the SD-date, has passed, a definitive order confirmation is sent to the sales company (7). The confirmation includes a CDD (Confirmed Dealer Date, see Concepts and Definitions), which does not admit any deviation, as well as the dependency checked final specification and the chassis number.

An illustration of when the different events occur in relation to each other is described in figure 4.9.

A list of all chassis that are under production at Scania CV is provided on Outline with information about delivery dates and current status. Through this list the sales companies can keep updated of when their chassis will be ready.

In connection with the move of the chassis production from Katrineholm to Södertälje in 2002, Scania CV experienced problems that resulted in delayed deliveries. This harmed the sales companies' confidence in Scania CV being able to fulfil the CDD.

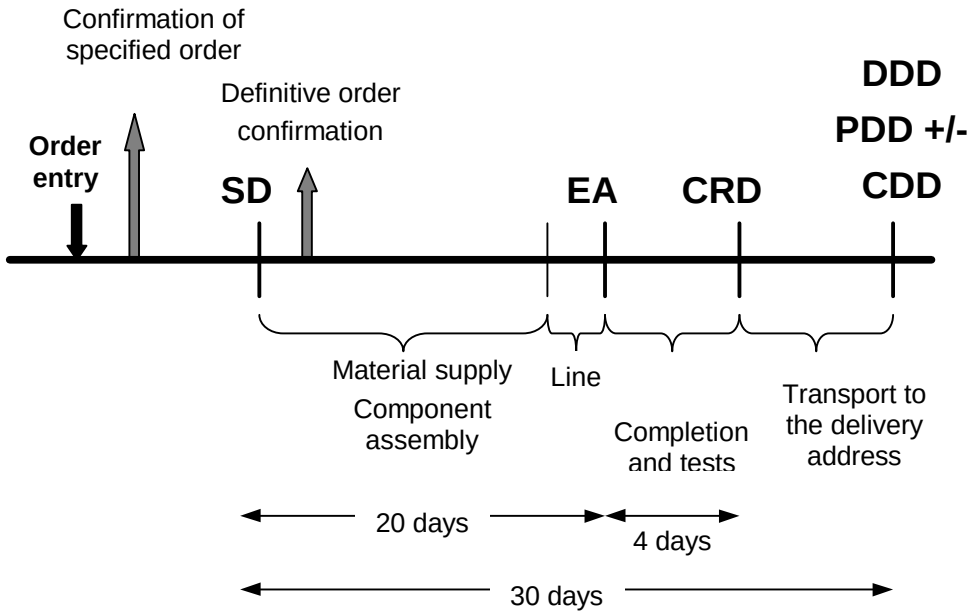

Figure 4.9: Time axle from order entry to delivery at Scania.

4.3.2.3 Lead-time at Scania CV

The total lead-time in the chassis production at Scania CV is about twenty days from the SD-date until the end of the production line. Thereafter, a couple of days are spent on completion and tests before the chassis are ready for delivery. The transportation time varies depending on the destination, but is approximately five days within Europe. This means that the total lead-time from the SD-date to arrival at the delivery address is about thirty days. However, chassis are frequently kept in stock before delivery and this prolongs the lead-time.

4.3.2.4 Stocks of Chassis (see figure 4.10)

There is a stock of chassis kept in connection with the production at Scania CV. Some of the chassis are ready for delivery, but kept in stock since the order was received without information about delivery address. This usually indicates that there is no end customer for the product, and that the sales company has ordered it on speculation. These chassis are in general invoiced by Scania CV, and consequently owned by the sales company that placed the order. On occasions, chassis are afflicted with production-caused defects, and have to be kept in stock until they have been adjusted.

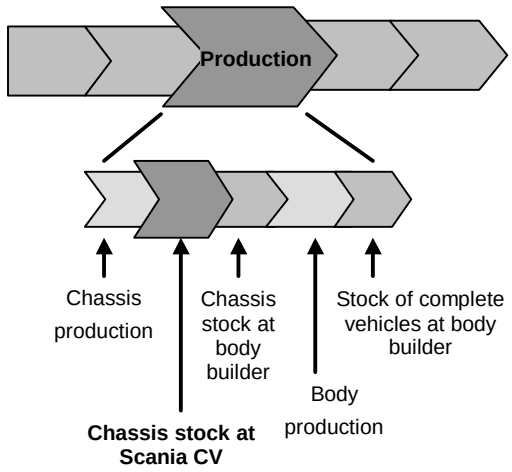

Figure 4.10: The sales-to-delivery process at Scania indicating where the chassis stock is located.

4.3.2.5 Reservations and Forecasts for Scania CV

All sales companies make monthly requests for reservations of chassis production slots to Scania CV for the coming twelve months, in a system called MOPEX (see Concepts and Definitions). They estimate the number of chassis they need every month, based on their own information and knowledge about the market situation. Scania CV reserve slots in the production for each market according to the sales companies' requests. Every month is divided into four production periods and the reservations are spread out evenly on these periods. Confirmations are sent to the sales companies with information about how many production slots they have received, and in which production periods the slots have been placed. When the sales companies place orders to Scania CV, these are allocated to the production slots reserved by each sales company. Approximately one week before the SD-date all remaining reservations are cancelled, and instead these production slots are made available for all markets. This date is called *open market*.

In addition to the reservation requests that are registered in MOPEX, the sales companies make forecasts with longer horizons. They evaluate new and existing customer relations in terms of sales potential, and they survey the market in order to keep informed about competitors' activities, coming business opportunities, changes of environmental restrictions and so on. How each of the reference markets for this thesis work with these types of forecasts will be described more in detail in chapter 4.4.

4.4 Sales Companies

At the start of the study three reference markets, representative of the European bus and coach markets, had been chosen by Scania, namely the Swedish, English, and German markets. When the first two of these markets had been visited, it became clear that the investigation of a fourth reference market was necessary in order to get a balanced view of how the order process is operated at Scania's Western European sales companies, and what the routines are for information-sharing and communication. It was decided by Scania that the fourth market should be Italy. The Italian sales company works towards both Omni and Irizar, but also towards a third main body builder, De Simon. They manage a quite well functioning order process in co-operation with Irizar which are active on the market through their own sales organisation. In this chapter an introduction and a short description of the different reference markets will be given, as well as descriptions of the order process at each sales company. Since the main characteristics of the process are similar for the different markets, first general descriptions of the order processes for Omni buses and Irizar coaches are given. Later, in the chapters concerning the different markets, it will be explained more in detail what aspects make the process unique for each market.

All sales companies make reservations in the chassis production through MOPEX, and quarterly they also provide Scania CV with a financial projection with information of estimated sales of buses and coaches, as well as all the expected costs for the coming twelve months. However, what might differ from one market to the other is how these forecasts are developed, on what information they are based, and with which actors they are shared.

4.4.1 Sales Companies Order Omni

The ordering of Omni buses has, until March 2004, been done in approximately the same way as the ordering of buses and coaches from other body builders. This means that the body and the chassis have been ordered from Omni and Scania CV respectively. The specifications of the chassis and body have been put down on two different forms, and the responsibility for matching the two components has been on the sales companies.

Formally starting on the 15 of February 2004 a new process for the ordering of Omni buses has been implemented. According to the new procedure, the complete vehicle is ordered from Omni, and the sales companies specify the body and chassis on one specification form. The responsibility for ordering the chassis in time, and for specifying it correctly, is fully on Omni. The reason for the change is problems experienced with chassis not optimally specified to fit the designated body, and the wish to minimise the time from when the chassis leaves the production in Södertälje until it enters the production of Omni.

Since the change of processes at Omni took place while this report was written, the interviewees did not have any experience of the new process at the time of the interviews. Therefore both processes are described, and the differences for each of the reference markets are highlighted. However, the first part of the process is still the same as before March 2004, and is therefore only described once.

4.4.1.1 The Order Process towards Omni

When a public transport company competes for the operation of the city or intercity traffic in an area, they invite tenders on the production of the buses according to the specification ordered by the authorities in that area. Scania's sales company on the market takes the requests under consideration, and after discussions with Omni an offer is submitted on the production of the buses. Preliminary specifications are built according to the requirements from the authorities, as well as to individual wishes from each of the competing transport companies. These specifications serve as offers from Scania's sales company. The transport companies then submit their offers to the authorities buying the traffic, and when the traffic finally has been allotted to a transport company the actual process of finding a producer for the buses starts (see box 1 in figures 4.11 and 4.12). Again the sales company submits its offer for the production of the buses (2). The total order might include hundreds of buses, and normally the aim is to win a part of this order since Omni's production capacity is limited.

Before March 2004

If, before March 2004, a public transport company accepted the offer from one of Scania's sales companies (see box 3b in figure 4.11), an order on bodies was placed to Omni (4). This order contained information about the number of buses, the body type, the customer's name, the delivery address, and the desired date for delivery of the complete vehicle. Omni confirmed the order and gave the DDD for the chassis, i.e. the date when they want the chassis to arrive at their plant (5). The sales company transferred this date to Scania CV when placing the order for the chassis (6). This order also contained information about the number of chassis, what type of chassis, the body builder, the customer's name, the delivery address, and a specification of the chassis (see Appendix C, D). The specification at this stage was most often quite general. Adjustments were made later, closer to the SD-date and when the body had been specified. Scania CV confirmed the order and gave the PDD and the SD-date for the chassis (7). The SD-date is about thirty working days before the delivery of the chassis to Omni, and about sixty working days before the delivery of the complete bus. After the SD-date no more changes to a specification can be made. The PDD was in turn transferred to Omni (8) that now could give the delivery date and the SD-date for the body. The SD-date for the body is about fifty working days before the delivery of the complete bus.

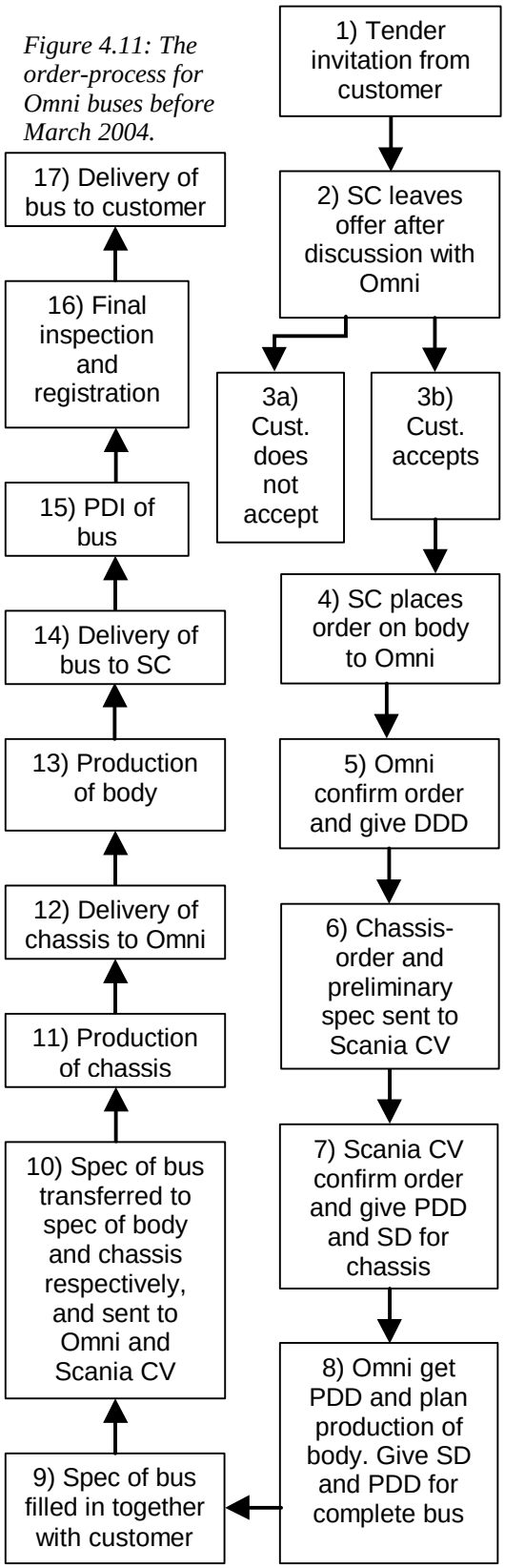

Figure 4.11: The order-process for Omni buses before March 2004.

The specification of the complete bus was put down together with the customer (9), and then transferred to separate forms for the chassis and the body respectively (10). The specification of the chassis to the factory was done by the sales company filling in an altered specification form and referring to a standard specification. This information was sent to Scania CV by e-mail or fax. The specification of the body was put on a form supplied by Omni (see Appendix E). This form included a large number of options, but only a limited number of these options were relevant to

each market. If there were any specific requirements on either the chassis or the body that could not be explained on the original forms, a Special-order (S-order) form was also included. On this form any unique attributes that were not covered by the options on the original order forms could be filled in. After the SD-date for the chassis and the body no changes in the specifications could be made.

Steps 11 to 17 were unaffected by the restructuring of the order process, and will therefore only be described in the next section.

After March 2004

After March 2004, if a public transport company accepts the offer from a sales company (see box 3b in figure 4.12), an order on complete buses is placed to Omni (4). This order contains information about the number of buses, the body type, the customer's name, the delivery address, and the DDD for the vehicle. Omni then handle the ordering of the chassis from Scania CV (5). Scania CV confirm the order and give the PDD and the SD-date of the chassis (6). Omni plan the production of the buses and inform the sales company about the delivery date of the complete vehicles. Omni also specify the dates when the sales company has to provide the final specifications of the chassis and the bodies, which is about sixty and fifty working days respectively before delivery of complete bus (7). The sales company fills in the specification of the bus together with the customer (8) (see Appendix C, D, E), and sends the whole specification to Omni (9). Omni check the specification and transfer the specification of the chassis to Scania CV (10).

When the chassis are completed (11) they are delivered to the address stated in the order from the sales company, i.e. Omni's production plant (12). The production of the bodies can not really start until the chassis arrive (13). The sales company sometimes visits the production plant to inspect the buses together with the customer. This inspection takes place either while the buses are still in production or when at least a few of them are completed. The specification form can be used as a checklist for the customer. The buses are then delivered to the sales company (14), where some final adjustments such as the installation of destination signs take place. The sales company inspects the buses (PDI = Pre-delivery inspection) to make sure they meet their standards (15). After this a final inspection is undertaken to make sure the vehicles meet the legal requirements of the market (16). Finally the buses are inspected by and delivered to the end customer (17).

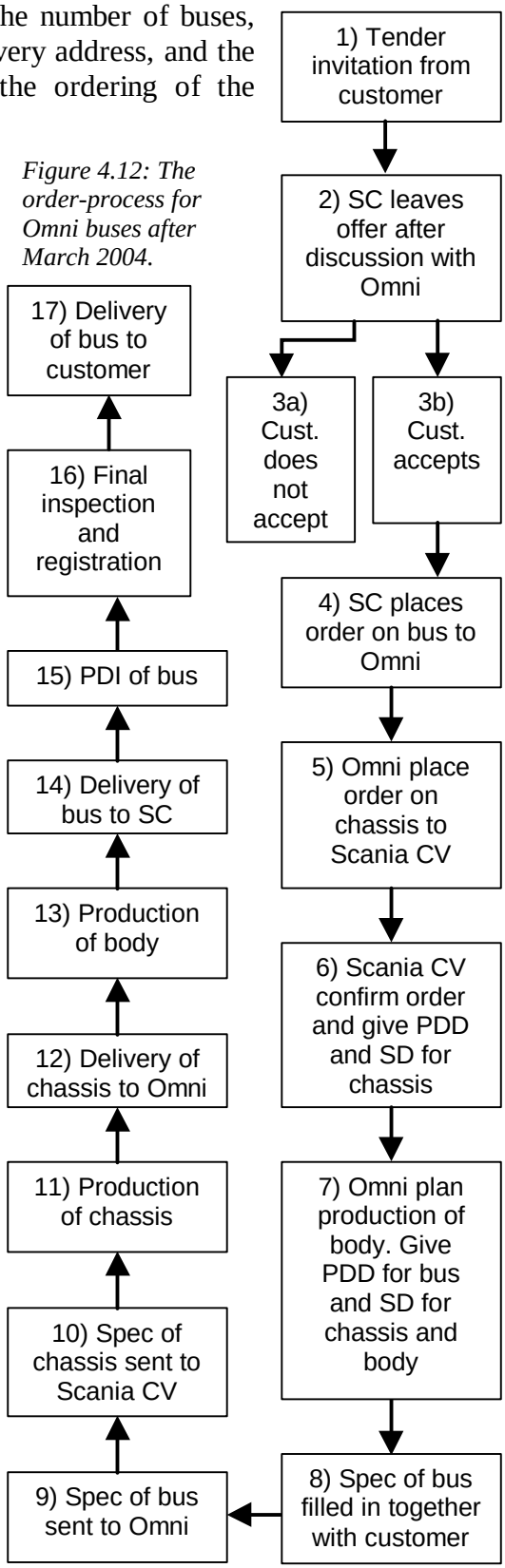

Figure 4.12: The order-process for Omni buses after March 2004.

4.4.2 Sales Companies Order Irizar

The most common course of event when a coach is sold to a private customer is that the customer contacts one of Scania's sales companies or dealers to discuss the specification, the price, and the date of delivery (see box 1 in figure 4.13). The specification of the coach is performed slightly differently on the markets, therefore this part will be handled in chapter 4.4.3. If the customer and the sales company manage to agree on all issues, the sales company places an order on the body to Irizar (2). The order contains information about number of coaches, the body type, the chassis type, the customer's name and the desired date for delivery. Irizar confirm the order and give the DDD for the chassis to their facilities in Spain (3). The sales company transfers this date to Scania CV when placing the order for the chassis (4). This order also contains information about the number of chassis, the chassis type, the body builder, the customer's name, the delivery address, and a general specification of the chassis (see Appendix C, D). Scania CV confirm the order and give the PDD and the SD-date for the chassis (5). The PDD is in turn transferred to Irizar that now can give the dates for when they need the definite specification of the body and when the coach will be transported to the delivery address (6). After the SD-dates for the chassis and the body no changes in the specifications can be made.

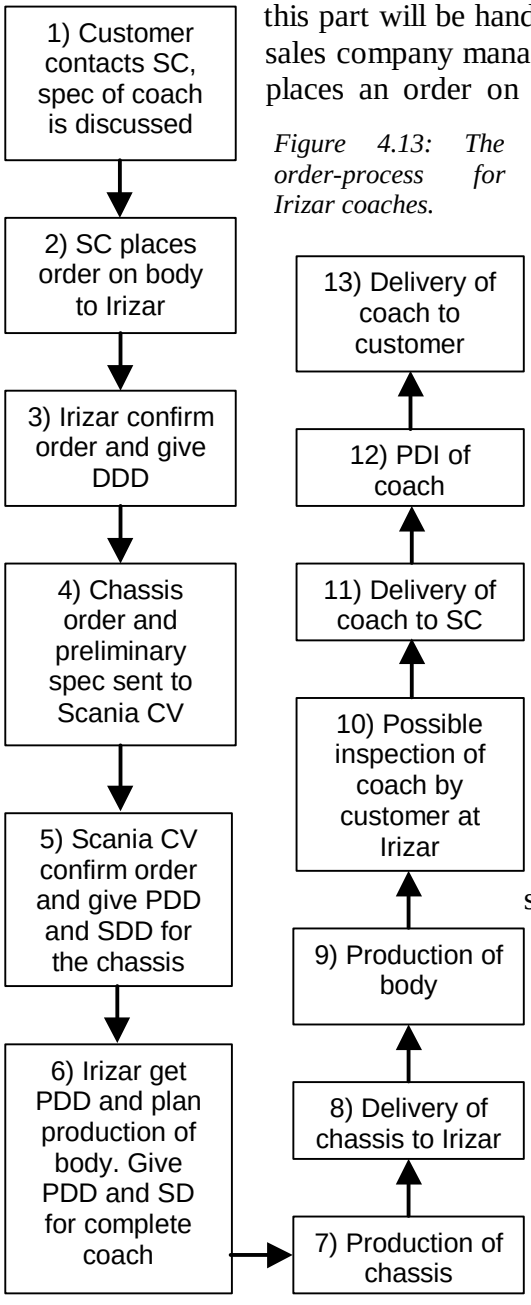

Figure 4.13: The order-process for Irizar coaches.

The chassis is produced four weeks after the SD-date (7), and delivered to Irizar two weeks later (8). The production of the body starts when the chassis arrives to Spain (9).

If the customer wishes to do a delivery inspection, this can be undertaken either at Irizar's factory in Spain (10) or at the facilities of the sales company or the dealer. If the customer wants any changes on the coach, it is easier to perform them at Irizar before the coach is delivered from Spain than at the sales company (11).

When the coach arrives to the delivery destination a PDI is performed by the dealer (12), as well as an inspection by the national authorities to make sure the vehicle does not violate national laws and regulations and can be registered. If the customer has not undertaken an inspection in Spain, this takes place at this stage, before the coach is delivered to the final destination (13).

4.4.3 The Swedish Sales Company

The sales company for the Nordic market was until January 2004 located at Katrineholm, at the old chassis-production facilities and next to Omni's office and manufacturing facilities. A restructuring process resulted in four different sales companies, one in each of the Nordic countries Sweden, Norway, Denmark, and Finland. As a result of this change staff was moved from Katrineholm to Södertälje, where the sales company for trucks, Scania Sverige AB, is located. The new sales company was named Scania Sverige Bussar AB (SSB) since it from now on would work only towards the Swedish market. Before the year of 2006 SSB will be integrated into Scania Sverige AB, and the same organisation will then be responsible for the sales and services of buses, coaches and trucks on the Swedish market.

The total market in Sweden comprises about 800 vehicles per year. SSB sell buses and coaches both through dealers and directly to end customers. About 200 vehicles are sold in Sweden by SSB every year, and around thirty per cent of these are sold by dealers while the rest is sold by SSB directly. Selling directly to end customers is mainly associated with the selling of coaches and city buses to major public transport companies such as Connex, Swebus, Busslink, and Arriva. These companies buy about seventy per cent of all the buses and coaches Scania sell in Sweden. The dealers, about seven in Sweden, mainly sell coaches and intercity buses to smaller operators. There are dealers that are owned by Scania, as well as private dealers. Irizar is mainly sold through a private dealer in Värnamo, called Svenstigs. Whether or not Scania own the dealer does not have any effect on the order process.

When SSB sell a bus or a coach they order a chassis from Scania CV and a body from a body builder, and sell a complete bus to the customer. The main body builders used are Swedish Omni, Vest-Busscar in Norway, Lahti in Finland, and Spanish Irizar. When a bus is sold through one of the dealers, the dealer buys the chassis through SSB, but orders the body from the desired body builder. An exception is when the dealer orders a bus with a body built by Omni or Irizar. In those cases the dealer can order a complete bus from SSB.

4.4.3.1 Sales at Scania Sverige Bussar AB (see figure 4.14)

Sales Support from Scania CV

SSB feel that they do not receive sufficient support and information from Scania CV about product updates and what arguments to use when selling a product. To be able to sell vehicles effeciently, SSB feel it is important that the salesmen receive the information and education they need about the products.

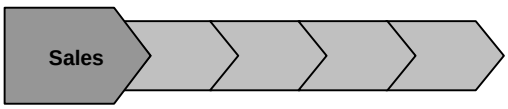

Figure 4.14: The part of the sales-to-delivery process that concerns sales.

Sales of Omni Products

When there is a tender invitation on city bus traffic, SSB create preliminary specifications according to the requirements from the authorities and to the individual wishes of each of the transport companies competing. These specifications serve as offers from SSB. The next step is to meet with each transport company to make

adjustments to the preliminary specification, and thereby form the definite specification. Involved in this are, in addition to the transport companies and SSB, personnel from Omni.

SSB have a list of standard prices from Omni for the Swedish market, but since there are always a great number of S-order points on the bodies it is not possible to submit an offer based on these prices without contacting Omni. However, since the public tender invitations often concern a large number of vehicles, SSB feel it is in any way necessary to have a dialogue with Omni about how the price can be decreased in each offer.

There is no system for assuring that SSB get continuous information about product updates from Omni. This is considered a problem by SSB.

SSB sometimes visit Omni's production plant together with the customer to inspect the buses while they are still in production. As previously mentioned, the specification form serves as a checklist for the customer. SSB feel that this inspection is important, since there are often details on the buses that are not manufactured correctly and it is better to discover such inaccuracies before all buses are completed.

Sales of Irizar Products

When selling an Irizar coach, the salesman from SSB fills in a specification of the chassis on a form in Microsoft Excel, which also serves as a price-list and a calculation sheet. With this form as a base, SSB are able to submit an offer on the price of the coach to the customer without having to contact Irizar.

As with Omni, SSB feel there is a lack of continuous information from Irizar about product updates.

When the date for transportation of the coach from Spain approaches, SSB contact the customer to decide whether a delivery inspection should be performed at Irizar's production facilities or not. If the customer wants any changes on the coach, it is easier to perform these at Irizar before the coach is delivered from Spain.

4.4.3.2 Order Handling at Scania Sverige Bussar (see figure 4.15)

Ordering towards Scania CV

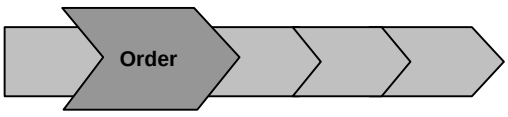

Figure 4.15: The order-related part of the sales-to-delivery process.

Before the move from Katrineholm to Södertälje, SSB placed their orders and specified chassis straight into the ordering system SMOFS. After the order had been registered, SSB received an automatically generated reply and a copy of the registered specification. It was however decided that SSB, in connection with the move would start to place their orders in the same way as the other sales companies. Therefore SSB, since the beginning of 2004, place their orders by e-mail, using the original specification form where the choices are marked by a cross (see Appendix C). When the order has been registered at Scania CV, SSB receive a confirmation and a copy of the registered specification.

Ordering towards Omni

E-mail, and to some extent fax, are the main means of communication between SSB and Omni in the order process. Exceptions are discussions before an offer is made to the customer, and if problems occur, for example associated with the specification of bodies. These discussions are most often held on the telephone.

The complete buses are specified in a specification form in Swedish that SSB have developed with Omni's general English specification form as a template. The reason for this is that the customers prefer the specification form to be in Swedish since all other documents, for example the tender invitations, are in Swedish. The Swedish specification form has fewer options than the original one, since not all options are relevant for the Swedish market. This form is also used as an offer to the customer, and the customer will use it as a checklist when inspecting the completed buses. After the specification form has been filled in together with the customer, SSB transfer it to Omni's original specification form, which is then sent to Omni.

Order confirmations from Omni are received in two steps. The orders, which are sent to Omni as soon as the businesses are won, are confirmed by information from Omni about delivery dates and order numbers. Since the final specifications of the buses are not sent until thorough discussions have been held with the customers, the confirmations of these are not received by SSB until later.

Ordering towards Irizar

As mentioned before, specifications of Irizar's coaches are done on a form in Microsoft Excel, which also serves as a price-list and a calculation sheet. When the form has been filled in, it is sent by e-mail to Irizar that confirm the order and the specification. When this report is being written, SSB have just started to use this form, and there are still a few aspects of the form that need to be improved. Before the form was introduced, there was no standard form to use when specifying Irizar coaches.

Regularly SSB receive a list from Irizar of which coaches are under production, and when they are estimated to be ready for delivery. When the date for estimated delivery of a coach approaches, SSB contact Irizar to verify the date.

4.4.3.3 Stocks of Chassis and Built-up Vehicles

SSB keep two or three chassis for coaches in pipeline or in stock at Scania CV. They also keep two to four built-up coaches in stock as demonstration vehicles, mainly with bodies from Irizar. These can be used to win orders where extremely short lead-times are requested. The coaches are kept at SSB, but dealers can borrow them when necessary.

4.4.3.4 Reservations and Forecasts at Scania Sverige Bussar

Amongst the body builders the only one that receives any kind of forecast from SSB is Omni. The estimated need for buses on the Swedish market is based on information from salesmen and other sources about the situation on the market. All possible public tender invitations on city and intercity buses are listed and followed up. When a transport company wins a contract, it is taken into consideration by SSB which company it is, and what relation this company has with Scania. Depending on this relation, as well as on other aspects, the business is classified as "hot" or "possible". A business can not be classified as "hot" before the contract has been won by a transport company. Every quarter Omni receive a list of potential tender invitations as well as an estimation of the number of buses SSB will order, and every month they receive the list of "hot" and "possible" business. The quarterly estimation of sales is corresponding to the forecasts that are sent to Scania CV.

4.4.3.5 Internal Communication at Scania Sverige Bussar

SSB would like to have a more structured process for collecting information about for example prices, warranties, delivery times and DDS's when placing orders. They feel that they have neglected to create routines since they work closely together and easily can visit each other's offices to get information. However they would like to gather all information at one place, where it is accessible for everyone and easy to update.

4.4.4 The British Sales Company

Scania Buses and Coaches UK (from now on written SBC) is located at Worksop, about 31 kilometres southeast of Sheffield. SBC is divided into two departments, one for coaches and one for city buses. They work with the body builders Irizar, Van Hool, and Berkhof on coaches and with Omni, East Lanc, and Wrightbus on city buses. Within the coach department there is a special group dedicated to the selling of used vehicles. The work of this group is necessary in order to keep the stock of used vehicles down, since it is essential on the British market to offer customers to trade in their old coach when buying a new one.

Scania have a market share of approximately 15 per cent on the British market, which means around 450 vehicles, of which about 75 per cent are buses and 25 per cent are coaches. There has been a significant increase in sales over the last couple of years. Sidan: 41
[0]This is partly due to that SBC expanded their product range four years ago by entering the city bus market, since last year also including double-deckers manufactured by East-Lanc, and partly due to the fact that SBC now offer a wider range of coaches than before. There has been a demand for new manufacturers of double-deckers on the market, and thanks to this SBC managed to sell 100 vehicles during their first year in the business. The total demand for double-deckers on the British market is 1000 vehicles per year. The double-deckers sold by SBC are built on a longer chassis than the vehicles of the competitors, which allows East-Lanc to put in more seats. This is a big advantage since it is important for the profitability of the transport companies to offer seats for as many passengers as possible. Another advantage is that East-Lanc's double-deckers fulfil the requirement for height to the ceiling in city traffic, but are at the same time low enough to pass under bridges in the

countryside. This allows the operator to use the buses for both city and country traffic, which makes East-Lanc unique on the market.

4.4.4.1 Sales at Scania Buses and Coaches UK (see figure 4.16)

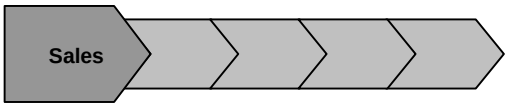

Figure 4.16: The part of the sales-to-delivery process that concerns sales.

Even though the product range SBC offer has increased, there are still only a limited number of variants on buses and coaches, which the customers must stick to. Information about which chassis that can be fitted with which bodies is gathered in one document, and it is not possible for the customers to order a product type that is not covered by SBC's limited range.

SBC have access to fix standard prices for the body and the chassis, and can therefore often submit an approximate offer to the customer immediately while filling in the specification. They know the difference in price between different options, and can therefore give the customer a hint of the price for the vehicle even if they have to contact Omni or Irizar for the definite price on the S-order points.

Sales Support from Scania CV AB

SBC think they receive adequate support from Scania CV.

4.4.4.2 Order Handling at Scania Buses and Coaches UK (see figure 4.17)

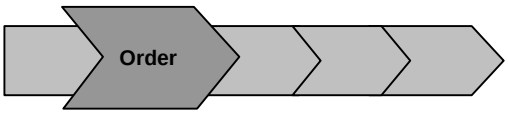

Figure 4.17: The order-related part of the sales-to-delivery process.

The order process at SBC is done by manually filling in orders and specifications and sending them by e-mail or fax to Scania CV and the body builders. This works satisfactory, and if an information technology system for the placing of orders and specifications were to be implemented, SBC would prefer it to be one that could be used towards all parties, Scania CV as well as body builders. According to SBC it is quite common, both for Omni and Irizar, that vehicles are not built fully according to the specification. SBC are not quite sure what the reasons for this is, but they believe it might be due to communication problems such as misinterpretations when translating the specifications.

SBC do not consider it a problem if the ordered chassis are not optimally adjusted to the designated body. Since the production processes of most body builders are flexible the manufacturers are, according to SBC, capable of building any bus on whichever chassis that is sent to them.

The customers of SBC generally want their buses and coaches delivered as soon as possible. Because of this there is no room in the order process for time buffers. The order processes for both Omni and Irizar differ in that aspect from the ones described in chapter 4.4.1 and 4.4.2. Instead of ordering the bodies in order to get the DDD for the chassis, SBC first order the chassis and transfer the PDD to the body builder. They

ask for the body builder to start the production of the bodies as soon as possible after the chassis has arrived.

Ordering towards Scania CV

In the past when SBC specified the chassis they did this on the original forms with all different options available. Lately they have instead started to use the altered specification forms and referring to a standard specification or a specification sent with a previous order. This has simplified the activity of specifying and reduced the number of faults on chassis delivered from Södertälje. The forms and orders are sent to Scania CV by e-mail.

The British market is unique in Europe in the sense that the driver's seat in the buses and coaches has to be placed on the right-hand side due to the left-hand traffic. Since not all Scania chassis are produced with right-hand steering, SBC sometimes have to order chassis that are left-hand driven and rebuild them at a local workshop.

In order to, before placing an order, get information about in which production period there is room for a chassis, SBC have to contact Scania CV by telephone or e-mail. There is no means for them to attain this information by themselves.

Ordering towards Omni

When specifying a bus together with a customer SBC use Omni's own forms that have been adjusted for the British market. The adjustments of the specification forms are made by SBC and Omni in collaboration.

SBC communicate with Omni by e-mail during the order process. Details about the order and the specification may be discussed on telephone, and then confirmed on e-mail. One problem in the communication occurs when deliveries of buses are delayed for some reason. Often Omni fail to report the delay in time, which results in unnecessary inconvenience for SBC.

Ordering towards Irizar

The communication with Irizar works unsatisfactory, it is hard for SBC to get clear answers to questions. Staff at Irizar promises to see to that action is taken in different situations, but fail to register the decision or change, which results in it never being implemented. It has also happened that Irizar have used another chassis when building a coach than the one that was designated for that particular vehicle. This causes problems with the registration of the coach since different chassis are owned by different sales companies and designated to different markets. It is also hard to get confirmations of orders from Irizar within reasonable time.

Specifications and orders to Irizar are sent by fax. The forms used, both when specifying with the customer and for transferring the specification to Irizar, are developed by SBC and agreed on by Irizar. On the forms it is visible which options are standard, and which options incorporate additional costs. The salesman has access to prices for the different options, as well as to the margins. SBC sometimes experience problems with receiving order confirmations from Irizar.

At the time of the writing of this report SBC were anticipating the arrival of a web-based system from Irizar for altering specifications and attaining information about coaches in production. Through this system it will be possible to make changes to different parts of the body specification after the coach has entered the production. In other words there will be different last dates for when changes can be made depending on at what stage of the production process the changes have to be implemented. The system will also give SBC information about where in the production process specific coaches are, and at what date they are estimated to be completed.

4.4.4.3 Stocks of Chassis and Built-up Vehicles

SBC never order a chassis without knowing which body builder it will be sent to and what type of body that will be built on it. In order to be able to meet the demand for short delivery times, and to have access to demonstration vehicles, SBC keep built-up coaches in stock in their yard.

SBC do not think it would be possible to keep centralised stocks of neither chassis nor coaches, since there are significant differences between markets, for example left-hand contra right-hand steering. They also believe a centralised stock of built-up vehicles would be too expensive.

4.4.4.4 Reservations and Forecasts at Scania Buses and Coaches UK

Every quarter SBC report to Scania CV as well as to Omni and Irizar what volumes they anticipate to reach within the next year. These reports are based on experiences from previous years. According to SBC, they seldom cancel any of the reservations they place in MOPEX every month or have any problems to get reservations when they need them.

4.4.4.5 Internal Communication at Scania Buses and Coaches UK

The heads for the bus and coach departments respectively are also the only salesmen for new vehicles at SBC. Recently the two salesmen moved into the same open-plan office as the administrative personnel handling their orders. This has been a positive change for both parties. The administrative personnel now feel they have better access to their managers, and the salesmen feel it renders possible for them to leave more tasks, for example certain customer support, to their staff. This in turn enables the salesmen to spend more time contacting and selling to customers.

The communication between the personnel seated in the same open-plan office at SBC works satisfactory, but when it comes to the communication between personnel located in different parts of the premises there are shortages. There are no routines for storing and sharing information, and often several persons possess the same information without knowing it. At the same time their co-workers do not know whom to contact to access the information, and this results in unnecessary work and time spent on finding information. Information stored at different locations risks not to get updated, and there is a risk for out of date information to be shared and used. It also affects relationships with body builders and customers when information received by staff at SBC is unknown to other contact points. To improve the situation and to be able to store all information in one place, a database was under creation at

the time of the writing of this report. However, even with such a database the staff at SBC wishes for better communication between different departments and personnel.

4.4.5 The German Sales Company

Until 1998 Scania did not sell complete buses and coaches on the German market, but only chassis. It was the truck distributor that took care of this business. In 1998 Scania Bus Deutschland (SBD) was formed, and started to sell Irizar coaches. In the beginning of 2004 SBD also started to sell Omni buses. Every year approximately 5000 coaches are sold on the German market. SBD sell about seventy of those, and accordingly have a market share of almost 1.5 per cent. Domestic brands together have a market share of eighty to ninety per cent. There is a significant demand for quality on the market.

SBD's coach customers are mainly small, private actors that are buying one or two coaches at the time. Lately however, more and more larger customers, i.e. customers that buy three to five coaches at once, have shown interest.

4.4.5.1 Sales at Scania Bus Deutschland (see figure 4.18)

Sales Support from Scania CV

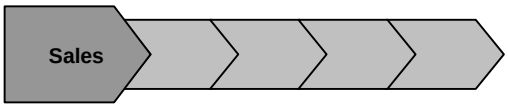

Figure 4.18: The part of the sales-to-delivery process that concerns sales.

SBD consider there being a need for a sales-system including prices, calculations, specifications for body and chassis, interior specifications and seats planning, and order confirmation. The system should make it possible to visualise for the customer what the bus or coach will look like depending on the choice of colours as well as number of and placing of seats. SBD are not interested in any solution that does not include both the chassis and the body in the same system. The only administrative tasks handled by the salesmen are the submitting of offers. A sales-system that would enable for this activity to be performed more efficiently would liberate time both for the salesmen and for other staff at the office.

The information provided by Scania CV about product updates is not sufficient according to SBD. The staff at SBD have to look on Outline for product news.

Sales of Omni Products

When this report is being written, SBD have not yet started to order buses from Omni for customers.

Sales of Irizar Products

When specifying an Irizar coach together with the customer, the salesman uses a specification form for the complete vehicle. This form includes all options available as well as prices for every option. If the customer has some specific request not covered by the options, the salesman has to contact Irizar to be able to give a price. As long as the customer sticks to the standard specification the chassis are compatible with the bodies. S-orders on the body normally do not have any effect on the

compatibility with the chassis, but if SBD suspect that the chassis construction might be affected by a request from a customer, they ask Scania CV and Irizar to communicate this between them and thereby solve the problem. The specification is either filled in on a printed form or on the computer of the salesman. The specification of the interior of the coach is performed in a special room at SBD, where they keep samples of textiles for seats, curtains, inner walls, and ceilings. This specification also includes descriptions of number of seats and their planning, and it is filled in on an individual form, developed by SBD and agreed on by Irizar.

The support from Irizar when it comes to information about product updates is not considered to be adequate. SBD often ask for information about product news, but feel that there is no active support from Irizar.

4.4.5.2 Order Handling at Scania Bus Deutschland (see figure 4.19)

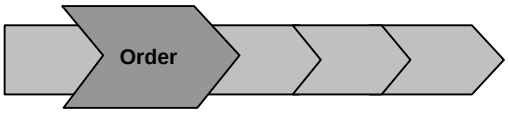

Figure 4.19: The order-related part of the sales-to-delivery process.

The salesmen at SBD meet with the customers to fill in the specification, which is then printed and handed over to administrative staff at SBD's office. At the moment there is only one person at SBD handling all administrative tasks associated with the order handling. This person transfers the information from the specification to the forms that will be sent to the factories. When the order confirmations arrive, the specifications have to be checked in order to make sure that they correspond to the ones sent. This repeating of manual registration and checking takes a lot of time, and the additional step between the gaining of information from the customer and the registration of it, when the specification is handed over to administrative staff, opens for mistakes being made. Everything is done manually, mainly in Microsoft Excel. Since the handling of the orders takes a lot of time, the administrative staff is working under high pressure in order to cope, which also increases the risk of faults. Even if faults are rare, much thanks to the fact that the person handling the orders has become somewhat an expert, they are often very costly when they do occur. SBD would prefer if the salesmen themselves could specify and order the vehicles directly to the factory through a shared information technology system.

SBD do not believe that the order process would improve if they were to send the specification for the complete vehicle to Scania CV or the body builders. Instead they fear that an additional step when half of the information has to be transferred from either Scania CV to the body builder or the other way around would mean an additional stage sensitive to manmade faults. They also appreciate the variety in working with different companies and cultures.

Ordering towards Scania CV

When a salesman from SBD is specifying an Irizar coach with a customer, he or she uses a specification sheet that includes both the specification of the chassis and the body. This sheet is developed by SBD and used in their internal organisation only. There are only a limited number of options for the chassis on the specification sheet, since the customer is only allowed to choose motor, gearbox and overhang. All other options are already set in standard specifications, of which there is one for every type

of coach. When the order is being placed, all that needs to be sent to Scania CV is an altered specification form with reference to a standard specification. The altered specification form is sent by e-mail, and a confirmation from Scania CV arrives quickly.

Ordering towards Omni

Since SBD have not yet started to order Omni for customers when this report is being written, a complete description of the order process can not be provided. However, a few demonstration buses have been ordered by the use of Omni's own order forms. These forms are by SBD considered inefficient and old-fashioned. It is however appreciated that the specification for the complete bus can be retrieved by stating the chassis-number, instead of searching through archives of documents. This facilitates the operations of the after-sales, since they easily can locate information on previously sold vehicles.

Ordering towards Irizar

As mentioned above, the salesman uses a specification form for the complete vehicle when specifying a coach together with the customer. When the specification has been agreed on, the salesman hands over a printed copy of the body specification, often covered with notes and instructions in the margin, to the person handling the placing of orders and the registration of specifications. He manually transfers the information in the specification to an altered specification form for the chassis (see above) as well as to an e-mail with a list of choices on options for the body with reference to a standard specification. The specification of the interior is also attached to this e-mail. When the confirmation arrives from Irizar, either by fax or e-mail, it is gone through carefully and a confirmation is given to the customer within six weeks. Sometimes the confirmation from Irizar arrives very late, often not until SBD request it. A late confirmation can cause problems if it does not correspond to the order sent by SBD. The delivery of the coach might be delayed due to such problems. Daily contact with Irizar allows the person responsible for the order process to keep track of the coaches in production.

SBD feel that there is a lack of co-operation between Scania CV and Irizar. Neither Scania CV nor Irizar have knowledge about, or seem to care about, how the complete bus will look and operate. Instead of communicating directly with each other they leave the responsibility of specifying a functioning coach to SBD. SBD do not feel that they have, or should have, the technical knowledge necessary to take this responsibility. According to SBD their job is to sell coaches, and the technical aspects should be taken care of by Scania CV and Irizar together.

The Irizar coaches that arrive from Spain are not quite ready for delivery to customer. All electronic equipment, such as navigation systems and CD-players, as well as kitchens, still has to be installed. This is done by SBD's own electrician in their workshop and takes two to three days. The reason for the work being performed in Germany is that neither the installations done in Spain nor the equipment Irizar provide meet the requirements on the German market. For example, the navigation systems installed by Irizar are not of the latest version. To perform the installation of the equipment in Germany instead of in Spain is a little bit more expensive, but since SBD have not been able to convince Irizar to change their process they find it

necessary to do the work themselves. There have been discussions on the subject, and technicians from Irizar have visited SBD to learn how the Germans want the installations to be made properly. However, so far this has not led to any improvements. SBD also have to clean the coaches before the customers inspect them, since they are not satisfied with the cleaning performed by Irizar before delivery to Germany.

In Germany there is a system for classification of coaches according to comfort-level. The coaches are allotted one to five stars, for example depending on the distance between the seats. If there is not enough space for the legs for all passengers in a coach to fulfil a certain standard, the coach will be classified as of a lower class. It is common for German customers to measure the distances between the seats when they perform the delivery inspection, and if Irizar have been neglectful when installing the seats this might cause problems for SBD getting the customer to accept the coach.

4.4.5.3 Stocks of Chassis and Built-up Vehicles

Since the chassis ordered by SBD are standardised, SBD consider it feasible, and also necessary, to always keep a number of chassis in stock or in pipeline. During spring, when coaches ordered are needed within a few months, SBD keep about 14 to 18 chassis in pipeline, but during autumn the amount is lower. Thanks to the stock, SBD practically never need to order a chassis for a specific customer, and therefore the exact delivery date of the chassis is not very important. Chassis that leave Scania CV's production are most often delivered straight to Irizar, where they are stored in Irizar's yard. However, it has happened that Irizar have started to build bodies on chassis without an order from SBD, because they have felt a need to fill their production. To prevent this, SBD sometimes demand that completed chassis are stored in the yard at Scania CV. The person at SBD handling the placing of orders and specifications have created a list in Microsoft Excel where he every other day updates which chassis are available in pipeline or in stock. On Outline he can see if SBD have any chassis in production in Södertälje that has not yet been invoiced.

If there are no suitable chassis in pipeline or in stock, SBD utilise Open Market for placing orders on chassis. In this case they need the chassis as soon as possible, and therefore information about different dates for when the chassis can be produced is irrelevant. The only information SBD need is the PDD, which they hope will be in the near future.

SBD and their dealers together keep about ten to fifteen coaches in stock for demonstration purposes. Those are kept either at SBD or at the dealers' site. When dealers want demonstration coaches they have to buy them, and therefore these coaches are not really considered part of SBD's stock.

4.4.5.4 Reservations and Forecasts at Scania Bus Deutschland

SBD use Sales Platform, which is a sales support tool provided by Scania CV, to gain an overview of possible business. Sales Platform is a means to map the market as well as to categorise relations to customers, and thereby forecast possible businesses in a structured way. Thanks to Sales Platform SBD are able to prepare for orders in time by the use of chassis in stock or in pipeline, and therefore do not feel that the lead-time for delivery of complete coaches is a problem. SBD also use Sales Platform as a

tool for deciding how many reservations to make at the factories and how their forecasts should look.

SBD feel that the body builders are more dependent on the forecasts than Scania CV, due to the fact that Scania CV compensate miscalculations in reservations with Open Market and that chassis are more standardised than bodies. Irizar receive forecasts for three months at the time two months in advance. These forecasts are sent per e-mail.

4.4.5.5 Internal Communication at Scania Bus Deutschland

SBD feel that their internal communication works well, but that excessive time is spent searching for information in archives. If all orders instead were stored automatically in a database, SBD believe this would save time and facilitate the work for the after-sales function as well as for the administrative staff when placing new orders that are similar to old ones.

4.4.6 The Italian Sales Company

Scania Bus Italy (SBI) are located in Trento, about ninety kilometres north of Verona. They share their premises with Italscania, which is the organisation responsible for the truck sales and after-sales in Italy. SBI sell Omni products to the Italian market and chassis to other body builders, mainly to Irizar and De Simon. De Simon is an Italian manufacturer of intercity buses that only build on Scania-chassis, and they have been working with Scania since 1988. De Simon have a manufacturing process that is quite different from most other body builders. Instead of building the body on the chassis, they produce the body separately and then fit it onto the chassis. This allows for a short lead-time for the complete bus, and also gives financing advantages since De Simon do not have to pay for the chassis until the final phase of the production of the vehicle. However, it demands quite heavy and rigid body constructions, and their process is very sensitive to even small changes in the design of the chassis. Even though SBI are only suppliers of chassis to De Simon and Irizar, and do not sell complete vehicles to customers, they feel a responsibility for what type of vehicles their products will be used in. If they do not co-operate with the body builders in forming the product strategy, they feel there is a risk that the brand name of Scania is damaged. SBI sell about 300 vehicles and chassis per year, which gives them a market share of approximately twelve per cent.

In Italy *type homologation* is an important aspect to the selling of buses and coaches. Instead of authorities, like in Sweden, inspecting and registering every single vehicle, type homologation gives permission to sell buses or coaches built according to a certain specification. If you make any changes to the vehicle that influences the performance, you have to apply for a new homologation or a homologation update. Until September 2003 the homologation of a vehicle had to be done in the country where the vehicle was to be used, i.e. to be allowed to use the vehicle-type in Italy the bus or coach had to be homologated by Italian authorities. Since September 2003, however, it is possible to do a European homologation anywhere in the European Union. Once the vehicle has been approved for homologation in one country, the Italian authorities can not require any additional inspections. Homologation of Omni buses produced for Italy is therefore now done in Sweden. It is very important for SBI

that this process is working well, and that Scania CV provide them with all the necessary documentation after a homologation or homologation update.

4.4.6.1 Sales at Scania Bus Italy (see figure 4.20)

Sales Support from Scania CV AB

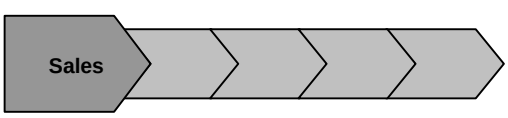

Figure 4.20: The part of the sales-to-delivery process that concerns sales.

SBI think the support from the factory in Södertälje is not satisfactory when it comes to supplying documents necessary for closing deals on city buses. They would wish the response from Scania CV to be more prompt, for example when asking for lifetime cost calculations on the vehicles. There is a function in the factory responsible for handling this kind of support, but SBI still request better information and quicker answers. There is also a lack of information about product updates. These are very important to SBI since even minor changes might make a homologation update necessary.

Sales of Omni Product s

When there is a tender invitation on city buses, SBI first examine the documents to conclude if they have the possibility to submit an offer or not. If there is no hesitation SBI construct a specification for the bodies and the chassis, and contact their Area Sales Manager at Scania CV to get a price on the complete buses. SBI do not have access to any standard prices on Omni bodies. If there are any requirements that are not covered by Omni's standard specification and which SBI are uncertain if Omni can fulfil, they ask for a *contract review meeting* with Omni in Katrineholm. Present at such a meeting are normally representatives for SBI and for the design department of Omni, as well as staff from Omni with good technical knowledge of the specific aspects that are subjects for discussion. If there are any complicating aspects on the chassis, SBI normally discuss this with Scania CV directly.

When Omni and SBI have managed to find solutions for every aspect in the specification, and SBI have received a price on the vehicles, an offer is submitted to the customer. If SBI win the business, they place the order for the chassis to Scania CV and the order for the bodies to Omni, using the preliminary specifications. Then they meet with the customer to decide on the details in the specification, and the final specifications and S-order lists for the chassis and the bodies are transferred to Scania CV and Omni respectively.

SBI do not feel that Omni provide sufficient support on product updates for them to handle the homologation procedures efficiently.

Sales of Irizar Products

Irizar have their own sales-organisation in Italy, Irizar Italia. Irizar Italia buy chassis from Scania and MAN, and sell complete coaches to customers. Only short vehicles, where Scania do not offer suitable chassis, are built on MAN chassis. Irizar Italia started to operate with Scania in 1994, and in the beginning they bought the chassis directly from the factory since there was no bus organisation on the Italian market.

Irizar Italia mainly sell coaches, but have also started to submit offers on public tender invitations for vehicles intended for intercity traffic.

Even though it is Irizar Italia that sell the coaches to the customers, SBI are involved in the process of marketing the products and approaching customers. SBI and Irizar Italia together decide what products to offer in which segments, and how they should position themselves in comparison to competitors. Today they have three standard products. The *Capacity* coach has a plain specification and is intended for customers looking for a cheap but safe alternative for short trips. The *Century* is a tourist coach at the middle level, and the *PB* is a highly specified luxury coach positioned at the top level. The fundamental specifications for these three types of coaches can not be altered on requests from the customers, since SBI want to avoid the three vehicle types competing in each other's segments.

SBI have worked together with Irizar Italia to standardise the chassis used for the three different types of coaches as much as possible. There is only one standard for each type of chassis, and the customer can not request any changes to these specifications. Since there are no S-order points on the chassis the SD-date is closer to the production date.

4.4.6.2 Order Handling at Scania Bus Italy (see figure 4.21)

Ordering towards Scania CV

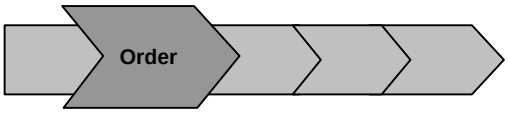

Figure 4.21: The order-related part of the sales-to-delivery process.

To get a homologation, buses sold in Italy can not be invoiced from two different companies. There must on paper be only one manufacturer of the bus, and because of this Scania CV have invoiced complete Omni buses to SBI. The orders for the chassis and for the bodies have been sent to Scania CV and Omni respectively, though. Since March 2004, due to the changes in the process of ordering Omni (see chapter 4.4.1.1), it is instead Omni that sell the complete vehicle to the Italian market.

Since SBI do not buy the chassis and the body separately, but the complete vehicle from one manufacturer, they do not have to finance the chassis until the bus is completed and can be invoiced to the customer. Because of this, they do not see any problem in Scania CV producing chassis too early. If Scania CV produce chassis before the DDD given by Omni, in order to fill their production, it is Scania CV's problem since they will have to finance the chassis for the extra period of time as well as finding a place to store them.

Standard specifications are used when ordering chassis from Scania CV. All documents, such as orders and specifications, are sent by e-mail between SBI and Södertälje. When something needs to be clarified outside the normal routines, this is often done on the telephone. SBI know whom at Scania CV to contact depending on the nature of the problem. Their main contact is their Area Sales Manager, but they also contact the factory or different administrative personnel directly if they find it necessary.

When an order and a specification has been sent to Scania CV, a confirmation arrives with a copy of the specification that has been registered. SBI have to check this specification carefully to make sure it corresponds to the one they sent, and normally there is something that differs so that the specification has to be resent maybe two or three times. According to SBI this is due to lack of knowledge of the staff registering the specification at Scania CV, and they believe CESOW could be a means to solve this problem. They hope it will be possible to use CESOW for specifying both the chassis and the body. However it has also happened, foremost right after the chassis production was moved from Katrineholm to Södertälje, that the chassis have not been manufactured according to the specification. SBI have for example been forced to change gearboxes as well as tyres at workshops in Spain or in Italy.

Ordering towards Omni

Offers that are submitted on public tender invitations in Italy are evaluated by points allotted to pre-set aspects. The number of points available for each aspect is depending on the preferences of the authorities inviting the tenders. For example, common aspects are lead-time, price, safety and lifetime cost. If price is allotted fifty points, the offer with the lowest price will gain fifty points on this aspect, and the offer with the second lowest price will gain a certain percentage of fifty points. In the end, the manufacturer that submits the offer with the highest amount of total points is the winner. To win the affair, it is important for the manufacturers that the strengths of their products are allotted a high portion of the total points available. Therefore an important activity to be able to compete on public tender invitations on the Italian market is lobbying. To have a reasonable opportunity to win the affair, it is necessary to try and influence the authorities before they set how the points will be allotted the criteria in the tender invitation. It is often quite easy, by looking at the requests and distribution of points in a tender invitation, to conclude which manufacturer has done the best job lobbying and consequently will have the best opportunity to win. Since delivery time and price are critical aspects for SBI, their aim is to make the authorities put little weight on those criteria.

When SBI win an order on city buses, they place the order for the bodies to Omni using the preliminary specification. The specification is made on Omni's original form, where SBI mark their choices on the standard options, together with an S-order list. The final specification and S-order list are transferred to Omni later, when SBI and the customer have agreed on the details. All orders and specifications are sent by e-mail. SBI receive a confirmation from Omni that the order is ok, but this confirmation is often very late. However, SBI relies on Omni noticing them if there are any problems with the order, and therefore they assume that the buses will be produced as requested if they do not hear anything from Omni. Often there is some detail discovered after delivery to Italy that needs to be fixed by SBI before the customer accepts the bus. According to SBI this is due to lack of communication or misunderstandings between SBI and the factory, and SBI find it hard to explain complex technical requirements on paper.

The buses on the Italian market are rather standardised, and when it comes to S-order points for Omni SBI appreciate that about eighty per cent of them are common for all buses sold in Italy. The rest of the S-order points differ from customer to customer and from order to order.

Orders from Irizar

SBI receive orders on chassis from Irizar by e-mail.

4.4.6.3 Stocks of Chassis and Built-up Vehicles

Since the chassis ordered by Irizar are standardised, Irizar Italia can keep five to six chassis in stock without deciding which bodies to build on them. Every month SBI and Irizar Italia decide on how many chassis to order and how many units to keep in stock. SBI generally never keep any unsold stock, but they might keep sold chassis in stock up to fifteen days. SBI only place orders for chassis on demand from Irizar that buy the chassis and store them at their plant in Spain.

4.4.6.4 Reservations and Forecasts at Scania Bus Italy

Every year SBI present their objectives and activity plan for the next twelve months. This is divided into the three segments city, intercity, and coach. It is built on information about financing programs from authorities regarding city traffic, relations to public transport companies, the status of the deregulation process of public transport, as well as on information from branch magazines, competitors, and body builders. This forecast is shared with Scania CV as well as with the body builders Irizar and De Simon, but not with Omni directly. In the activity plan it is determined how to act in order to fulfil the projection.

SBI also inform Scania CV about their financial projection based on sales every quarter. This includes information about anticipated sales of buses and chassis as well as all SBI's costs.

Reservations in MOPEX are made after discussions with Irizar and De Simon about what chassis will be needed for the next months. Preliminary bookings in Omni's production are based on "hot" and "possible" businesses and their quantities, categorised according to the probability that SBI will win the affairs. The probability is considered high if the customer has previously bought buses from Scania and been satisfied with the vehicles, and if SBI feel that they have done a good work lobbying before the tender invitation. There is however a dialogue with Omni about these reservations, and in case Omni receive an order from another sales company but not from SBI they cancel the reservation if SBI can not guarantee they will have an order to place for the period. The list of "hot" and "possible" businesses is sent to Omni every month.

4.5 Body Builders

Scania co-operate with two body builders as their Globally Preferred Partners, namely Omni and Irizar. These will be presented in the following chapters and their order processes towards Scania will be described.

4.5.1 Omni

Omni is a subsidiary completely owned by Scania, and one of Scania's Globally Preferred Partners. They manufacture buses for city and intercity traffic that are sold in Sweden, Denmark, France, Italy, Great Britain, as well as on occasion in Norway, Finland, and Korea. Scania's German sales company has recently started to work with Omni by ordering a few demonstration buses. All buses that Omni produce are built on Scania chassis, and sold through Scania's sales network.

All buses are made in aluminium, which is quite unique and regarded as a strength in competition with other manufacturers, mainly due to the low weight and non-corrosive qualities of the material. Omni products are also competitive in terms of safety and maintenance costs. The price, on the other hand, is regarded as high.

Omni are located in Katrineholm, Sweden, and until recently the main production plant was sited there. During the end of 2003, however, most of the production was moved to Poland and the only activities that remain in Katrineholm are assemblies of prototypes, and some cases of adjustments that need to be made on buses after the pre-delivery inspection. The Poland plant has a capacity of producing between thirty and forty buses per month. There is also a production facility in Russia, which manufactures about ten buses per month. The total production of Omni buses in 2003 amounted to approximately 450 units and Omni regard this fairly low volume as a problem. They receive too few orders to fill the production and it is difficult to handle the large fluctuations in demand.

Scania's strategy has previously been to consider Omni as being just another body-builder. However, the customers' growing demand for purchasing complete vehicles from one single source has made Scania review their standpoint. It has become apparent that there is a lot to gain by taking advantage of, and developing, the close relationship that already exists between the two companies due to their common history and the fact that they have been situated side by side for several years.

4.5.1.1 Sales at Omni (see figure 4.22)

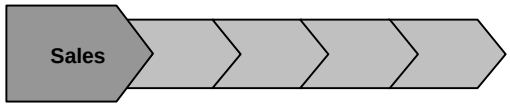

Figure 4.22: The part of the sales-to-delivery process that concerns sales.

All Omni products are sold by Scania's sales companies. Until recently, Omni did not have any proper market organisation and no channels to work directly with the market, which consequently made them dependent on Scania to be able to sell their products. Communication between Omni and the sales companies was formally performed via the Area Sales Managers at Scania, even though information was frequently exchanged directly. In association with the implementation of the new order routines in the beginning of 2004, a market and sales

organisation was set up at Omni that would take over part of the tasks previously performed by the Area Sales Managers. The purpose was to improve the communication with the sales companies and enable Omni to get better knowledge of what goes on in the market. The sales companies still manage the customer relations, but by working closer together with them Omni hope to be able to give better support and information about prices and specification details, as well as being more active in the sales and tender process.

Omni manufacture buses, and as described previously in chapter 4.2 a public tender process precedes most bus orders. When a Scania sales company decides to participate in a tender process, they contact Omni with a request for an offer. Most of the times the customer has dictated a number of requirements, which have to be fulfilled by the supplier in order for it to be able to apply for the tender. Omni go through the requirements that concern the body in order to see if they correspond with options that their production is technically prepared to manufacture as standard. For requirements that do not correspond with Omni's standard offer, an S-order list is created. Every order point on this list requires an evaluation of whether it would be possible, and in that case what it would cost, to produce it. In order to minimise the number of S-order points Omni may try to convince the sales company and the customer that they can offer an equivalent solution from their standard program. When all customer requirements are taken into consideration, Omni send a tender proposal to the sales company. The sales company creates a tender for a complete bus and presents this to the customer.

4.5.1.2 Order Handling at Omni (see figure 4.23)

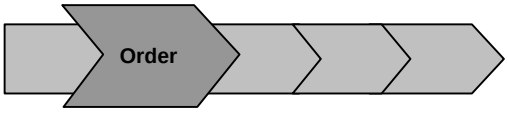

Figure 4.23: The order-related part of the sales-to-delivery process.

The order routines for Omni products were changed in the beginning of 2004. At the time of writing this report very few orders had been registered since the change, and some details concerning the new routines were yet to be determined. The information that was collected about the order process during the work with this report is therefore a description of how things are *supposed* to work rather than actual experiences of the process. As mentioned in chapter 4.4.1, the new routines imply that the sales companies will send orders for complete buses to Omni that in turn order the chassis from Scania CV. It is easier for Omni than for the sales companies to anticipate when the chassis will be needed to enter the body production, and therefore the change is expected to result in a better synchronisation between the chassis deliveries to Omni and the date of entry into the body production. The change is also expected to create a better fit between the specifications of the chassis and the body. The following chapter will describe the sales-to-delivery process at Omni according to the new conditions, and only in some cases refer to the former structure.

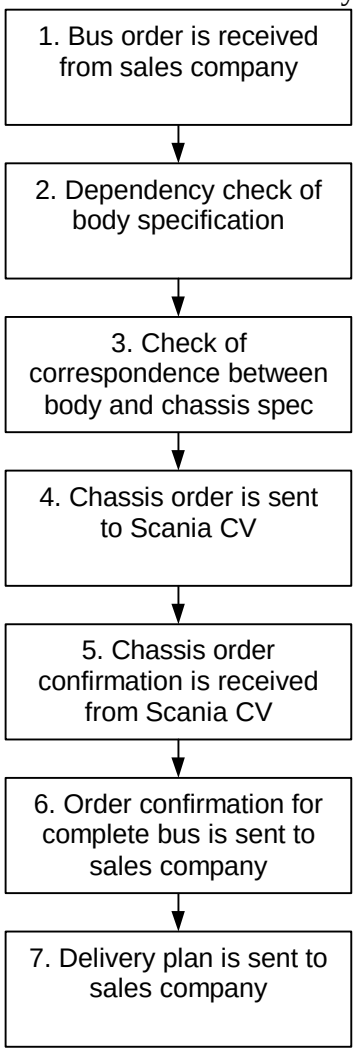

Figure 4.24: The order handling at Omni.

The sales companies send orders to Omni, mostly by e-mail, including information about who the customer is, the delivery address, the quantity, type of buses, and the desired delivery date for the complete buses (See box 1 in figure 4.24). This order form (see Appendix E) has been developed by Omni. Specifications for both the chassis and the bodies are submitted with the orders. The body specification form is created in Microsoft Excel, just like the chassis specification form (see Appendix C), which implies that the sales companies can fill in any combinations of options. However, many of the options are interdependent, and putting a cross in one box may reduce the number of available options in another part of the specification form. A list is provided at the end of the specification form where all the dependencies are stated, but since the form is extensive and many of the choices are connected to several others it is difficult to follow the dependencies. An indication of whether or not the options that are chosen are possible to combine is given when Omni has received the order and registered the body specification in a computer system (2). Every choice has to be registered manually into the system, which is a time consuming work. A result is received from the system within a couple of hours and if any errors are detected, the sales company has to be contacted to clarify which choices they intended to make. It may also be necessary to involve the customer in cases where a new choice has to be made.

According to both Omni and the sales companies, the specification forms are lengthy and complicated. There are too many alternatives and it is difficult to understand how they are dependent on each other and what they actually mean. Omni believe that many mistakes could be avoided by providing the sales companies with better product information such as descriptions, pictures, and drawings of the alternatives in the specifications. There is no tool or system available today for providing such information. It would also be possible to reduce the extent of the specifications by adjusting them to the different markets. All alternatives would not have to be available on all markets.

When the body specification is corrected, an additional control is performed to check that the chassis and body specifications are compatible (see box 3 in figure 4.24). This is also done manually as there is no system available for this purpose. Some choices must be consistent between the two specifications in order to make the chassis and the body fit together. For example, the choices of the vehicle's width, as well as the dimensions of the fuel tank must correspond between the chassis and the body. According to Omni, the workforce in the Katrineholm plant is experienced and can thus detect most such errors just by looking at a chassis. In the Poland plant, on the other hand, many of the errors are not identified until after the chassis have entered Omni's production, which causes large problems. The new order routines are expected to decrease the risk for discrepancies between the chassis and the body specifications, as Omni and the sales companies will work closer together when creating the specifications for the complete buses.

Before ordering the chassis (4), Omni contact the plant where the buses will be manufactured, which most of the time is in Poland, to get information about when the chassis will be needed there. Omni order chassis from Scania in the same way as the sales companies do. A description of the order process can be found in chapter 4.3.2.2.

Omni receive order confirmations from Scania CV of the chassis orders. The order confirmations include the PDD, the SD-date, the verified specification, and the delivery address for the chassis.

Omni send order confirmations to the sales companies by returning the order form, including information about when the buses are due to be delivered and when the complete body specifications are needed, which is seventy days prior to delivery of the buses. The SD-date for the body is twenty days after the date when the complete specification is needed, and during these days Omni order material and start creating drawings and purchasing basis for the S-order points.

The construction of the roofs and the sides of the buses is initiated in Omni's production before the chassis arrive.

When the chassis have arrived at Omni's production plant, Omni send updated delivery plans to the sales companies with information about when the buses are estimated to be ready. However, information about deviations from the delivery plans are not always distributed to the sales companies in time.

Omni experience a lack of communication between different functions within Scania CV. Omni may provide Scania with information, and yet receive an inquiry concerning the same issue several months later.

4.5.1.3 Lead-time at Omni

The production lead-time at Omni is about 3.5 weeks. Two weeks are spent on the production line, and the rest of the time is used for preparations to get the bus ready for delivery. The chassis is needed at Omni about six to seven days before the meeting-point when the assembly of the chassis and the body starts. As mentioned previously, there are twenty days between the SD-date and the date when Omni want the complete specification of the body. The reason for this is mainly that Omni need time to make preparations for the S-order points. Consequently a reduced number of S-order points in the specifications would mean a possibility to minimise this time period.

4.5.1.4 Stocks of Chassis and Built-up Vehicles

Omni do not have space enough to keep stock of neither chassis nor complete buses. Chassis deliveries from Scania CV are generally considered to be quite accurate in time. Yet, chassis are occasionally delivered too early, which is regarded as a problem.

4.5.1.5 Reservations and Forecasts

Omni collect information about the situation on the markets by talking to the Area Sales Managers at Scania CV and to the sales companies on a regular basis. The sales companies provide Omni with a list of their "hot" and "possible" businesses approximately once a month. This is done in a Microsoft Excel document that Omni have created[96], and it gives an indication of how the sales companies estimate their chances of winning the tenders that are currently out on the market. The list includes information about the type of product, the quantity, and who the customer is. These forecasts serve as basis for Omni's decisions about investments in buildings, tools, and labour. They also affect the forecasts that Omni in turn give to their suppliers, and if these forecasts are based on unreliable information the relations between Omni and their suppliers are damaged. Omni will have an unfavourable position in negotiations, and the suppliers will have difficulties meeting the actual demand from Omni in time. Omni do not make any reservations in their production according to the sales companies' forecasts, since they think that they can not rely on getting the businesses that are marked as "hot".

According to Omni, the sales companies do not put enough effort into estimating their potential businesses. The reason, or part of the reason, is believed to be that the sales companies do not feel the direct consequences of how well the estimations correspond to the actual sales. One of the objectives with the new market organisation at Omni is for the company to be more present at the market and to take part in the tender

[96] The Italian sales company is an exception. They use their own forms, which Omni transfer into the hot/possible list.

process. This will give Omni a better picture of the markets and make them less dependent on the information they receive from the sales companies.

4.5.1.6 Internal Communication at Omni

Omni was part of Scania until 2002 when it was turned into a separate company. Many new routines had to be developed in connection with the reorganisation and Omni therefore experience a lack of structure in their work. Too much knowledge and competence is also believed to be possessed by single individuals within the company, rather than spread throughout the organisation.

4.5.2 Irizar

Irizar are a Spanish coach manufacturer and one of Scania's Globally Preferred Partners. The production of coaches began in 1928 and today Irizar produce about 2500 coaches each year, which makes them the second largest coach manufacturer in Europe. Nearly seventy per cent of the coaches are built on Scania chassis. The main production plant is located in Spain and it contains six lines.

Part of Irizar's strategy is to be flexible in order to meet the various customer needs. A chassis can be shifted from one customer order to another if necessary, and since most of the operations are manual the production can be adjusted to suit a wide range of requirements. Unlike Omni, Irizar sometimes build up coaches without performing the final customisation, such as the painting or the mounting of seats. There are obvious advantages associated with flexibility but it also increases the risk for errors and may lead to lower quality. In terms of production rate Irizar are less flexible. One of their most prioritised objectives is to always fill all the production slots, and since the demand for coaches is seasonal this leaves them with problems during the low season. When the demand is low, Irizar push the sales companies to deliver chassis earlier than planned. In exceptional cases the lack of orders connected to available chassis has lead them to put chassis into production that were originally not planned for that customer. Such actions cause problems for the sales companies since each chassis has a chassis number that is connected to the order number.

4.5.2.1 Sales at Irizar (see figure 4.25)

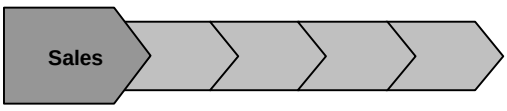

Figure 4.25: The part of the sales-to-delivery process that concerns sales.

In most of the European countries, coaches with Scania chassis and Irizar bodies are sold through Scania's sales network. The sales companies receive orders for complete vehicles from the customers, and order the chassis from Scania CV and the bodies from Irizar. The exceptions from this procedure are Spain and Italy where Irizar act directly towards the customers. In Italy Irizar have a sales-organisation, Irizar Italia, that purchase chassis from Scania and sell complete coaches to the customers. The Spanish market differs from the other European markets since customers there tend to buy chassis and bodies separately. Therefore, both Irizar and Scania sell their products directly to the Spanish customers.

Irizar keep in contact with the markets through *reliability teams*. There are fifteen reliability teams, and six of them are responsible for different regions within the Spanish market. Due to the market structure, these teams mainly deal directly with the customers. The remaining nine teams take care of about two or three European countries each, and their primary market contacts are the Scania sales companies. However, they visit the customers together with the sales companies in order to gain knowledge about their demands and opinions about the products.

Irizar provide the sales companies with price lists that can be used for calculation and as specification forms. These lists contain prices for standard choices and hence the sales companies often have to consult Irizar to receive prices for the S-order points.

4.5.2.2 Order Handling at Irizar (see figure 4.26)

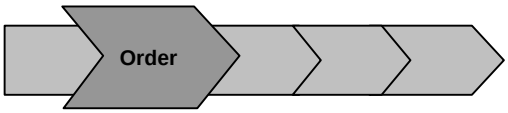

Figure 4.26: The order-related part of the sales-to-delivery process.

Sales companies order bodies from Irizar by fax or e-mail. The customer often comes to Irizar to specify the body, and otherwise the specification is sent in together with the order. There are no common order or specification forms, and consequently they look different between the sales companies. Irizar send order confirmations to the sales companies by fax with information about when they need to receive the chassis. These confirmations, however, are often sent as late as after the coaches have been delivered.

There are no channels for transferring information from Scania CV to Irizar about when the chassis will be ready and delivered to Spain. At the moment this information is passed on by the Scania representative being placed at the delivery centre at Irizar. The production planning at Irizar is performed weekly for the coming four weeks. The orders are put in sequence to enter the production according to when the customers want to have the coaches delivered. However, the coach production can not start until the chassis has arrived, and Irizar are therefore dependent on reliable information about the chassis deliveries in order to perform an optimal production planning.

Irizar provide the sales companies with a list of the coaches they have in production, and when these will be ready for delivery. The sales companies also keep in regular phone contact with Irizar to update this information.

When a vehicle is completed, Irizar perform a pre-delivery inspection to check the quality. Yet, there have been problems with coaches that do not meet the customers' quality requirements, and therefore Scania have established a delivery centre at Irizar that makes an additional check after the pre-delivery inspection. The check is made on behalf of the customer and is not intended as a reinforcement of Irizar's resources. Any problems that are detected during the inspection at the delivery centre have to be rectified by Irizar.

4.5.2.3 Lead-time at Irizar

It takes 14 to 15 days for a coach to go through the production line, and the total average lead-time from that the chassis enters Irizar's production until the vehicle is being delivered to the customer is about 22 days. Some vehicles are not completely finished when they come off the line due to missing parts or extraordinary options in the specification that Irizar do not have the ability to provide. In such cases, the vehicle may have to be taken to an external workshop.

4.5.2.4 Stocks of Chassis and Built-up Vehicles (see figure 4.27)

A large stock of chassis is being kept in the yard at Irizar, and there are several factors contributing to this. Irizar have not been able to count on the information they get from Scania regarding when the chassis will arrive. Chassis frequently arrive too late, which has resulted in Irizar putting on margins of between a week and ten days when they tell the sales companies when they would like to receive the chassis. Other chassis are delivered too early since they have been produced at Scania CV earlier than planned, and then sent to Irizar as soon as they are ready. Many chassis are also delivered without any information about whether they are sold, who the customers are and what types of bodies that are supposed to be built on them. These chassis remain in Irizar's yard until further information is provided. Some chassis can not be put into production because there are parts that will not be delivered in time. These parts have often been ordered from a supplier that Irizar do not normally work with, on special request from the customer. The lead-time for such parts is generally longer than for parts within Irizar's standard range and the chassis are kept in stock until the parts arrive.

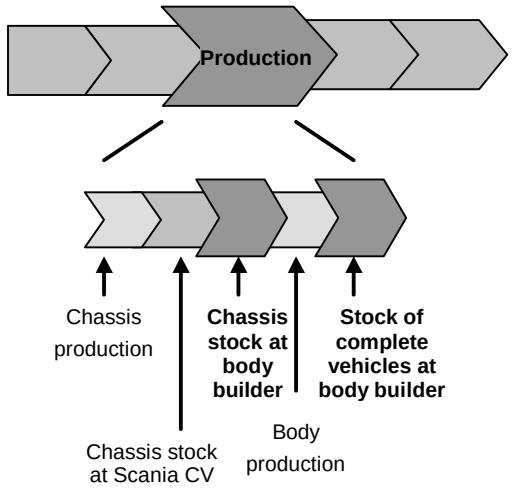

Figure 4.27: The sales-to-delivery process at Scania indicating where the stock is located.

There are also a number of complete coaches kept in stock. One of the reasons is that Irizar put chassis into production earlier than necessary in order to fill vacancies. The complete coaches are kept in stock until it is time to deliver them to the customer. On occasion, chassis are put into production despite the fact that some parts are missing. The coaches are built up without being completely finished and are kept in stock until the parts arrive. Other coaches are awaiting inspection, or have been inspected but have to be rectified before delivery.

4.5.2.5 Reservations and Forecasts

The sales companies inform Irizar about how many orders they expect to receive during the coming months and consequently how many chassis they believe to be putting into production at Irizar. This is done on a monthly basis, but the information does not contain details such as customer names or how likely it is that the orders will actually be booked. Irizar reserve places in the production according to this information. The reservations can be changed in case the chassis do not arrive on time, or if parts that are needed in the production are missing. Irizar weekly provide the sales companies with lists of where in the production their reservations are allocated, as well as how many production slots that are available for booking.

The reliability teams are responsible for collecting information about the markets. They keep in constant contact with the sales companies in order to learn what they think about the situation on the market and how many units they estimate to be putting into Irizar's production the coming year. The reliability teams set up targets every year, divided into four sections, for their work. In order to increase the *customer knowledge*, which is one target, they decide how many customer visits they will perform, as well as how many customers that are going to visit Irizar. The *service* targets include an indication of how many days it should take on average from the start of production until delivery to the customer. Service also concerns customer satisfaction, and it is measured by letting the customers fill in a questionnaire upon delivery of the coaches. An additional service target points out the ratio between delivered and produced coaches. Production to stock, for example, decreases this figure since coaches are being produced but not delivered. The *sales* target states how many coaches that are expected to be produced, as well as how many of the customers that are new. Sales also include the stock levels. The *economical* targets include costs for flight tickets, hotel rooms, warranties and margins.

5 Analysis

In this chapter the analysis made by the authors based on the theory in chapter three and the empirical findings described in chapter four is presented. The analysis is divided into five sections, where the activities in each section strongly affect the areas focused on in the thesis, i.e. lead-time, stock levels and sales time. The first two sections handle activities and aspects directly connected to sales and order handling. Then the aspects and analysis of stocks of chassis and built-up vehicles, reservations and forecasts, and finally internal communication are handled in separate sections.

5.1 Sales

The lack of routines for information handling and communication leads to a lot of the sales companies' resources being spent on administrative tasks instead of on selling and marketing products. In some cases the situation could be helped by for example CESOW or a structured database, but first of all efficient routines need to be implemented, and the right support provided from Scania CV and body builders.

Communicating advantages with standardised products

The sales companies interpret the requirements from their customers separately on different markets, and this results in individual solutions for meeting customer demand. Because of this, the needs on different markets appear to be unique although they might actually be rather homogeneous. Some of the customers' demands for special features do not stem from an actual need for them, but from a lack of knowledge about standard options that can fulfil their needs equally well. Scania CV aim to improve their support to the sales companies concerning product information, sales argumentation, and order and specification handling. The management of these tasks is complicated due to the large variety of products, and the large number of body builders that the sales companies co-operate with. This is part of the reason why Scania CV want to exploit the similarities in demand on different markets to promote more harmonised products and processes. By informing the sales companies about the advantages, these can be more motivated to sell standard products than other types of vehicles. It is important to clarify to the sales companies that working with a limited product range instead of trying to meet all customer demands enables Scania CV to provide them with better support. The customers are used to the sales companies meeting all their demands, but by making the customers pay for extra features that are not in the standard specification the number of unessential requests can be decreased.

Scania CV want to harmonise the product program over the markets, and utilise the expertise of the sales companies to develop and increase the use of standard specifications. This mission would be easier to realise if Scania CV liberated the sales companies from the responsibility of specifying functional vehicles. Scania CV and the body builders should co-operate in deciding on a limited number of products that are strategically important, and that together cover all segments that the companies want to be present in on the different markets. By deciding on such a product program, valid for most markets, Scania CV would increase their possibility of steering the sales companies in the preferred direction. The work of standardising the

vehicles would be helped, and it would facilitate for the sales companies to sell the "right" products.

Sales support from Scania CV

To avoid demand for changes due to misunderstandings in connection with the specification of the vehicles, it is important that the salesmen are capable of describing and making clear to the customers the function of different options. This is not possible if the salesmen do not have the adequate education and tools to support them. Specification sheets should be designed in such a way that they are easy to understand and clearly describe options. Information to the salesmen is also crucial for successful introductions of new products and features. For the salesmen to be able to promote and sell a new product, they need extensive information of the function of the features and how it makes life easier for the customer. To facilitate and make the work of the salesmen more efficient the sales companies also need to have access to a usable tool for selling and offer submission. A system should gather all information at one place, and provide means for calculating prices and specifying a complete vehicle. The means for specifying together with the customer should be descriptive and give a good picture of what the bus or coach will look like when completed. Then, if the customer is not satisfied with a vehicle that follows the specification, the customer must itself pay for any changes. CESOW could provide a means to make specifications and product information accessible to the sales companies at one place. Provided that price lists for both the chassis and the body are available, these could also be incorporated in CESOW to facilitate the submission of offers.

To render possible for the salesmen to perform their work as efficient as possible, it is important that Scania CV have routines for offering prompt and accurate answers to inquiries. Sales companies might not be able to proceed with the sales process until they receive an answer from Scania CV, which results in either lost businesses or prolonged lead-time.

Sales support from Omni

It is important that the sales companies have access to information and sales argumentation about Omni's products in order to be able to transform the customer requests into choices in the body specification. It is also crucial for the salesmen's ability to promote the different choices that they know what the choices represent. Omni, as well as Scania CV, also has a responsibility to, and interest in, informing the sales companies about product updates. If this is not done properly it is impossible for the salesmen to sell Omni products in the most efficient way. If the body specification could be included in CESOW, these problems could be solved, and at the same time the sales companies could specify the chassis and the body together more efficiently. Clearer information about options when specifying the buses would also limit the risk that the customer misunderstands how the choices will affect the outcome, and thereby the need for changes after the buses have been produced decreases. Scania CV's decision to move the responsibility of ordering bus chassis from the sales companies to Omni indicates their intention to increase Omni's involvement in the process, and possibly eventually incorporate the specification of Omni bodies in CESOW.

Access to prices for Omni products

The many S-order points on a normal order for Omni make it difficult for the sales companies to submit an offer on the bus without having to contact Omni. However, since there are sales companies that have managed to come around this problem, by using their experience from previous orders, this should not be an insoluble issue. Many S-order points are more or less standard on one or a few markets, and Omni should transfer such points to the standard specification form and give them fix prices. When it is not possible to include the S-order points in the standard specification forms, they should at least be included in a local price list. The sales companies should be able to create a price list for recurring features on their markets by registering the prices as they come up. By use of such a list, at least a maximum price for the vehicles should be possible to present without having to contact Omni. By being able to present the price of different options for the customer already when filling in the specification, this can also serve as a means to influence the customer in sticking to standard choices. However, it is important that Omni keep a close co-operation with the sales companies during the negotiations, so that alternative solutions can be presented and the best possible offer worked out in contact with the customer. If Omni are not present during the process, they will not have insight into the affair and it will not be possible for them to provide the support required for forming an optimal deal. The first steps in the process of improving these issues are taken in connection with the new order routines for Omni products[97].

Inspections at Omni during production

When the customers are allowed to inspect the buses during production, it is very likely that they will find some aspect on which they do not agree. Even if the aspect is manufactured according to the specification, Omni might try to solve the disagreement there and then to not unnecessarily provoke the customer. The result might be that the specification is changed at a very late stage, where the change is impossible to make without involving additional costs. Since such a change is not performed and documented according to any predetermined routines there is a risk for the cost to stay with Omni, without being transferred to the invoice to the customer. If inspections are instead performed on completed vehicles, changes requested by the customer that are not part of the original agreement can be performed only if the customer agrees to pay the additional cost and to cope with the delay in delivery without imposing any fines on the sales company. The cost of the changes and the increase in lead-time due to them can easily be separated from the original agreement.

Sales of Irizar Products

Irizar have developed a combined price list and specification sheet, which allows for the sales companies to submit offers without having to contact them. There is no reason why not all sales companies that sell Irizar coaches should have access to this kind of sheet. It would be desirable if also the price and specification of the chassis could be included in the same sheet, since it would facilitate the work of the salesmen and make it easier for Scania CV and Irizar together to make sure the right product is specified and sold. CESOW could support these functions, but is a tool for specifying

[97] Omni are introducing their own market companies, see chapter 4.5.1.1.

rather than for the submission of offers. Further it is unfortunately not in Scania's plans for the near future to incorporate the specification of Irizar bodies in CESOW.

It should not be up to the sales companies to make sure the chassis and the body can be combined in case of S-orders. If it can not be easily worked out from the specification sheet what impact an S-order point will have on the rest of the vehicle, a supporting function formed by Scania and Irizar together should solve such matters for the sales companies.

Inspections at Irizar during production

For the same reason as with Omni, the customer should not be allowed to inspect the coaches during the production. If the customer wishes to visit the production facilities in order to gain knowledge about Irizar's production process, this should be done at a time when the customer's own vehicles are not being worked on.

5.2 Order Handling

Specification handling

Many elements involved in the ordering of buses and coaches are performed by hand, which, apart from being very time consuming, implies a risk for mistakes. In lack of standardised specification forms that can serve as calculation sheets and price lists in sales situations, many sales companies have developed their own forms that are being used when in contact with the customers. These forms are adapted to suit the differing needs of each market by a narrowed down number of available choices. The customers' choices are marked on the forms and then transferred to the regular order sheets before placing the orders to Scania CV, Omni or Irizar. Even though the specification forms have been adjusted, there are normally a number of the customers' requirements that can not be satisfied by any of the pre-defined choices on the specification. These requirements frequently result in notes made by the salesman in the margin of the specification. Considering that the transferring from the adjusted specification form to the regular order sheet is usually not done by the person who specified the order together with the customer, such notes implies a risk of misinterpretation. The registration of incoming orders is done manually at Scania CV, Omni and Irizar, which increases the risk for mistakes even further. The risk of mistakes is also increased when the sales companies do not use standard specifications, but specify the chassis or the body on an original form with all options available. By the use of CESOW, the options on the specification could be adjusted so that only the ones relevant for the specific market are available. This would eliminate the need for the sales companies to create their own specification forms. CESOW would also allow the salesmen to register the specification directly, without sending it in by fax or e-mail. Thereby the manual handling of specifications and orders would be superfluous at Scania as well as at the sales companies.

Adjustments of chassis

The conception of some sales companies that the body builders' flexibility makes it unnecessary to optimise the fit between the chassis and the body might have several disadvantages. It is more costly to adjust the chassis at the body builders than to specify and produce it to fit the designated body from the start. It also has a negative effect on the lead-time. If a dependency check could be performed for the complete vehicle this problem could be eliminated since it would make it impossible for the sales companies to order a chassis that does not fit with the designated body. If a chassis is produced for stock, it should still be decided what kind of body that will eventually be built on it.

Order confirmations

The majority of customers that order buses and coaches have a specific requirement for when they want the vehicle to be delivered. It is therefore important for the sales companies to know which promises they are able to make, and consequently they need to know when the factory can deliver. When the sales companies receive a customer order, they usually send an order to the body builder. The body builder is supposed to return an order confirmation, with information about when they need the chassis, to be able to start the production of the vehicle in time. This information is used when the chassis order is sent to Scania CV. However, the sales companies can not always await the order confirmations since both Omni and Irizar often send them late, and the desired delivery dates for the chassis are instead based on the sales companies' calculations. The absence of order confirmations involves an uncertainty of whether or not the order and the specification have reached Omni or Irizar, and it also results in a mismatch between the chassis and body production. The chassis is either produced too early, and has to be stored until the start of the body production, or produced too late with a prolonged lead-time as result. It should not require much effort to give order confirmations promptly, yet it would probably render considerable improvements of the production flow. Scania should inform the body builders about the importance of quick replies, and require improvements.

Production planning

When FAIN will be available to all sales companies, this will save time for them as well as for Scania CV since the sales companies will not have to contact Scania CV to get information about vacancies in the chassis production. It will also enable a quicker response to customer inquiries about delivery dates, which in extension may lead to increased chances of winning orders. However, the information about when the production of the chassis can start, leaves the sales companies with the task of matching the date of when the chassis will be ready with the date of when the body builder needs it. It should be up to Scania CV to plan the production and see to that the chassis can be manufactured and delivered in time. The sales company should only have to focus on placing the order and the final specification before the SD-date and to give a DDD that corresponds with the body builder's production planning. Chassis with a designated slot in the body builder's production should be prioritised in front of chassis that are produced for stock. To make this possible the chassis order should be complemented with the date of entry in the body builder's production. In order to avoid misuse by the sales companies giving a too early date for the

production start of the body, the date should be confirmed by the body builder. The ultimate goal should be to visualise the PDD for the complete vehicle in FAIN. This way the sales companies would be able to provide the customer with information about the delivery date directly, without having to make calculations and check the PDD for the chassis towards the production start of the body.

Information of deliveries

The body builders experience a lack of information about when chassis will be delivered from Scania, and furthermore, the information they receive is not believed to be reliable. Scania also fail to inform about delays of chassis deliveries, which causes problems for the body builders' production planning. This leads the body builders to add a few days, or even weeks, to the date they give the sales companies for when they need the chassis. This is negative since lead-time is a critical factor when selling buses and coaches.

The body builders should provide a date for delivery of the vehicle when they confirm the orders to the sales companies. The sales companies should be able to trust that the vehicles are delivered on schedule, and if there are any delays, it should be up to the body builders to inform the sales companies about the new delivery dates. Without reliable information about the delivery dates, the sales companies are likely to order vehicles for delivery unnecessarily early, in order to not risk that they will not be able to deliver to the customers in time.

Specification definite

The purpose of setting up a last date for making changes in the specification, a SD-date, is to give the factory time to purchase material and to make preparations before the production starts. To avoid delays and disturbance in the production it is important to respect that date, but nevertheless it is common that the body builders accept later requests for changes. This kind of behaviour gives the sales companies misleading signals and makes them expect the body builder to fix anything at anytime. It may also lead the sales companies to putting less effort into creating a final specification well in advance. The extent of the effects differs considerably between Irizar and Omni. Irizar have a much larger production volume and a philosophy that is built around the concept of flexibility. Hence, they easily adapt to altered conditions even though a general opinion among sales companies is that it is often made at the expense of the quality level of the products. Omni focus on quality and strive to modularise the production as much as possible, which makes them sensitive to late changes. The fact that they want the complete specification twenty days prior to the SD-date makes that statement quite clear. Fewer S-order points would, however, make it possible to shorten that period of time, since the preparations for the production of the vehicles would be less extensive. Scania CV have a stricter policy concerning the SD-date for the chassis, and the sales companies seem to experience it as being more or less impossible to make adjustments in a specification when the SD-date has passed. Consequently, the sales companies make sure they have the final specification for the chassis in time. The same attitude could be achieved towards the SD-date for the body by the body builders being more firm and not allowing any late and costly changes.

Co-operation with Globally Preferred Partners

Since Omni and Irizar are Scania's Globally Preferred Partners, those are the body builders that the sales companies should prefer to co-operate with. However, the view among many sales companies is that the quality of Irizar's coaches leaves more to wish for. There are areas where the communication with and the support from Irizar does not work any better than with other body builders. Because of these factors, it does not come naturally to the sales companies to promote Irizar more than other body builders. To motivate the sales companies to push for Omni and Irizar it is important that they realise the purpose with Globally Preferred Partners and feel that they gain something from choosing to co-operate with them instead of with other body builders. This can be achieved by providing better tools for sales support, such as sales arguments, product information, and standard specifications. Scania and the Globally Preferred Partners need to co-operate more in developing standard specifications so that the sales companies are not left unaided with the responsibility to create a functioning vehicle of the chassis and the body. Making it possible for the sales companies to specify both the chassis and the body in CESOW could be a means to enhance and demonstrate such collaboration. If dependencies between features on the chassis and the body could be registered and automatically checked when the vehicle is specified, the work of the sales companies would be facilitated. It is also Scania's responsibility to make sure that the level of quality of the vehicles fulfils the requirements on the markets. To be able to offer complete transport solutions to customers, all activities concerning vehicles manufactured by Scania CV and their Globally Preferred Partners should be performed with a complete vehicle perspective.

5.3 Stocks of Chassis and Built-up Vehicles

Since chassis and built-up vehicles take up a lot of space and therefore often have to be kept out-doors it is difficult to protect them from external factors such as rain or sunshine, and there is hence a risk that the quality, and thereby the value, deteriorates. If the products are kept in stock for a long period of time, there is also a risk that they become obsolete and difficult to sell. Furthermore, stocks tie up capital. Sixty per cent of the total lead-time for buses and coaches consists of stock.

Pipeline management

Stocks of chassis and built-up vehicles are kept at both Scania CV and the body builders. Part of the stock consists of products in pipeline, i.e. products that are under production. The stock of built-up vehicles involves larger costs of interest for Scania, since those products have gone through more value adding processes than the chassis. It might also be harder to sell off complete vehicles since they can not be tailored to a customer's specific requirements or sold to other countries due to market specific adaptations. The latter could be helped by standardising products over different markets which would render possible to lower the stock levels. By implementing separate SD-dates for activities that are undertaken at different stages in the vehicle production or are planned closer or further from the production start, it would be possible to postpone parts of the specification that adapt a product to a specific market or customer. Thereby the product could be kept market neutral further in the process. This would lead to an improved production flow and a preservation of the opportunity to tailor the products according to customer or market requirements. Keeping a certain

level of stock is necessary in the bus and coach business in order to meet the demand for short lead-times. By managing the pipeline through the principle of form postponement the stock level could be kept at a minimum. With additional SD-dates it would no longer be possible to circumvent these, since the SD-dates would be individually set according to the planning of the activity. A common SD-date for a complete order has to be set according to the activity that needs to be planned furthest in advance, and therefore leaves margins for the rest of the activities. This encourages attempts to make changes after the SD-date has passed.

Order to stock

The sales companies have historically not been able to rely on chassis being delivered on time, which has caused problems in the interface with the body production. To cope with the uncertainty the sales companies have created buffers by ordering chassis to stock, since this allows the body building process to start on schedule even if deliveries from Scania CV are late. When sales companies order chassis to stock, they are not dependent on Just-in-Time delivery, or on even knowing the exact date for delivery. Therefore there are in such cases no external pressure on Scania CV to give accurate information of deliveries in time, or to fit their production with a body builder's. Because of this, there is no continuous improvement of the process, and the sales companies will keep finding it necessary to keep stock. The result is a negative loop, with no incentives for improvements.

Standardisation of products

More standardised products would make it easier to predict the consumption of components since a lower number of components would be used more frequently. This would result in a more even demand for deliveries from suppliers, and thereby facilitate for them to meet the needs of Scania and the body builders. A lower number of components also make it easier to plan the production of vehicles and thereby shorten the lead-time. A higher degree of harmonisation is likely to create a better flow in the production, which also would have a positive effect on the lead-time. To be able to centralise the administration of stocks of chassis and built-up vehicles, it is necessary to harmonise the products.

5.4 Reservations and Forecasts

It is important that the sales companies understand that their reservations and forecasts have an impact on the planning activities at Scania CV and the body builders, and consequently also affect their own ability to serve the customers. It is Scania CV's responsibility to visualise this relationship. Although many sales companies experience the deliveries of chassis and built-up vehicles to be unreliable and often late, they do not seem to perceive the connection between the quality of their forecasts and their suppliers' ability to meet the demand.

Reservations in the chassis production

There is no follow-up done or feedback given to the sales companies about to what degree they fill their reservations in MOPEX. The sales companies have the impression that it is not very important to make reservations that correspond with their actual needs, since they most often can compensate discrepancies with Open Market. Exaggerated reservations are believed to be absorbed by other sales companies when they reach Open Market, while underestimations are solved by residual slots. If the sales companies seldom experience problems with placing reservations on Open Market, the total level of reservations is probably too high.

It is the sales companies' responsibility to plan for the production of the chassis to fit with the date of entry in the body builder's manufacturing process. However, this is hard since the sales companies can only specify in what month they want their reservations in MOPEX, and not in which production period[98]. When placing orders, the result is often a gap between the delivery of the chassis and the start of the body builder's production process. This problem could be helped by letting the sales companies specify exactly in what weeks they want their reservations. On the other hand it should not be the sales companies' problem to plan the production at Scania CV. They should only have to focus on the DDD for the chassis, and it should be up to Scania CV to make sure the chassis are produced and delivered in time.

Information about potential orders to Omni

Omni do not feel that the list of "hot" and "possible" businesses gives them enough or reliable information about potential orders. The procedure with the list of "hot" and "possible" businesses should be complemented with a system for making reservations in Omni's production, similar to the one used by Scania CV for chassis. There should be a rewarding system to motivate the sales companies to fill their reservations. For example they could receive discounts depending on how far in advance they place reservations and how accurately they estimate the volumes.

Forecasts

The sales companies use different information as basis for their forecasts. Some rely on history, while others take several aspects into consideration. To ensure the quality of the forecasts, Scania CV should present clear guidelines for which aspects to be considered when producing forecasts. These guidelines must be communicated to the sales companies, so that no room is left for unmotivated discrepancy and negligence. Sales Platform could be a means for the sales companies to structure their work with forecasts as well as with reservations. Scania should see to that Sales Platform becomes a tool utilised by all sales companies. If all sales companies used the same routines for producing forecasts it would be easier to manage the quality and discover areas for improvements. It would also facilitate the sharing of experience and knowledge between sales companies about how Sales Platform best can be utilised.

Forecasts should be complemented by activity plans where it is stated how the objectives should be fulfilled. It should be clear for example how many new

[98] One month is divided into four production periods.

customers the sales company should contact and how many visits to production plants the sales company should make together with customers in order to reach the sales in the forecast.

There should be incentives for the sales companies to improve the quality of their forecasts. The sales companies should be rewarded according to how well they fulfil the objectives in the activity plan, as well as to how well their forecasts correspond to the actual need. The rewards could for example be in the form of discounts on products and services, or of higher priority when placing orders.

5.5 Internal Communication

There is a general lack of routines for internal information handling at the sales companies. There is often no central storage of information, which results in several persons collecting the same information without being aware of it. There is a risk of out of date information being used, since it is not updated at all locations simultaneously. The repeated collecting of information from the original source is time consuming, both for the individual in need of it and for the person providing it. The few existing routines at the sales companies are locally used, and often developed by individuals on their own initiatives. Due to this, there is a risk that the information is lost if a staff member changes position or leaves the company. By developing routines centrally at Scania CV, and implementing these at all sales companies, it would not be left for the individual staff member to decide what kind of information he or she should collect. The routines should clarify where to store the information and whom to share it with. This would enable more efficient information collecting for example during contacts with customers. Centralised routines facilitate for Scania CV to manage them and to communicate efficiently with the sales companies. Common routines is also a prerequisite for the implementation of a common information technology system.

When information is stored in document archives it becomes more time consuming to locate it, than if it was electronically stored in a database. Since it is available only at the location where it is physically stored, it also becomes less accessible.

6 Conclusions

In this chapter the conclusions drawn by the authors in the analysis are summarised, and suggestions are given on actions that Scania CV should take, in collaboration with sales companies and Globally Preferred Partners, in order to make the process more efficient in the studied areas.

The conclusions are formulated based on the analysis presented in chapter 5.

Development of routines

There is an extensive lack of routines for both information exchange between the sales companies, Scania CV and the body builders, and for internal information handling at all parties. Gathering information is time-consuming and even more so since the lack of routines results in information getting lost. Many activities could be performed more efficiently with the use of an information technology system, but first manual routines have to be established.

Globally Preferred Partners

For the strategy of co-operating with a limited number of body builders to be trustworthy and successful, selling and ordering vehicles built by Globally Preferred Partners should be favoured by the sales companies in front of other products. A prerequisite for this is a close collaboration between Scania CV and Omni and Irizar concerning the development of a common product range and the ordering routines.

Complete vehicle perspective

To be able to offer complete transport solutions to customers, all activities concerning vehicles manufactured by Scania CV and their Globally Preferred Partners should be performed with a complete vehicle perspective. It includes for example sales and ordering activities performed by the sales companies, as well as support and planning activities performed by Scania CV and the body builders.

Sales and ordering system

To specify and order vehicles more efficiently, and to provide the customers with better service and increase their level of satisfaction, the sales companies need to have access to proper sales tools, such as price lists and offer generator, standard specifications, product information, and sales argumentation. CESOW provides a means for the sales companies to access such tools, and for registering orders and specifications that are automatically transferred into SMOFS. By including the body specification in CESOW an instant dependency check for the complete vehicle could be enabled.

Well working communication

To make the sales-to-delivery process as efficient as possible, it is important to have a well working communication between the parties, and to give prompt and accurate answers to inquiries.

Delayed order confirmations have a negative effect on the production flow. It should not be difficult to provide prompt order confirmations, all it takes is commitment. Scania should inform the body builders about the importance of quick replies, and require improvement.

Scania CV as well as the body builders often fail in providing accurate information about delivery dates. This forces the recipients of the chassis or the vehicles to incorporate time margins in their planning, with increased lead-times as results.

Focus on DDD instead of production period

In order to reduce the total lead-time and to free the sales companies from the task of fitting the production of the chassis and the body together, Scania CV should adjust the chassis production according to the DDD of the body builder. By providing the desired date of delivery to the customer, the sales companies should be able to receive a delivery date for the complete vehicle.

Pipeline management and additional SD-dates

An implementation of a standardised product program would enable the utilisation of pipeline management and form postponement in order to minimise the stock levels. To improve the flexibility in the production process additional SD-dates should be implemented. That way, part of the specification could be fixed at a later stage without delaying the delivery of the vehicle.

It is important for a continuous production flow, as well as for the production costs, that the SD-dates are not violated.

Forecasts

Since it is very important for the planning of activities at Scania CV and the body builders that the forecasts correspond with the actual demand, there should be incentives for the sales companies to put effort into the creation of forecasts. It should be visualised to the sales companies how the quality of their forecasts affect the ability of Scania CV and the body builders to meet the demand on the markets.

7 Suggestions on Continued Studies

In this chapter suggestions from the authors on continued studies and future projects are presented. These projects are suitable for future master theses, and the hope of the authors is that Scania offers the responsibility of performing these studies, and the opportunity to learn from them, to students studying Industrial Management and Engineering at Lund Institute of Technology.

The suggestions on continued studies are formulated based on the conclusions stated in chapter 6.

Establishing of routines for order handling at the sales companies

The present routines for order handling at the sales companies need do be examined and evaluated. The next step should be to develop and implement common routines for all sales companies, with the knowledge gained from the evaluation of present routines used as a base. Investigation of the possibility to standardise the design of the local specification sheets should be part of such a project.

Implementing CESOW for complete vehicle

A study should be made to investigate the possibilities to introduce the body for specification in CESOW, and the possibilities to complement specification possibilities with sales support through SPISA (see Concepts and Definitions). Such study should focus on Globally Preferred Partners, and Omni bodies should be first to be introduced if possible, since this would take less effort than for Irizar bodies due to already existing homogeneity between Omni's and Scania CV's specification systems and standards.

Establishing routines for communication between parties

A study should examine why Scania CV, the sales companies, and the body builders fail to communicate information such as order confirmations, delivery dates and delays, and product information for sales support efficiently. The study should also result in development of more efficient routines for communication, and an implementation plan.

Establishing routines for forecasting

A project should deal with the implementation of Sales Platform on all markets. In connection to this project, it should also be investigated how activity plans can best be used to motivate the sales companies to be active on the markets, and what kind of incentives that would be most efficient in the purpose of improving the quality of forecasts. It should be investigated whether Scania's Market Development Agreement could be better utilised for creating activity plans with incentives for the sales companies.

Implementing DDD for complete vehicle

In order to improve the fit between the chassis and body productions, and to facilitate for the sales companies, a goal should be to implement DDD for complete vehicle, i.e. that the sales companies only need to focus on what date they need the complete

vehicle at their premises. A study should conclude what changes need to be made to the ordering and production planning systems in order to fulfil this goal.

Implementing additional SD-dates

The possibilities to harmonise the product program with Globally Preferred Partners across markets should be investigated. If this is proven possible to some extent, a study should be performed in order to decide on stages in the production where the vehicles have to be specified for a few markets, or one specific. Such points should serve as guidelines for where additional SD-dates should be located.

8 Reflections on Fulfillment of Objectives and Choice of Methods

In this, the last, chapter the authors reflect over to what degree they have managed to fulfil the initial objectives of the study, as well as over how suitable their choices of methods have proved. The chapter serves as closure of the report, and the conclusions made are meant to help the authors, as well as the readers, to reflect over how they can improve their contribution to future studies.

8.1 Fulfilment of Objectives

When the project was initialised, the aim was to study the complete sales-to-delivery process in order to find areas of improvements. The conception of the authors, as well as of the tutor at Scania CV, was that the basic routines in the order handling process were rather well functioning, and that the study would bring findings of possible improvements on a different level. Due to this, and the width of the initial assignment, it was not until the project had proceeded during some time that the final areas of focus were decided upon. This resulted in limited time available for in-depth studies, and not as specific conclusions and suggestions on improvements as the authors had hoped for.

However, the authors consider the project aim described in chapter 1.6 to be fulfilled. The needs specified by Scania have been considered, and doable alternatives on how to improve the efficiency of the sales-to-delivery process concerning stock levels, lead-time and sales time have been presented, even though the general characteristics of these alternatives make cost-benefit analysis hard to develop. It can be concluded, though, that for major savings in the sales-to-delivery process to be possible, it is necessary to first establish such routines as are being described in this report.

8.2 Choice of Methods

The choices of methods made at the beginning of the study have proven to be suitable for the project. The complexity of the process studied, and the importance of the relations and interaction between its actors, made the systems approach the most suitable one. The choice of making a qualitative survey has also proved successful, since it allowed for the interviewees to have significant influence on the dialogue and thereby contribute to the project with new ideas and insights. It might have been beneficial for the study if the initial interviews would have been more focused on certain areas, but since the more specific problem areas of focus for the study were not known until later this would have been impossible without a more narrow project definition from the beginning. The authors approach to mapping the problem, i.e. to emanate from individuals' personal experiences and views of the process in order to locate areas suitable for improvement, have generated a large number of ideas and interesting aspects for analysis, and as described in chapter 2.11 the validity and reliability have not been considered problems.

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Concepts and Definitions

Area Sales Manager

Scania CV support the sales companies through *Area Sales Managers.* The Area Sales Managers are responsible for volumes, prices, specifications, and products and they keep in constant contact with the sales companies to support activities on the markets, and to communicate their needs and knowledge.

Bus

See chapter 4.1 and Appendix B.

CDD – Confirmed Dealer Date

The date when the chassis will be delivered to the delivery address indicated in the order, which in most cases is the body builder's manufacturing plant. The CDD is enclosed with the definitive order confirmation that Scania CV send to the sales company when the last date for making changes in the chassis specification has passed. The CDD does not, as opposed to the PDD, admit any deviations from the actual delivery date and is supposed to correspond with the DDD.

CESOW – Central Specifications On The Web

A web-based specification tool that was initially developed for Scania's truck business. CESOW can be linked to a dependency register and consequently provide the salesman with instant results from the dependency check when specifying a product.

Coach

See chapter 4.1 and Appendix B.

Customer

The term *customer* refers to a company or an individual that purchases a product from Scania's sales companies or dealers. Hence, the sales companies are *not* referred to as customers even though they purchase chassis and bodies from Scania and the body builders.

Dealer

Dealers sell Scania vehicles on the markets. They order vehicles through the sales companies. Some dealers are owned by Scania, and some are independent.

DDD – Desired Dealer Date

The date when the chassis has to be ready for delivery. The DDD is calculated according to when the body builder need the chassis to go into their production to be able to get the bus ready in time.

FAIN – Factory Availability Indication

A web application that shows the availability in the chassis production as well as the reserved chassis volume and the access to certain components. FAIN also indicates the dates for SD and Open Market. Scania's order office has access to information about all markets in FAIN, whereas the sales companies and the dealers can only see the information that concerns their market.

MOPEX – Monthly Order Production planning External

System used by the sales companies when planning and making reservations in the chassis production.

Outline

Scania's extranet, available for external users such as sales companies and dealers. Scania CV use Outline for communicating information to their representatives on the markets.

PDD – Promised Dealer Date

The date when the chassis will be delivered to the delivery address indicated in the order, which in most cases is the body builder's manufacturing plant. The PDD is enclosed with the order confirmation that Scania CV send to the sales company after the reception of the order. The PDD admits a deviation of two days from the actual delivery date.

PRAL – Production Allocation

System for allocating slots and planning the production at Scania CV.

Sales company

Sales companies are responsible for activities on their respective markets. They handle the communication with dealers, as well as sell vehicles directly to customers.

Scania

The name *Scania* refers to the complete company, including the sales companies.

Scania CV

The name *Scania CV* refers to the facilities in Södertälje, including the chassis production, the Buses & Coaches department, and the order office.

SD – Specification Definite

The date after which it is not allowed to make any changes in the specification. There are separate SD-dates for the chassis and the body.

SMOFS - Scanias Mekaniska Order och Fakturerings System

S-order – Special order

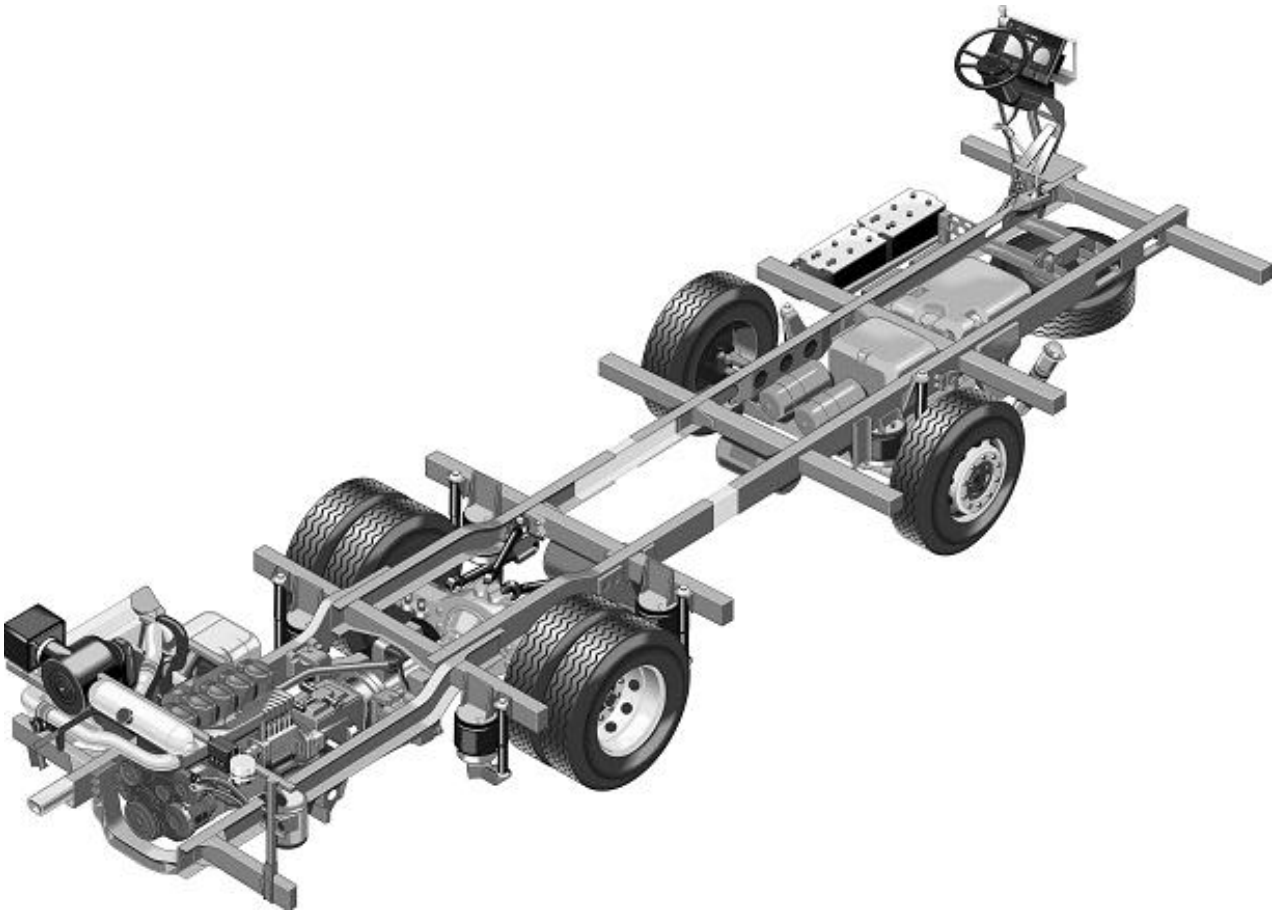
S-orders are created when the customers have requirements that can not be fulfilled by the options available in the regular specification forms. The sales companies send in the S-order together with the regular order.

SPISA

System that provides sales argumentation such as drawings, pictures, and product information. SPISA can be linked to CESOW and it that way make the information available for the customer and the salesman when specifying a product.

Appendix

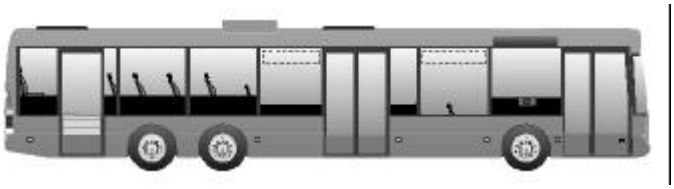
Appendix A - Chassis



Appendix B – Chassis for bus and coach

Chassis for bus

Bus



Chassis for coach

Coach

Appendix C - Specification form for chassis

CHASSIS ORDER SPECIFICATION **K124 EB4x2**

Distributor	Quantity	Required week (ready at factory)
	Order No(s)	Bus/coach builder
	Date and signature	

GENERAL		
Final vehicle length:	mm	X
Operator´s manual:		X
Frame overhang:	front 2500/rear 3250 mm	X
Axle distance:	3000 mm (trp. frame)	X
Frame height at drivers position:	normal (Z0 -8 mm)	
	low (Z0 -325 mm)	

DRIVER'S AREA		
Steering wheel position:	left hand drive	
	right hand drive	
Steering gear ratio:	17-20:1	
	22-26:1 1)	
Speedo-meter:	km/h without tachograph	
	mph without tachograph	
	with tachograph 1-day km/h	
	with tachogr. 1-day km/h+mph	
	with tachograph 1-day SIM	
	with tachograph 7-day km/h	
Inside / outside temperature display		
Start function:	switch	
	general key	
	individual key	
Throttle interlock		
Speed signal amplifier:	with speed monitor	
	without speed monitor	
	without	
Bus stop brake (prepared for)		

CLIMATE	
Air condition prep. (chassis mounted)	
Extra pulley 2)	

POWER TRAIN				
Engine:	DSC1202	360 hp	Euro 2	
	DSC1205	420 hp	Euro 2	
	DC1202	400 hp	EPA 98	
	DC1201	420 hp	Euro 3	
Safety filter				
White smoke limiter				
Pre-cleaner air intake				
Water trap 3)				
Exhaust outlet direction; rear:	with tail pipe extender			
	without tail pipe ext.			
Speed limitation:	100 km/h			
	115 km/h			
	without			
Emergency stop				
Hand throttle control 4)				
Noise suppression, prepared for:	80 dB(A) with certificate			
	80 dB(A) without certificate			
	83 dB(A)			
Gear-box:	GR801 - gear change servo			
	GR801 - CS			
	GR801 - opticruise 5)			
	GR801R - gear change servo			
	GR801R - CS			
	GR801R - opticruise 5)			
Oil cooler (gearbox)				
Axle gear R660 with gear ratio:	2,92			
	3,07			
	3,42			
Differential lock				

Coolant filling:	rear	
	right side	
Fuel tank: transport tank 20 dm^3		X
Fuel filter:	with water sep. 4)	
(engine mounted)	without water sep.	
Fuel heater (engine mounted)		
Fuel filter (chassis mounted) with water separator		

AXLES & WHEELS		
Disc rims:	6 pcs	
	7 pcs	
	8,25 x 22,5 steel 6a)	
	8,25 x 22,5 aluminium 6a)	
	9,00 x 22,5 steel 6b)	
	9,00 x 22,5 aluminium 6b)	
Tyres:	6 pcs	
	7 pcs	
Spare wheel carrier 7)		
Wheel nut covers:	without	
	painted steel	
	stainless steel	
Hose for tyre inflation (20 metres)		
Towing device 7)		
Tool kit with hydraulic jack		

AIR & BRAKE SYSTEM		
Air tank rubber spacers		
Disc brakes, front and rear		X
Exhaust brake:	automatic	
	manual / automatic 8)	
Control for Scania retarder:	manual	
	manual / automatic	
ABS - Anti-lock Brake System		X
TC - Traction Control 9)		
Interlock valve, parking brake		

SUSPENSION		
Air spring control:	ELC	
	mechanical	
Raised height (mechanical)		
Partial lowering (ELC):	front door	
	whole front	
	whole side	
	without	
Total raising and lowering (ELC)		
Overturn protection (ELC)		
Shock absorbers, front and rear:	standard	
	heavy duty	
Reinforced suspension		

ELECTRICS		
Alternator(s):	140 A	
	140 + 65 A	
	140 + 140 A	
Batteries:	175 Ah	
	220 Ah	
Battery tray		
Battery cable with fuse		
Trip computer (prepared)		
Battery charging socket:	without	
	Hella	
	Harvey	
Location battery master switch:	at the batteries (knob)	
	in the instr. panel (switch)	
Electric fuses:	blade fuses	
	circuit breakers	
Fog lamps front, prepared		
Fog lamps rear, prepared		
Order type:	A-order	
	S-order = ECO	

Remarks:

1) = Not steering wheel right hand side.
2) = Not with air condition prep.
3) = Not with pre-cleaner air intake.
4) = Only with engine DSC1202.
5) = Only with engine DC1201, DC1202 or DSC1205 and TC.
6) = Only with tyres:
   a) = 295/80- or 12R22,5.
   b) = 295/80-, 315/80- or 12R22,5.
7) = Only with normal frame height at driver´s position.
8) = Not with gearbox GR801R.
9) = Not with differential lock.

Order No(s) = _____

Prod. month = _____ :

K124EB4x2 YTP 2003-09-02

Appendix D – Altered specification form for chassis

SCANIA

Order specification Bus Chassis Date: No. of pages:

Distributor	Delivery address code		Distributor order id
Chassi type	Quantity	DOD	SCANIA order No.
Distributor name and address			☐ S-order Ref. No:

(Note! All text must be typed)

STANDARD :
SIMILAR TO :

Delete	Add	Fact answer

Remarks:

Order_Spec_Bus.doc

Appendix E – Specification form for Omni body

OMNI

Order No:
Distributor:
Quantity:
Delivery week:

SCANIA CN94UB4x2

Customer:
C-Order no:

Date:

GENERAL

Bus length

11 515 mm		524D
11 985 mm		524A

Bus body width

2500 mm		1555A
2550 mm		1555B

Steering wheel position

left hand drive	X	403 B

Door configuration

2 - 2 - 0		150A
2 - 2 - 1	a)	150B
2 - 2 - 2	b)	150H
1 - 2 - 1	c)	150D
1 - 2 - 0	at)	150C

INTERIOR

Door opening exit doors

outwards		2444 B
inwards	bb)	2444 A

Passenger seats

Compin		100L/2503-
Noco		100J/2503-
Vogel		100K/2503-
Fainsa, Arienne I		100S/2503A
Fainsa, Arienne U		100S/2503B
Fainsa, Arienne S		100S/2503C
Fainsa, Cosmic	at)	100S/2503D

Bus execution (Fainsa seats only)

Urban		389B
Suburban		389E
Intercity		389G

Handle and signs (disabled)

with		2006A
without		2006Z

Pram space behind front axle

small		1843A
large		1843B
without		1843Z

Folding seat(s)

with	d)	1779A
without		1779Z

Standing area behind rear axle

with platform, with double door	e)	1960C
without platform, with door		1960A
without platform, without door		1960B
hight floor	ba)	1960D

Wheel chair ramp at middle door

		1547A
manual, in front of door		1716A/2275A
manual, in the floor		1716A/2275C
electric control		1716B/2275-
without		1716Z1547Z

Wheel chair brackets

with		1798A
without		1798Z

Floor carpets

Altro TFCR 2216		3251 A
Altro TFCR 2215		3251 B
Altro TFCR 2207		3251 C
Altro TFM 2211		3251 D
Altro TFM 2210		3251 E
Altro TFM 2202		3251 F
Altro ASX 29-39 Pewter grey		3251 G
Customer order (see page 10)		3251 CO

Podester strip (platform nosing)

plastic		2128A
aluminium/brass		2128B
aluminium/aluminium		2128C

Heating in floor at front door

with		489A
without		489Z

Wall panels

Kiruna bird		2009 F
Tornado		2009 V
Weathered Oak		2009 WO
Erable Beige		2009 EB
Tropical Blue		2009 TB
Pillar Box		2009 PB
Pompei Jade		2009 PJ
Torun Grey		2009 TG
Midas Moon		2009 MM
Pharos Marble		2009 PM

Ceiling panels

fabric (see page 10)		594B

Painted

colour White NCS S0502Y		594E/3197A
colour Grey NCS S1500N		594E/3197B
colour Grey NCS S5502B		594E/3197C
colour Customer order (see page 10)		594E/3197CO

Luggage shelf
with av) ☐ 165A
without ☐ 165Z

Curtains (colour yellow)
with ☐ 3095A
without ☐ 3095Z

Partition behind driver
transparent glass ☐ 1812A
non-transparent glass ☐ 1812B
transparent dark glass ☐ 1812C

Stanchions
painted (see page 10) ☐ 1833A
stainless ☐ 1833B

Bracket for card reader
with ☐ 2360A
without ☐ 2360Z

Channeliser, door
front of front axle
with bl) ☐ 1795A
without ☐ 1795Z

behind front axle
with g) ☐ 178A
without ☐ 178 Z

behind rear axle
with e) ☐ 1797A
without ☐ 1797 Z

Illumination intensity
100 lux ☐ 2020A
200 lux ☐ 2020B

Blue night light
with ap) ☐ 3015A
without ☐ 3015 Z

Reduced lighting, rear part of passenger compartment
with ☐ 1691A
without ☐ 1691 Z

Steplight control
open door only ☐ 1986B
open door and interior light switch on ☐ 1986A
open door and exterior light switch on ☐ 1986C

Sign language
Danish ☐ 3K
Finnish ☐ 3H
French ☐ 3G
Italian ☐ 3M
Norwegian ☐ 3J
Polish ☐ 3L
Swedish ☐ 3A

Sign "STOP"
with ☐ 1679A
without ☐ 1679 Z

Stop signal button
yellow ☐ 2031A
grey ☐ 2031B

Sign "UTGÅNG BAK"
with f) ☐ 1680A
without ☐ 1680 Z

Sign "NO EXIT"
with bg) ☐ 1683A
without ☐ 1683 Z

Passenger information display
with i) ☐ 1685A
without ☐ 1685 Z

Sign "VÄLKOMMEN OMBORD"
with ☐ 2054A
without ☐ 2054 Z

Traffic sign holder, window(4 holders)
with ☐ 198A
without ☐ 198 Z

Advertising holder(s)
window (5 holders)
with ☐ 192A
without ☐ 192 Z

air-duct channel
with ☐ 193A
without ☐ 193 Z

behind driver's area, 2 profiles ☐ 194B
behind driver's area, frame A4 ☐ 194C
behind driver's area, frame A3 ☐ 194D
behind driver's area, frame 500x700mm ☐ 194E
without ☐ 194Z

Box for documents
with 184A
without 184 Z

Waste paper basket at driver's area
with 167A
without 167 Z

Waste paper basket behind front axle
with 3200A
without 3200 Z

Waste paper basket behind rear axle
with bh) 3201A
without 3201 Z

Coat hanger
with 3064A
without 3064A

Umbrella holder
with 3063A
without 3063 Z

Bottle retainer
with 3067A
without 3067 Z

Air compressed horn with alternated sound
with 3209A
without 3209 Z

Route instruction holder
with 3241A
without 3241 Z

SAFETY, WARNING SYSTEM

Fire extinguisher
Presto 1799A
Tempus 1799B
Sicli 1799C
without 1799Z

Safety edge warning system front door
for opening and closing movements 1984A
for closing movements 1984C
without 1984Z

Audible alarm for safety edge warning system
with 1985A
without 1985 Z

Safety edge check
with ag) 2285A
without 2285Z

City bell (prepared for)
with 2115A
without 2115 Z

Box for first aid
with 176A
without 176 Z

Axe
with 499A
without 499 Z

Monitoring voltage drop
with 2119A
without 2119 Z

Reset of emergency opening doors
separate switch 2113A
door switch be) 2113B
without 2113Z

Driver's gate alarm
with, parking brake 1674A
with, parking brake and gear selector neutral 1674B
with, parking brake and open front door 1674C
without 1674Z

Starter interlock hatches
at engine and front compartment hatches 1676B
at engine compartment hatch 1676C
at front hatches 1676D
without 1676Z

Disengagement switch for stop request signal (location switch board)
with 1849A
without 1849 Z

Bus stop brake
with, for all doors 426A
with, for middle and rear door(s) 426B
with, for front door 426C
with, wheel chair ramp only 426D
without g) 426Z

Additional control of driver's light
with m) 3176 A
without 3176 Z

Box for documents
with 184A
without 184 Z

Waste paper basket at driver's area
with 167A
without 167 Z

Waste paper basket behind front axle
with 3200A
without 3200 Z

Waste paper basket behind rear axle
with bh) 3201A
without 3201 Z

Coat hanger
with 3064A
without 3064A

Umbrella holder
with 3063A
without 3063 Z

Bottle retainer
with 3067A
without 3067 Z

Air compressed horn with alternated sound
with 3209A
without 3209 Z

Route instruction holder
with 3241A
without 3241 Z

SAFETY, WARNING SYSTEM

Fire extinguisher
Presto 1799A
Tempus 1799B
Sicli 1799C
without 1799Z

Safety edge warning system front door
for opening and closing movements 1984A
for closing movements 1984C
without 1984Z

Audible alarm for safety edge warning system
with 1985A
without 1985 Z

Safety edge check
with ag) 2285A
without 2285Z

City bell (prepared for)
with 2115A
without 2115 Z

Box for first aid
with 176A
without 176 Z

Axe
with 499A
without 499 Z

Monitoring voltage drop
with 2119A
without 2119 Z

Reset of emergency opening doors
separate switch 2113A
door switch be) 2113B
without 2113Z

Driver's gate alarm
with, parking brake 1674A
with, parking brake and gear selector neutral 1674B
with, parking brake and open front door 1674C
without 1674Z

Starter interlock hatches
at engine and front compartment hatches 1676B
at engine compartment hatch 1676C
at front hatches 1676D
without 1676Z

Disengagement switch for stop request signal (location switch board)
with 1849A
without 1849 Z

Bus stop brake
with, for all doors 426A
with, for middle and rear door(s) 426B
with, for front door 426C
with, wheel chair ramp only 426D
without g) 426Z

Additional control of driver's light
with m) 3176 A
without 3176 Z

Door opening condition, bus stop brake
manually applied ak) 2962 A
automatically applied m) 2962 B

Bus stop brake, brake pedal
with m) 2957 A
without 2957 Z

Speed monitor (5 km/h) for bus stop brake, front door
with l) 1792 A
without 1792 Z

Speed monitor for opening front door
with, 5 km/h 2111A
with, 10 km/h 2111B
without 2111Z

Manual bus stop brake
separate push button (switchboard) m,n) 1725A
separate hand lever (switchboard) m,n) 1725B
handlever doors m,o) 1725C
without 1725Z

Release condition for applied bus stop brake
with, left direction indicator, throttle activation and closed doors m) 1726A
with, throttle activation and closed doors bd) 1726B
with, resetted stop request signal, throttle activation and closed doors m) 1726C
without q) 1726Z

Bus stop service
with bf) 2120B
without 2120Z

Emergency stop door opening
with 3010A
without 3010Z

Lighting with battery master switch off
with 3011A
without 3011Z

Automatic hazard lights
with, reverse gear 3174A
with, wheel chair ramp 3174B
with, reverse gear or/and wheer chair ramp 3174C
without 3174Z

Separate indicator lamps doors
with k) 3175A
without 3175Z

Fire-fighting equipment
with bi) 1857A
without 1857Z

DOOR CONTROL

Door control system
manual 151A
automatic ax) 151B

Driver's manouvre switches
knob for front door and rocker switch for middle and rear doors r) 2097A
push buttons for all doors s) 2097B
hand lever for all doors t) 2097C

Disengagement switch for 2nd front door leaf
with u) 1719A
without 1719Z

Exterior open/close switch for front door
illuminated button behind front door 199B
non-illuminated switch behind right front hatch 199D
illuminated button behind right front hatch 199E
illuminated button behind front door inside a hatch 199F
without 199Z

Disengagement exterior open / close switch for front door
with v) 1721A
without 1721Z

Exterior locking device for front door
cylinder lock x) 1722B
square lock at, ba) 1722C
without z) 1722Z

Locking device, interior
pullock aa) 2028A
square lock aa) 2028B
without ab) 2028Z

Exterior emergency opening
with 2516A
without 2516Z

Main circuit switch, middle and rear doors
fixed position 2100A
momentary 2100B

Common manouvering all doors

opening	k,t)	2956 A
opening / closing	aj)	2956 B
without		2956 Z

Forced closing middle and rear doors

separate push button	ad)	2101A
included in push buttons for all doors	ac,ad)	2101B
without	t)	2101Z

Self service control for middle and rear doors

with	ad,ae)	1712 A
with, including automatic applied bus stop brake	ad, ae)	1712 B
without		1712 Z

Zone divided stop request signal

with	ad, af)	2110A
without		2110Z

Automatic middle and rear door opening

with, passenger open request button	ad)	2117A
with, open front door and stop request signal	ad, ag)	2117B
with, open front door and stop request signal or photo detector	ad,ag)	2117C
without	t, ae)	2117Z

Number of driver's manouvre switches for opening the middle and rear door(s)

one	n)	2098A
two	n)	2098B
without	o)	2098Z

Interior door open switch exit door(s)

colour orange	ar)	3080A
colour grey	ar)	3080B

Open request switch for the middle door (behind the front axle)

interior and exterior	ah)	2104A
interior	ah)	2104B
exterior	ah)	2104C
without		2104Z

Open request switch for the rear door (behind the rear axle)

interior and exterior	ah or ai, o)	2105A
interior	ah or ai, o)	2105B
exterior	ah or ai, o)	2105C
without		2105Z

Disengagement of automatic middle and rear doors opening

with	ad)	2102A
without		2102Z

Illumination component shelf

direct. downward	ax)	2498A
direct. down/out		2498B

Disengagement switch for rear door (behind the rear axle)

with		2103 A
without		2103 Z

Pram signal switch at front standing area

interior and exterior	d)	2107 A
interior	d)	2107 B
exterior	d)	2107 C
without		2107 Z

Pram signal repetition

with		2284 A
without		2284 Z

Automatic middle door opening at activated pram signal (door behind front axle)

with	ad,ao, am	2109 A
without		2109 Z

Main switch door circuit location

panel above driver		3153A
electric centre	at)	3153B
panel r.h.s. driver		3153C

CLIMATE

Climate system, passenger

tempered ventilation		1657B/1912-
air conditioning, single compressor, including tempered ventilation		1657C/1912A
air conditioning, twin compressors, including tempered ventilation		1657C/1912B

Climate system, driver

separate El-AC	bn)	3245A
combined AC	bj)	3245B
only defroster		3245C

Convectors at passenger compartment
with, including pause function ☐ 1655A/336A
with, excluding pause function ☐ 1655A/336Z
without ☐ 1655Z/336Z

Convector at driver´s area
with ☐ 1786A
with, including fan ☐ 1786B
without ☐ 1786Z

Auxiliary heating
with ☐ 1646 A
without ☐ 1646 Z

Auxiliary heating type
UWE electric ☐ 1647 A
diesel-driven ☐ 1647 B
UWE-el/diesel-driven ☐ 1647 C

Auxiliary heating make
Stroco ☐ 1648 A
Webasto ☐ 1648 B

Park ramp heating
UWE EK 100E al) ☐ 1835A

Low park ramp temperature: 5 degrees ☐ 1847A
8 " ☐ 1847B
10 " ☐ 1847C
12 " ☐ 1847D
14 " ☐ 1847E
16 " ☐ 1847F

High park ramp temperature, 18 degrees
with ☐ 1848A
without ☐ 1848Z

UWE manual bk ,al) ☐ 1835B, 1848Z
UWE EK 100 bk ,al) ☐ 1835D, 1848Z
without ☐ 1835Z, 1847-

EXTERIOR

Side windows
single glass ☐ 152A
double glass ☐ 152C

Side windows
openable, folding without lock ☐ 1501A
openable, folding with lock ☐ 1501B
openable, sliding (single glass only) ☐ 1501C
not openable ☐ 1501Z

Door window
single glass ☐ 1302A
double glass ☐ 1302B

Roof hatches
2 pcs ☐ 65C
3 pcs ☐ 65D

Glass in roof hatch
smoke coloured ☐ 1768A
grey ☐ 1768B

Roof hatch control for front hatch
manual ☐ 153A
electrical ☐ 153B

Rear view mirrors
standard, not heated bc) ☐ 69B
standard, heated ☐ 69A

Mirror control, right hand side
electrical ☐ 1468A
manual ☐ 1468B

Mirror control, left hand side
electrical ☐ 1469A
manual ☐ 1469B

School sign
with ☐ 196A
prepared for ☐ 196B
without ☐ 196Z

Head lamps, automaticly dipped beam
with ☐ 1694A
without ☐ 1694Z

Head lamps change over to position lamps
applied parking brake ☐ 1695A
entrance door open ☐ 1695B
gear selector "N" ☐ 1695C
gear selector "N" and applied park.brake ☐ 1695D
any door open ☐ 1695E
without ☐ 1695Z

Rear light placed high up

stop lamp		3192A
pos./direction indicator	bm)	3192B
stop lamp, pos./direction indicator	bm)	3192C
without		3192Z

Exit lamps, exterior

with	1692A
without	1692Z

Locking device batt.cover square l.

with	3065A
without	3065Z

Locking device aux.cover square l.

with	3066A
without	3066Z

Locking device rear comp.door

square lock	3070A
L-handle with lock	3070B
T-handle with lock	3070D

Wheel chock

2pieces	bk)	1233B
without		1233Z

Sliding cassette battery

with	3071A
without	3071Z

SIGN BOXES

Sign box control

by manufacturer	1678A
without	1678Z

Location sign box controll

in ceiling	2996A
in instr. panel	2996B
without	2996Z

Sign box light, controlled by

separate switch	1677 A
exterior / interior light switches	1677 B
interior light switch	1677 C
ignition key	1677 D
battery master switch	1677 E
switch and ignition key	1677 F
exterior light	1677 G
without	1677Z

Sign box, front

destination FD244810 16x112-15	543A/2998C
destination FD247810 19x112-15	543A/2998E
destination FD245810W 20x112-15	543A/2998D
destination HG4/10.120x16/1 YW SLIM	543D/2998A
destination HG320.200x24/1 YW SLIM	543D/2998B
without (or placed at our disposal)	543Z/2998-

Sign box, left hand side

route number FD241110 16x28-10		1841A/3008C
route number FD243110 13x28-15	ao)	1841A/3008E
route number FD242210W 20x35-10	ao)	1841A/3008F
route number HG4/10 28x16/1 YW S	ao)	1841D/3008B
without (or placed at our disposal)		1841Z/3008-

Sign box left hand side, located

in window	2576A
in side panel	2576B
without	2576Z

Sign box, right hand side

destination FD241810 16x112-10		469A/3009D
destinat. FD242810W 20x112-10	ao)	469A/3009F
destinat.HG375.120x16/1 YWSLIM		469D/3009A
without (or placed at our disposal)		469Z/3009-

Sign box right hand side, located

in window	1864A
in side panel	1864B
without	1864Z

Sign box, rear

route number FD243110 13x28-15	457A/3007B
route number FD242210W 20x35-10	457A/3007C
route number HG4/10 28x16/1YM SLIM	457D/3007A
without (or placed at our disposal)	457Z/3007-

POWER TRAIN

Exhaust outlet direction

left hand, side		392K
left hand, down		392L

Emergency stop

with		551A
with, excluding step light		551B
with, interior light		551C
without		551Z

Fuel volume

2x150 dm3		1670FG/2154-
2x150+100 dm3 (bottom tank left side)		1670FJ/2154A
2x150+100 dm3 (bott. tank right side)		1670FJ/2154B
2x150+2x100dm3		1670FK/2154-
2x75+100dm3 (left side, low tank)		1670FM/2154A
2x75+100dm3 (right side, low tank)		1670FM/2154B
2x75+2x100dm3 (low tank)		1670FL/2154-
3x100dm3 (low tank)	aq)	1670GA/2154-

Fuel filling

right side		103B
left side		103A
both sides		103C

Fuel filling thermistor

with		406A
without		406 Z

AIR & BRAKE SYSTEMS

ZF retarder control

automatic		510B
manual / automatic		510C

Extra air pressure tank in front

with		3068 A
without		3068 Z

SUSPENSION

Partial lowering

front door		1476B
whole front		1476A
whole side		1476C
without		1476Z

Partial lowering activation

with all doors closed		2443 A
with any door open		2443 B
doors open or closed		2443 C

Sidewalk detector

with		1672A
without		1672 Z

ELECTRICS

Battery charging socket

Fenwick	--	636C
Hella		636A
without		636Z

Battery master switch control

switch on dashboard		3078A
knob inside a hatch behind front door		3078B
knob behind right front hatch		3078C

Starting help socket (engine compartment)

with		2047A
without		2047 Z

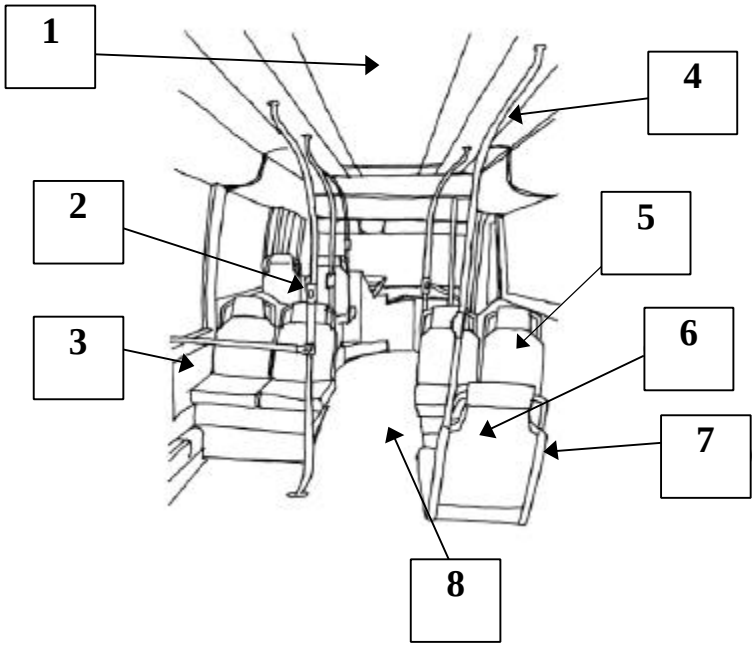
Fog lamps front

with		646A
without		646 Z

Fog lamps rear

with	X	98A

COLOURING:



1. Ceiling panels Fabric: _____

Painted (colour): _____

2. Stop signal button Colour: (See page 2) _____

3. Wall panels Colour: (See page 1) _____

4. Stanchions, grab handles & Handrails Colour: _____

5. Passenger's seat Make: (See page 1) _____

Fabric: _____

6. Seats back: Laminate : _____

Fabric : _____

7. Seats frame Colour : _____

8. Floor covering Gangeway: _____

Podester: _____

Driver's seat Make: (See page 2) _____

Fabric: _____

Following items are requested by Customer-order, to be included in the specification.

1

Remarks:

-- = Yet not available.
a) = Only with bus lenght 11 515 mm.
b) = Only with bus length 11 985 mm.
c) = Only with bus lenght 11 515 mm and bus body width 2 550 mm.
d) = Only with pram space behind front axle (1843A/B).
e) = Only with door configuration 2-2-2.
f) = Only with sign language "Swedish"(3A)
g) = Not with wheel chair ramp (1716A/B, 1547A).
i) = Intended for the French market.
k) = Only with driver's manouvre switches; push buttons for all doors (2097B).
l) = Only with bus stop brake for all doors (426A) or for front door (426C).
m) = Only with bus stop brake (426A/B/C).
n) = Not with driver's manouvre switches; hand lever for all doors (2097C) or without (2097Z).
o) = Only with driver's manouvre switches; hand lever for all doors (2097C).
p) = Not with manual bus stop brake (1725A/B/C).
q) = Not with bus stop brake (426A/B/C).
r) = Not with disengagement switch for 2nd front door leaf (1719A).
s) = Only with automatic retarder control (510B).
t) = Only with door control system manual (151A).
u) = Only with door configuration 2-X-X, driver's manouvre switches; push buttons for all doors (2097B) and safety edge warning system for front door; for closing movements or without (1984C/Z).
v) = Not with exterior open/close switch for front door (199D/Z).
x) = Not with safety edge warning system for front door; for opening and closing movements (1984A).
z) = Only with safety edge warning system for front door; for opening and closing movements (1984A), or also for closing movements (1984C) with door opening inwards (2444A).
aa) = Only with locking device exterior (1722B/C).
ab) = Not with locking device exterior (1722B/C).
ac) = Only with driver's manouvre switches; push button for all doors (2097B).
ad) = Only with door control system autom. (151B).
ae) = Not with safety edge check (2285A).
af) = Only with self service control for middle and rear doors (1712A).
ag) = Not with self service control for middle and rear doors (1712A/B).
ah) = Only with automatic middle and rear door opening; passenger open request button (2117A).
ai) = Only without autom. middle and rear door opening (2117Z).
aj) = Only with driver's manouvre switches; knob for front door and….(2097A).
ak) = Only with manual bus stop brake (1725A/B/C).
al) = Only together with convectors at passenger compartment (1655A) and convector at driver´s area (1786A/B).
am)= Only with pram signal switch at front standing area (2107A/B/C).
an) = Only with door opening exit doors inwards (2444A).
ao) = Only in window
ap) =Only intercity (389G),without read lamps unit (1688Z) and only with illumination intencity 100 lux (2020A)
aq) = Only intercity (389G),with fuel filling right side (103B) and without fuel filling thermistor control (406Z)
ar) = Only for interior open request switch middle and rear doors(2104/2105 A and B)
as) = Only with front door double.
at) = Only intercity bus (389G)
au) = Only with Be-Ge seats (99A)
av) = Only intercity bus (389G) and with small or without pram space behind front axle(1843A/Z).
ax) = Not for intercity bus (389G)
ba) =Always for intercity bus (389G).
bb) =Not with single door behind rear axle(151B and D)
bc) = Only with manual mirror control (1468B/1469B)
bd) = Only with bus stop brake (426A,B,C,D)
be) = Only with push buttons and hand lever for all doors (2097B,C)but not with Intercity buses(389G)
bf) = Only with exterior switch for front door (199B or F) and battery master switch control (3078A or B)
bg) = Only with Swedish or Danish sign language(3A/K) single or double door behind the rear axle (150B,H,D,N,M) and with disengagement switch for rear door (2103A).
bh) =Only with single or double door behind rear axle (150 B,H,D)
bi) =Only valid for sign language Swedish and Italian (3Aand 3M)
bj) = Only together with twin compressors (1912B)
bk) =Not together with UWE-el (1647A or 1647C)
bl) = Only with door configuration 2-X-X.
bm) = Only with bus body width 2550 mm(1555B).
bn) =Not together with air conditioning for passenger (1657C-1912A/B)

Scania Buses & Coaches to fill in:

S-order request dated: .....
Design description dated: .....
Customer equipment: 1938.....
Order No (s): .....
Prod. month: .....
Variant No: .....