Customer Tailored Logistics

– A Case Study of Volvo Construction Equipment in Southeast Asia and Australia

Master Thesis – International Business
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ACKNOWLEDGEMENT

First of all we would like to thank Hans Josefsson, Senior Vice President, and Magnus Björkman, Business Controller, at Volvo CE headquarters in Brussels; Hans Josefsson for initiating this project, and Magnus Björkman for organising all practical issues. We would also like to thank everyone else at the Volvo CE headquarters in Brussels, especially Emmanuel, who has helped us during this project.

In Australia we would especially like to thank Paul Torrington, who organised our stay there, Thomas Edling, for guiding us around Manley Beach, and Chris Moroz, for showing us around Sydney.

From Singapore we would like thank C. K. Chan for organising accommodation and interviews, Wan Jia Loh, for providing us with a lot of information, and Sim You Chen, café manager at the Orchard Grand Court hotel, for good arrangements.

We would also like to thank Atiphong Phongwan, assistant Vice President, in Bangkok, for making our stay there a success.

Last but not least, we would like to thank our professors, Sten Söderman and Hans Jansson. Sten Söderman, our consultancy mentor, initially more or less dragged us into the project, and later introduced us to his customer satisfaction survey. Hans Jansson has been our academic mentor and helped us improve the structure of our work.

We would like to show our gratitude to the Swedish and German postal services for delivering an express mail from Gothenburg to Berlin, in no less than 16 days. The result of this was that one of us, Wang, missed the trip to Australia.

Christoffer Jonsson and Junyi Wang

Göteborg, December 13th 1999
ABSTRACT

The purpose and main problem of this thesis is to describe the supply chain, in a system with great distances between production and sales units, and explain how to solve logistics problems and increase sales by focusing on the customers’ needs.

Customers in Southeast Asia and Australia are annoyed with the construction equipment industry. Volvo CE is in an unfavourable competitive position, although it is the leader in terms of product quality. It is the service that causes Volvo problems. Volvo CE is weak on such service-related factors as parts availability, after-sales service, financing, and product availability. Service-related factors are more important than product-related.

Concerning the information flow we have found that forecasting is rigid, order systems are not fully integrated, and communication between different entities is inadequate. Transportations are complicated and time consuming, the level of machines in inventory is too low, which makes for long lead-times. Parts management is sometimes uncoordinated, service levels are lower than the main competitors’, and sales companies are reluctant to share parts between them.

We believe that the current structure with one warehouse in Singapore, serving the Southeast Asian market, and one in Sydney, covering the Australian market, should be kept. Increase inventories of both products and spare parts, to increase the service level. Employ the concept of one-warehouse-thinking, and integrate information systems between the different units, plants, sales companies, and dealers. Install a central control authority, responsible for co-ordinating parts distribution world-wide.

Volvo CE needs to make the following improvements in order to improve their competitive position:

The “sell one – build one” concept is difficult to employ in a system with great distances between production and sales units. This is especially true in an industry characterised by big, bulky products, low volumes, and few and expensive transportation alternatives. If the customers’ differentiation level is relatively low, it is recommended to have some stock closer to the customers.

Key words: Construction equipment industry, customer satisfaction, competitive positions, order-to-delivery logistics, benchmarking
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1 INTRODUCTION

We begin the introduction with a background to our research, why we chose to study Volvo CE and why Southeast Asia and Australia are so interesting. We continue with our purpose and research problems. Finally we present our research model that outlines the structure of our thesis.

1.1 BACKGROUND

Volvo Construction Equipment became the third largest international construction equipment manufacturer after the acquisition of Samsung Heavy Industries. It shows Volvo CE’s geographical expansion into the Asian market.

Competition in the Asian construction equipment market is very intensive. There are big scale regional manufacturers such as Komatsu, and Hitachi from Japan, international competitors with local production, such as Caterpillar, and other smaller sized manufacturers such as Kobelco, and Daewoo.

Time-based competition is another characteristic of the construction equipment market in Asia, customers are becoming more time oriented. Instead of patiently waiting for quality products, customers prefer quick product/parts delivery and fast maintenance. It takes Caterpillar and Komatsu two or three weeks to deliver a machine to the end user through their dealer network. Volvo Construction Equipment provides its Southeast Asian and Australian customers with its highly regarded wheeled loader and articulated hauler made in Sweden, two or three months after ordering.

Construction equipment transportation is complicated for many reasons. The products are big and bulky, and there is a limited number of shipping alternatives due to the lower demand after the Asian crisis. Transportation fees are, as a result, higher. The crisis turned the regional regular shipping into a great mess, there are no more regular shipping lines that depart from Korea to Southeast Asia, or to Australia. That gives rise to delivery problems from Korean plants, resulting in long lead-times. It is even worse in terms of product transhipment. The Asian crisis gave rise to higher stock among the competitors and made it even easier for them to satisfy customers’ needs of quick delivery.

Compared with Caterpillar and Komatsu, the main disadvantage of Volvo CE in Southeast and Australia is long distances between the plants in Sweden and sales units in the region.
1.2 Purpose and Research Problems

Successful supply chain management aims at providing its customers with the right product, at the right place and at the right time. Successful business can never go without offering its customers good value and satisfaction. How customers perceive the product and service that a company offers them, and to what extent logistics issues influence customer satisfaction will ultimately affect the company’s sales in the market.

We have identified one main problem and three underlying research problems for our study.

<table>
<thead>
<tr>
<th>Purpose and Main Problem</th>
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<tr>
<td>To describe the supply chain, in a system with great distances between production and sales units, and explain how to solve logistics problems and increase sales by focusing on the customers’ needs.</td>
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Distances between production and sales units create logistics problems. A good understanding of the supply chain will create a good base for coming up with improvements. The purpose of this thesis is to look at a system with great distances between production and sales units from the customers’ point of view. We will identify the problems as they are today, and thereafter we will tailor the logistics to the customers’ needs in order to increase the sales.

<table>
<thead>
<tr>
<th>Research Problem A</th>
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<tr>
<td>Make a customer satisfaction analysis to find out the competitive position of the main players in a selected industry.</td>
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The customer is king, eventually it is the customer who decides which product to purchase. Hence it is critically important to read customers’ minds and understand what customers perceive as the most important factors in their purchasing decision. Analysing the answers from customers will give us a good insight to customer purchasing decision making.

Therefore, we began with an analysis of customer satisfaction, in which we identified logistic-related factors that are important for the customer in the purchasing decision making, and judged how important they are. We found out the main players in the selected industry, and identified the competitive position of each company.

<table>
<thead>
<tr>
<th>Research Problem B</th>
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<tr>
<td>Describe the order-to-delivery process in a system with great distances between product and sales units. Identify the main problems in this process.</td>
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Efficient and accurate ordering not only reduces lead-times, but also facilitates the production procedure. The delivery vehicle chosen, distribution center location and inventory management will to a great extent influence the success and efficiency of deliveries. Customers' repeat purchasing is always based on delivery experience of the previous order. As a result, it made sense for us to give a detailed description of what the supply chain looks like today, and try to pinpoint the bottlenecks of the logistics system. We decided to focus on the process from customers’ orders until the product/part is delivered. We will not include the suppliers nor the monetary flow in our study.

Research Problem C
Make an analysis of the main competitors in a selected industry, to be used as benchmarking.

Insightful companies will always keep evaluating their main competitors’ logistics systems. Sensible benchmarking can provide a company with good guidelines for competing effectively.

We made an analysis of the main competitors found in our customer survey, in which we analyzed the strategies, objectives, assumptions, resources & capabilities, and logistics.

Later we put together the findings from these three research problems and made an analysis, in which we used the results from our survey, the order to delivery logistics, and the competitor benchmarking to draw our conclusions and give recommendations on how to increase sales.

Our purpose and main problem are to describe the supply chain, in a system with great distances between production and sales units, and explain how to solve logistics problems and increase sales by focusing on the customers’ needs.

What kind of methods are we going to use to analyze our problems?
1.3 Our Research Model

Figure 1. Our research model
2. METHODOLOGY

In this chapter we will describe the methods we have employed in our research. We give a picture of our data collection, including criticism of our way of working.

2.1 RESEARCH STRATEGY

According to Yin (1994, pp. 7), there are five different research strategies, which we have listed in the table below. Experiments are done when the investigator can manipulate behavior; this can typically occur in the laboratory. Survey and archival analysis are more likely to identify the outcome of quantitative research with a research question, such as how many and how much. The difference between them is the time aspect; a survey deals only with contemporary events while the latter can deal with both contemporary and historical events. Archival analysis is the preferred strategy when there is virtually no access or control, and it is used only for historical events.

A case study is preferred in examining contemporary events, when the relevant behaviors cannot be manipulated. What differentiates the case study from the historical one is that the former uses direct observation and systematic interviewing. It is also good at dealing with a full variety of evidence - documents, artifacts, interviews, and observations. (Yin, 1994, p. 8)

A case study can be defined in terms of a research process: “It is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” (Yin, 1994, p. 13)
Table 1. Relevant Situations for Different Research Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Form of research question</th>
<th>Requires control over behavioral events?</th>
<th>Focuses on contemporary events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>How, why</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival analysis</td>
<td>Who, what, where, how many, how much</td>
<td>No</td>
<td>Yes/no</td>
</tr>
<tr>
<td>History</td>
<td>How, why</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case study</td>
<td>How, why</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Yin, 1994, p. 6

Since our focus in this thesis is on the present and the future concerning logistics in a system with great distances between production and sales, we think that a case study is the best alternative for our study.

2.2 CASE COMPANY

We have chosen Volvo Construction Equipment as our case company, since it is a perfect example of a company with great distances between production and sales companies. It has much of its production in Sweden and its sales units spread all over the world.

2.3 CASE STUDY RESEARCH DESIGN

A case study design is needed to produce a logical framework in collecting relevant data during the initial stage, to develop questions, and ultimately, to state conclusions (Yin, 1994, p. 39) A case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in process rather than outcome, in context rather than a specific variable, in discovery rather than confirmation. Insights gleaned from case studies can directly influence policy, practice, and future research (Merriam, p. 19)

The purpose of the design is to help us to identify evidence, which is relevant to our main problems. There are four types of designs of case studies: single-case designs, multiple-case designs, holistic designs, and embedded designs.
Since we are only studying one case company (Volvo CE) in this thesis, type 1, a single case design with a holistic view, is the most appropriate design for us. We do study other cases, competitors of Volvo CE, but not enough to motivate a choice of type 3. We think that our findings are not only applicable to Volvo CE, but that they can be transferred to other companies with a similar logistics system, with great distances between production and sales units.

2.4 APPROACHES FOR CONDUCTING RESEARCH

According to Yin, there are three different approaches for conducting research: descriptive, explanatory, and exploratory. The descriptive approach aims at giving a detailed description of a case or a set of events. (Yin, 1994, p. 3)

The objective with the exploratory approach is to broaden the domain of options, with the intention of finding the best alternative in the set of alternatives to be evaluated. The exploratory approach, which is also called the causal approach, exemplifies a cause-and-effect relationship. The explanatory approach is used when there is not a lot of research within a certain area. The goal is to develop hypotheses and propositions for future inquiry. (Yin, 1994, pp. 3)

In order to gain knowledge of the problem we have used a descriptive approach to outline the present order-to-delivery logistics and the competitors. We are exploratory when we suggest how Volvo CE should locate their warehouses, increase their sales and in our customer satisfaction survey.
2.5 Qualitative and Quantitative Research

Qualitative research is based on data that cannot be quantified; this kind of data is often called "soft data" such as attitudes, values, beliefs and other types of data of emotional character. When using a qualitative research method, the researcher collects a lot of information about just a few research units, which the researcher examines in-depth. In the quantitative method, the researcher collects less information about a huge amount of research units, which makes the research broad. (Holme, JM., 1997)

We have mostly been using the qualitative method in our research, although we used a quantitative approach in our customer satisfaction survey. The key concern of qualitative research is understanding the phenomenon of interest from the participant’s perspectives, not the researcher’s, and the researcher is the primary instrument for data collection and analysis. Fieldwork is often involved in qualitative research and the researcher must physically go to the people, site, and institution in order to observe behaviour in its natural setting. Compared with quantitative research, which is much more precise, the product of qualitative study is richly descriptive. (Merriam, pp. 5-8)

Qualitative case studies are limited by the sensitivity and integrity of the investigator. The researcher is the primary instrument of data collection and analysis. This has its advantages, but also disadvantages. The investigator is left to rely on his/her own instincts and abilities throughout most of this research effort. (Merriam, pp. 41-43)

2.6 How we did our Customer Satisfaction Survey

2.6.1 PIMS Principles - The Base

The customer satisfaction survey we conducted constitutes the backbone of our thesis. It is on the findings from this survey that we base our investigation. We have used the established PIMS (Profit Impact of Market Strategy) principles of customer satisfaction survey as the base for our survey, and modified it to some extent to suit our requirements better. The PIMS principles are based on studies of companies in the so-called PIMS database. These principles try to establish important linkages between strategy and performance of a company.

The survey is a quantitative study, in which we let the participants rank Volvo CE and its competitors on different purchasing criteria. The aim was to establish a competitive position of each major company in the construction equipment industry in Southeast Asia and
Australia. By profiling how customers make purchase decisions, we could determine which attributes count and see how customers rate each attribute for each competitor.

2.6.2 How representative are our findings?

For our survey we conducted 16 interviews. Eight of them were with customers, four with existing Volvo customers, and four with potential customers. We interviewed three dealers, two in Australia, and one in Thailand. We also carried out interviews in three sales companies, two in Singapore, and one in Australia. Finally we interviewed two persons from Volvo CE headquarters in Brussels. We did not choose respondents in each organisation ad hoc, instead we tried to find the key persons. Except for the customers, who were chosen ad hoc.

The population in our survey is not large enough to make it a statistical survey. We have used nonprobability sampling, which is the method most often used in qualitative studies. Nonprobability sampling does not allow the researcher to generalise results of the study to the whole population, from which it has been drawn. This method does not give answers to questions such as “how much” and “how often”, but can help solve qualitative problems, such as discovering what occurs and the implications of the occurrences. We can not claim to have a representative sample to base our findings on. Therefore we can only give indications of phenomena, not proof of them. (Merriam, 1998, pp. 61)

2.6.3 How we conducted the survey

When doing our customer satisfaction survey we used a standardised form (see appendix B) that we modified from existing forms. The reason why we chose this method was that it allows the respondent to come up with important criteria and competitors, without interference from the interviewer. This gives a good picture of what is really important in this industry in this region, since the interviewer does not influence the respondent in any direction. The procedure we followed during the interviews was to let the respondent answer these questions, in the given order.

1. List the criteria he/she thinks are the most important in the purchasing decision.
2. Rank the importance of each criterion by allocating 100 points between them.
3. Identify the main competitors of Volvo CE.
4. Put a grade, from 0-10, for each of the competitors mentioned in 3 and Volvo CE on each of the criterion mentioned in 1, where 0 is the lowest grade and 10 the highest, and 5 is labelled as industry average.
5. Give the same type of grade for the price-level of each company.
After finishing the interview we calculated a qualitative score for each company, and plotted the results on a value graph.

Figure 3. The value graph: Five generic positions

![Value Graph](image)

Relative price

Quality for price curve

Inferior      Superior

Relative quality

Source: Buzzell & Gale, 1987, p. 112

A value map is typically used to plot the line of business and key competitors on a two-dimensional price-versus-quality chart. Most businesses fall along the “comparable quality-for-price curve”, as they offer the same value, but there are businesses that wind up in unusual positions. Offerings positioned along the quality-for-price curve give the customer roughly comparable value (for price) and they tend to hold their market share. Companies in the economy-zone offer low quality at low price, while companies in the premium zone offer high quality for a premium price. Some companies offer better value, meaning that they offer high quality at a low price, while some offer worse value, low quality at a high price.
The value map shows how the studied company fares versus competitors in relative price, relative quality, and relative value. Relative quality constitutes both product and service quality. Quality profiling gives an indication of what attributes count in the purchase decision, how the customer rates the company in comparison with leading competitors on each attribute. Many companies never get to the real non-price cues and attributes that count in the purchase decision, they concentrate on price alone. (See further discussion in chapter 3.1.2.)

2.6.4 Calculation of the comparative score

After plotting the companies on the value graph, we calculated a score for each of the main competitors on each of the purchasing criteria identified. This enabled us to compare the perceived strengths and weaknesses of each company. We called this the comparative score, since it gave us the possibility to compare the companies on one issue at a time. The procedure we followed for this is as follows:

1. We added together the score of each individual purchasing criterion (found in the second bullet, see 2.6.3 above) from all the interviews. The result for productivity could for example be: 30+40+20+40+30=160. Following these rules, we got the total score of each individual factor. E.g. productivity 160, durability 200, and so on.

2. We found out the weight of each individual factor. Since the total score was 1600, (16 interviewees and each person allocated 100 points to the factors you wish to compare) the weight of productivity is: 160/1600= 10\%, durability 200/1600= 12.5\%.

3. We obtained the average score of all purchasing factors for Volvo, Caterpillar and Komatsu and compared them on each purchasing factor.

Table 2. Productivity – an example of a comparative score calculation.

<table>
<thead>
<tr>
<th>Company</th>
<th>Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo</td>
<td>9</td>
</tr>
<tr>
<td>Caterpillar</td>
<td>8</td>
</tr>
<tr>
<td>Komatsu</td>
<td>7</td>
</tr>
</tbody>
</table>

The average productivity marks in the table above would give the graph seen below.
4. We multiplied the average score of one factor with its weight, then we did the same for each factor. Finally, we added all of them together, then we got one company’s total comparative score. E.g. productivity and durability for Caterpillar can look like this: $8 \times 10\% + 10 \times 12.5\% = 2.05$

### 2.6.5 The disadvantages of customer survey

Customer-satisfaction surveys can generate valuable information that enables a company to compare the performance of one business unit or several business units in different time periods and locations. They can provide leading indicators of market shifts and can provide a clear sense of the product or service attributes that individual customers desire most. However, customer-satisfaction surveys cannot supply the breadth and depth of information about customers needed to guide the company’s strategy and product-innovation process. Satisfaction surveys alone will not enable a company to fend off new competitors or keep products and services attuned to customers’ changing needs. Another disadvantage is that customers being interviewed might say one thing and do another. There is no guarantee that they will back up their words in actions. For these reasons, companies must also utilise a variety of other methods to listen to existing, potential and former customers.

### 2.7 Data collection

There are three principles of data collection according to Yin (1994, p. 19), for conducting a case study. These include a) multiple sources of evidence, i.e. evidence from two or more sources with focus on the same set of facts or findings; b) a case study data base, that is, a formal assembly of evidence distinct from the final case study reports; and c) a chain of
evidence, i.e. a link between the questions asked, the data collected, and the conclusions drawn. We have had all these principles in mind when conducting our research.

Table 3. Types of interviews

<table>
<thead>
<tr>
<th>Highly Structured/Standardised</th>
<th>Semi-structured</th>
<th>Unstructured/Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Word of questions predetermined</td>
<td>• Mix of more-and less-structured questions</td>
<td>• Open-ended questions</td>
</tr>
<tr>
<td>• Order of questions predetermined</td>
<td>• Flexible, exploratory</td>
<td>• More like a conversation</td>
</tr>
<tr>
<td>• Oral form of a survey</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Merriam, p.73

The most structured interview is actually an oral form of the written survey. The problem with using a highly structured interview in qualitative research is that by rigidly sticking to predetermined questions one may not allow for access to the participants' perspectives and understanding of the world. For the most part, however, interviews in qualitative investigations are more open-ended and less structured. This format allows the researcher to respond to the situation at hand, and to the new ideas of the interviewee on the topic. Unstructured interviews are particularly useful when the researcher does not know enough about a phenomenon to ask relevant questions, and it takes a skilled researcher to handle the great flexibility demanded by the unstructured interview. (Merriam, pp. 74-75)

Table 4. Questions to avoid

<table>
<thead>
<tr>
<th>Type of Question</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Multiple Questions</td>
<td>How do you feel about Caterpillar and Komatsu?</td>
</tr>
<tr>
<td>• Leading Questions</td>
<td>What emotional problems have you had since losing your job at Samsung?</td>
</tr>
<tr>
<td>• Yes-or-No Questions</td>
<td>Do you like the Samsung products? Do you think the quality of their products is as good as other Volvo products?</td>
</tr>
</tbody>
</table>

Source: Merriam, p.79

Three major types of questions should be avoided in an interview: Firstly, avoid multiple questions, such as one question that is actually a double question or a series of single questions that do not allow the respondent to answer one by one. Secondly, avoid leading questions, which may set the respondent up to accept the researcher’s point of view. Thirdly,
avoid yes-or-no question, any yes-or no response gives almost no information. (Merriam, p. 79) It is difficult to avoid these types of questions totally, but we have tried to limit their frequency as much as possible. To avoid leading questions have been especially important in our customer satisfaction survey, and we think we have managed to an overwhelming extent.

2.7.1 Field work in Europe and Asia

Primary data include mainly interviews and questionnaires. We conducted field work at the Headquarters of Volvo CE in Brussels from August 25th to 26th; the plant in Eskilstuna on September 30th; a sales company and dealer in Sydney from Oct 6-8th; a dealer in Perth on October 11th; a sales company in Singapore from October 13th to 14th. One of us visited a dealer in Thailand on 18th and the other one continued interviewing in Singapore.

2.7.1.1 More or less structured questions

We have combined all three types of interviewing, depending on the situation and how much knowledge we had before the interview. Mostly we have been using semi-structured interviews, based on a loose questionnaire that we did not always stick to as we progressed. But our customer satisfaction survey is an example of a structured interview. We split the survey into four parts, which could not be changed as each step would lead to the next one.

2.7.1.2 Six types of issues

We used semi-structured questionnaires, where we divided the questions into six groups, and asked the questions to different persons depending on their competence: strategic related, marketing related, logistics related, warehouse related, products related etc.

2.7.1.3 Specific questions

For the prospective interviewees whose position we knew before the interview, we set up specific questions and highlighted the important issues that were prioritised in case of a limited time schedule. Our questions were not highly structured, sometimes the interviewer’s answer naturally led to another question or he answered another question, then there was no need for us to repeat the question. Sometimes question repetition could not be avoided due to this semi-structured questionnaire. One reason for this was to penetrate deeper query, and we asked an interviewee almost the same question in different ways, e.g. “what do you think is the most serious problem in the logistics chain?” compared with “in your opinion, which part of the logistics chain should be improved at the first place?” Another reason was to ask different interviewees the same question in order to get a holistic view and find out different opinions from different people. Sometimes the same questions gave completely different answers from the headquarters of Volvo CE, regional sales company, dealer and customer,
such as “in your opinion, which are the main criteria for a customer when he/she is purchasing construction equipment?”

2.7.14 Ten start-up questions
Unstructured interviewing was another method we had to use in some situations. While we were conducting interviews in Brussels, we were told to prepare only 10 important questions for our interviews beforehand. After finishing the main 10 questions, we were flexible and asked more questions concerning our research.

2.7.15 Like bystanders...
Sometimes we had to be even more flexible and not follow the structured questions. This was the case while we were interviewing a manager of a Japanese construction company in Singapore. Japanese people are very hesitant to talk to unknown interviewers. We were refused by the first prospective interviewee, he would not accept our interview without seeing an introduction letter from a professor at our school. Then we changed our identity and asked another manager by behaving like bystanders. First, we discussed something general about the construction project, then we asked him questions about our customer survey.

2.7.16 The magic role of the tape recorder
Most of our interviews were recorded. This helped us compile the interviews afterwards and we could concentrate on interviewing and asking more relevant questions, instead of spending time writing down the answers. The disadvantage is this taping method is that it to some extent restricted the outspokenness of our interviewee, one interviewee told us to turn off the tape recorder, and then answered some sensitive questions. In some cases, when our interview proceeded without recording, the interviewee spoke freely and complained more. When we began to record again they changed their attitude and seemed reluctant again, then we had to turn the recorder off again. Coffee breaks and lunchtimes were also good opportunities to collect first-hand material, as people were quite related without the supervision of a tape recorder.

2.7.2 Valuable help from the company
Secondary data is data that already exists, and examples of this are books, articles, journals previously made studies and statistics. Secondary data can be divided into two categories, i.e. from internal or external sources. Internal data comes from within the organisation for which the study is conducted. External secondary data comes from outside the organisation and can be obtained from a wide range of sources. (Kinnear & Taylor, 1991, p. 182)
We received a lot of useful material from the company at the beginning of the project. This material was compiled by the company, and was more of an introduction to Volvo CE’s structure, strategy and its operations in Southeast Asia and Australia. During the fieldwork in Australia and Singapore, we got access to more internal resources, such as inventory management, detailed sales figures and customer segment analysis. The Circle of Excellence is an internal organisational report that stresses dealer improvement. We especially used the included chapter on customer satisfaction, which gave us some good ideas and suggestions for our customer satisfaction research.

We also received external material from the company, including some consultancy reports, such as the Off-Highway report, which gave us a more detailed picture about the market. We also got some material concerning Caterpillar, such as their Parts Availability Guarantee Program, which gave us more insight about competitors’ behaviour and allowed us to have some benchmarking.

We searched for relevant information from schools’ on-line databases, such as the General Business File. We searched for information on the competitors on the internet, mostly their homepages. We also checked magazines in libraries, such as Harvard Business Review. An Annual Report is another good data resource, where we got more information about strategy and objectives concerning competitors.

2.7.3 Workshop

On October 15th and 16th, we had a two-day intensive workshop in the seminar room of our hotel in Singapore. All the students involved in the Volvo CE project, our supervisors and the Business controller from Volvo CE attended the meeting to supervise our thesis.

During the meeting every group presented their research results so far, then all participants came up with questions and suggestions to the other groups. The intensive work not only brought us many productive ideas but also deepened the mutual understanding between students and professors. It put us on the right track with consensus between students, professors and the company.

2.8 Implementing existing theory vs constructing our own

A case study can be inductive or deductive. An inductive case study is used when building a new theory. A case study is deductive when the researcher tries to find information that suits the existing theories. The researcher should prepare the case study by doing research in the literature related to what the researcher wants to study. We combined the inductive and deductive ways of doing research by developing new theories as well as using the old existing
theories. Therefore, while we were conducting the Volvo CE case, we tried out the existing theories with the empirical materials collected from both interviews and secondary data. After digesting the data, we tried to construct our own theories. An example of this is our customer tailored logistics, where we made a general theory based on existing theories.

2.9 Reflections on Validity and Reliability

2.9.1 More than 60 Hours of Interviewing

During our case study we have conducted some 35 interviews, accumulating to more than 60 hours. A case study is the best plan for answering the research questions; its strengths outweigh its limitations. It offers a means of investigating complex social units consisting of multiple variables of potential importance in understanding phenomena.

2.9.2 A Few Aspects on Data Collection

Table 5. Case Study Tactics for Four Design Tests

<table>
<thead>
<tr>
<th>tests</th>
<th>case study tactic</th>
<th>phase of research in which tactic occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>construct validity</td>
<td>use multiple sources of evidence</td>
<td>data collection</td>
</tr>
<tr>
<td></td>
<td>establish chain of evidence</td>
<td>data collection</td>
</tr>
<tr>
<td></td>
<td>have key informants review</td>
<td>data collection composition</td>
</tr>
<tr>
<td></td>
<td>draft case study report</td>
<td>data collection</td>
</tr>
<tr>
<td>internal validity</td>
<td>do pattern-matching</td>
<td>data analysis</td>
</tr>
<tr>
<td></td>
<td>do explanation-building</td>
<td>data analysis</td>
</tr>
<tr>
<td></td>
<td>do time-series analysis</td>
<td>data analysis</td>
</tr>
<tr>
<td>external validity</td>
<td>use replication</td>
<td>research design</td>
</tr>
<tr>
<td></td>
<td>logic in multiple-case studies</td>
<td>data analysis</td>
</tr>
<tr>
<td>reliability</td>
<td>use case study protocol</td>
<td>data collection</td>
</tr>
<tr>
<td></td>
<td>develop case study data base</td>
<td>data collection</td>
</tr>
</tbody>
</table>

Source: Yin, 1994, p. 33 (COSMOS Corporation)

When conducting the research, it is always crucial to test the quality of the work, validity and reliability are instruments that help the reader to test the quality of the information given.
There are three different types of validity: construct validity, internal validity and external validity.

To meet the test of internal validity, we have used a multiple source of evidence (primary and secondary) and also tried to maintain a chain of evidence. Before the interview, we first made a draft of our questionnaire and let our supervisors monitor it; we also sometimes sent back our interview record to the specialists (informants) to review the result after the interview.

We believe that the theoretical framework that we built in the theory chapter will have a high degree of generalisation. The fact that we only conducted one single-case study makes the possibility to generalise the practical conclusions restricted. We have, in chapter 9, split our conclusions into general and company specific ones.

The objective of reliability is to be sure that if the study, and the procedures along with it, were followed exactly by another researcher, he or she would arrive at the same findings and conclusions. The goal is therefore to minimise the errors and biases of the study as much as possible. To increase the reliability, we have followed procedures that are easy to pursue, we have also tried to structure our work in a logical way. The recording of the interviews was a good way to minimise misunderstandings and misinterpretations.

Whilst conducting interviews with dealers in Australia, they pointed out the logistics problem of Volvo CE in a very critical way. Additionally, while asking freight forwarders in both Singapore and Australia, they both praised the advantage of their “own” harbour’s strategic location and could not see any disadvantages with it.

Personal opinions to some extent affected our interviews, for example when we interviewed potential customers. One was Japanese and he praised his national construction equipment company - Sumitomo. Another interviewee was the subcontractor of a Japanese construction company, he praised Kobelco. One customer was the opposite, he was one of Kobelco’s small customers, and complained that he never got any service from them and said the only reason to buy Kobelco was its low price. He showed his desire to have Caterpillar equipment and praised Caterpillar as having the best quality in service, but in fact he had never tried any Caterpillar products himself.

Since the main customers generally occupy 80% of the total sales of a company in industrial marketing, these small customers’ and potential customers’ ideas may have too much influence on our customer satisfaction survey.
Another common problem is that almost all the students visiting foreign countries to some extent become representatives of those countries and emotionally inclined to that country, which may result in a subjective conclusion.

One source of error could unfortunately be misinterpretations and misunderstandings, which is stressed by the language problem. While conducting the interview with the dealer in Thailand, only two out of five could speak some English, but with a strong Thai accent. They had to interpret our questions to the rest of them and vice versa, which may have led to communication problems. Since it was a big room the microphone recording quality was found to be rather low and it turned out to be difficult for us to type down the interview later because of these problems.

2.10 **DElimitation**

Our research is mainly focused on customer satisfaction, and customer satisfaction related logistics. The geographical area we have limited our study to, is Southeast Asia and Australia. The reason we chose these two regions is that they constitute the extreme regarding long distances between production and sales units. The products investigated are articulated haulers made in Sweden, excavators made in South Korea, wheeled loaders made in Sweden and the big L 330 made in USA. The parts investigation will be focused on parts to these products as well. We will not focus on Champion motorgraders and Zettelmayer compact loaders, and even less on Pel-Job compact equipment. When investigating competitors, we mainly focus on the two big competitors that were identified in our customer survey. The other less important competitors identified, can be found in appendix A. Concerning the logistics issue, we have focused on the order to delivery procedure and did not go deeply into the terms of payment.

2.11 **DEFINITIONS**

*Lead-time* means the elapsed time from order to delivery in the customer’s viewpoint.

*Pipeline management* is the process whereby manufacturing and procurement lead times are linked to the needs of the marketplace.

*Bottleneck* is the slowest activity in a chain and whilst it may often be a machine, it could also be a part of information flow such as order processing.

*Demand penetration point* is that it occurs at the point in the logistics chain where real demand meets the plan.

*Quick response* (QR) In order to reap the advantage of time-based competition it is necessary to develop a system that is responsive and fast.
We chose the case study as our research strategy, and used Volvo CE as our case company. We mainly conducted a qualitative study, with a lot of interviews and a customer satisfaction survey. We mixed the inductive and deductive approaches.

What kind of existing theories are relevant in our case?
3. THEORETICAL FRAMEWORK

We have divided the theoretical framework into three parts: customer satisfaction, logistics, and benchmarking competitors. In the end we combined all three parts and created our own theory, customer tailored logistics.

3.1 CUSTOMER VALUE AND SATISFACTION

3.1.1 CUSTOMER VALUE

Customers buy from the firm that they believe offers the highest customer delivered value, that is the difference between total customer value and total customer cost (see the figure below). The total customer value is the sum of the value received from the product (e.g. durability, and productivity), the service (delivery, training, and maintenance), personnel (knowledgeable and responsive), and image (reputation). The total customer cost is the sum of all the monetary, time, energy, and psychic costs associated with a marketing offer.

Figure 5. Customer delivered value

Source: Kotler, 1999, pp.545
Customer satisfaction with a purchase depends on the product’s actual performance relative to a buyer’s expectations. If the product falls short of expectations, the customer is dissatisfied. If performance matches expectations, the customer is satisfied. If performance exceeds expectations, the customer is highly satisfied or delighted. Highly satisfied customers produce several benefits for the company. They are less price sensitive, remain customers for a longer period, and talk favourably to others about the company and its products.

Expectations are based on the customer’s past buying experiences, the opinions of friends and associates, and marketer and competitor information and promises. Marketers must be careful to set the right level of expectations. If they set expectations too low, they may satisfy those who buy but fail to attract enough buyers. In contrast, if they raise expectations too high, buyers are likely to be disappointed.

Many companies today embrace total customer satisfaction. By doing this they set their goals very high, as customers’ expectations will rise as a result of this. Thus the company has to deliver a performance to match these high expectations. These companies track their customers’ expectations, perceived company performance, and customer satisfaction. The purpose of this is to have as satisfied customers as possible, while still making a profit and not giving away the products.

Satisfied customers are more likely to become loyal customers. To what degree this is true depends on the industry and how competitive it is. The amount by which revenues from a given customer over time will exceed the company’s costs of attracting, selling and servicing that customer is called customer lifetime value. It is much more profitable to retain an old customer than to attract a new one by looking at it this way. (Kotler, 1999, pp. 545)

3.1.2 THE PIMS PRINCIPLES

According to the PIMS principles (Buzzell & Gale, 1987, pp. 111), the most important single factor affecting a business unit’s performance in the long run, is the quality of its products and services, relative to those of the competitors. Quality is an effective way for a business to grow, it leads to both market expansion and gains in market share. Quality contributes to growth as well as to profitability. Businesses usually achieve quality advantages first by innovating in product/service design and later via product improvements.

Value is the relationship between quality and price, as described above. But who determines what counts as good or bad quality? The answer is the customer. The customer’s behaviour is crucial, it is he/she who decides whom to buy the product from, and at what price. Quality is
whatever the customer says, and it is what the customer perceives to be good quality that
does really matters in the buying decision. This decision is made by comparing the different
offerings available in the marketplace. It is the perceived relative quality of the total package
of products and services that influences customer behaviour, and thus competitive success.

Improving quality sets off a chain reaction. Rising perceived relative quality not only leads to
market share gain, but also to rising capacity utilisation, better turnover on investment, higher
employee productivity and lower expense per dollar of sales.

Many quality leaders achieve their superior quality position by anticipating what customers
need and by being the first to offer it to the marketplace. Better performance on product
attributes is not the only way to achieve this position. Relative perceived quality covers all the
price attributes that count in the purchase decision. Businesses frequently achieve a superior
overall quality position by developing a better image than competitors or providing better
customer services than competitors.

Losers receive low quality scores in all segments of the served market, which places them on
the left side of the map. A niche business is typically well received in some segments but not
in all, which places them on the upper left side. Market leaders tend to be well received by
most segments, and are therefore typically found in the upper right corner of the map.

Followers that improve their market positions usually do so through a combination of
improvements in product/service quality, introduction of new products, and increasing
marketing expenditures. Whether a market follower should attempt to grow by gaining market
share will depend, of course, on how much it would cost to achieve the gains. While the costs
of gaining share are often high, it is also true that most businesses that gain market share
improve their profitability at the same time.

There is in many businesses a focus on evaluating the quality of its products from an internal
perspective, i.e. does the product conform to predetermined specifications? One also needs to
look at it from the customer’s perspective. He sees the offering as it arrives in the marketplace
and measures it relative to competing products. It is a question of whether the company has an
internal or external focus.

3.1.3 Customer Service

One example of what customer service can look like in theory, is outlined by Gattonona and
Walters (1996, p. 47). According to this theory customer service is concerned with making
the product available to the customer. There is no value in a product or service until it is in the hands of the customers. Customer service includes:

- Frequency of delivery
- Order cycle time
- Reliability of delivery
- Flexibility in replenishment
- Order fulfilment accuracy
- Accuracy of documentation
- Continuity of supply

3.1.4 SERVICE DRIVEN LOGISTICS SYSTEM

An effective starting point for logistics system design is the marketplace, in other words, companies must fully understand the service needs of the various markets that they address and then seek to develop a low cost logistics solution.

The ideal logistics strategies and systems should be devised in the following sequence:

Figure 6. Ideal design of logistics system

Identify customer’s service needs

Define customer service objective

Design the logistics system

Source: Christoffer, 1998, p. 48

3.1.4.1 Identifying customers’ service needs

It is important that no two customers will ever be exactly the same in terms of their service requirements. However it will often be the case that customers will fall into groups or “segments” which are characterised by a broad similarity of service needs. These groupings might be thought of as ‘service segments’. The logistics planner therefore needs to know just what the service issues are that differentiate customers. Market research can be of great assistance.
The approach to service segmentation suggested here follows a three-stage process:

1. Identifying the key components of customer service
   The first step in search of this type is to identify the key sources of influence upon the purchase decision. Ideally once the decision-making unit in a specific market has been identified, an initial, small-scale research programme should be initiated based upon personal interviews. The purpose of interviews is to elicit, in the language of customers, which are the key components of service. Once these dimensions are defined, we can identify the relative importance of each one and the extent to which different types of customers are prepared to trade-off one aspect of service with another.

2. Establishing the relative importance of customer service components
   One of the simplest ways of discovering the importance a customer attaches to each element of customer service is to take the components generated by means of the process described in step 1 and to ask respondents to rank order them from the most ‘important’ to the least ‘important’. E.g. asking respondents to place a weight from 1 to 10 against each component according to how much importance they attached to each element.

3. Identifying customer service segments
   Having determined the importance attached by different respondents to each of the service attributes previously identified, the final step is to see if any similarities of preference emerge. Cluster-analysis, by trying to match respondents across as many dimensions as possible, can identify the customer service segments.

3.14.2 Define customer service objective
The whole purpose of logistics strategy is to provide customers with the level and quality of service that they require and to do so at least cost to the total supply chain. The definition of appropriate service objectives is made easier if the concept of the perfect order is adopted. Perfect order is achieved only when each of those service needs meets the customer’s satisfaction. One frequently encountered measure of the perfect order is ‘on-time, in-full and error-free’. In order to calculate the actual service level using the perfect order concept, performance on each element is to be monitored and then the percentage achievement on each element to be multiplied together.

Customer service is usually measured in terms of (1) the level of availability, (2) the speed and consistency of the customer’s order cycle, and (3) the communication that takes place between seller and customer. The customer service level should be established after carefully studying the customer’s needs to find the appropriate level. Availability can be seen as the
number of available products in stock compared to the products out of stock within a specified order cycle. The order cycle is the time that passes between the customer’s order and the time he or she receives the product. Communication refers to the firm’s ability to supply timely information to the customer regarding factors such as order status, order tracking, back order status, order confirmation, product substitution, product shortages, and product information requests. (Stock & Lambert, 1987, pp. 100 & 419)

3.1.4.3 Design the logistics system
The third and final step of this model is to design the logistics system, based on the first two steps.

This model influenced our customer tailored logistics theory, see 3.4.

3.2 STRATEGIC LOGISTICS MANAGEMENT

We now move over from customer satisfaction to logistics theories. We begin this part with some general theories explaining the supply chain, then we go into the different flows, information and physical (products and parts).

3.2.1 SUPPLY CHAIN MANAGEMENT

Supply chain management is concerned with achieving a more cost-effective satisfaction of end-customer requirements through buyer-supplier process integration. This integration is typically achieved through a greater transparency of customer requirement through the sharing of information. The important concept is the idea of process integration. (Christopher, 1997, p. 72)

Figure 7: Product and Information flow from suppliers to customers

![Product and Information flow from suppliers to customers](image_url)

Source: Christopher, 1997, p. 72
3.2.1.1 Intermediaries

Figure 8. How intermediaries reduce the cost of market contact between supplier and customer

Source: Stock & Lambert, 1987, p. 77

Marketing channels develop because intermediaries (wholesalers and retailers) make the marketing process more efficient by reducing the number of market contacts. It is generally accepted that a manufacturer selling to low-volume customers could substantially reduce selling and logistics costs by using a wholesaler/retailer. Intermediaries provide possession, time, and space utility. (Stock & Lambert, 1987, p. 77)

Information needs to be passed on from the customer, through the retailers, distributors, manufacturers, to the suppliers, to be able to satisfy customers in an efficient way. Products and parts move in the opposite way, from the suppliers, through the manufacturers, distributors, retailers, to customers. Thereby there are two parallel processes that need to be worked on in a company. We have therefore, split the logistics into two different parts, information and product/parts.
3.2.2 Information Flow

3.2.2.1 Time-based competition

Customers in all markets, industrial or consumers, are increasingly time-sensitive. Although price is still important, a major determinant of choice of supplier is the ‘cost of time’. The cost of time is simply the additional costs that a customer must bear whilst waiting for delivery or whilst seeking out an alternative. A pressure leading to the growth of time-sensitive markets are:

Volatile markets making reliance on forecast dangerous

A continuing problem for most organisations is the inaccuracy of forecasts. The evidence from most markets is that demand volatility is tending to increase, often due to competitive activity, sometimes due to unexpected response to promotions or price changes and as a result of intermediaries’ re-ordering policies. In situations such as these there are very few forecasting methods that will enable prediction of short-term changes in demand with any accuracy. All forecasts are prone to error and the further ahead the forecast horizon is, the greater the error. It is preferable to reduce lead-time in order to reduce forecast error and hence the need for inventory.

Figure 9. Forecast error and planning horizons

![Figure 9. Forecast error and planning horizons](source: Christopher, 1998 p.152)

3.2.2.2 The order-to-delivery cycle

The figure below shows the components of order cycle time. Each of the steps in the chain will consume time. Because of bottlenecks, inefficient processes, and fluctuations in the
volume of orders handled there will often be considerable variation in the time taken for the various activities to be completed. The overall effect can lead to substantial reduction in the reliability of delivery. In situations where orders are not met from stock but may have to be manufactured, assembled or sourced from external vendors, the clear lead-times will be even further extended.

Figure 10: The order cycle

| Customer places order | Order entry | Order processing | Order assembly | Transport | Order received |

Source: Christopher, 1998, p. 158

3.2.2.3 Order penetration point

Capturing information on the requirements of customers as close as possible to the point of sale or point of use should be a key goal of supply chain management. Many organisations are forced to anticipate the requirements through a forecast since they have no clear view of the final marketplace. The order penetration point is where activities cease to be forecast-driven and become demand-driven. The challenge to the supply chain is to find ways in which the order penetration point can be pushed as far upstream as possible. At the same time a search for greater flexibility in manufacturing and logistics can contribute to an ability to carry inventory in a more generic (unfinished) form – to be converted to its final form only when the actual demand is identified. This requires less inventory and the risk of over/under-stocking is reduced. To achieve this a great deal of collaboration between supply chain partners is required and, in particular, collaboration through the sharing of information. (Christopher, 1997, pp. 89)

The customers’ demand for shorter delivery is the requirement for reliability. The reason why so much logistics is forecast-dependant is because lead-times are long. The longer the lead-time the further ahead one needs to forecast. Forecast accuracy also tends to vary directly with lead-times. The longer the lead-time, the greater the forecast error, which increases more than proportionally after a while. One rule of thumb suggests that a reduction of the lead-time by 50 percent will reduce the forecast error by 50 percent. A number of significant benefits can be reached by reducing pipeline time. It frees up working capital but it can also enable faster and more flexible response to changes in the environment or demand.
The lead-time gap

The company that achieves a perfect match between the logistics lead-time and the customer’s required order cycle has no need for forecasts or inventory. The challenge for logistics management is to search for the means whereby the gap between the two lead-times can be reduced if not closed. (Christopher, 1998, p. 169)

Figure 11. Closing the lead-time gap

Reducing the gap can be achieved by shortening the logistics lead time (end-to-end pipeline time) whilst simultaneously trying to move the customer’s order cycle closer by gaining earlier warning of requirement through improved visibility of demand.

Reducing logistics lead-time

All the logistics processes can be viewed as a network of inter-linked activities that can only be optimised as a whole by focusing on total throughput time. Any attempt to manage by optimising individual elements or activities in the process will lead to a less-than-optimal result to overall. Optimised Production Technology (OPT) is the best choice to view logistics processes.

The essence of OPT is that all activities in a logistics chain can be categorized as either ‘bottleneck’ or ‘non-bottleneck’. A bottleneck is the slowest activity in a chain, the throughput time of the entire system is determined by bottleneck activities. It follows therefore that to speed up total system throughput time, it is important to focus on the bottleneck, to add capacity where possible and to reduce set-ups and set-up times, if applicable. The aim of reengineering logistics systems is to manage the bottlenecks for throughput efficiency which implies larger batch quantities and fewer set-ups at those crucial points, whereas non-bottlenecks should minimize batch quantities even though more set-ups will be involved. (Christopher, 1998, p. 169)
3.2.2.6 Improving visibility of demand

What is meant by extending the customer’s order cycle is that we should seek to obtain significantly earlier warnings of the customer’s requirement.

A key concern of logistics management should be to seek to identify ways in which the demand penetration point can be pushed as far as possible upstream. This might be achieved by the use of information so that manufacturing and purchasing hear what is happening in the market place faster than they currently do. The other route to achieve an upstream shift of the order penetration point is by postponing the final commitment of the product to its final form (Christopher, 1998, p. 173)

Perhaps the greatest opportunity for extending the customer’s order cycle is by gaining earlier notice of their requirements. If we only have the order to rely on, it is like the tip of an iceberg. Only a small proportion of the total iceberg is visible above the surface. Likewise the order cycle time may only be the visible tip of the ‘information iceberg’.

Figure 12. The information iceberg

Source: Christopher, 1998, p. 175

There are now signs that buyers and suppliers are recognising the opportunities for mutual advantage if information on requirements can be shared on a continuing basis. If the supplier can see right to the end of the pipeline then the logistics system can become much more responsive to the actual demand.

This twin-pronged approach of simultaneously seeking to reduce the logistics lead time whilst extending the customer’s order cycle may never completely close the lead gap. However, the experience of a growing number of companies is that substantial improvements can be made
both in responsiveness and in the early capture of information on demand resulting in better customer service at lower cost.

### 3.2.2.7 Quick Response

Essentially the logic behind QR is that demand is captured in as close to real-time as possible and as close to the final consumer as possible.

QR is obviously a classic case of the substitution of information for inventory. Figure 13 indicates the relative advantage of QR when higher service levels are demanded.

Figure 13. Quick response system versus traditional inventory-based system

[Diagram showing Quick Response and Inventory with Cost and Service level axes]

Source: Christopher, 1998, p. 193

A further feature in favour of the QR system is that by speeding up processing time in the system, cumulative lead times are reduced. This can then result in lower inventory and thus further reduce response times. In effect a ‘virtuous circle’.

### 3.2.2.8 Customer order management

Understanding customers’ service preferences is the starting point for re-engineering logistics processes to ensure greater cost-effectiveness. The order is the central activity of any firm and this should be reflected in a firm’s organisation. A customer order management system is the planning framework that links the information system with the physical flow of materials required to fulfill demand. Practical steps in doing this (Cooper, 1993, pp. 28):

- Eliminate the non-value-added activities
- Order fulfilment groups (a cross-functional team responsible for orders processing)
- Logistics as the vehicle for change
3.2.3 PRODUCT AND PARTS FLOW

3.2.3.1 Warehouse management

Types of Warehousing
There are two major warehousing options, rented facilities – called public warehousing, or owned or leased facilities – called private warehousing. Private warehousing brings greater control for the owner, tax benefits, and it can be less costly in the long term. On the other hand, the flexibility is constrained and it requires a certain amount of capital to be built or bought. Public warehousing brings reduced risks, flexibility, adjustments for seasonality are possible. It can also create economies of scale even for smaller firms, and requires no capital investments. The disadvantages include a lack of control, possible communication problems, availability of space, and lack of specialised services (Stock & Lambert, 1987, pp. 279)

Functions of warehousing
Warehousing has three basic functions: movement, storage, and information transfer. Movement includes the unloading of products from transportation carriers, moving them into the warehouse for storing, regrouping products according to the customer’s assortment, and moving the assembled orders to be shipped out of the warehouse. Storage can be either temporary or semi-permanent. Safety stock and buffers, i.e. goods that are stored a little longer time belong to the latter category. Information transfer occurs simultaneously with the other activities, and serves to administer the warehousing activity. (Stock & Lambert, 1987, pp. 282)

Activities performed in a warehouse:
1. Receiving and unloading trailers or box cars from inbound transportation.
2. Put-away for storage.
3. Storage.
4. Replenishment of goods from storage area to pick-up area.
5. Order selection (picking).
6. Checking for errors and mistakes.
7. Packaging and marking (preparation for shipping).
8. Staging and consolidation (final preparation for shipping).
9. Loading and shipping.
10. Clerical/administrative work.

During all activities housekeeping and equipment maintenance will take place.
Size and number of warehouses
The size and number of warehousing facilities are interrelated decisions in that they typically have an inverse relationship, e.g. as the number of warehouses increases, the average size of a warehouse decreases. Some of the most important factors affecting the size of a warehouse are: (Stock & Lambert, 1987, pp. 307)
1. Customer service levels
2. Size of market(s) served
3. Number of products marketed
4. Size of the product(s)
5. Material handling system used
6. Throughput rate
7. Production lead time
8. Economies of scale
9. Stock layout
10. Aisle requirements
11. Office area in warehouse
12. Types of racks and shelves used
13. Level and pattern of demand

Customer service is perhaps the most important component of a firm's marketing and logistics system. If the cost of lost sales is very high, a firm may wish to expand its number of warehouses. Other factors affecting the number of warehouses are the purchasing patterns of customers and the competitive environment in the industry. If customers order small quantities on a frequent basis, the firm will need more warehouses located closer to the marketplace. A firm will also have more warehouses if the level of competition is high. When competitors offer rapid service to customers, a firm may be forced to match the service level, unless it possesses some important differential advantage. (Stock & Lambert, 1987, pp. 305)

Location Analysis
The site selection decision can be approached from a macro or a micro perspective. The macro perspective examines the issue of where to locate warehouses geographically (in a general area) in order to improve the firm's market offering (improve service or reduce cost). The basic choice here is to determine if a warehouse should stock only one product-line or several, if it should be oriented to the market it serves, or a general purposed one. (Schmenner, 1982, pp. 11-15) Some researchers include the factors of cost minimisation, demand and profitability at this level as well. The micro perspective examines factors that pinpoint specific locations within the larger geographic areas. Factors that should be considered include: (Stock & Lambert, 1987, pp. 313)
- Quality and variance of transportation carriers serving the site
- Quality and quantity of available labour
- Labour rates
Three primary considerations need to be examined when determining warehouse sites: (1) marketing aspects, (2) traffic (transportation economics), and (3) location or consolidation objectives. (World-wide Distribution, 1976, p. 36)

Schmenner proposed an eight-step approach to a business location search that we have elaborated to fit in with our warehouse site selection decision. It has been used to select a site
3.2.3.2 Inventory management

Why hold inventories?
Inventory serves five purposes within the firm: (1) it enables the firm to achieve economies of scale in their transportation, (2) it balances supply and demand, (3) it enables specialisation in manufacturing, (4) it provides protection from uncertainties in demand and order cycle, and (5) it acts as a buffer between critical interfaces within the channel of distribution. (Stock & Lambert, 1987, p. 395)

Once the manufacturing process has been completed, the product must be moved into finished goods inventory at plant locations. The next step is the strategic deployment of finished goods inventory to field locations, which may include corporate-owned or leased distribution centres, public warehouses, wholesalers’ warehouses, and/or retail chain distribution centres. Inventory is then positioned to enable customer or consumer purchase. (Stock & Lambert, 1987, p. 398)

Types of inventory

Table 6: Six types of inventories

<table>
<thead>
<tr>
<th>Type of inventory</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle stock</td>
<td>Inventory that results from the replenishment process and is required in order to meet demand under conditions of uncertainty.</td>
</tr>
<tr>
<td>In-transit inventories</td>
<td>Items en route from one location to another.</td>
</tr>
<tr>
<td>Safety or buffer stock</td>
<td>Held in excess to cycle stock because of uncertainty in demand or lead-time.</td>
</tr>
<tr>
<td>Speculative stock</td>
<td>Inventory held for reasons other than satisfying current demand.</td>
</tr>
<tr>
<td>Seasonal stock</td>
<td>Serves to adjust for large variations in demand seasonally.</td>
</tr>
<tr>
<td>Dead stock</td>
<td>Items for which no demand has been registered for a specified period of time.</td>
</tr>
</tbody>
</table>

Source: Stock & Lambert, 1987, pp. 399

Objectives of inventory management

The objectives for inventory management are: to increase corporate profitability, to predict the impact of corporate policies on inventory levels, and to minimise the total cost of logistics activities. Corporate profitability can be improved by increasing sales volume or cutting
inventory costs. Increased sales are often possible if high levels of inventory lead to better in-stock availability and more consistent service levels. (Stock & Lambert, 1987, p. 403)

Inventories and customer service
The establishment of a service level, and thus a safety stock policy, is a matter of managerial judgement. Often, customer service is improved simply by adding safety stock. A more economic approach is to stock the highest volume items at retail locations, high and moderate volume items at field warehouse locations, and slow moving items at centralised locations. The centralised location may be a distribution centre or a plant warehouse. This approach is referred to as an ABC-analysis. (Stock & Lambert, 1987, p. 416)

3.3 Benchmarking competitors

The third and final part of our theory is benchmarking of the competitors. Here we focus on predicting their behaviour.

3.3.1 Predicting competitor behaviour
1. Identifying Current Strategy. The starting point is identifying the competitor’s current strategy. In the absence of any forces for change, a reasonable assumption is that the company will continue to compete in the future in much the same way as it competes at present. A competitor’s strategy may be identified on the basis of what the firm says and what it does.

2. Identifying the Competitor’s Objectives. In order to forecast how a competitor might change its strategy, it is critical to have some knowledge of its goals. The identification of basic financial and market objectives is particularly important.

3. Competitor’s Assumptions about the Industry. A competitor’s strategic decisions are conditions of its perceptions (of the outside world and of itself) and of assumptions concerning the industry and about business in general.

4. Identifying the Competitor’s Capabilities. The key issue for a firm is evaluating the seriousness of a potential challenge. The extent to which a competitor threatens a company’s market position depends on the competitor’s capabilities.
Customer Tailored Logistics

Chapter 3 – Theoretical Framework

3.4 CUSTOMER TAILORED LOGISTICS

Customer Tailored Logistics is the conclusion of the theory we have undertaken, which begins with a customer satisfaction survey and ends with competitor benchmarking. Customers are demanding and expect high quality products and good service. It is therefore preferable that companies tailor their logistics to the customers’ needs in order to maintain their competitive advantage. Two important issues, in terms of logistics, according to the theory we have studied are order and delivery. Order actually is information flow and parts/product delivery is physical flow. Benchmarking competitors aim to gain deep insight on competitors’ behaviour and their logistics, in order to provide the company with some suggestions on how to improve their own logistics.

Source: Grant, 1998, p. 97
3.4.1 CUSTOMER SATISFACTION

The customer is king, according to many researchers. A customer satisfaction survey can provide a good understanding of the key criteria that are critical for the purchasing decision. Among all the criteria that the customer perceives as important, researchers sort out the main relevant factors by means of logistics. These factors will be the main research targets in the logistics description later.

3.4.2 EFFICIENT ORDER

An efficient order includes communication between customer and company. Good communication is highlighted because the supplier can then see right to the end of the pipeline, the customers’ demand. Then they can quickly respond to customers and narrow the lead-time gap. Accurate forecasting and an integrated order system between dealer, sales company, and product company, are prerequisites for an efficient order system. An on-line system is recommended because of its quicker and more accurate information flow compared with fax, telephone, and ordinary mail.

3.4.3 PRODUCT/PARTS QUICK DELIVERY

Quick delivery begins at the plant, which can be located far from sales company and dealer, and even further from the customer. The long distance may create the misperception by the
plant that “the sales company and dealer are the end customers”. Quick delivery competitive advantage can be created through cooperation with a transportation company or through economies of scale. An inner group cooperation (like Volvo) can create such an advantage with increased bargaining power. Due to the long distance between the production company and sales units, stock stored in a strategic location can shorten the lead-times and provide quick response to customers.

3.4.4 BENCHMARKING COMPETITORS

It is good to know one’s competitors’ current strategies, their assumptions and objectives, as well as how their supply chain is organised. Good analyse of competitors’ resources can offer the company the possibility of imitating a competitor’s logistics operations or to develop a system suitable to its own resources.

3.5 TO WHAT EXTENT WE USED THE THEORIES

Table 7. To what extent we use the theories

<table>
<thead>
<tr>
<th>Theory</th>
<th>Chapter number</th>
<th>To what extent we use it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer delivered value</td>
<td>3.1.1</td>
<td>Basic understanding</td>
</tr>
<tr>
<td>PIMS principles</td>
<td>3.1.2</td>
<td>The backbone of our customer satisfaction research</td>
</tr>
<tr>
<td>Customer service</td>
<td>3.1.3</td>
<td>An example of what customer service can include</td>
</tr>
<tr>
<td>Service driven logistics systems</td>
<td>3.1.4</td>
<td>Influenced our customer tailored logistics model</td>
</tr>
<tr>
<td>Supply chain management</td>
<td>3.2.1</td>
<td>Describing the supply chain</td>
</tr>
<tr>
<td>Information flow part</td>
<td>3.2.2</td>
<td>How to reduce lead-times</td>
</tr>
<tr>
<td>Warehouse management</td>
<td>3.2.3.1</td>
<td>Types, functions, size and number of warehouses we use in the OTD description and warehouse analysis</td>
</tr>
<tr>
<td>Location analysis</td>
<td>3.2.3.2</td>
<td>We use it for the warehouse location analysis</td>
</tr>
<tr>
<td>Inventory management</td>
<td>3.2.3.3</td>
<td>Basic understanding, used in the OTD description</td>
</tr>
<tr>
<td>Competitor analysis</td>
<td>3.3</td>
<td>We use it in our competitor analysis and company presentation</td>
</tr>
<tr>
<td>Customer tailored logistics</td>
<td>3.4</td>
<td>Our model for combining all the theories under one roof</td>
</tr>
</tbody>
</table>

Presentation of Volvo Construction Equipment

40
4. VOLVO CONSTRUCTION EQUIPMENT

We begin this part by giving a short history of Volvo CE, focusing on the acquisitions and mergers that have taken place. After that we present what the Volvo brand stands for, and we introduce the company’s current strategy.

4.1 PRESENTATION OF VOLVO CONSTRUCTION EQUIPMENT

Volvo Construction Equipment traces its history back to 1832, when Eskilstuna Mekaniska Verkstad, the Eskilstuna Engineering Works, was founded in Sweden. In 1932 Munktells merged with Bolinders of Stockholm to form Bolinders-Munktell and in 1950 it was bought by the Volvo group. It remained as a separate entity in Volvo until 1973 when it took the name of Volvo BM.

Table 8. Important events in the recent history of Volvo CE.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>Merged with Clark Michigan to form VME (Volvo Michigan Equipment)</td>
</tr>
<tr>
<td>1991</td>
<td>Acquired the Swedish hydraulic excavator producer Åkerman.</td>
</tr>
<tr>
<td>1991-93</td>
<td>Acquired the German smaller wheeled loader producer Zettelmeyer.</td>
</tr>
<tr>
<td>1993</td>
<td>Formed EHHE (Euclid-Hitachi Heavy Equipment), a joint venture in the rigid dump truck business with Hitachi</td>
</tr>
<tr>
<td>1995</td>
<td>Volvo AB bought Clark’s share in VME, and formed Volvo CE (Volvo Construction Equipment).</td>
</tr>
<tr>
<td>1995</td>
<td>Acquired the French mini excavator producer Pel-Job.</td>
</tr>
<tr>
<td>1997</td>
<td>Acquired the Canadian motorgrader producer Champion.</td>
</tr>
<tr>
<td>1998</td>
<td>Acquired the South Korean excavator producer Samsung Heavy Industries.</td>
</tr>
<tr>
<td>1998</td>
<td>Closed down the Åkerman plant.</td>
</tr>
<tr>
<td>2001</td>
<td>Hitachi will become sole owner of EHHE.</td>
</tr>
</tbody>
</table>

Source: Internal Volvo CE resources
4.1.1 SAMSUNG ACQUISITION

The acquisition of Samsung provided Volvo with a programme of modern excavators that is strategically important since excavators account for approximately 40 per cent of the annual sales of Construction equipment throughout the world. The acquisition also gave Volvo a base for continuing expansion in Asia. (Volvo corporate presentation, p. 10) The Samsung acquisition was followed by Volvo CE restructuring.

4.1.2 THE VOLVO BRAND

Volvo brand stands for quality, safety and durability, reliability, customer care and environmental concerns. Volvo Construction Equipment has to be viewed as part of the realigned AB Volvo, which intends to concentrate on transport vehicles and on traditional strengths. It wants to be a major manufacturer of construction equipment and it still wants to conquer new markets and to enter new fields in products. (Volvo Annual Report 1998)

The Samsung acquisition highlights Volvo CE's strategic transition: entering an emerging market, establishing a regional hub. From November 1999, Volvo will rebrand Samsung to Volvo in order to market excavator internationally. The Samsung brand will be kept locally for another 2-3 years. Samsung also began to assemble articulated haulers and wheeled loaders locally mainly to supply the domestic market.

4.1.3 PRODUCTION PLANTS

Volvo CE has a very broad product programme: production facilities in four parts of the world. Its business area produces more than 150 different models of excavators, wheel loaders, motor graders and articulated haulers, and mini-construction equipment. There are two main factories in Sweden located in Eskilstuna and Braås producing wheeled loaders and articulated haulers, respectively. Champion motor graders are produced in Ontario, Canada. Its larger wheeled loader, L 330, is manufactured in Asheville, USA. The excavator plant is situated in Changwon, South Korea. Smaller wheeled loaders are produced in Kone, Germany. In Pederneiras, Brazil, wheeled loaders and articulated haulers produced for the South American market. Pel-Job compact equipment is manufactured in France for global sales as well. (Volvo CE internal sources)
4.1.4 Volvo CE in Southeast Asia & Australia

Volvo CE has two sales companies in the region, one in Singapore, responsible for the Southeast Asian market, and one in Sydney, responsible for the Australian market. In South East Asia, there are four dealers of Volvo CE: Intraco Penta in Indonesia, Italthai in Thailand, Civic in Philippines, which is also the dealer of Volvo Truck & Car division, Scott & English is the exclusive excavator dealer in Malaysia. Volvo CE has three dealers in Australia, HBH in Sydney, CID with 8 branches across the country, and a small dealer in Queensland.

4.2 Strategic Analysis of Volvo CE

4.2.1 Volvo CE Global Strategy

Customer Segment Expansion
Volvo CE will continue to develop its current strongholds, wheeled loaders and articulated haulers, while expanding into new customer segments via the Samsung excavator. It will now focus on the large and medium sized customers. Volvo CE divides the customers into A, B, C, and D (sometimes even class E is mentioned). Class A customers are world-wide construction companies, such as Skanska, that demand high quality machinery. Class D customers are the small local entrepreneurs, such as Nisses grävmaskiner. Having improved technical standard and increased product security, Samsung excavator will focus on Class A and B customers.

Source: Volvo CE internal resources
Volvo CE’s new focus will transfer to material handling, in which the wheeled loader is the core product, and earthmoving, where the main products are articulated haulers and excavators. Pulp & paper and construction are also highlighted through selling excavators.

**Geographic Expansion**

Regarding the geographical expansion, Volvo CE’s strategy is to try to establish a hub in each region and try to produce as much as possible for the region in that hub. The Hub Concept is important, both from logistics perspective. It is also important to be able to supply a region’s needs from local manufacturing, and exchange rate perspective. In Korea, Volvo CE is now producing excavators and some articulated haulers in order to provide quicker response for local customers, which is definitely a logistics advantage. Volvo CE believes that the only way to compete with Caterpillar and Komatsu is to broaden the geographical coverage to reach volume, R & D, and economies of scale.

**Product Expansion**

Volvo CE is a company with a background as specialised on a few product lines. It has changed strategies and added more product lines in order to be more competitive. Previously, the base was wheeled loaders and articulated haulers. The key product, excavator - which constitutes more than 40% of world sales, was missing. Through the Samsung acquisition Volvo CE fully entered the construction equipment industry, it now has both the products and a platform in Asia. Volvo CE is trying to expand its current product line by introducing a backhoe loader from next year, and is stressing the potential of compact products in the Asian market. It will expand its product line by strengthening synergy with Volvo construction trucks to offer its customers a good product combination: excavator, wheeled loader, articulated hauler, motorgrader, compact machinery, backhoe loader and construction truck.

**Volvo CE Total Franchise**

Probably total franchise is the final destination of Volvo CE’s global strategy. Which means building a strong franchise through stronger dealer support. Volvo CE has left the retail business, it will leave it to its dealers. Compared to Caterpillar and Komatsu, Volvo CE has no strong distributors. Therefore, it has to consolidate and restructure them. Volvo CE believes that one strong dealer is better than hundreds of small dealers. Volvo CE will help its dealers with finance, and rental. If the sales of Volvo products represent 70% of the dealers total sales, it is deemed as a franchise. The aim is to let dealers depend on Volvo to a larger extent, and be more focused on Volvo products, which is a good way to increase the sales as the dealer will actively push the business.
4.2.2 Objective

Volvo CE’s objective is to realise an increase of Return on Capital of 10% per year, this should be done through increasing both volume and price. After hub establishment, Volvo CE gradually wants to realise the philosophy of “sell one and build one” in South Korea as well. Volvo CE believes that the development of contacts between hub and dealer is a very important means of increasing sales. Currently only 2/3 of Volvo CE’s dealers have set up the used equipment communication system with Volvo CE. Volvo CE hopes to establish the system between all dealers to push the sales of used equipment. Volvo CE will also focus on rental business, it has already started five rental pilots in Europe, and another two will be set up in North America next year. Rental will be implemented in the Asian market after accumulating enough experience in the Europe and North America.

4.2.3 Assumption

The Future of the Construction Equipment industry may be continuous consolidation. 20 years ago Caterpillar had about a 19% market share world-wide, and 10 competitors had a 2%-3% share. Together they constituted about a 55%-60% market share worldwide. Today, those 10 competitors have a market share of about 80%. New Holland’s acquisition of Case in 1999 offers another evidence of the consolidation process. Volvo CE has shown some interest in acquiring Daewoo Construction Equipment, if its parents will divest that business due to the strong domestic force of restructuring in South Korea.

4.2.4 Resources and Capabilities

Volvo CE has very advanced modern products, with high productivity, and high cost efficiency. They are developing soft products, which means also offering financing, rental possibility, support etc. Volvo CE works together with their dealers to make sure that its customers receive this offering. In the international aspect, Volvo CE can do quite a bit in cooperating with other Volvo Divisions. In the distribution level, one source indicates that there could be as much as 70% overlap. After the Samsung acquisition, Volvo CE will probably begin to use joint-distribution with other Volvo divisions in the Korean market.

Volvo CE’s strategy is to expand geographically, mainly in emerging markets, and to expand the customer segments. They are working on a total franchise concept with independent dealers. The purchase of Samsung creates a hub in Asia, which can create shorter lead-times to customers in the region.

How is the perception of Volvo CE among customers in Southeast Asia and Australia?
5. CUSTOMER SATISFACTION

We begin with presenting the purchasing criteria and the importance of each of them according to our survey. Then we rank the competitors according to how many times they have been mentioned in the survey. This is followed by the general value graph, where we show the competitive position of all the companies. We then split up the general picture into individual value graphs for the customers, dealers, sales companies, and headquarters. This allows us to compare the differences in views between the different groups. We proceed by showing the positions of the different Volvo product lines and brands. Finally, we examine the different purchasing criteria in detail, and compare the score for Volvo with its main competitors on each criterion.

5.1 WHO HAS PARTICIPATED IN OUR SURVEY?

For our survey we conducted 16 interviews. Eight of them were with customers, four with existing Volvo customers, and four with potential customers. We interviewed three dealers, two in Australia, and one in Thailand. We also carried out interviews in three sales companies, two in Singapore, and one in Australia. Finally we interviewed two persons from Volvo CE headquarters in Brussels. We did not choose respondents in each organisation ad hoc, instead we tried to find the key persons. Except for the customers, who were chosen ad hoc.

5.2 DRIVERS OF PURCHASE - SERVICE IS MORE IMPORTANT THAN PRODUCT QUALITY

Table 9: The purchasing criteria found in our survey.

<table>
<thead>
<tr>
<th>Product-related factors</th>
<th>Number of times mentioned</th>
<th>Weight</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>13</td>
<td>130</td>
<td>20</td>
</tr>
<tr>
<td>Durability/Reliability</td>
<td>12</td>
<td>110</td>
<td>19</td>
</tr>
<tr>
<td>Safety</td>
<td>6</td>
<td>85</td>
<td>5</td>
</tr>
<tr>
<td>Service-related factors</td>
<td></td>
<td></td>
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<tr>
<td>Spare parts availability</td>
<td>14</td>
<td>115</td>
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</tbody>
</table>
The table above shows all the factors considered when the customer is buying construction equipment that we have identified in our survey. We have split them on product-related and service-related factors. How to improve in the products-related factors is not part of our study, and therefore we only present the results in this area. How to improve in the service-related factors will be analysed later in this thesis.

The second column in the table shows the number of times each factor has been mentioned in an interview. The third column shows the importance, the weight, of each factor, added together. The final column shows the weight as a percentage.

The most important purchasing criteria found in our survey are productivity, followed by spare parts availability, durability/reliability, and after-sales service. The service-related factors are more important than the product-related. They account for 56% and 44% respectively of the total weight.

### 5.3 Competitors - Caterpillar and Komatsu are the main players

Table 10: The competitors of Volvo CE found in our survey.

<table>
<thead>
<tr>
<th>Company</th>
<th>Number of times mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caterpillar</td>
<td>16</td>
</tr>
<tr>
<td>Komatsu</td>
<td>15</td>
</tr>
<tr>
<td>Hitachi</td>
<td>6</td>
</tr>
<tr>
<td>Kobelco</td>
<td>4</td>
</tr>
<tr>
<td>Bell</td>
<td>1</td>
</tr>
<tr>
<td>Case-New Holland</td>
<td>1</td>
</tr>
<tr>
<td>Daewoo</td>
<td>1</td>
</tr>
<tr>
<td>JCB</td>
<td>1</td>
</tr>
<tr>
<td>Sumitomo</td>
<td>1</td>
</tr>
<tr>
<td>Sum</td>
<td>32</td>
</tr>
</tbody>
</table>

47
From our survey we can clearly identify two main competitors of Volvo CE; Caterpillar and Komatsu. In our competitor analysis we will therefore analyse these two companies in detail and only make shorter presentations of the other competitors (which can be found in appendix A).

5.4 Volvo CE is not in a good competitive position

In the general value graph we show the results from all our 16 interviews put together. No companies are found on or under the quality for price curve, which means that they all offer comparatively low quality compared to the prices they charge. Caterpillar offers the best quality at a premium price. Komatsu offers lower quality but at a lower price. This means that the two of them offer similar value to the customers. Hitachi offers an even lower quality but they also charge a lower price, which makes them offer a similar value. Volvo has better quality than Hitachi, but the high price puts them in a bad competitive position. Kobelco offers roughly the same value to the customers as Volvo.
Bell, Daewoo, Case-New Holland, JCB, and Sumitomo have all been mentioned only once during our survey. It is therefore difficult to draw any conclusions from their positions on the value graph.

5.5 CUSTOMERS ARE ANNOYED WITH THE INDUSTRY

The competitive positions according to the customers’ point of view do not differ much to the general picture. Customers are very annoyed with the industry, they feel that they do not receive enough quality for the price they pay for the products. No company is even close to the quality-for-price curve above. Volvo is however, rated a little bit better than the general picture, it is not far behind Komatsu in terms of quality.
Product support is the most important factor for dealers. In Australia Volvo clearly gets lower marks than the main competitors. In Thailand the situation is reversed. Volvo is here seen as better in after-sales service than spare parts availability, and gets the highest marks in after-sales service. Volvo is far from the competitors in financing, the rating is 5 in two cases, while the competitors are all between 8 and 10. Durability/reliability is the most important product-related factor, the only one mentioned more than once.
5.7 Sales companies are just as pessimistic as dealers

Figure 21. Competitive positions according to sales companies

Both Singapore and Sydney stress the importance of financing, product support, and the perception of the company. In financing Volvo CE is so far after the other companies. Volvo is in both cases rated as a 2, while the competitors are all between 7 and 10. The service-related factors are dominating the product-related ones. They identify the same competitors; Caterpillar, Komatsu, and Hitachi.
5.8 Headquarters are optimistic - but impressed by Caterpillar

Figure 22. Competitive positions according to headquarters

Headquarters think highly of Caterpillar and rate Komatsu and Hitachi substantially lower than the other groups do. This is the only group that ranks Volvo ahead of Komatsu. Caterpillar offers the best value to the customers, followed by Case-New Holland, Volvo and Komatsu. Hitachi offers the lowest value.

5.9 Differences in perceptions

As shown in the value graphs above the different entities within Volvo CE have different perceptions of the company. Headquarters are the most optimistic, since they focus more on product-related factors, they rate Volvo’s quality as very good. The sales companies and dealers are most negative. They focus more on service-related factors (see table below), and
here Volvo is rather weak. The customers rate Volvo somewhere in between. Concerning the price they all agree that Volvo belongs to the premium market.

Table 11. What do you associate Volvo CE with?

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Potential Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third largest player</td>
<td>Does Volvo have construction equipment?</td>
</tr>
<tr>
<td>Having Global Customers</td>
<td>Volvo CE! They are in the European market.</td>
</tr>
</tbody>
</table>

Headquarters see Volvo CE as a global player, being the third largest company in the industry. On the other hand customers in Southeast Asia are not so familiar with Volvo CE. They all seem to know Volvo, but not the construction equipment.

Table 12. Which is most important, product quality or the quality of service?

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Sales company</th>
<th>Dealer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product quality</td>
<td>Service quality</td>
<td>Service quality</td>
<td>Service quality</td>
</tr>
</tbody>
</table>

Headquarters think that product quality is more important than service. Sales companies and dealers focus more on service-related factors, customers also rate service more important than product quality.

Table 13. How is the product quality of the main competitors?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Headquarters</th>
<th>Sales company</th>
<th>Dealer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo</td>
<td>Best</td>
<td>Best</td>
<td>Best</td>
<td>Best</td>
</tr>
<tr>
<td>Komatsu</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Caterpillar</td>
<td>Best</td>
<td>Good</td>
<td>Good</td>
<td>Best</td>
</tr>
<tr>
<td>Samsung</td>
<td>Good</td>
<td>Average</td>
<td>Average</td>
<td></td>
</tr>
</tbody>
</table>

Everyone agrees that Volvo CE has the best product quality. Headquarters think Samsung’s quality is good, but sales companies and dealers think that Samsung is not on the same level as Volvo. Komatsu and Caterpillar. Headquarters and customers think that the product quality of Caterpillar is almost as good as Volvo. Dealers and sales companies on the other hand
think that Caterpillar’s product quality is not as good as Volvo’s. It is on the same level as Komatsu.

Table 14. How is the service quality of the main competitors?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Headquarters</th>
<th>Sales company</th>
<th>Dealer</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo</td>
<td>Good+</td>
<td>Good</td>
<td>Average</td>
<td>Good</td>
</tr>
<tr>
<td>Komatsu</td>
<td>Good+</td>
<td>Good+</td>
<td>Good+</td>
<td>Good+</td>
</tr>
<tr>
<td>Caterpillar</td>
<td>Best</td>
<td>Best</td>
<td>Best</td>
<td>Best</td>
</tr>
<tr>
<td>Samsung</td>
<td>Average</td>
<td>Average</td>
<td>Average</td>
<td>-</td>
</tr>
</tbody>
</table>

Headquarters think that the service of Volvo is not as good as Caterpillar, but not too far behind Komatsu. But sales companies and dealers think there is a big gap between Volvo and Komatsu, some one even uses the word “terrible” to describe the current Volvo parts situation. Customers also think the service of Volvo is lagging behind its main competitors. Caterpillar is the best in service. Everyone agrees that Samsung offers the poorest service.

Table 15. Who are the competitors of Volvo CE?

<table>
<thead>
<tr>
<th>Entity</th>
<th>Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cat</td>
</tr>
<tr>
<td>Headquarters</td>
<td>★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Sales company</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Dealer</td>
<td>★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Customer</td>
<td>★ ★ ★ ★ ★</td>
</tr>
</tbody>
</table>

The different entities within Volvo CE have different perceptions on who the competitors really are. The stars indicate which companies have been mentioned by whom. People in headquarters, or even sales companies, generally see the competitors as the big players, Caterpillar, Komatsu and to some extent Hitachi. The dealers, naturally, see the local competition, the companies they are fighting with over an order. They focus more on companies such as Daewoo, Bell, and Kobelco. Some of them think Caterpillar, Komatsu, and even Hitachi, play in another division. This differs however, between Southeast Asia and Australia. Case New-Holland (CNH) is not so popular in Southeast Asia.
Perception of Samsung and Champion

Is it too early to change the Samsung brand into Volvo? According to the sales companies, customers all know the Volvo excavator is the former Samsung, with another colour and increased price. The product quality is only average. This is not in line with what the people in headquarters in Brussels believe, they think the product quality is no problem and that customers will not care whether the product is made in Sweden or Korea.

The Champion motor grader enjoys a good reputation in Australia but is not very good in Thailand. One guess is that this may result from local assembly in Thailand.

5.10 THE NEW VOLVO BRANDS HAVE A LOT OF GROUND TO MAKE UP

Figure 23. Competitive positions of the different Volvo brands

The graph above indicates the competitive position of the different product lines and brands, compared to the main competitors. The positions are uncertain, due to the small number of interviewees. Only 3-4 people participated in this study, only one person mentioned Champion. There is a difference between the traditional Volvo-branded products, the wheeled
loader and the articulated hauler, and the newer non-Volvo branded products, Samsung, and Champion. The non-Volvo branded products received lower marks on the product-related factors. Price and quality are usually seen as equally important. Since the Asian crisis the importance of price has grown in Southeast Asia. Still, financing is seen as more important than price alone.

The Singapore sales company thinks that the product quality of Hitachi’s excavator is better than that of Caterpillar and Komatsu. The excavator is made in Korea, and the product quality is not bad. Many Asian people regard it as a Japanese product in the 1970s. Previously Samsung only served the B and C even D customers, and did not have a good global reputation. After acquisition, everyone knows the Volvo Excavator is made in Korea instead of in Sweden. And nothing has changed except the brand and colour. Customers are very smart, you cannot hide anything from them, the only thing that attracts customers is Samsung’s lower price.

Sales companies also said that the gap between Caterpillar’s and Volvo’s Hauler is now shrinking. Since Caterpillar wants to be the leader of every product line, it designs the new Caterpillar which claims an even higher productivity, reliability than Volvo. From some index Caterpillar seems no worse than Volvo. Since it hasn’t put in to the market, its practice needed to be tested, also Caterpillar is going to market its articulated hauler at lower price than Volvo.

5.11 PRODUCT-RELATED VS. SERVICE-RELATED FACTORS

Table 16: Total score for the main competitors

<table>
<thead>
<tr>
<th>Company</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volvo CE</td>
<td>6.86</td>
</tr>
<tr>
<td>Komatsu</td>
<td>7.14</td>
</tr>
<tr>
<td>Caterpillar</td>
<td>8.13</td>
</tr>
</tbody>
</table>
5.11.1 Product-related factors - Volvo is the leader

Volvo CE generally has good ratings on product-related factors, such as quality, productivity, and safety; they are clearly ahead of all competitors. Durability/Reliability and productivity are very important criteria according to our survey. Safety on the other hand is not considered very important, it is seen as a basic requirement to be in the industry. Another of Volvo’s core values – environmentalism - is not mentioned at all in our survey.
5.11.2 Service-related factors - Volvo is weak on all service factors

Figure 27-32. Comparative score for service-related factors
The ranking on service-related factors, such as product support, availability of products, financing, and resale value, is rather low for Volvo. They receive the worst score in financing, and are also far behind the main competitors in the two main factors, i.e. parts availability and after-sales service. They also lag behind in product availability and resale value.

5.12 Factors found outside the survey

Since we conducted a number of interviews outside the customer satisfaction survey, we have made some important observations that are not reflected in the survey results.

5.12.1 Good service to the big customers

Relationships are very important in the purchasing decision, especially in Southeast Asia, but also in Australia. One customer mentioned “guanxi” (social relationship in Asia) as the most important factor in the purchasing decision.

Volvo CE Southeast Asia focuses on fleet customers, it develops dealers to be able to attend customers, and give high attention to them. They also send special technicians to the site of fleet customers to offer immediate machine maintenance. Volvo is a small player and can therefore give individual service on a personal level. Thanks to that, the sales company can interact early with the customer and foresee machine breakdowns early and prepare a change of parts before the machine breaks down. Volvo also has a good scope of controlling the spare parts business due to closer relationship with fleet customers in Indonesia, which guarantees that fleet customers always get the spare parts they want.

Volvo CE has many bigger customer of articulated haulers in Indonesia, most of them are international contractors. They usually get the projects early and sales company’s good connection with these fleet customers helps them get an early warning of machine
requirements, and customers order machines early which gives Volvo enough production and delivery time to meet the customers’ needs.

5.12.1.1 “No one has ever been fired for buying a Caterpillar-product.”

The image seems to be an underlying factor in many purchasing decisions. When customers are unsure of whose product to buy, they seem to favour Caterpillar. They are the safe choice, due to their good reputation. As one dealer said: “no one has ever been fired for buying a Caterpillar-product.”

Another purchasing criterion of construction equipment is the image of the dealer, which was highlighted by marketing people outside of the survey. They said that Caterpillar’s dealers not only can show customers their strong basis of many product lines, but also take its customers to visit the Caterpillar’s sales companies. It is always a kind of show-off to leave potential customers an idea that a strong dealer is backed by a strong and powerful sales company. In comparison with Caterpillar, Volvo CE in Singapore and Australia is too small.

5.12.1.2 “Environmentally friendly - who cares?”

None of the dealers, sales companies, or customers in Southeast Asia think environmental concern is an important factor in the purchasing decision. Sales company thinks Volvo is far ahead of its competitors, as well as its customers, at this level. If Volvo’s environmental mark is 10, the rest of its competitors in Southeast Asia may only rank as 2 or 3, far behind Volvo.

Some of the big customers are governments, buying machines for big projects. They are not concerned with environmental thinking either.

Customers are generally annoyed at the construction equipment suppliers in Southeast Asia and Australia. They feel that the quality they receive is not in line with the price they pay for the products. Service is more important than product quality. The four most important service-related factors we have found are: parts availability, after sales service, financing, and product availability. Volvo is the product quality leader, but needs to improve its service.

There is a gap in perceptions between headquarters, sales companies, dealers, and customers.

What does Volvo CE’s current logistics in Southeast Asia and Australia look like?
6. ORDER TO DELIVERY LOGISTICS

Figure 33. Map of the order to delivery process

<table>
<thead>
<tr>
<th>Abbreviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC Sales Company</td>
</tr>
<tr>
<td>FF Freight Forwarder</td>
</tr>
<tr>
<td>B/L Bill of Lading</td>
</tr>
<tr>
<td>M/C Machine/Component</td>
</tr>
<tr>
<td>P/D Pre-Delivery Check</td>
</tr>
<tr>
<td>VTFA Volvo Truck Finance</td>
</tr>
</tbody>
</table>

Only in Australia
We divide the order-to-delivery logistics into three different flows: information, products, and spare parts. We focus on identifying the bottlenecks in the pipeline. Since we have not seen any description of the whole supply chain in this region within Volvo CE, we have compiled the material and classified it ourselves. The content in this part is based on information from the interviews we conducted.

6.1 INFORMATION FLOW

6.1.1 ORDERING

6.1.1.1 Order placement - more than ten days

The customer places an order with the dealer. If the product is not available in the dealer’s warehouse, he will fax an order to the sales company in Singapore or Sydney. The confirmation from the sales company will take about two days, and the reliability is good. If the sales company does not have it in stock it uses the MAS system to order the machine from the production company. An order file is made up with a copy of the dealer’s order as well as the sales company’s order. The MAS program has three functions: ordering of machines from the product company, invoicing, and planning. MAS is linked to another system called Main through which Brussels can obtain the sales companies’ plans. From the interviews we have found that there is a feeling that Main is quite an old system.

Having received the order in the MAS system, the product company will place the order in the production. It will thereafter fax an order confirmation back to the sales company, including product specification and ready date. From Sweden, the order acknowledgement usually takes one week, according to the sales companies. The plant in Eskilstuna says it takes a maximum of 24 hours. Even considering the time difference, there is a big gap between the different statements. The order acknowledgement in Korea is slower than in Sweden, they are still getting used to the Volvo CE procedures. Sales companies send orders manually to Korea, instead of electronically.

Table 17. Dealers’ evaluation of the reliability of the order acknowledgement from the different product companies.

<table>
<thead>
<tr>
<th>Plant</th>
<th>Dealers’ evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini-loaders</td>
<td>not good</td>
</tr>
<tr>
<td>Graders</td>
<td>not good</td>
</tr>
<tr>
<td>Loaders + Haulers</td>
<td>very good</td>
</tr>
<tr>
<td>Samsung</td>
<td>not good at all</td>
</tr>
</tbody>
</table>
6.1.1.2 Secret production and unreachable invoicing
When the machine is ready the product company invoices the sales company electronically (fax for Korea). One week later a promised date of delivery is put in the MAS system. During the production procedure, no information regarding the status of the product can be found.

When the machine has been shipped, the product company will fax copies of a bill of lading (waybill) and an invoice to the sales company, meaning that the machine can be cleared when it arrives at its destination. From Eskilstuna the original documents - Invoice, Bill of Lading, and specifications - are sent to the sales company by post. Those documents are sent during the 6 weeks of transportation from Sweden. The sales company will send copies of documents to a freight forwarder for clearance. In Australia, the biggest obstacle with the invoicing has been that it has not reached the right person in the sales company.

6.1.1.3 Clean bill of lading or waybill
For the machine/component to be cleared, it needs a “clean” bill of lading, meaning that no one has endorsed on the bill. If a Waybill is used it can be faxed. A waybill is accepted as a legal document. The product companies of articulated haulers and excavators use that, but not wheeled loaders or Champion.

When the machine/component arrives at its destination, the Freight Forwarder clears it and informs the sales company of machine’s arrival to the branch by fax. He will also inspect the machine on arrival, if damaged a claim must be lodged within 7 days to the sales company.

If the machine/component is going to a dealer a copy of the invoice, as well as the Bill of Lading, is sent to the dealer. The sales company contacts the freight forwarder saying where the machine is to be delivered. The freight forwarder sends a confirmation to the dealer. The machine becomes part of dealer’s stock when delivered. When the dealer delivers a machine/component to a customer, he will inform the sales company of the delivery date through the weekly report.

6.1.2 DEALERS HAVE NO ACCESS TO ONLINE ORDER SYSTEMS
Concerning parts ordering most of the procedure is the same as that for machines, one difference is that the on-line system used.

In order to check parts availability, a system called RVPID (Volvo Parts Information Database) is employed. This system connects plants and sales companies, not dealers. It not only shows the availability of parts, but also the price of each item. All the parts are numbered, it is quite easy for the sales company to check the availability by typing the item
number and the plant can give an answer in a minute. It is quite an efficient system. If the part wanted is not registered in the system, an inquiry can be made by giving a description of the part. The answer will then take one or two days.

Both Singapore and Sydney use the MOP system for parts ordering, invoicing and picking. Dealers can use E-mail or fax for parts ordering. So far customers and dealers in the Southeast have not had on-line access to the inventory in the Singapore depot. Singapore plans to integrate 4 dealers, in the Philippines, Indonesia, Thailand and Malaysia, into the MOP system. This will enable them to have access to Singapore’s stock availability. This will probably be implemented in the near future, although not next year.

6.1.3 RIGID FORECASTING AND QUESTIONABLE PARTS REPLENISHMENT

The decision to stock products/components is based mostly on experience, but some predictions for the future are made as well. Forecasting is done annually, it starts from the dealers, goes to the district managers at the sales company, and is then put together by the regional manager for the entire region. Sales companies use a system called Main for machine-forecasting. The figure for the entire amount is then sent to Brussels, where headquarters revise the business plan in order to reach the financial objectives, put in place by AB Volvo. Then the sales company and the product company have to agree on the final plan for the coming budget year. This process takes a long time, it begins in August and ends in November, and it is not very flexible, even though the business plan should be updated every quarter.

The ways of forecasting in the production companies vary. As an example, the wheeled loader plant in Eskilstuna makes a monthly forecast. In it they use input both from the production side, such as material availability, and the marketing side, such as sales figures. Buffer and opportunity stocks are calculated. Finally adjustments are made with an environmental analysis carried out in Eskilstuna. The forecast is then approved by the top management in wheeled loaders. The master schedule for production is based on this forecast (see production below).

Sales companies can get information for parts replenishment through the VR system, which is the inventory management system. It provides historical data and information on stocks, and it can automatically offer recommendations for parts purchasing. But sales companies base their parts replenishment much more on their own experience anyway. They have parts marketing people out in the field visiting key customers and providing information on future trends.
6.1.4 Problems in Communication

6.1.4.1 Dealers and customers want more information
Dealers want more information about where the product is when it is being shipped. Customers often wonder where the products are and when they will arrive, now this has to be checked manually. Dealers think an online system would facilitate it, a network with all dealers, sales companies and plants would also be good.

6.1.4.2 What kind of parts should be stocked?
Communication between the product company and the sales company needs to be improved. Today a product company can upgrade machine models, or take parts back, without informing in advance. There is little communication between them on this issue. This brings high obsolete parts costs to the sales company. The management of spare parts overall is under hefty criticism in Southeast Asia and Australia. Many people agree that there is no plan on what to stock. Often sales companies have nothing to supply or have stocks that are not needed.

6.1.4.3 How many sales are lost each year?
The communication between the sales company and the dealer is another problem. When asking a sales company about sales lost each year, they cannot even give a general figure. But dealers, both in Australia and Thailand, all say that 10-15% of sales are lost each year, primarily due to lack of stock or too long lead-times.

6.1.4.4 Respondent is not responding
Communication with South Korea seems to be a problem at all levels. People in product companies, sales companies, and dealers all complain about this. The most common criticism is that they do not reply when asked something in South Korea. The person over there does not respond to mail, instead he/she sends back sales contracts by fax. An on-line system would be much better.
6.2 PRODUCT FLOW

6.2.1 WHERE THE PRODUCTS GO

Figure 34. The product flow in Southeast Asia and Australia.

Plant \[\Rightarrow\] Sales Company
\[\Rightarrow\] Dealer
\[\Rightarrow\] Customer

Freight Forwarder

(Only in Southeast Asia)

Source: own elaboration

The Volvo CE products we studied in this part are produced in plants in Sweden, South Korea, Canada, and the U.S. From the plants they are transported to one of the sales companies or dealers. A freight forwarder is usually employed to clear the goods when they arrive at their destination. In Southeast Asia they sometimes go directly to the customer. We will now look deeper into each stage identified in this process.

6.2.2 PRODUCTION

6.2.2.1 Minority means non prioritised

Volvo’s philosophy is to produce on order, not for stocking. Today the manufacturer does not build the machine until it has the order. Lead times depend much on the demand for the product company. Some of the product companies struggle with capacity problems, especially motorgraders in Canada. It is difficult for the sales companies in Southeast Asia and Australia to get products quickly, since they represent a minority of Volvo CE’s sales. They are not prioritised. For example, most of the compact machines go to the US. Southeast Asia and Australia are an insignificant part of the wheeled loader business. They are too low in volume to get prioritised by the plant.

6.2.2.2 Reliable but not always faster

It usually takes some 4 weeks for the Wheel Loader to be manufactured and ready for shipment (including scheduling in production and waiting for vessel). Production time is 15
days maximum. Components are ordered from the suppliers nine days before the product is
planned to be finished. Production planning in Eskilstuna is made on a weekly basis, the
master schedule. This is then split to a daily basis by a computer system called Mapix.
Eskilstuna is more reliable in terms of lead-times than Braås, but not always faster. The lead-
time for articulated haulers to Australia is typically two months, for wheeled loaders it is three
months. Braås is more flexible since Southeast Asia represents more of their business.

### 6.2.2.3 One month of waiting after the 10th

The Samsung factory in South Korea has a different production system. They use scheduled
dates for production, while the other plants have a more running schedule. The base for the
planning in Korea is the 6-month plan. The 6-month plan is broken down into a Master plan
for each month. The master plan begins on the 10th each month, and according to this a
production date is fixed and an estimated shipping date is fixed. That means that if the order
comes after the 10th, production of that product will not start until the next month.

In the long term more should be sourced from Korea. The first step in this direction, besides
the excavators, is one series of articulated haulers, and maybe later wheeled loaders. That
should bring down lead-times from 3 months to 1 month for Australia, according to a dealer.
Korea has a capacity of 12,000 units a year, last year they made 4000. When they start to
assemble wheeled loaders and articulated haulers they will use more local content. The
problem here is communication. Very few of them speak proper English. The financial
system needs to be improved as well.

### 6.2.3 Standardised versus differentiated products

Volvo CE tries to adapt the machines according to the customers’ wishes as much as possible,
thus producing them after they receive the order. But in order to have an effective stock,
products need to be standardised. Normally an order comes MRS (Market-related standard) in
Australia. This means that it comes with a certain standard (e.g. air condition) and the rest is
an option. Sales companies order as much of standard as possible and then add-on options
each time. The MRS is rebuilt for up to 8 models of machines, so when ordering every detail
is not specified. Dealers are usually asked what they want, and then that is made the MRS-
standard.

The A35 is a successful case of product standardisation. It is not as successful as the wheeled
loaders, since there are applications particular for each country, e.g. the logging business in
Indonesia does not occur in the Philippines. They still standardise as much as possible on the
larger wheeled loaders between L90-L180.
There are more troubles than benefits in having the unit shipped knocked down. Dealers do not have enough resources to reassemble the machines. Having to reassemble at the wharf is also risky in terms of quality.

6.2.4 Shipping

6.2.4.1 Volvo CE’s products are not popular

Preferably the product company tries to get the machines on car carriers, the so called Ro-Ro ships. These shipping companies going on a regular basis normally do not like Volvo products, since their products take much room, are heavy, and do not allow stacking other products on top. If a Ro-Ro ship is not available either a container ship, in regular containers or on flat-racks, or a bulk ship can be used. A flat-rack is a form of pallet, which is as big as a container, sometimes with sides, and a crane is needed to lift it up on the ship. It costs a couple of thousand USD to use one, and it very often causes damage to the machine. These types of transportation require cranes to lift the products on and off the ship. The big product also needs to be disassembled to fit into a container. The shipping company may be unfamiliar with construction equipment e.g. not knowing how to load it. It is much easier with roll-on roll-off, since the machine is just driven up the ramp.

Ro-Ro ships are always preferred, but Volvo CE does not have the volume to command the shipping line to take the products. Volvo often has to take whatever option there is. Having a ship with a fixed schedule would make it much easier in terms of planning. From Sweden it works out fine, since Volvo has a deal with Hyundai to Singapore, and with Wallenius to Australia, but to Korea there are big problems, due to the lack of regular ships ever since the Asian crisis.

It happens that an expected product does not arrive due to shipping problems, sometimes with short notice, only 1-2 weeks ahead of arrival. Australia is the extreme in many cases because of the distance, in a country closer to Sweden the problems are not as big.

6.2.4.2 Transportation from Sweden

5-6 weeks to Australia

The transports from Sweden to Australia are quite stable, even though it takes a long time. Wallenius Line has an agreement with Volvo CE to transport its products from Göteborg to Australia. Wallenius takes machines on a Ro-Ro basis, and are thought to be very experienced, reliable, and know construction equipment. Göteborg to Sydney takes about 35 days. No other shipping company wants to transport the products, they only want to have containers or cars.
The Wallenius route is:


If a sales company does not have the machine in stock it may take 12-14 weeks before it comes to Australia, if the product is not stocked in Sweden. If product is available in Sweden, it usually takes 6 weeks to get it.

27 days to Singapore

Hyundai carries cargo, mostly cars, to Europe and therefore needs cargo back. Hyundai’s vessels depart every Thursday from Göteborg, and go to Singapore, before they head back to Korea. It happens that the ship does not come to Göteborg, then the machines have to be trucked to Bremerhaven and shipped from there. From Sweden to Singapore by boat takes 27 days.

The plant in Sweden tries to ship the product directly to the customer in Southeast Asia. They are usually transhipped in Singapore, and from there shipped to the customer in another country. About half of the shipment goes directly to the customer, the other half goes to a warehouse (sales company or dealer). One reason for going to the warehouse in Singapore is that some customers, such as large customers in Indonesia, want to pick up the machines with their own barges in Singapore. Fleet owners do not pick up small orders; they order 10 machines or more, and can therefore provide their own transportation. The customers then pay for the machines in Singapore. Competitors like Caterpillar and Komatsu also sell from Singapore.

For countries like Vietnam and the Philippines machines are sent to the major harbour and the customer has to pick them up there. Volvo CE pays for transportation to Singapore; the customer pays from Singapore to their final destination. Products can be stored in the harbour in Singapore for one week free of charge when they are waiting for transhipment, and 3 days when they are not waiting for transhipment.

6.2.4.3 Transportation from Korea

Ro-Ro ships are too expensive

Ro-Ro ships can seldom be used to Australia, even though that is the preferred alternative. The cost of Ro-Ro transportation is extremely high, some USD 15 000 for one product to Australia, which is about 25% of total price of the product. Earlier most transports to Southeast Asia were bulk, but not anymore. The dominating way of shipping is now in
containers, regular or flat racks. Some of the shipping lines used, do not have construction equipment experience.

The Japanese shipping companies go to Korea after Japan on their way to Australia. They leave some space for Korean products, but it is not a lot and it is mostly for cars. It is also very easy for carriers from Korea to fill their ships with cars and to make more money on them. The machines are booked on these ships anyway. The Japanese shipping lines that go there are NYK, Mitsui, and K-Line.

**Machines have to be knocked down due to a fragile bridge**

Product sent from Korea, have to use semi knockdown, and they break up the machines over 20 t because there is a bridge that they cannot pass. They send them as two flat racks or one flat rack and a 40 feet container. After arrival the machines has to be assembled and possible damages fixed.

Masan is the best port for transports out of Korea. It is situated only 1 km from Samsung’s factory in Changwon. Pusan is the main port for carcarriers, it is 3 hours from the factory. Pusan is often used for transports to Australia. Other ports occasionally used are Ulsan and Inchon.

Mitsui goes out of Pusan and Atolsan to Australia with their carcarriers. Masan is only served by the Wallenius line. The bridge near Pusan can not take machines over 24 t. Heavier machines have to be dissembled, which means that Mitsui will not touch them, because the machines are not mobile. The big machines like excavators SE 280, 350, 450 are usually transported knocked down depending on where they are going, due to the weak bridge in Korea. The super long range of excavators is also delivered knocked down – the arm is not attached. Machines of 28 t, 30t and more are not taken by Mitsui. As it is now Mitsui and Wallenius do not have a common port, Wallenius goes to Japan from Korea, while Mitsui goes down to Australia. So if Wallenius could be convinced to take machines to a port that Mitsui also handles, they could be brought down to Australia efficiently.

**The preferred route has been removed**

Excavators are currently shipped in containers with two shipping lines, Mediterranean shipping and NYK line. The route taken is Pusan – Singapore – Australia. The transports are fixed on a case-by-case basis. There is a company called DWSAN that acts as a freight forwarder and books the ships. The products are transported to 4-5 ports in Australia, depending on which is closest to the dealer.

Routes used:
1. Pusan – Singapore (t/s) – Perth (22 days)
2. Pusan – Qingdao – Shanghai – Sydney – Melbourne – Brisbane
The second route is a new one, in which the port of Adelaide has been removed. This route takes longer time than the old one used, which went directly from Pusan to Sydney (that took 11 days). The routes are weekly but the machines from Samsung are often not wanted on the ships. There are typically two ships from Pusan per month, and flat-racks are usually used.

**Irregular shipping due to crisis**

Earlier there were usually two vessels a month to Southeast Asia, now they are more irregular. Still, there is usually a ship to Singapore at the end of each month. It takes 1.5-2 weeks on sea from Korea to Singapore. Earlier there was a fixed rate, now they have to pay the list price, USD 30/m³, due to the small volumes. There is no big problem finding ships to SEA but each case has to be worked on separately, which is time-consuming and costly.

Machines to Southeast Asia are usually shipped directly to the destination. Transhipment in Singapore is only needed in some cases, such as if the destination is a small island.

### 6.2.4.4 Transportation directly to dealers - the example of Bangkok

As an example of how the transportation to a dealer works we have chosen to study the dealer in Bangkok, Thailand. There are boats everyday from Singapore to Bangkok, the reliability is very good and there are no problems in this area. Shipping is taken care of by the Unity company. Ro-Ro vessels are mostly used, but sometimes flat-racks are needed. Shipping time is 3 days. Products from Sweden are transhipped in Singapore.

From Korea there is a direct link with boats every day, shipping time is 7 days. From Canada to Bangkok it takes 30 days, including transhipment in Singapore. Ships to and from Australia are expensive and not so common.

### 6.2.4.5 Transportation from other plants

The L330 from Asheville, U.S., is too big to be flat racked, it is usually transported by Wallenius’ Ro-Ro ships from Savannah to Australia and Singapore. Sometimes it is transported through Japan or Hong Kong to Singapore. It may take some 12 weeks before it arrives in Singapore.

The motor graders from Canada are shipped in containers. There are however, rather few container ships from Canada, which makes for long lead-times for these products.
6.2.4.6 Freight Forwarders

Machines not directly to the customer
In Australia the product always goes to a central warehouse or to the dealer and finally to the customer. The machine is not ready for delivery when it comes, it needs to be checked, and the coding removed etc, before it can be delivered to the customer. The freight forwarder in Australia is Fletcher International, it is responsible for clearing the machines and transporting it to the dealer.

Up to one week waiting for an inexpensive transportation
The freight forwarder used in Singapore is Harbor handlers. They take care of transportation, documentation and freight out of Singapore for Volvo CE. The Ro-Ro vessels have their own people that drive the machines on and off. They offer a point to point service, meaning that they take care of everything between that harbor and the warehouse. They offer a package deal. If there is damage to the product they file a damage report that is given to the client.

If the papers are in order, the harbor handlers will process and clear machines the very same day as they arrive. They see no disadvantages with the port of Singapore. Concerning vessels they think that choosing the first one might not be so good since it could be expensive. They try to find Volvo a better deal by waiting a week sometimes. For shipment out of Singapore they try to use Ro-Ro ships (hard to find), otherwise container carriers. Most of the machines go to Indonesia, Malaysia and Thailand. They also offer Pre Delivery Service, which means that they do a machine check, including checking oil, battery, and clean the machine up if necessary.

6.2.5 Warehouses and Inventories

6.2.5.1 Low inventory is the general policy
The general policy at the moment is to have as low inventories as possible. They are careful of not passing the desired level of inventory, and therefore do not want to place an order until they are pretty sure that an order will come from customer.
Table 18. Number of units that are stocked in the sales companies in Southeast Asia and Australia.

<table>
<thead>
<tr>
<th>Type of product</th>
<th>Singapore</th>
<th>Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavators</td>
<td>-</td>
<td>2-3</td>
</tr>
<tr>
<td>Haulers</td>
<td>3-4</td>
<td>2-3</td>
</tr>
<tr>
<td>Loaders</td>
<td>4</td>
<td>5-6</td>
</tr>
<tr>
<td>Graders</td>
<td>-</td>
<td>3-4</td>
</tr>
</tbody>
</table>

The table above shows the current stock levels at the sales companies in Southeast Asia and Australia. In Australia they have a total number of 42 machines in stock, the rest is on consignment (see below) at the dealers. They expect to reduce the level to 25 by the end of the year.

The dealers complain that the manufacturer does not want a high inventory, since the reduction of inventory can mean much cost-wise. When it comes to the deal, the customer wants the machine in time, when he wins the contract he wants the machine right away. Then they need to have inventory and have the machine in stock.

6.2.5.2 Machines on consignment only in Australia

In Australia the sales company has products on consignment at the dealers. This means that although the machines physically are stocked at the dealer, they still belong to the sales company. The dealer takes care of the machine, and pays for it when he is selling it. Having the low-volume products in Volvo’s stock gives the opportunity to decide where the machines should go if several dealers are interested in it. The negative aspect is that dealers are not that keen on sharing products among them. There are reasons why Volvo should carry all stocks on a consignment basis. That would provide total flexibility for Volvo, since the products could be moved the way they want that way. The negative side of it is that dealers would not be equally motivated to sell and take care of the machines if the products are Volvo’s. There are no machines on consignment in Southeast Asia.

6.2.5.3 Volvo CE stocks the heavier machines in Australia

The sales company’s warehouse in Sydney holds inventories of around USD 4 million of machines in stock, on top of that they have some USD 9 million in trade receivables of machines on consignment at dealers’ yard.
Volvo CE stocks the larger machines for dealers, in wheeled loaders from L150 and up, in articulated haulers from A30 and up, excavators the SE-450 and up. Dealers need help to stock those since they cannot afford to buy machines that seldom are sold. Instead they stock products with a higher turnover, such as small loaders and small excavators. The dealer should stock products that turn at least 4 times/year, according to an agreement with Volvo CE.

Of fast-selling products, such as L50 and L70, the sales company has some 2 in stock. Usually 2/3 of those are sold a month. For larger products usually one of each is kept in stock, and then some speculation stock.

The dealer should stock products that turn at least 4 times/year, according to an agreement with Volvo CE.

Of fast-selling products, such as L50 and L70, the sales company has some 2 in stock. Usually 2/3 of those are sold a month. For larger products usually one of each is kept in stock, and then some speculation stock.

The general turnover rate for machines in Australia is around 2 times per year. Before the restructuring in Australia inventories were even lower than today, products were shipped back and forth between the different retailers. That was very costly. The turnover rate for the fast-moving machines is around 100 days, and 6-12 months for the slow-moving machines. That is the reason why Volvo keeps those products as receivables and not the dealers. Stock should preferably turn every 6 months, otherwise it needs to be sold at a discount.

Not all the versions in a product line are available in Australia. The sales company supplies the 402, 30Z, 35 TPS, 45 in Compact Equipment. That is half of the total range, otherwise costs would be too high. The same stocking policy is used for other products as well, about half of the range is supplied. Which products to stock is always based on historical information and experience. If a new model comes in, like the new excavator, it is hard to judge what to stock.

6.2.5.4 L150 and L180 are the popular machines in Singapore

The turnover rate for Volvo’s products is 2, and for Samsung it is 1.5. The target is 2 or 2.5. For the moment Volvo East Asia has four articulated haulers and 4 wheeled loaders in stock.

The popular models are the big ones, like L150, L180 and a few L330s. The L330 costs some USD 500 000 so only the big companies buy that one. Smaller ones are also sold, some L70 and L90, but Zettelmeyer or Pel Job products. They are now starting to market the Champion products, whereas before they were shipped in from Canada directly. Champion sells its graders in Thailand in kits, where the dealer assembles them for the Thai market. One was sold last year, whereas before the crises some 100-200 were sold due to the high level of housing development projects. Åkerman products are sold to the mines, they are big and expensive. Now they sell Samsung, both small and big models. Selling smaller excavators means a new range of customers, e.g. a one-man operation.
The sales company will stock some excavators, and force dealers to stock 4-6 as well, the sales company does not believe that competitors will take their business. It is different for wheeled loaders and articulated haulers – those customers are able to wait those 6 weeks. They plan to have some wheeled loaders and some articulated haulers, and soon some excavators in stock. The sales company wants the dealer to carry most, but today they are rather weak.

6.2.6 Weak dealers are reluctant to have any stock

Very few new machines are delivered to dealers in Southeast Asia now, since there are already so many machines in the market. Right now they do not carry any inventory, except perhaps one loader. But they have plenty of space. They do not see any big sales coming up in the near future. Therefore they will not stock. There must be more demand for them to stock products. The dealers in Australia carry more stock, the current desired stock level at the dealer branches in Australia ranges from 8 units in Adelaide to 42 in Sydney.

The dealer carries out a pre-delivery check of the machine before it is delivered to the customer. The oil and battery are checked, and the protective coding is removed. This pre-delivery check is necessary since it happens that machines have problems when they turn up from production. It is a sort of quality assurance. The pre-delivery check usually takes one day. The coding is difficult to remove from the graders so that takes longer time.

6.2.7 Dealers supposed to carry all stock in the future

Volvo CE’s intention is to let dealers stock as much as possible. The goal, according to some, is even to let the dealers have all the stock, but that is still some 3-4 years in the future. Today they are not strong enough to do this, most of them are rather new. The volume on bigger machines, L150+, AH 35t+, EXC 45t+, is too low.

6.3 Spare parts flow

6.3.1 Order urgency

When a customer puts a part order to the dealer, if that part is not available in the dealer’s inventory, he/she will put an order to the sales company. The sales company categorises the order in one of four classes depending on the urgency of the demand.
Table 19. Order urgency classes for spare parts.

<table>
<thead>
<tr>
<th>Class type</th>
<th>Urgency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Machine break-down</td>
</tr>
<tr>
<td>Class 2</td>
<td>Urgent orders</td>
</tr>
<tr>
<td>Class 3</td>
<td>Supplement airfreight</td>
</tr>
<tr>
<td>Class 4</td>
<td>Sea-freight orders</td>
</tr>
</tbody>
</table>

In order to qualify as a class 1, the order must be extremely urgent. The costs associated with this type of order are very high. Parts that are not too bulky are transported directly to the customer. A class 1 part should be delivered within 48 hours, but this figure depends on the location and on the product line. Sometimes it takes as much as 60 or 72 hours until it is delivered. A class 2 order takes a few days more, but is significantly less expensive. Class 3 is even slower, but less expensive. Class 4 orders are mostly used for stock replenishment.

6.3.2 Parts Availability Programmes

Table 20. Guaranteed Parts Availability Programmes in Southeast Asia.

<table>
<thead>
<tr>
<th>Country</th>
<th>Parts Availability Program and models covered.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>All new equipment sales. Due to complex domestic distribution within Indonesia, the guarantees vary by destination and weight restriction from 48 to 60 to 72 hours.</td>
</tr>
<tr>
<td>Malaysia</td>
<td>320 330 966 D6 927 60 hour program in East Malaysia.</td>
</tr>
<tr>
<td>Thailand</td>
<td>320 330 935 930F 960F 40 hour program currently restricted to Bangkok.</td>
</tr>
<tr>
<td>Philippines</td>
<td>Broad range including D9 D7 320. The 24-hour program currently restricted to delivery in Manila but is without weight or value restrictions.</td>
</tr>
</tbody>
</table>

Source: Volvo CE internal resources

The table above shows the parts availability programmes offered to customers in Southeast Asia. Guarantees vary greatly depending on the geographical location.
6.3.3 Parts Stock Situation in Southeast Asia and Australia

Figure 35. Parts distribution in Volvo CE

Source: Own elaboration

6.3.3.1 No parts supply from Central Parts Authority
Customers order a part from the dealer, if it not available at the dealer, the latter order from the sales company’s depot, if they do not have in stock, they have to order it from the plant. There is a parts distribution centre in Gent (Belgium), but it does not cover Southeast Asia and Australia. Unlike Volvo CE, Caterpillar and Komatsu have their domestic or main parts distribution run separated from plants and run very efficiently regarding parts supply.

6.3.3.2 Customers have parts on consignment
There is a lot of costs involved in supplying parts to the customers in Southeast Asia and Australia, due to the great distances and difficulties with transportation. In Australia customers are often situated in remote areas and along the west and east coasts. Especially new customers need components quickly not to lose confidence in Volvo CE.

Some important customers in Indonesia have parts on consignment. They pay for the parts when they use them, until then they are in the books of the sales company. This system is not used elsewhere in the region.

6.3.3.3 Dealers - general service level of 60%
The policy for dealers is currently to keep as little stock as possible. Most of the parts kept are fast-moving items. Some dealers have a high inventory in Southeast Asia, the dealer in Bangkok has a service level of 80%, but most of them have a service level of about 60%. The
dealers’ service levels in Australia are generally higher, as they have slow-moving parts on consignment.

### 6.3.3.4 Sales companies do not have the appropriate stock

The strategy is generally to have high parts availability in sales companies to serve all markets. The composition of parts is that sales companies have both slow moving and fast moving items. Concerning new products releases, such as the new Samsung excavator, it is critical that the sales company stocks up with parts before the release. The rule of thumb is that they stock wear and tear items and some components.

Table 21. Key figure for the sales companies in Singapore and Australia.

<table>
<thead>
<tr>
<th></th>
<th>Singapore</th>
<th>Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parts inventory</td>
<td>USD 5 million</td>
<td>USD 4 million</td>
</tr>
<tr>
<td>Parts Turnover Rate</td>
<td>1.9</td>
<td>2</td>
</tr>
<tr>
<td>Targeted parts turnover rate</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Service level</td>
<td>77%</td>
<td>84-89%</td>
</tr>
<tr>
<td>Targeted service level</td>
<td>85%</td>
<td>92%</td>
</tr>
<tr>
<td><strong>Service levels for different products</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excavators</td>
<td>80</td>
<td>80-85</td>
</tr>
<tr>
<td>Haulers</td>
<td>60-85</td>
<td>80</td>
</tr>
<tr>
<td>Loaders</td>
<td>70</td>
<td>85-90</td>
</tr>
<tr>
<td>General</td>
<td>77</td>
<td>84-89</td>
</tr>
</tbody>
</table>

Source: Volvo CE internal resources

In Singapore the whole Volvo group used to be integrated under one roof at the current Volvo CE warehouse, but since a few years Volvo CE runs its own, the other Volvo divisions have their own warehouses elsewhere in Singapore. Singapore will not be handling Euclid parts from the year 2000, therefore parts inventory is expected to decrease slightly to USD 4.5 million next year. Volvo CE shares the warehouse in Australia with Volvo Trucks and Cars, as well as Renault, and costs are split accordingly.

When one cannot afford to stock all parts it is important to stock the right ones. This is not always the case with Volvo CE. Both dealers and the sales companies themselves have many examples of parts that should be stocked but are not stocked. There seems to be a lack of coordination sometimes.
An example of what Volvo CE’s bad product support can mean in real life, is an L 35 which broke down at the bottom of a mine in Queensland, Australia. Two weeks later the machine still could not move, it could not be fixed since the needed parts were not available. Another example is a dealer who ordered spare parts from Sweden. When the parts arrived, the manual was written in Spanish.

I can see the part I want, but I cannot have it right now!
Thanks to the Volvo CE global on-line system, Singapore can have access to parts stocks in the following countries: Great Britain, Germany, France, Australia, Japan, Turkey, Belgium, Greece, Ireland, Portugal, Israel, Australia, Spain, Norway, Denmark, Sweden and North America. It is the same case for Australia. When an urgent parts order is placed at the sales company, sales company can clearly see the wanted part in other sales companies’ inventory through the on-line system, but he cannot order it. Since the current parts order situation in neither Singapore nor Australia follow the closest principle, instead of sourcing from Japan, Australia and Singapore, they first check the plants’ inventory in Sweden. Singapore and Australia have ordered each other only in special cases and they are both reluctant to share each other. Sometimes the parts availability in Sweden is limited as well, sometimes a plant in Sweden bought back parts from Singapore to supply urgent needs elsewhere.

6.3.4 TRANSPORTATION

6.3.4.1 Urgent orders – 3 days to fly in from Sweden
Flights are, as described above, only used for urgent orders. The flight-time from Sweden to Singapore is 3 days. An order placed on Monday afternoon arrives on Wednesday afternoon. Depending on which country the part is going to the total time differs. In the Philippines an SGS (a private company checking imported items) inspection is needed for items over S $ 500, which causes delays. To avoid this Volvo CE tries to split up packages if possible. Import taxes for spare parts in Thailand are between 5-30% depending on what type of item it is. Flights to Australia take a little longer time, but import tariffs are relatively low.

6.3.4.2 Parts replenishment - long lead-times
Sea-freight lead-time from Sweden to Singapore is about 6-7 weeks, broken down as: 1 week processing time in Sweden, maximum 1 week waiting for a vessel (subject to availability of vessels), 4-5 weeks sailing time (depending on sailing route and type of vessel). The lead-time for parts going from Sweden to Australia by boat can be up to 10 weeks.
6.3.5 Parts Supplied by Each Plant

Most of the parts are ordered from the plants in Sweden. Other sources would be Germany (Volvo compact machines), Japan (old Michigan/TCM machines), Korea (Samsung/Volvo Excavators), Canada (Champion motorgraders) and North America (L 330 Plant). Plants take parts back from Australia that have not moved for one year. This principle is not employed in Singapore. That is to say, plants are not only in charge of product manufacturing, but also of parts producing and distribution.

The main problems in the information flow are rigid forecasting, a not fully integrated order system, and inadequate communication between different entities. The problems in the product flow include low inventories, and complicated transportation. The plant in South Korea still has the old rigid production planning. Parts management is uncoordinated, service levels are low, and sales companies are reluctant to share parts with each other. All these factors give rise to the problem of long lead-times, and explains why Volvo CE received a relatively low score on the service-related factors. This low score leads to the unfavourable competitive position.

What do the logistics and strategies of Volvo CE’s main competitors look like?
7. BENCHMARKING COMPETITORS

We will in this part analyse the main competitors of Volvo CE, Caterpillar and Komatsu. The important findings from this part will be used as benchmarking in the next chapter - analysis. In an appendix an extended presentation of the other competitors found in the customer satisfaction survey can be found.

7.1 CATERPILLAR

Caterpillar is the leading manufacturer of heavy construction equipment in the world. It operates in three principal segments: machinery (earthmoving, construction and materials handling), engines (for on-highway trucks, locomotives and construction machines), and financial products (provides financial alternatives and extends loans to customers and dealers).

7.1.1 STRATEGY - BE NUMBER ONE IN ALL SEGMENTS

Caterpillar’s strategy is to continually be the global leader in the industry, and to be the leader in each product line they enter. One example of this strategy is the hauler segment, which Caterpillar plans to focus on with the introduction of a new hauler. This will be done by increasing market shares, primarily in developing countries, and developing new products and product families (agriculture, forestry and compact machines). (White, 1998) The company is also expanding financially, in product support and customer service programmes. Increasingly, the company uses acquisitions and joint ventures as a means to grow in both areas. Since 1991, Caterpillar has entered into 38 acquisitions or joint ventures that range from partial to 100 percent ownership. (www.caterpillar.com)

Strengthening and stabilising the distribution network through its world-wide dealers is another of its strategies. Caterpillar is trying to convince more dealers to open Caterpillar-branded rental stores. It would like to increase the number of these stores from the current figure of 200 outlets to 350. A fairly large portion of the increase will come in Asia. (Upbin, 1999)
7.1.2 Assumptions - Expansion in Emerging Markets

Provided the global construction equipment competition becomes even more intense, continuous mergers and acquisitions will create fewer stronger competitors. Many smaller regional players will withdraw from the construction equipment industry. Caterpillar assumes that it will consolidate its advantage by marketing expansion (mainly in emerging markets) and product line bordering (mainly in mini-equipment).

Currently, sales of Caterpillar products to developing countries account for only about 23 percent of the total company sales (more than 80 percent of the world’s population live in these countries). That percentage will grow as sales, primarily in Asia, Central Europe and the former Soviet republics, are expected to grow. (www.caterpillar.com)

7.1.3 Objectives - Control All Inventories Centrally

Providing services while keeping its own costs down is Caterpillar’s main objective. It supports the “one-warehouse” concept of a single world-wide inventory, which allows it to direct inventory to wherever it is needed in the world. When a Caterpillar dealer enters an order for a replacement part at its facility, it will automatically search that facility’s inventory. If it is not there, it will automatically search all the dealers participating in the system and find who has the item. That dealer will get the machine or parts from the closest dealer’s inventory. They operate 24 hours a day, every day of the year and intend to ship 99.7 percent of all those items the same day. 90 percent of inventory is controlled centrally, and Caterpillar is preparing to get that closer to 100 percent. (Andel, 1999)

Another strategy of Caterpillar is to centralise its parts distribution in strategic locations. The objective is that the service inventory should be 25 percent of its service revenue, and the service delivery rate should be such that by the next morning, 95 percent of the parts ordered should be on site where needed. Caterpillar also intends to introduce same-day deliveries. (Andel, 1999)

7.1.4 Resources and Capabilities - A Strong Reputation

Despite being an American company, Caterpillar has quite a number of production facilities in Asia, serving the Asian and Australian markets: Australia 3 facilities, China 4, India 2, Indonesia 1, and Japan 2. Caterpillar produces motorgraders in Australia.

Caterpillar is present in all segments. Caterpillar has the highest prices but it can sell anyway due to its good reputation, and high resale value. The general feeling is that the perception of
Caterpillar is better than the quality of their products. Caterpillar wins most deals to governments, due to their strong supply and good reputation. In Australia for example, they win most of the contracts offered by government councils. It is always safe to buy a Caterpillar product, “no one has ever been fired for buying a Caterpillar product” as a dealer said in Australia.

Caterpillar has its own financing company. It subsidises financing to its customers, it offers a small sum in down payment (as low as 0) and very low interest rate (as low as 0%). Caterpillar has the best 2nd hand value on their products, and it is good at buy-back guarantees. Caterpillar was early into renting and leasing, and its leasing system is effective.

7.1.5 Logistics

7.1.5.1 Urgent order – 24 hours delivery

Distribution is conducted from central and regional distribution centres, both inside and outside the US. They have a master depot in Singapore to serve the Southeast Asian market, and another one in Melbourne to serve the Australian market. The Asian distribution center in Singapore is 70,000 square meters large, handles 138,000 line items, and has 89-91% parts availability.

Order processing and dispatch are conducted Monday to Saturday, emergency orders can be handled all hours. Caterpillar’s high parts availability and delivery within 24 hours is justified by their large volumes, their parts sales amount to USD 340 million a year in Australia. However, Caterpillar’s claimed delivery within 24 hours is not reliable. The big customers can get that service, but it is not so certain that a small customer does. Caterpillar once used an advertising campaign in Singapore saying: “24 hours delivery - otherwise free parts maintenance”. But this slogan was followed by limitations, the names of the parts that could be delivered within 24 hours were specified. That is to say, even Caterpillar’s “24 hours delivery”, is based on the demand of big customers.

7.1.5.2 Provides logistics services to other companies

Compared with its competitors, Caterpillar has an unparalleled supply chain, it does not only meet its own customers’ needs of safe, fast deliveries, but also has enough capacity to provide logistics services for other companies.

Caterpillar Logistics Services distributes other companies’ products using certain of their own facilities, as well as external. Caterpillar logistics service, is a world leader in providing fully integrated logistics solutions that incorporate information technology, warehouse management, transportation management, inventory management and product support.
services. (Caterpillar Logistics Service, 1999) Sales for this division of Caterpillar have grown 70 percent since 1994. Caterpillar Logistics has more than 30 multinational customers, including Daimler Chrysler, who benefit from Caterpillar’s distribution expertise. (Annual Report of Caterpillar)

### 7.2 Komatsu

Komatsu was established in 1921 and is a diversified provider of industrial products and services. The Komatsu Group consists of over 300 companies world-wide. The Asian crisis has led to a consolidation process in the company, as well as a reduction of costs, while shifting procurement and production to plants outside Japan. Despite the crisis the company has remained profitable. ([www.komatsu.com](http://www.komatsu.com))

#### 7.2.1 Strategy - Adapting to Crisis

Komatsu stated a four-year strategy in 1997 called the “G 2000 mid-range Management strategy”. The key words in this strategy are quality and reliability. Komatsu’s key strategic business is ranked in importance as follows: construction and mining equipment, followed by electronics & engineering.

To cope with the slowdown in demand, the company has strived to offer more reliable products and services, which are attuned to the customers’ needs. At the same time, the company worked hard to strengthen its earning power through increased efficiency of sales and distribution systems by downsizing branch functions or eliminating distribution centres. ([www.komatsu.com](http://www.komatsu.com))

#### 7.2.2 Assumptions - Responding to Increasingly Diversified Demand

As customer needs become increasingly sophisticated and diverse, Komatsu intends to strengthen its response to market demands around the world by developing a globalised operating structure that integrates the 300 Komatsu Group companies. Komatsu intends to use the closed co-operation among the group’s companies and strengthen the mutual support function. Also, the company has anticipated the changes of the times and expanded into new fields early on by discovering the potential needs of customers. ([www.komatsu.com](http://www.komatsu.com))
7.2.3 Objectives - satisfying customers

Komatsu’s philosophy includes “new machines should be developed at the location closest to the market”, “communicating and clearly understanding the needs of their customer and distributors”, and “continuing to shorten lead times and ensure distribution and inventories are appropriate to meet customer needs and expectations.”

They introduced an innovative new programme to globalise management for the coming century: the Global Officer System, consisting of 18 selected Komatsu group companies. Key phrases are both “Think Global, Act Local” and “Think Local, Act Global.” The ultimate goal is to satisfy all Komatsu customers around the world.

Komatsu believes, in order to serve its customers effectively, it must be sound financially, have a strong distribution network, and provide a full product line for “one-stop-shopping”. It aims to continue to provide products of high quality and high productivity, along with customer financing options. (www.komatsu.com)

7.2.4 Resources and Capabilities - Customer Survey Programme

Komatsu has a cost competitive global production system with plants in 13 different countries world-wide; it is represented on every continent. Komatsu’s manufacturing facilities are in Asia/Pacific: China 2, Indonesia 2, Japan 7, Thailand 1, and Vietnam 1.

Komatsu has a Dealer Advisory Council that works as a partner with management. They have established sub-committees to work on parts, marketing, utility, service and re-marketing issues. Additionally, they regularly survey all of their customers through their Pulse programme to understand the performance of their equipment, and to get feedback on distribution and comments about Komatsu. This provides them with the necessary information to improve their customer service. (www.komatsu.com)

Komatsu have trading house support for financing, in Thailand for example they offer 1 year credit with no interest.
7.2.5 Logistics – Central Parts Coordination

Figure 36. Komatsu’s Parts Supply System

Source: www.komatsu.com

Abbreviations

O Order
D Delivery

Domestic parts distribution centre functions as a parts authority. They can either send parts to the regional parts centre or directly fly it to the dealer. Overseas customers procure parts through Overseas Distribution Centers established by the subsidiaries: Komatsu America International, Komatsu do Brazil, Komatsu Europe International, Komatsu Asia & Pacific, and NS Komatsu. Using the P-WINS program, Komatsu can check inventory conditions at any point in the world-wide network. This makes the integrated management of inventories possible and allows a speedy supply of parts.

7.3 Caterpillar and Komatsu - Big also means trouble

Caterpillar and Komatsu have a big population. Since they have such a big population they have problems to offer a good service to all of them. They have so many customers, which makes it hard to treat all customers equally, e.g. customers call Caterpillar, Caterpillar may only remember their phone number, but Volvo can remember the name of its customers. One problem is that pirates make spare parts and another is that parallel import takes place.

Caterpillar and Komatsu have more machines stuck in Asia due to the crisis and which means they lost money every day and more than other competitors. In order to keep its good reputation of high service level, one-stop-shopping and good relationship with their dealer, Caterpillar is now losing huge amount of money to bail out their dealers over the past two years. No matter how financially strong Caterpillar, they have to make some changes, if the
Asian market continues like this until 2001 or later. They will have to either skip small dealers, downsize branch or reduce distribution centres.

7.4 How did they respond to the Asian crisis?

7.4.1 Caterpillar - Does not intend to lose dealers even if it loses money

Caterpillar generally let their dealers have 80% service level, and they even stock 90%-91% of parts in their distribution centers. For three straight years- 1982, 1983, 1984 Caterpillar lost about a million dollars a day, but didn’t lose a single dealer around world. (Flites, 1996, p. 92) They are now doing the same but keep the high service level at dealers’ place and own distribution centres. Their big size and dealer protections have adversely effected them more than any manufactures in Asia, and maybe they will continue with their strategy in 2000.

7.4.2 Komatsu with middle-way formula

Komatsu has a domestic parts distribution centre which covers regional distribution centres globally, and is separated from plants in Japan. At all times Komatsu tries to choose middle formula, never go to the extreme and much more adaptable to environment. In the Asian Crisis, high reliable service tailored to customer needs, plus downsizing branches or eliminating distribution centers, is Komatsu’s surviving strategy, which helps them be more customer-oriented but also deletes the overlaps cause of Asian crisis.

Caterpillar has high inventories and service levels, one-warehouse-thinking. They aim to be number one in every product line they compete in.

Komatsu has good communication within the company, they are focused on customer satisfaction, and they have a good co-ordinated parts distribution system.

How can Volvo CE improve its logistics to respond better to customers’ needs?
8. ANALYSIS

We commence this part with an analysis of the information flow, followed by an analysis on the products and parts flows. We conclude with strategies for how Volvo CE can improve its competitive position.

8.1 INFORMATION FLOW

The key success factors in ordering according to the literature are efficiency and speed. Therefore, our analysis focuses on how to improve the order system in these two respects.

8.1.1 LACK OF INFORMATION SHARING

Currently, dealers do not have any information concerning a product’s status during production. They have to find out manually where the product is when it is being shipped. Dealers cannot order parts directly from a plant in case of urgency. That is only possible if dealers can have access to an on-line system and directly order parts from a plant. Then the dealer would not have to wait until the next morning to place an order to the sales company, by then it is evening in Europe so one day is lost.

Communication between sales companies, dealers and plants is not satisfactory. Plants do not often get feedback from dealers, not only about perceived product quality but also about the product and parts stock situation. Frequent notifications between plants and sales companies/dealers about parts supply and updates can help sales companies to avoid having too many obsolete parts, resulting in unnecessary costs. Communication with the Korean plant is a bottleneck in the order procedure. Response is generally slow and sometimes they do not respond at all.

8.1.2 INAPPROPRIATE SYSTEMS AND UNCLEAR OBLIGATION

When a sales companies places an order with the plant in South Korea, they have to do it manually, not electronically. Response is slow and it usually takes at least one week for them to give the order acknowledgement. Due to the limited number of orders so far, this problem has not been highlighted yet, but it may result in more trouble with an increased number of orders. If the plant in Korea was integrated into the MAS system, orders and invoicing could be made electronically.
According to the sales company the Main system (the product forecasting system) is old and unfriendly. The efficiency and reliability of the system is questionable. Parts replenishment is based more on experience than following the VR system’s recommendations for parts purchasing.

According to the sales company in Australia a big obstacle with invoicing is that the original documents of invoicing, and the bill of lading, which are sent by the plant, sometimes do not arrive to the right person at the sales company. The obligation seems unclear.

8.2 Product and Parts Flow

8.2.1 Production

Since it is expensive to stock machines Volvo CE focuses more on quick response and flexible production, to improve its logistics. The “Sell-one build-one” concept is not ideally suited for a logistics system with great distances between production and sales units. The competitors, above all Caterpillar, have more warehouses and production closer to the customers, where they can adapt their products to the customer’s requirements. Caterpillar is rebuilding its products along the way. Volvo CE does not have this option, but has to build the products right from the start. This is however, easier in Southeast Asia and Australia than in Europe, since the products are rather standardized here. This enables Volvo CE to have more stock in this part of the world, by doing this they would also reduce the impact of the long lead-times from production to customer.

There are some bottlenecks in Volvo CE’s production system. One is the capacity problem of the graders plant in Canada. Another similar bottleneck is the supply of components to the wheeled loader plant in Eskilstuna. This may lead to delays, which is sensitive in a just-in-time system.

Since the acquisition of Samsung Volvo CE has two different production systems in parallel within the company. The original one, employed in most plants, is to be as flexible as possible and produce on order. The plant in Changwon, South Korea, is more volume-oriented, with its monthly planning schedule. The two different systems create uncertainty within the company.
8.2.2 TRANSPORTATION

In the area of transportation it is difficult to see many changes that Volvo CE can make. It has to use the existing ships, and the ships are going where the demand is. Volvo CE is not big enough to have any major influence on the shipping companies, and can therefore not create the routes they want, but have to adjust to the existing routes. If however they were to use Volvo’s transportation division, instead of organizing transportations themselves, it could help them gain a substantial bargaining power. AB Volvo is for example one of Wallenius’ main customers. They might be able to push Wallenius to go from Masan to Pusan in South Korea. This would facilitate transportations from South Korea to Singapore, and above all to Australia, since Mitsui has ships going from Pusan to Australia. In this way they would get rid of the problems associated with disassembling and trucking the machines to Pusan.

It does not seem as though Samsung has anyone specialising in logistics. Employees today are doing a little bit of everything, unlike prior to Volvo’s acquisition. A specialist in this area can co-ordinate all transports out of South Korea.

8.2.3 WAREHOUSES AND INVENTORIES

Our warehouse analysis begins with a discussion of a public versus a private warehouse, to see which is most suitable for Volvo CE, and is followed by arguments on the possibility for Volvo CE to share a private warehouse with the Volvo group. After that, we evaluate the current two warehouses in detail, especially focusing on the strategic location analysis and its operation. Thereafter, we evaluate options of warehouse locations, and conclude about number and location of future warehouses in the conclusion.
8.2.3.1 Private or Public warehouse?

Volvo’s policy is to have private warehouses. With private warehouses Volvo CE has greater control over the warehouse and the inventories, and receives tax benefits from the government. Most of Volvo CE’s competitors, such as Caterpillar, Komatsu, and Kobelco all have private warehouses.

8.2.3.2 Own versus shared warehouse

Sharing a warehouse with other Volvo divisions raises some questions.

1. Who should be prioritised? Especially since the truck business will constitute 75% of the whole Volvo Group after Scania is acquired.
2. Warehouse integration may be followed by unclear obligation division. Construction equipment is different from truck and bus businesses, both from selling and maintenance perspectives.

In Australia Volvo CE currently shares a warehouse with the other Volvo divisions. According to the sales company it is not very efficient, but still rather inexpensive for Volvo CE, due to the deal with Volvo Parts. Setting up a new warehouse of their own is associated with a lot of costs.
8.2.3.3 Warehouse Location Analysis - Southeast Asia
The current warehouse in Singapore can stock 25-30 machines of mixed sizes; the capacity for parts is high since it used to stock parts for the whole Volvo group in Southeast Asia.

Harbour transportation quality
Singapore is the busiest port in the world in terms of shipping tonnage. At any one time, there are more than 800 ships in port. Singapore is the focal point for some 400 shipping lines with links to 740 ports world-wide. Singapore is also Asia's main transshipment hub. In 1998, the Singapore Port won the Best Seaport award in Asia (eleventh consecutive year), Best Warehouse Operator (ninth consecutive year) and the Best Container Terminal Operator (eleventh time). Storing a product that is not going to be transhipped is free for three days. When a product is transhipped, one week's storage is free of charge.

Quality and quantity of available labour
The labourers in Singapore harbour are skilled and educated, they are highly committed to their job. People work everyday, even on holidays. 35-37 containers are unloaded in the harbour per hour; the record is 43 containers in an hour. Singaporeans are multi-lingual, they can speak English, Chinese, Malay, and Indonesian without problem.

Backing of government
Although the cost of land in Singapore is high, the Singaporean government, EDB (Economic Development Board) offers special incentives, such as lower tax to companies that live up to certain standards, number of employees, and a certain level of spending. Volvo pays only 13% tax instead of 36%. The more committed one is here, the more benefits one obtains from EDB.

Financial support
Singapore is a thriving financial centre served by 149 commercial banks, 77 merchant banks, and 71 representative offices of banks and merchant banks in Singapore. In addition, there are 8 international money brokers. (www.sedb.com/index1.html)

Other alternative locations
Other possible locations for a warehouse in Southeast Asia include Indonesia, Malaysia, Thailand, and the Philippines, mainly due to the construction equipment market size in these countries.

Indonesian customers are mainly focused on articulated haulers, and bigger customers are quite satisfied with the product supply and service. The speculation stock of the sales company is articulated haulers, that are specially prepared for bigger customers in Indonesia and the articulated haulers service level is about 90%. The sales company sends a technician on site to offer service. These customers also have their own fleet for product transportation.
There is no big problem either from the product delivery or parts service aspect. Because of the unstable political situation locally, a warehouse in Indonesia may be excluded.

Concerning location in Malaysia, the Philippines and Thailand, Port Kelang in Malaysia is trying to compete with Singapore to be a logistics hub. They have a lot of land but do not have a good level of English, and lack educated and skilled labourers. In Port Kelang unloading can take 3 days when it takes 3 hours in Singapore, according to a freight forwarder in Singapore. There are no boats directly from Sweden going here. In the Philippines the government promotes in the same manner as EDB in Singapore, but without success so far, since fewer vessels pass the Philippines and their infrastructure is less developed.

A warehouse in Thailand would be relatively cheap. There are however, certain negative aspects associated with a central warehouse here. Transportation availability is good only from Bangkok to Singapore. There are no direct boats from Sweden to Thailand. The language could be a problem, as the level of English is not very high.

8.2.3.4 Warehouse location analysis - Australia

Number of warehouses
The Australian market is just not big enough to justify more than one warehouse, despite the great distances and problems with transportations. The current structure with the sales company having one warehouse and dealers having their own seems to be appropriate. The decision will therefore be whether to keep the existing one in Minto, outside Sydney on the east coast, or open up a new one somewhere else in Australia.

Location analysis
Since we are discussing different location alternatives within the same country a number of factors are constant or similar, e.g. tax rates, and labour rates. The factors that will decide the outcome of the location analysis will therefore be where the customers are and the possibilities and economics of transportations.

As discussed earlier the population in Australia is concentrated to the east/south-east and west coast, with the distinct majority living in the south-eastern part. The customers of Volvo CE follow a similar pattern, with the exception of mining industries in Queensland, the northern part, some forest industries in the south-west, and a number of customers in the inner part of the continent.

Transportations are generally expensive in Australia. Since most flows go in an east-west direction it is cheaper to transport the opposite way, from west to east. This is true for all transportation ways; ships, trucks, railroad, and air freight. The major ports in the southeast –
Brisbane, Sydney, Melbourne, and Adelaide are quite close to each other, while the fifth main one Freemantle (Perth) is a long way away, on the west coast.

According to our analysis there is no point in moving the warehouse from Sydney to another location in the southeastern part of the country. Sydney is the leading hub with the best harbour, and the costs for moving the warehouse are greater than the possible gains. The only other viable alternative is Perth. Perth is the hub for the whole western part of Australia. Perth’s main advantage is the economics of transportation, as described above. We feel however, that this is outweighed by the great distances to many customers in the eastern territories. It takes 4-5 days by boat from Perth to Sydney. To support the dealer branches in Brisbane, Sydney, and Melbourne from Perth would mean 3-6 days longer lead-times than today. The shorter lead-times the move would create in the western part do not outweigh this.
8.3 Can lead-time be shortened?

Figure 38. Lead-times in the logistics pipeline: Eskilstuna and South Korea

- Order Processing
- Production
- Plant to Harbor
- Waiting for shipping
- Shipping
- Transhipment

3-4 weeks in Sweden
3-5 weeks in Korea
1-2 weeks waiting time in Sweden for not being prioritised
1-2 weeks in Sweden
Irregularly 1-2 weeks in Korea
S: 3-5-4 weeks to Singapore, 5-6 weeks to Australia
S.K.: 1 week to Singapore, 2-3 weeks to Australia

Source: own evaluation
Once the equipment leaves the harbour, it is hard to change the lead-times during shipping and transhipment. The only possibility to reduce the lead-times is from order processing to waiting for shipping at the harbour.

8.3.1 Lead-time in Sweden

If we look at the plant in Eskilstuna, the average lead-time for haulers to Australia is typically 8 weeks, and loaders 9-12 weeks. To Singapore it is between 7 and 9 weeks. To put the order into the plant’s production planning system takes one week, thereafter an order acknowledgement is sent back to the sales company. The actual production time in Eskilstuna is 2 weeks. Since products are tailor made, components are not ordered from the suppliers until 9 days before the product is supposed to be ready. Some of the component plants struggle with capacity problems, which causes delays. We are not sure what the plant is doing the 6 days (2 weeks minus 9 days) in production before they order the components.

It takes no more than one day to deliver products from plant to harbor. The waiting time in harbor (one or two weeks) is non-value added lead-time. The extra waiting time (1-2 weeks), in addition to the 4-6 weeks, can be due to the priority given to European and North American customers, when there are several orders coming in at the same time.

We think it is possible to gain up to two weeks time in Sweden, by shortening ordering procedures, having quick response in production, and reducing the waiting time that is due to prioritization. Lead-times in Sweden should not be more than 4 weeks, one week order and putting it into production, two weeks production, and one week waiting for a ship. If production can be matched even better with the shipping dates, the lead-time can be reduced to 3 weeks. Then the total lead-time for wheeled loaders can be 8-9 weeks to Australia, which is about the same as for articulated haulers today, and 6-7 weeks to Singapore.

8.3.2 Lead-time in South Korea

Concerning Korea, lead-time varies between 5-8 weeks to Singapore and 6-10 weeks to Australia. Firstly, the manual order procedure is slower than in the Swedish plants. We estimate that the order acknowledgement and putting the order in production takes about 2 weeks. Production is efficient and does not take more than one week. Since production plans start only once a month, an order can have to wait up to 4 weeks to be part of next month’s plan. This is the main reason for the long lead-times and it will be even more complicated with an increased number of orders. Volvo introduced the sell-one build-one thinking, which is characterized by minimum stock levels, in Samsung. The production system of Samsung is still the old one, based on monthly schedules and set up for keeping stock. The lead-time for
component sourcing is as long as 4-6 months, compared to no more than one week for the plant in Eskilstuna. The Samsung plant stocks the components, while the plant in Sweden order them nine days before the product is scheduled to be finished.

Since the crisis and Volvo’s acquisition, Samsung has had difficulties in finding ships for their products. Waiting time for a vessel is up to 2 weeks, earlier they had weekly shipping.

Lead-times to Singapore can be shortened down to 4-5 weeks (with weekly production plans), depending on shipping availability. This includes one week order acknowledgement and putting the order in the production plan, one week production, 1-2 weeks waiting for a vessel, and one week shipping. For Australia it can be shortened down to 5-7 weeks.

8.4 IMPROVING THE COMPETITIVE POSITION

Based on the opinions of customers, dealers and sales companies we here give some prescriptions on how sales can be increased.

8.4.1 PRICE REDUCTIONS OR SERVICE IMPROVEMENTS

How can Volvo CE increase its sales in Southeast Asia and Australia? We think the competitive position needs to be improved. There are two general ways of doing this, as can be seen in the graph below. The first is to lower the price (the arrow pointing down), and the second one is to improve the quality offered to the customer (the arrow pointing right). Our investigation shows that the product-related factors are good, here there is a correlation between product and price. It is the service-related factors that need to be improved to be able to attract more customers. According to our survey we can identify four main areas that need to be improved: after-sales service, parts availability, financing, and product availability.

Financing is especially bad in Southeast Asia, where there is no co-operation with Volvo Finance and contacts with local banks are kept at a minimum. Even though Volvo-Finance is being used in Australia the terms to the customers must be improved significantly. The competitors offer good terms such as no down payment and very low interest rates. We have not gone deeper into financing, but have concentrated on the other issues.
8.4.2 Price Discussion

The customers’ perception of the price-levels corresponds well with the actual price-levels. Caterpillar is generally the price-leader, followed by Volvo. Komatsu generally has lower prices. Since Caterpillar and Komatsu, unlike Volvo, offer buy-back guarantees to the customers, meaning that they buy back the machines after some time for the residual value, their actual prices are lower than the initial price. The second-hand value of a Volvo machine is more uncertain.

In the articulated hauler market, Volvo CE was head and shoulders above its competitors for many years. Volvo keeps a 60% market share in Southeast Asia, and there are no real competitors, expect for Bell in Australia. But Caterpillar wants to be the leader of all product lines internationally. Its new articulated hauler will probably be marketed at a lower price to compete with Volvo in terms of market share. It can be difficult for Volvo CE to keep its desired market share of 55-60%, if the price of Caterpillar’s new hauler is considerably lower than Volvo’s.
The excavator is the dominating product in the construction equipment, and Volvo CE’s objective is to try to realise a 10% market share in both Southeast Asia and Australia in five years time. Volvo CE plans to price the excavators higher than Komatsu. A problem with this strategy is that Samsung’s excavator does not belong to the premium market. Its quality and brand image is not highly regarded by Asian nor Australian customers. Moreover, customers suspect that today’s Volvo is yesterday’s Samsung, all that has changed is the colour and the brand. So if Volvo cannot provide powerful arguments to justify the high excavator price, it can be difficult to reach the targeted market share. After all, Komatsu, and even Hitachi enjoy a higher reputation in the Asian market than the former Samsung brand. From the customer survey we can see that the excavator will not be in a good competitive position after a price increase.

8.4.3 Machine stock

The general sentiment among the dealers is that they lose 10-15% of their sales due to a lack of products in stock, or too long lead-times. An estimation from the plant in Eskilstuna suggests that 30% of the time, customers want delivery within three weeks from ordering. The only possibility to meet this requirement is to have stock locally. The shortest total lead-time from Sweden to Singapore is 6 weeks, and 8 weeks to Australia. From South Korea it is a minimum of 4-5 weeks to Singapore, and 5-7 weeks to Australia.

Sales of haulers are substantial in Southeast Asia and relatively small in Australia. Haulers can therefore be centred to Singapore. But there is no real need to stock too many haulers in Singapore anyway, since these customers often plan their purchases in advance and do not require one immediately.

Sydney can be the regional distribution centre for Loaders, since they are highly demanded in Australia, and not as much in Southeast Asia. Loaders need to be kept in stock as customers sometimes want them quickly. Demand in Australia is highest for the mid-sized and smaller loaders, such as L70 and L90. These loaders should be kept by the dealers, in increased quantities compared to today, in order to minimise the risk of running out of stock. The sales company should stock the heavier loaders, L150 and above. It is important that the sales company keeps at least one of each model of these loaders (including the L330), which is not always the case today. The loaders are not only needed in stock to be sold at short notice, but are also needed to be demonstrated to potential customers. The demand in Southeast Asia is largest for the mid-sized and heavier loaders, such as L120, L150 and L180.

Compared to haulers and loaders, excavators are another type of product. They are often referred to as a consumer product, since the range of customers is very wide and the required
delivery time is short. Excavators should preferably be kept in stock to a very high degree, at both sales companies and dealers.

Heavier machines are kept at the dealers as consignments in Australia. One alternative is to expand this system to the dealers in Southeast Asia. Since the crisis they are financially weak and do not want to carry anything above minimal inventories. As the markets show signs of slowly picking up it is important to have products in stock to be able to increase sales.

8.4.4 Parts

For Singapore, in order to serve the whole region, the current service level is quite low. The dealers are financially weak, and therefore have low stock levels (around 60% service level). Since more haulers are sold in Southeast Asia, and loaders sell more in Australia, it is a good idea to stock more parts for haulers in Singapore and more parts for loaders in Australia. Due to the fact that Volvo CE wants to increase the market share for excavators to 10%, a strong parts support is needed in both Singapore and Australia.

One problem in parts distribution is that airfreight is too expensive for bulky parts. Shipment takes 6-7 weeks to Singapore, and up to 10 weeks to Australia. If stocked locally, the lead -time would be shortened to 1-2 weeks.

Both Caterpillar and Komatsu have main parts distribution centres to co-ordinate the parts flow. Caterpillar employs one-warehouse thinking, in which a dealer can get the parts he need from the closest source, whether it is a sales company or another dealer. Volvo CE lacks this type of co-ordinating authority, sales companies in Singapore and Sydney are reluctant to share with each other. Dealers never do it. If Volvo had a central parts authority, it would facilitate the parts flow and could lead to increased service.

8.4.5 Service

It is very important to be able to provide service to the customers quickly. For example if a machine has broken down it needs to be fixed fast, preferably within 24 hours. The geographical conditions, both in Southeast Asia with its jungle and Australia with its great distances and deserts, make this difficult.

Fast repairs require two things: available parts and people to carry out the repairs. It is difficult to improve service without increasing parts availability. Other improvements that can be made, include hiring more people, both machine mechanics and in customer support. Since
construction equipment generally, and Volvo machines in particular, are quite complicated products technicians need to be very well trained.
9. CONCLUSION

9.1 The “sell one - build one” concept to be questioned

The “sell one – build one” concept is difficult to employ in a system with great distances between production and sales units. This is especially true in an industry characterised by big, bulky products, low volumes, and few and expensive transportation alternatives. If the customers’ differentiation level is relatively low, it is recommended to have some stock closer to the customers. If the customers’ differentiation level is high, it is not recommended to have too much stock, since the chance that the stocked products will be in line with the customers’ demand is quite small.

It is important to have parts and products stocked in a strategic location, to be able to supply the customer as fast as possible. When service levels cannot be at 100%, due to the extreme costs that would bring, it is important to have good management of the warehouse. The right products and items must be stocked. A central control authority, with an overview of all warehouses and inventories, is a good way of ensuring this. It is suggested to have a “one-warehouse-thinking” to let products and parts freely flow between warehouses. To facilitate communication between different entities within the company, information systems (covering the areas of ordering and forecasting) need to be integrated.

One way of overcoming the problems associated with the great distances between production and sales units, is to have a production hub in the region. This will reduce lead-times and therefore increase sales. One negative aspect is that it can be expensive and it can be difficult to maintain product standards.

9.2 Volvo CE is in an unfavourable competitive position

Customers in Southeast Asia and Australia are annoyed with the construction equipment industry in general. They feel that they do not receive enough quality for the price they pay for the products. Volvo CE is in an unfavourable competitive position, although they are the leader in terms of product quality. It is the service-related factors that cause Volvo problems. Volvo CE is weak on issues such as parts availability, after-sales service, financing, and product availability. These factors are the heavy ones in service. Service-related factors are found to be more important than product-related. (see chapter 5)
To understand what causes Volvo CE’s low score on service-related matters we identified a number of problems in their current order-to-delivery logistics. Concerning the information flow we have found that forecasting is rigid, order systems are not fully integrated, and communication between different entities is inadequate. Transportations are complicated and time consuming, the level of machines in inventory is too low, which makes for long lead-times. The plant in South Korea has a different, more rigid, production planning system than the other plants. Parts management is sometimes uncoordinated, service levels are lower than the main competitors’, and sales companies are reluctant to share parts between them. (see chapter 6)

We believe that the current structure with one warehouse in Singapore, serving the Southeast Asian market, and one in Sydney, covering the Australian market, should be kept. Increase inventories of both products and spare parts, to increase the service level. Employ the concept of one-warehouse-thinking, and integrate information systems between the different units; plants, sales companies, and dealers. Install a central control authority, responsible for coordinating parts distribution world-wide. (see chapter 8.2.3)

Based on our customer satisfaction survey we found out that the service-related factors are more important than the product-related ones. Volvo CE is the leader on all the product-related factors. It is the service-related factors that need to be improved, in order to increase sales. Our order of improvement is: (see chapter 8.4)

2. Parts availability
3. Product availability
4. Price
5. After-sales service

It is difficult to gain market share and realise price increases at the same time, especially when the market is down and dealers are financially weak, as is the case in Southeast Asia today.

Many customers can wait for their products. Fleet owners plan their purchases in advance, so for them the lead-time is not a major issue. The smaller customers do not plan their purchases in advance, so they need their products quickly. Here the lead-time is important. The lead-time is of great importance for parts supply. When the machine is down, all customers need maintenance urgently, since they lose large amounts of money when the machine cannot operate. (see chapter 5.12 and 6.3)

To be able to shorten lead-times, it is important to have a holistic view and study the whole process from ordering to delivery. The shipping time is a reality and difficult to change. The most effective way for Volvo CE is to improve ordering and production procedures. (see chapter 8.3)
Although not one of the most important factors, the area where Volvo CE receives the lowest score is financing. If they could improve the retail financing closer to the level of the competitors, they would attract a number of customers quite fast. (see chapter 5.2 and 8.4.1)

Benchmarking competitors strengths is a good way to improve your own weaknesses. One has to be careful when doing this, not everything can be directly transferred to another company. Volvo CE can learn from Caterpillar’s “one-warehouse-thinking”, as well as Caterpillar and Komatsu’s central parts distribution authorities. (see chapter 7 and 8.4.4)
10. RECOMMENDATIONS

10.1 PRIMARY RECOMMENDATIONS

10.1.1 PRICE VS. SALES INCREASE

- We suggest that Volvo CE does not try to increase prices at the same time as it tries to gain market share, especially right now when the market is down since the crisis. They should first focus on market share then consider price issues.

- In order to maintain its leading position, with a market share of 55-60%, in articulated haulers, keeping current customers is first priority. We suggest that Volvo CE lower their prices slightly and to try to prevent Caterpillar from gaining too high market share.

- Regarding wheeled loaders, we recommend Volvo to maintain its current price level, and offer better service to reach the objective of increasing sales.

- We think Volvo CE should not price the excavators higher than Komatsu. The customers do not think that a high price increase is motivated by improvements in product quality.

10.1.2 INFORMATION FLOW

- Improve forecasting systems to be more flexible and accurate.

- Let dealers get connected with both sales companies and plants, to have access to the online parts ordering system and check parts availability at sales companies. Dealers can then also know the product status during production and delivery.

- Improve the current manual order system in Korea by introducing the MAS system as other Volvo CE plants.

- More communication between plant and sales company about parts supply and better updating to reduce obsolete parts and wasteful cost.

- Clarify the obligation of the sales company in Sydney to make sure documents will reach the right person.
Someone in headquarters should be responsible for co-ordinating all logistics activities. This includes the whole process from plants, to sales companies and dealers.

10.1.3 PRODUCT FLOW

- Volvo CE should continue to use private warehouses. They should keep the current structure with one warehouse in Singapore and one in Sydney.
- Use Singapore as a regional distribution centre for haulers, since sales of them are substantial in Southeast Asia and relatively small in Australia. Inversely Australia should be the distribution centre for loaders, since they sell more here than in Southeast Asia. Which machines to be stocked, should depend on the demand in each region.

10.1.4 SPARE PARTS FLOW

- Volvo CE should increase its spare parts service. The increase of service level may not be too aggressive, as the market is down since the crisis. Therefore we suggest a middle-way strategy to improve the parts service.
  1. Increase the number of bulky components in the warehouses of Singapore and Australia.

      Bulky parts have to be shipped, and should be stocked locally to avoid too long lead-times. Since Singapore sells more articulated haulers, and Australia sells more wheeled loaders, it is good to increase bulky parts availability of articulated haulers in Singapore, and bulky parts of wheeled loaders in Australia. This can also create an interdependence between Singapore and Australia on parts of articulated haulers and wheeled loaders. When for example a bulky loader part is needed in Singapore, it is shipped from Australia. One thing needs to be stressed, they should not wait for a cheaper boat when shipping parts to each other, they should ship as soon as possible.

      2. Increase parts availability of excavators in Singapore and Australia.

           The market for excavators is substantial both in Southeast Asia and Australia. A strong support is therefore needed in both regions, especially with the introduction of the first Volvo-branded excavator. The service level of excavator parts needs to be increased, according to the sales companies the level has to be at least 90%.
3. Urgent smaller spare parts should be flown in from a European distribution centre.

Today the plants are responsible for parts distribution. They are not as efficient as a dedicated parts distribution centre should be. We think it is crucial to have a main distribution centre for Volvo CE parts in Europe, in a strategic location and with global coverage, which can provide urgent parts via fly-in. It would be even better if dealers can have on-line access to the order system connected with both the sales companies and the main parts distribution centre, especially due to the time difference between Asia and Europe.

4. Keep the current service level of articulated haulers and wheeled loaders

If the European parts distribution centre can operate effectively, it is unnecessary to increase the stock of small parts in Singapore and Australia, due to the high costs and unpredictable market situation.

6. “One warehouse thinking” should be gradually introduced

We recommend a four-step scheme to implement one warehouse thinking in Volvo CE. Firstly, regional sharing between sales companies in Australia, Singapore and Japan. Secondly, international sharing among sales companies. Thirdly, regional sharing between dealers and sales companies. Fourthly, global sharing between dealers and sales companies. All inventories should be controlled centrally from the European parts distribution centre.
11. FUTURE RESEARCH

- Customers’ perception of the new Volvo CE (Samsung) excavator.
- How can a push in retail financing increase sales?
- Examine customers that have defected, how many they are, and why they defected?
- Investigate government procurement in Southeast Asia & Australia. How important are relationships, Guanxi – government strategy?
- The same type of study we carried out for Volvo CE (customer satisfaction), can be done for one of the competitors.
- This type of survey can also be done in other markets. Not so much has been done in the emerging markets, most studies like this are made in Europe and North America.
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www.sedb.com/index1.html 991101 Singapore government
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Caterpillar Annual Report 1999
Internal Volvo CE sources
**APPENDIX A - OTHER COMPETITORS**

**HITACHI CONSTRUCTION MACHINERY CO., LTD.**

Hitachi Construction Machinery Co., Ltd. (HCM) is a comprehensive manufacturer of construction machinery. They produce approximately 50 models of hydraulic excavator, its main business line. Producing hydraulic excavators in Europe, the United States and Asia. In addition, market such products as wheel loaders and bulldozers made by the above manufacturers and others. Its objective is to reach the aim of consolidated ROC from 2.2 in 1999 to 10 in 2002.

*Explore new sources of demand:*
- Enhancement and expansion of dealer network to respond more fully to specific local needs
- Promotion of New Service Operations. Comprehensive line-up of services, to include contract services, remote diagnosis service and others. Entry into the used machinery market, which is equal in scale to the market for new machinery, on a group-wide basis. Targeting the ¥1 trillion rental market.
- Computer-integrated management (CIM) system, Just in Time (JIT) delivery system
  - Two + Two System (two days preparing for assembly and two days for actual assembly)
  - Reduction of delivery times for products tailored to customers' specifications
  - Minimization of inventories

**KOBELCO CONSTRUCTION MACHINERY**

Kobelco Construction Machinery is one division of Japanese Kobelco group. For decades, kobelco construction equipment business used to be part of an integrated company consisting of metals and machinery. It turns out into an independent companies in Oct, 1999 due to the previous time-consuming decision-making within the organization. It also show the strong intention of Kobelco Group to strengthen its Construction Machinery business oversee expansion.

Kobelco believe, in order to improve profitability, it cannot rely on a recovery in demand in the Japanese and Southeast Asia markets. The overseas market is more promising. We are introducing new models, and firm demand in North America and Europe is increasing sales.
Kobelco has signed a distribution agreement with Hyundai Heavy Industries Co., Ltd in order
to increase its sales. In July, the Korean government is lifting its import ban on Japanese-
made hydraulic excavators. As the Korean economy recovers in the second half of this year,
both Kobelco and Hyundai look forward to a recovery in demand for construction equipment.

**Bell Equipment and John Deere**

Bell is a South African manufacturer of heavy equipment. They are not a major actor in
Southeast Asia, but last year held the top spot for articulated haulers in Australia. Bell has
formed a strategic alliance with American manufacturer John Deere. Deere is a leading
producer of agricultural equipment but also offers construction equipment. The deal brings
tracks to complement Deere’s existing products, most notably excavators, while Bell gets
stronger financially. Deere offers its customers financial services.

**Sumitomo Heavy Industries**

Sumitomo is an integrated Japanese manufacturer of a wide range of products, from ships and
bridges to industrial machinery. Their operations in Southeast Asia and Australia are directed
from an office in Singapore. Efforts at the moment are focused on bringing costs down to
increase competitiveness. The company has been hit by a decreased domestic demand in
Japan.

**Daewoo**

The South Korean company Daewoo established their Heavy Industries branch in 1937, and
the construction equipment division was founded in 1977. Three manufacturing facilities for
construction equipment, one in South Korea and one in China for the Asian market. In August
1999 Korea government announced a sweeping restructuring plan for Daewoo, whose debt
estimated at $73 billion. The plan calls for Daewoo to strip down to six units from current 25
by the end of this year. Construction unit, one money-losing affiliate is within the spin-off
package. Komatsu and Volvo have shown interest in acquiring the heavy equipment division.

**JCB**

Britain’s Construction equipment manufacturer, established in 1945 by Joseph Cyril
Bamford, and is the fifth largest manufacturer of construction equipment in the world
by volume. JCB innovated first the backhoe loader and they are now world market
leader of backhoe loader. They have seven UK factory sites, a joint venture
manufacturing plant in India, eight subsidiary sales companies and eleven regional offices around the world. Its main product lines are: backhoe loaders, telescopic handlers, wheeled loaders, mini excavators, skid steer loaders, rough terrain forklifts, tracked and wheeled excavators and high speed tractors.

**CASE NEW-HOLLAND (CNH)**

Case was founded in 1842 near Racine, Wisconsin, by Jerome Increase Case. The company first made grain threshing machines. Through expansion and acquisition, the company developed a broad line of agricultural equipment, while also becoming the leading supplier of small- to medium-sized construction equipment. Case Capital, the company’s financial services business, began in 1957.

Case Corporation is a leading worldwide designer, manufacturer and distributor of agricultural and construction equipment, and offers a broad array of financial products and services. Headquartered in Racine, Wisconsin, Case had 1998 revenues of $6.1 billion and sells its products in 150 countries through a network of approximately 4,900 independent dealers.

New Holland was formed in 1991 from the merger of Ford New Holland and Fiat Geotech. New Holland has rapidly established a significant global presence in agricultural equipment and a growing presence in the construction equipment industry.

New Holland is a world leader in the design and manufacture of a full line of agricultural and construction equipment, and offers a rapidly expanding line of financial services in many of its markets. With revenues of $5.7 billion in 1998, the company and its joint venture partners operate in 160 countries through a network of approximately 6,100 dealers and distributors.

On November 15, 1999, New Holland, a unit of Italy’s Fiat acquired Case and form CNH. The new CNH will expand construction-equipment and financial-services business. Its major brands including Case, Case IH and New Holland.
# APPENDIX B - SURVEY OF CUSTOMER SATISFACTION

**Name of respondent:**

**Company:**

**Position:**

**Date of interview:**

**Location:**

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APPENDIX C - INTERVIEWS

Brussels
Magnus Björkman Business Controller, Region International Markets
Hans Jonsson Senior Vice President
George Lilly Manager of marketing and sales
Helmut Peeters Senior Vice President
Uwe Thams Marketing Manager
Harry Whistler Financial Analyst

Eskilstuna
Johan Andersson Logistic Engineering
Lars-Göran Andersson Manager of marketing and sales
Christina Söderberg Manager of marketing and sales
Cathrine von Büren Sales Administration and Shipping

Australia
Per Björkman Parts manager
Sung-Young Choi General Manager, Volvo CE Korea
Nick Clayton Marketing Manager, CJD (dealer in Perth)
Allan de Souza National Parts Manager
Michael Hector Managing Director, HBH (dealer in Sydney)
Michael Hudson Managing Director, Fletcher International
Chris Moroz Order Manager
Ron Rafferty Managing Director, CJD
Paul Torrington Chief Financial Officer
Scott Turner National Customer Support Manager

Singapore
Choong Keen Chan Business Controller
P. Chandra Sales Administrator
Jeff Chua Managing Director, Harbour Handlers
Richard Lau Product Support Director
Han Beng Lee Technical support
Wan Jua Loh Parts Manager
Nick Mules Manager of sales and marketing
Anthony Neo District Manager
Eric Perben Business Development Manager
<table>
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<tr>
<td>Atiphong Phongwan</td>
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<td>Kwanchai Tanyaluck</td>
<td>Assistant Vice President, Italhai</td>
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<tr>
<td>Narongchai Thepbinnakarn</td>
<td>Project Manager, Italian-Thai Dev.</td>
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<td>Sarun Veangsong</td>
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