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# **Predicting the future**

**-A case study of Volvo CE's forecasting process**

**Joachim Ramström and Martin Söderlund**

Graduate Business School  
School of Economics and Commercial Law  
Göteborg University  
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## **Abstract**

Forecasting has today become a key success factor for companies with long lead times. Resources and capabilities within a company have to be managed in an optimal way, which requires prognosing fluctuations in future demand.

In this thesis we examine corporate forecasting processes i.e. how corporations make their forecasts and what they base these forecasts on. To do this we look into the current forecasting process of a case company, Volvo Construction Equipment, to map techniques and methods used when developing forecasts, as well as information requirements and weaknesses in Volvo CE's process.

We have identified four theoretical approaches that we consider the four cornerstones of a complete forecasting system. The theories are the traditional forecasting theory, customer purchasing behavior, institutional analysis and management information systems.

We have also given special attention to forecasting using leading indicators. We attempt to create a structured and methodological way of identifying indicators in a company in the construction equipment industry. For this purpose we have developed a non-mathematical model based on the four theories mentioned above.

**Key words: customer buying behavior, forecasting, institutional analysis, leading indicators, management information systems, Volvo Construction Equipment**

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**Joachim Ramström**

**Martin Söderlund**

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”My interest is in the future – because I’m going to  
spend the rest of my life there”

Charles Kettering



### 1. Introduction

During the past 25 years forecasting has been used in a variety of functional environments, ranging from finance, distribution and logistics, to the world of marketing and sales. Forecasting plays a key role in all of these functions, but the emphasis shifts back and forth like a pendulum, one time from one function, another time to another function and then back again. The latest emphasis of forecasting has been in the areas of scheduling and logistics, renamed “Supply Chain Management”. Resources and capabilities within a company are to be managed in an optimal way, which requires different functions to be prepared to fluctuations in demand. As a result, processes are geared towards reacting from the input of forecasts as well as actual changes in the order book.

Over time, these processes have been perfected to the point that all functions in the company are effectively and optimally carried out on the basis of forecasts. It has however become painfully evident that although the processes are effective, the forecasts, which these processes rely on, are not always correct. This lead to a number of difficulties in the company, most of which can even have large financial consequences. It has also happened that companies have filed for bankruptcy as a result of bad forecasting.

Bearing this in mind, it becomes evident that more focus has to be placed on the forecast processes. A popular method of forecasting is to compare macro economic indicators with demand for certain products to find out if demand follows the pattern of some specific indicator. This is problematic because it is a time consuming process, since there are a great number of possible indicators. Another problem has turned out to be that the use of indicators in forecasts requires a large input of data and information, but companies’ information systems do not give adequate support to the forecasting teams.

Our interest in the subject started when we attended a course where the main content was to make an institutional analysis of some emerging markets. The institutional analysis was an interesting way of approaching markets, since it

takes into consideration both ‘hard facts’, such as economical data, inflation etc, and also ‘soft factors’ such government actions, institutional characteristics and the organization itself. As we came in contact with Volvo Construction Equipment (CE), and they presented their problem with inaccuracies in the forecasts, we realized that their forecasting methods takes limited consideration into these ‘soft factors’. We also realized that the construction equipment industry is a very traditional industry, much focused on processes and measurable facts. Only from the early 1990’s has the industry embraced customer satisfaction concepts, which are wider than just absolute cost savings, lower expenditure and higher revenues.

Hence, we wanted to study if the forecasting problems in Volvo CE are related to this old construction equipment industry habit of focusing on measurable and quantifiable facts. We thought it would be interesting to see if it is possible to improve the outcome of forecasts by studying how the behavior of some of the institution affect and change demand for construction equipment. Because it is very difficult to quantify behavior of customers and institutions, we hoped that we could identify how this type of information can be used in forecasts. The methods that are available to make use of non-quantifiable information is, for instance, jury of executive opinion and expert opinion, but they seem to get limited attention in our case company. These subjective methods may also be the only way of gaining information from many emerging markets, where statistical data is not available or of questionably reliability.

We also wanted to investigate if there was a possibility of using the institutional network analysis for attempting to map how the interaction of institutions affects actors in the market. In some markets the government may have a large influence over the economy, while other markets are highly sensitive to the general economic state of the world economy. Datamining alone cannot give an answer to questions about interconnectedness between factors and institutions, neither can mathematical models explain the relationship between for instance, buyer intentions and actual sales. Therefore, there is a need to complement datamining and mathematical methods with judgmental methods, especially in markets with little economic data or no past sales history.

Literature on the subject states that successful total market forecasting requires a company to take into consideration both qualitative and quantitative data. The methods for acknowledging qualitative and quantitative data are also called subjective or objective. Running mathematical based forecasting techniques on statistical data is a typical objective method. But trustworthy data is not always available for some markets, and sometimes there is even no data available at all. This renders objective forecasting methods nearly useless.

In a case where there is no statistical data available, which factors should a market analyst then take into consideration? Is it merely a trial and error procedure, or is it possible to approach the problem in a more methodological and structured way? Furthermore, how can an analyst approach, for instance intuition, in a scientific way?

### 1.1 Problem definition

The consistent theme in this thesis is to examine corporate forecasting processes, especially with regards to techniques and methods used when developing forecasts, as well as information requirements. We want to investigate how corporations make their forecasts, and what they base these forecasts on. We also want to investigate how corporations can improve their forecasting. Of special interest is the information requirement for forecasts, because the so-called indicators, which are frequently used, require a well-developed forecasting system. Special attention is given to investigating what is required when trying to identify an indicator.

Any company should start by asking themselves what the goals of a forecast are? Accuracy is foremost in everybody's mind, but management often also wants both accuracy and usefulness, i.e. forecasts should be a utility as well as a management and decision tool. A good forecast is effective if it can also deliver commentary and make it actionable.

Bearing this in mind, it becomes clear that more than just statistical macro economic data is required in order to make *accurate* and *timely* forecasts. For static markets it may be enough to follow macro economic statistics to make

accurate forecasts. But most markets are both dynamic and complex, and reliable data may not be available. Furthermore non-economic factors may have an impact on demand for certain products. Such factors can for instance be government policies, degree of mix between public and business life.

To gain order out of this random pattern of different factors, it is evident that companies need to systemize their approach to forecasting. How should a company categorize factors involved in forecasts? What factors need to be identified when making a forecast? Where is required data or information found?

**Main problem:**

How can indicators, which are used in forecasts for companies in the construction equipment industry be identified in a structured and systematic way?

Forecasts have traditionally been considered as something static, for example if a company makes a one-year forecast they stick with. Today this traditional way of looking at forecasts has to be replaced by flexible and pro-active forecasting. Today's rapid changes in the world economy effecting the global and local business climate require companies to approach forecasting in a much more open-minded and flexible way. Companies must be ready to adapt to the current environment and if necessary make new forecasts to meet the new requirements. Theories on forecasting state that both subjective and objective methods have to lie as the base for forecasts. It is however our view that understanding customer behavior, as well as identifying the relevant institutions in the environment will enable more accurate forecasting.

The statistical forecasting methods greatest strength is that it provides an objective, unbiased and unemotional view of the future. The statistical

forecasting method is rarely the last word, since it cannot incorporate every factor that might impact demand.<sup>1</sup>

An evaluation of the forecasts is an absolute necessity in order to get a measurement of how efficient the forecasts are. Without tracking the results and progress of the forecasts it is impossible to improve the processes and techniques used. If so, the meaning of forecasting disappears, since companies do not know if the forecasts are reliable or not.

The discussion above raises some interesting questions. Which forecasting method(s) are most effective? What determines market development? How can non-measurable information be used in forecasts? Can an understanding of the customer improve forecast accuracy? These questions lead us to our first research problem:

### **Research problem 1:**

*What should be taken into consideration when trying to identify leading indicators?*

The first research problem with consider the following areas:

- A forecast is per definition wrong
- There is more than one method to make a forecast
- There are a lot of factors, which affect market development
- Not all factors are measurable in numbers
- Evaluation

While the first research problem is concerned with gaining high forecast accuracy, it does not address the issue of the basic requirement for making a good forecast – the need for market information. Information and data for forecasts might be obtained from different sources, such as from statistical forecasting techniques, marketing and sales department, customers and

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<sup>1</sup> Lapide, (spring, 2000).

suppliers. The marketing department is most likely to have a good understanding of how promotional uplifts and new. The sales department, on the other hand, is the eyes and the ears of the market. It best understands local market dynamics and trends taking place on a geographical and customer account basis.

Any company should ask itself; how can we get hold of reliable data and information? Who are in a position to give us the information we need? Who should we involve in the forecasting process? How can we gain new knowledge from our process and methods? These questions are our starting points for research problem 2.

### **Research problem 2**

*How can the information need, which is required when identifying indicators and creating forecasts, be satisfied?*

The second research problem will consider the following areas:

- Sources of information/types of information
- The role of different actors in the organization
- Information flow/communication

### **1.2 Purpose**

The purpose of the thesis is to examine the current forecasting procedure of Volvo CE, to determine its weaknesses and strengths, where the primary focus is on the forecasting system itself. Based on the preliminary research we will identify problem areas and explore how they can be improved. The so-called indicators are also put in focus. Because the use of indicators requires a good input of data and information, we will look at the information base for forecasts. Then we will develop a practical non-mathematical model, which can be used as a strategic analytical tool for selecting indicators when making market forecasts in the construction equipment business. This will be done by



combining elements from several theories, that is, subjective forecasting theories, the institutional network approach and customer purchasing behavior. The goal is to form a model, which will point out certain critical aspects of the market, that need to be taken into consideration when choosing leading indicators.

For the purpose of this thesis, it is not interesting to ask why a customer or end-user chose to buy products from one company or another. The interesting question to ask is rather why did the customer buy now, why did he not buy earlier or later? What drives the customer/end-user to make a purchase decision on a specific time? What are the factors that influence the decision to go ahead or postpone a purchase? Is there a method to help a company understand the underlying logic of a customer's purchase decision? What are the information requirements for forecasts?

Our initial purpose was to focus completely on indicators, i.e. what lies behind them, how they can be identified etc. But a limited access to interviewees prevented us from gaining the necessary primary data to conduct a thorough investigation of indicators, especially in the markets we were asked to do a deep investigation on. It therefore became necessary to focus more on the forecasting process itself. Although it was a disappointment not to be able to completely focus on indicators, evaluating the forecasting process is useful because leading indicators require a good forecasting/prognosis system.

### **1.3 Delimitation**

There are two main approaches to forecasting, an objective, which is based on statistical, mathematical analysis, and a subjective, which is based on human judgment. The objective approach is well developed in Volvo CE, and we will therefore only briefly explain this approach. We have chosen to focus on the subjective approach, partly because it offers an interesting view on how to create forecasts, and partly because it receives little or no attention in our case company.

We also have to limit ourselves to analyzing our case company. The construction equipment industry is very secretive, and it is very difficult to find information about the forecasting practices of competitors. Although it would be of great interest to conduct an industry analysis, complete with competitor analysis, we will unfortunately have to refrain ourselves from this.

The emphasis of this thesis is to study forecasting from the market performance points of view. We will therefore not mention forecasting requirements for such things as cash flow requirement, hedging, financial planning etc.

### 1.4 The case company

Volvo Construction Equipment has been associated with the Volvo Group since 1985 and became a fully owned subsidiary in 1995.

Volvo CE has sales in more than 100 countries and has a product range including more than 150 different models divided into two major product groups:

- *Compact Equipment*, which includes Volvo compact wheel loaders and Volvo compact excavators, which are used in lighter duty.
- *General Purpose and Production Equipment*, which includes Volvo wheel loaders, Volvo excavators, Volvo articulated haulers and Champion motor graders.

Today, Volvo is present all over the world with manufacturing facilities in Sweden, Germany, France, Korea, the United States, Canada and Brazil.

Forecasting plays an important role throughout the production cycle at Volvo CE. The largest function, which relies heavily on forecast, is resource planning. Resources such as people and material take a long time to acquire and unforeseen drops or jumps in demand create all kinds of problems for production and planning. Too low forecasts lead to low production, which has

to be compensated by overtime working, which also leads to higher delivery cost.

Since Volvo CE covers over 60 markets, there is a need to prioritize some markets over others, that is when to deliver the products and where. These action plans are also based on forecasts. If a forecast is incorrect, there is a great chance that too many or too few machines are produced, or the right amount of machines are produced but at the wrong time or sent to the wrong market.

### 1.5 Definitions and central concepts

**Customer purchasing behavior:** "...mental and physical activities undertaken by household and business customers that result in decision and actions to pay for, purchase and use products and services." (Sheth, 1999)

**Dealers:** the independent or fully owned companies that sell Volvo CE's machines in different markets.

**Emerging market:** an economic sector with growth potential; a country that is deregulating its markets, and liberalizing its trade and investment regimes. (Gipson, 1994).

**Forecasting:** the art of estimating future demand by anticipating what buyers are likely to do under a given set of conditions. (Kotler et al., 1999)

**Headquarter:** When we talk about the headquarter, we refer to the Volvo CE headquarter in Brussels

**Information:** when discussing information in this thesis we define information as data (raw facts and observations).

**Institutions:** “Human life is organized in certain ways. The organization of such basic processes is here defined as institutionalization processes. Behavior patterns become ingrained in society leading to a self-activated individual behavior. Behavior follows from certain social programs and conventions. This behavior complex is defined as an institution and institutionalization concern how society is organized.” (Jansson, 1999)

**Leading indicators:** time series that change in the same direction but in advance of company sales. (Kotler et al., 1999)

**Multinational Corporation (MNC):** “a firm with branches and subsidiaries in several countries from which it derives at least 25 percent of its annual income. Corporations become multinational to avoid barriers to entry in target markets, benefit from lower cost labor, and secure sources of cheap raw materials.” (Gipson, 1994)

**Objective forecasting:** the forecast is derived from an analysis of data.

**Sales companies:** Volvo CE’s regional sales companies/offices in charge of the different regions with no direct sales themselves, with the exception of sales in markets without dealers.

**Sales people:** working directly for a sales company in the markets without dealers.

**Subjective forecasting:** it is based on human judgment.

## 2. Methodology

This section of the thesis is written to guide the reader through the thesis, to help him or her understand how the work has proceeded, as well as why we have chosen to write the thesis in some manner. It is also a guideline to understanding the approaches we have used to conduct the research. The discussion is focused on three major issues; the structure and content of the paper, the research approach and the data collection.

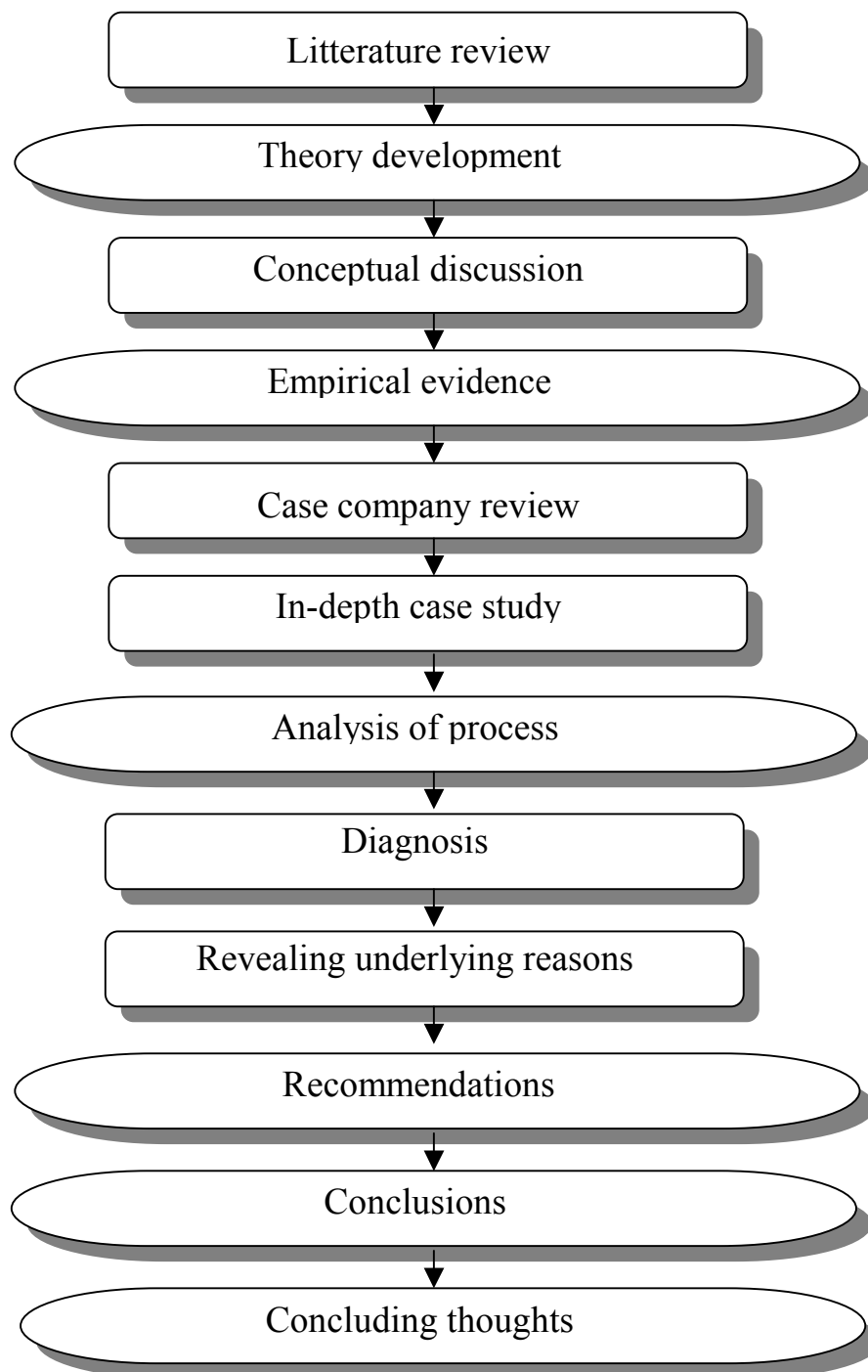
*Structure and content:* The layout of the thesis is presented. The contributions to the theoretical framework are discussed, as well as the goals of the theoretical, empirical and analytical presentations.

*The research approach:* Here the rationale for the choice of method is discussed. Since the research has the dual objective of theory building and model formulation, we argue that it is necessary to use two different approaches.

*Data collection:* This section discusses how the data is gathered and on what bases interview samples have been chosen. It also discusses the need and relevance for data collection.

### 2.1 Structure and content

The research process follows the procedures as summarized in figure 2.1 on the following page.



**Figure 2.1 The research process**  
**Source: Our own**

The theoretical part of the thesis deals with different approaches to forecasting and understanding consumer behavior is based on literature studies about different aspects of forecasting, customer behavior, institutional analysis and handling of information. This part of the thesis is developed using models and

theories according to work done by authors such as Sheth (1999) and Nahimas (1997). The theoretical foundation of forecasting (Chapter 3.2) is concerned with different aspects of companies interpreting statistical data (objective approach) or individual judgment (subjective approach).

An important contribution from the school of marketing are the theories on customer purchasing behavior, which explains patterns in companies' behavior with regards to the acquisition of products and services (Chapter 3.3). The theories on institutional analysis (Chapter 3.4) gives the researcher the opportunity to identify certain aspects in the macro and micro environment of the company, aspects which in many ways influences the behavior of customers. By understanding customer purchasing behavior and macro and micro factors in the environment of the customer, we hope it will be possible to increase the accuracy of corporate forecasting. The theories on information concerns how and where a company can collect information necessary for forecasting (Chapter 3.5).

By using these theories we hope to give a good overview of factors that influences and affects corporate forecasting. We hope to contribute to the area of forecasting by establishing that the most effective way to accurate forecasting is both a combination of the different approaches to forecasting, and understanding the behavior of the customer.

In the empirical part of the thesis (Chapter 4) we will try to find support for the application of the theories in practice. We will attempt to combine the practical applications of forecasting, customer purchasing behavior and institutional analysis to reach a model on how a company in the construction equipment industry can improve their forecasting practices. The first part of the empirical study accounts for the current forecasting practices of Volvo CE (Chapter 4.2). This part of the empirical study will also deal with different approaches to forecasting (Chapter 4.2.2). Moreover the empirical study is concerned with what should be taken into consideration when making forecasts and looking for indicators and how that information can be achieved.

By understanding customer purchasing behavior and macro and micro factors in the environment of the customer, we hope it will be possible to increase the accuracy of corporate forecasting. The theories on information concerns how and where a company can collect information necessary for forecasting.

The final part of the thesis is concerned with our analyses (Chapter 6), recommendations of how the forecasting can be improved, and what measures should be taken in order to increase the usefulness of forecasting (Chapter 7), our conclusions on the theoretical and empirical study (Chapter 8) and some concluding thoughts (Chapter 9).

### **2.2 The research approach**

Initially the scientific approach to the thesis is, by and large, exploratory, since there is limited or no prior information on the subjective forecasting practices of our case company. The exploratory approach allows a great degree of flexibility and it is able to deal with the unexpected. Both secondary and primary sources were used to define, among other things, the problem area and problem questions. Initial knowledge about the basic problem was gained by studying previous research and theory about forecasting. We began by reviewing the literature on forecasting in order to follow the development of the area and to develop a framework for analyzing business forecasting.

After gaining a deeper understanding of forecasting, and as the subject and the requirements became clear, we changed research strategy. We use a descriptive approach to explain how customer behavior affects customer purchase decisions, how to combine the different approaches to forecasting and how micro- and macro-environmental impacts customer behavior.

Of the different research methods available, the case study is most appropriate when trying to gain an in-depth understanding of the situation and meaning for what is involved in the study. It is also an obvious option, since we only have one firm to analyze, and there is a need to conduct a thorough investigation in order to discover rather than confirm. It is also favorable because our



phenomenon (forecasting) is to be studied as it occurs in a real-life situation.<sup>2</sup> Since there is only one firm involved, it is also logical to use a single-firm approach. Although we would like to investigate forecasting methods in other industries, it has become clear to us that the forecasting methods are widely different for different industries, even between different product lines. Therefore there is no use in analyzing a large number of companies, although they might encounter the same difficulties as our case company.

Since we are conducting a case study, qualitative researching is most suitable to us. It gives us the opportunity to assemble both subjective and objective information, which in the case of assessing the impact of customer behavior on forecasts is necessary. It allows us to get the necessary in-depth information on the subject. It also allows us to gain a deeper understanding of some actions or experiences based on information that can be rather difficult to quantify. Such information is for instance individual preferences or attitudes and other types of data of emotional character.

Finally, in this case study we will use an abductive research strategy. It is build on developed or new theory as well as old theories. But the theories on forecasting are only loosely connected to our research problem, because most forecasting theories are concerned with statistical analysis of different data. Therefore we intend to incorporate other theories when we explore forecasting in the case company. We attempt to be critical of the existing theories and modify them according to what we learn practically. Therefore we also choose to approach the problem from different perspectives in hope of finding an interesting result.

In the final part of the thesis an inductive strategy is adopted, with the aim of creating a model for choosing leading indicator in a company in the construction equipment industry. The model is based on selected parts of existing theories, but combines them in a new way.

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<sup>2</sup> Yin, (1994).

### 2.3 Data collection

Data can be collected from either primary or secondary sources. Below we will explain the differences between the two types and explain how we have used them.

#### 2.3.1 Primary data

The researchers collect primary data in order to solve a specific problem. It is new data that has not been used before, and may consist of observations, interviews or surveys.<sup>3</sup>

Our main technique for collecting primary data has been through interviews, but we also sent one questionnaire via e-mail. We have used unstructured and semi-structured interviews. We choose to take notes during all interviews instead of taping them as we believe that taking notes makes the interviewees more relaxed and willing to answer more delicate questions. In most cases, all questions were sent to the interviewees prior to the interview. The interview language was either Swedish or English, as preferred by the interviewees.

At the beginning of our research we conducted unstructured interviews at Volvo CE's headquarters in Brussels. The purpose was to gain a better understanding of the problem and mapping the current forecasting procedure at Volvo CE. We choose to interview the persons working frequently with forecasts, which was the Market Planning and Research Department, located in Brussels. The MPR is responsible for preparing, making and validating forecasts for the Volvo CE group. During our visit we conducted unstructured interviews with four people at the department and also with the Business controller for Region international markets. Follow-up questions were conducted during a semi-structured interview in Gothenburg three weeks later with three persons from the Market Intelligence and Research Department. An unstructured phone-interview with the Business Controller was held to discuss the theoretical findings.

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<sup>3</sup> Meeriam, (1998).

During a second visit to Brussels semi structured interviews were held with three persons from the MPR. An open interview was conducted with the Business Controller and President for International Markets. Structured phone interviews were held with a market analyst in Växjö, Sweden, a Sales administration manager in Trappes, France, and the Director of Marketing Planning and Research in Eskilstuna. At a later stage a phone interview was arranged with the Vice President, Excavators European Region, Netherlands. A semi-structured questionnaire with many open-ended questions was e-mailed to the President of Volvo CE South America, which resulted in an extensive response one week later.

Dealer interviews were conducted in the middle of November. A semi-structured interview was conducted with the Forecasting and Marketing Manager at Swecon AB in Eskilstuna, Sweden. The Marketing Manager and Product Manager Excavators at Bilia AS, Oslo, Norway were interviewed as well as a salesman for Bilia AS. Bilia AS gave us the opportunity to conduct an open-ended interview with a customer. Finally the Sales Manager at Swecon in Gothenburg was interviewed.

### 2.3.2 Secondary data

Secondary data is data that already exist somewhere, having been collected for another purpose; examples are books, articles, journals, previous studies and statistics.<sup>4</sup>

In order to get an understanding for the forecasting process at Volvo CE we collected a large amount of secondary data, both from internal and external sources. Volvo CE provided us with a substantial amount of internal material, which highlighted the current processes. We also deepened the understanding of the procedures of Volvo CE by collecting data from various book, Internet web pages and different scientific articles.

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<sup>4</sup> Kotler et al., (1999).

When looking for literature we have been searching in the Göteborg University Library database, GUNDA. Articles were collected from database such as Financial Times and Helecon, available the Economics Library at Göteborg University. We have also used different sources on the Internet such as the homepage of Volvo CE.

### 2.4 Quality of research

The researchers must always do their best to make sure the analysis is of highest quality. To measure the quality of research, the terms validity and reliability are often used. Validity and reliability are in a case study based on the researchers' ability to plan the study, the analytical skills and the conclusions that are drawn. A qualitative research should provide the reader with a detailed description to make it possible for the reader to decide whether the conclusions drawn are logical or not.<sup>5</sup>

#### 2.4.1 Internal validity

When using a case study method in research, it is possible that the researchers are using subjective rather than objective judgments. To improve the internal validity we have tried to use multiple sources or asked respondents if the data and interpretations are correct.

Because we have conducted interviews with only 16 people at various positions within and outside the company, we believe that internal validity is not as good as it could be if we had a larger sample of interviews. To compensate for the small amount of interviews, we sent a copy of our empirical findings to the Market Planning and Research Department at Volvo CE, and we made changes based on their evaluation of the material. Consequently, the empirical study should be of high internal validity. A high involvement both from employees at Volvo CE and our academic tutors has strengthened the internal validity of our case study.

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<sup>5</sup> Merriam, (1998).

### 2.4.2 External validity

External validity deals with the problem of generalizing the findings of the study beyond the immediate case study. Is the research applicable to other situations than the examined case?<sup>6</sup>

Since our main problem is to find a way to identify indicators for companies in construction equipment in a structured and systematic way, we believe our research-findings are possible to generalize to different markets and products similar to construction equipment.

We also believe our recommendations for using the dealers (or equivalent) more extensively in forecasting, and for using several different methods to increase the quality of forecasting are applicable to different markets and different products outside the construction equipment industry.

### 2.4.3 Reliability

We believe we have given a thorough description of the theories we have used and how we have collected the empirical evidence. We have also described what kind of data we have used and we have provided a complete list of all references (Chapter 11) and interview questions (Appendix 2). We believe this has increased the reliability of our study.

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<sup>6</sup> Yin, (1994).

### 3. Theoretical framework

*In this chapter we will present the concept of forecasting. At first we will offer a short description of the different theories that we believe will lead to an increased understanding of forecasting. We will attempt to show that customers purchase decisions affects and has implications for forecasting, and that the behavior of institutions impact the accuracy of forecasts. We will divide factors, which affect customer behavior, into broad groups and identify certain important characteristics within each group, i.e. macro, micro, or end-user. Finally we will emphasize the necessity of a well developed information system as the base for any forecasting system.*

#### 3.1 Description of main theories

##### *Forecasting models*

We will attempt to extend the traditional statistical forecasting models with elements from the other theories we have mentioned. It is not the purpose of the thesis to use statistical models as such, or to run regression analysis on several indicators that might be of interest.

##### *Customer purchasing behavior*

The customers purchasing behavior is of utmost importance when attempting to make reliable forecasts. The end consumer decides when to purchase a product. But the customer does not exist in a vacuum. Different factors in the environment of the customer or end user impacts and influences the purchasing decision. It is our purpose to establish a set of factors, which are of importance when making forecasts.

##### *Institutional network theory*

The institutional network theory will be used to find out relevant institutions within a country that affects demand and therefore the accuracy of forecasts. We will attempt to find out how, and to what extent, different institutions affect each other. It is also important to establish the effect of different institutions on the end user.

### *Management information systems*

There is a great need for data and different types of information when creating forecasts. This information exist both externally and internally, but it is important to have a well-developed internal information system to be able to collect and make use of the information, which is requires when making forecasts. Information systems must be effective on several types of information, not only quantifiable.

### **3.2. Theories on forecasting**

Forecasting has been part of a variety of functional environments throughout the history. It has ranged from finance, to distribution and logistics to the world of marketing and sales. Managers with forecasting training and experience can be significant contributors to the strategic direction of companies. The latest emphasis of forecasting has been in the areas of scheduling and logistics, also popularly known as "Supply Chain Management".

In this part of the theoretical framework we will discuss different aspects of forecasting, which we consider relevant for the area we have delimited ourselves to. Important points in this part of the theoretical framework is:

- Which aspects of forecasting are important for companies?
- Which are the different approaches to forecasting?
- What is an indicator?
- How to define a leading indicator?

#### **3.2.1 Forecasting in companies**

One thing companies all over the world can be sure of is that the future will be different from the past. The question is how different it will be and how it will affect the decisions and plans made today? Regardless of whether it is in the

field of politics, social behavior, finance or technology, there is no evidence to suggest that uncertainties will diminish or disappear in the foreseeable future, and that makes uncertainty a large problem for multinational corporations.

The degree of uncertainty depends on the nature of a market or environment. Static environments are characterized by few changes in the market conditions, which make them easy to predict. These market are however uncommon. More common are markets with a complex environment. They are characterized by diverse conditions, which require a great degree of knowledge and experience from the actors in the market. Another factor that increases complexity is environmental influences, which are interconnected or dependent upon each other. Many environments are, in addition to complex, also dynamic. There is a high rate and frequency of change, which requires a company to be more open to changes in the organization, management and methods. A combination of complex and dynamic market may create an extremely uncertain environment for a company.<sup>7</sup>

How are companies able to make predictions on future demand given the high degree of uncertainty connected with many of the markets? Are predictions, or forecasts as they more commonly are known in business circles, useful or a waste of time and energy? Let us begin by exploring the area of forecasts.

*A definition on forecasting:*

*"The art of estimating future demand by anticipating what buyers are likely to do under a given set of conditions."<sup>8</sup>*

It is today uncommon for any firm not to base its business planning on some sort of forecasting. Sales of existing products, customer demand patterns for new products, needs and availability of raw materials, changing skills of workers, interest rates, capacity requirements, and international politics are examples of factors likely to affect the future success of a firm.<sup>9</sup> Marketing and production are the two functions in a firm that are most likely to make use of forecasts. For marketing, forecasts are made to forecast sales for both new and

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<sup>7</sup> Johnson and Schoeles, (1988).

<sup>8</sup> Kotler et al., (1999).

<sup>9</sup> Nahimas, (1997).



existing product lines, while the production department utilizes forecasts for operations planning. Put simply, forecasting is the process of predicting the future. But can all events be accurately forecasted? Although we are in the early stages of the process of writing a thesis about forecasting and leading indicators, we are inclined to conclude that it will not be possible to accurately forecast everything.

When an industry is in a state of relative slow incremental change, then forecasting is an effective way of planning. In a situation like this, it is relatively straightforward to do projections on the future on the basis of what has happened in the past. The problem with forecasting is that people start to believe that this situation will continue forever.<sup>10</sup> But there is always a point in time when behavior changes structurally. Usually what happens is also that managers keep on recycling old solutions and none keeps track of what happened when those solutions were used in the past. Therefore, forecasters need to be aware which variables may suddenly break the relationship between the past and the future, i.e. which variables could create a trend break. Learning from history, research and experiment should be built into the way forecasters think, and sudden changes are the indicator that a model or an approach is in need of a revision.<sup>11</sup> The more unstable the market the more there is a need for accurate forecasts and elaborate forecasting methods. In addition, incomplete but timely forecasts are better than perfect but late forecasts.<sup>12</sup>

Products that are easy to forecast are rather the exception than the rule, because it is rare to find steady sales growth and a suitable competitive situation. Instead the volatility of markets have made successful forecasting a key factor for company success.<sup>13</sup> Poor forecasting can lead to excessively large inventories, costly price markdowns or lost sales due to stock shortages.

Business moves very quickly, and decision have to be made whether there is available or complete information. So, bearing that in mind, what are the goals

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<sup>10</sup> Heijden, (1996).

<sup>11</sup> Altabet, (fall, 1998).

<sup>12</sup> Altabet, (fall, 1998).

<sup>13</sup> Kotler et al. (1999).

of a forecast? Accuracy? Accuracy with the right lead-time? Accuracy at the monthly level? Given the fact that forecasts are usually wrong<sup>14</sup>, is it better to assume that forecasts are a tool for bringing some form of order into the random element of demand? Steven Nahmias (1997) has listed five general characteristics of forecasts, which sheds some light on the purpose of forecasts.

*1. They are usually wrong*

Forecasts, once determined, are often treated as known information, but resource requirements, production schedules may require modifications if the forecast of demand proves to be inaccurate. The planning system should therefore be flexible enough to react to unpredictable forecast errors.

*2. A good forecast is more than a single number*

Because forecasts are usually wrong, once made, they should also give some measure of the anticipated forecast error.

*3. Aggregate forecasts are more accurate*

Forecasts made for an entire product line are often less inaccurate than one made for an individual item, i.e. forecasts for total market demand are generally more reliable than forecast for the demand of a single product.

*4. The longer the forecasting horizon, the less accurate the forecast will be*

*5. Forecasts should not be used to the exclusion of known information*

A particular technique may result in a reasonably accurate forecast in most circumstances. However, there may be information available concerning the future demand that is not presented in the past history of the series. This can for instance be a promotional campaign for a particular item, which probably will lead to a higher demand than normal.

### 3.2.2 Forecasting methods

We have identified two different approaches to making business forecast. The difference between them lies in what the forecasts are based on, that is if they are based on human judgment or derived from analysis of data. The first method is commonly known as a subjective forecasting method, while the second is known as an objective forecasting method. We are in this thesis going

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<sup>14</sup> Nahimas, (1997).

to put our emphasis on subjective forecasting methods. The reason for this is that objective forecasting is well developed in our case company, and secondly, there is relatively little material compiled on subjective forecasting. Also, when we are attempting to create a model on how to select indicators, human judgment and experience will be the main purpose of explaining why a specific indicator is valid and important. A third reason that speaks for this approach is that relevant and reliable data is not available in all markets, but still a MNC have to be able to make forecasts for any market regardless if statistical data is available. For such markets, human judgment, expert opinion etc, are the only means of making forecasts.

There are several types of forecasts, the common denominator is that they build on one of three information bases: what people say, what people do, or what people have done.<sup>15</sup> We have chosen to describe seven different forecasting techniques covering the aspects of forecasting we use in our thesis.

Based on:	Methods:
What people say	Surveys of buyers' intentions Composite sales force opinions Expert opinions
What people do	Test markets
What people have done	Statistical demand analysis Time-series analysis Leading indicators

**Figure 3.1 Common sales forecasting techniques**  
Source: Kotler et al. (1999)

<sup>15</sup> Kotler et al., (1999).

### *3.2.2.1 Subjective forecasting methods*

A forecasting method is classified as subjective if it's based on human judgment. Some of the known methods for gathering information for forecasts are sales force composites, customer surveys, jury of executive opinion or the Delphi method.<sup>16</sup>

#### *Composite of sales force opinions*

Interviews with buyers can sometimes be impractical and companies can therefore also consider basing the sales forecast on information provided by the sales force. Adjustments may be needed when using the sales force's estimates because salespeople are often somewhat biased observers, since they may be naturally optimistic or pessimistic. Accepting these biases are a must since advantages can be gained by involving the sales force. Sales people are probably the group in a company with the best insights into developing trends among any other group.

A good source for subjective information is the company sales force. The sales force has direct contacts with consumers and is therefore in a good position to see changes in demand. Using this method, the sales force submits estimates of the products they will sell in the coming year. Sales managers are then responsible for aggregating individual estimates to arrive at overall forecasts. But, it has to be kept in mind that sales force composites may be inaccurate when compensation of sales personnel is based on meeting a quota! Their participation in forecasts may also give them more confidence to communicate with the forecasting department and an inspiration to constantly look for new developing trends.<sup>17</sup>

#### *Surveys of buyers' intentions*

To survey and directly ask buyers what they will do is a straightforward way of doing forecasts. But for surveys to be valuable, it is important for buyers to

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<sup>16</sup> Nahimas, (1997).

<sup>17</sup> Kotler et al., (1999).

have clearly formed intentions that will be carried out. Buyers also have to be able to describe them in a good way. There are various agencies that carry out business buying intention surveys about plant, equipment and materials purchase. These measures need adjusting when conducted across nations and cultures. Overestimation of intent to buy is higher in southern Europe than it is on northern Europe and the United States. In Asia, the Japanese tend to make fewer overstatements than the Chinese.<sup>18</sup>

Customer surveys can also signal future trends and shifting demand. But for these kinds of surveys to be effective, they have to be carefully designed to guarantee that the resulting data is statistically unbiased and representative of the customer base, otherwise they are likely to result in wrong conclusions.

#### *Expert opinion and Delphi method*

If there is no past history for a product or market, expert opinion may be the only source of information for preparing forecasts. Individual forecasts can be combined by interviewing executives directly, and then develop forecasts from the result of the interviews, or by requiring the executives to meet as a group and come to a consensus. Experts include dealers, distributors, suppliers, marketing consultants and trade associations<sup>19</sup>. Dealer estimates are very similar to sales force estimates in their weaknesses and strengths. It is very common for companies to buy economic and industry forecasts since the forecasting specialists are often in a better position to prepare forecasts due to more data available and more forecasting expertise.

*The Delphi method* is similar to jury of executive opinion, but the difference is in the manner which individual opinions are combined. The Delphi method attempts to eliminate some of the inherent shortcoming of group dynamics, in which the personalities of some group members overshadow those of others members.

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<sup>18</sup> Kotler et al., (1999)

<sup>19</sup> Kotler et al., (1999)

### *The test-market method*

The test-market method is especially useful in forecasting new-product sales or established-product sales in a new market and is focused on the sales of a single company.<sup>20</sup>

Judgmental methods often provide very accurate forecasts.<sup>21</sup> The major advantages are that they are inexpensive to develop and executives usually have a solid understanding of the broad-based factors and how they affect sales demand. They are inexpensive to develop, because there is no need to acquire expensive computer hardware/software. These sales forecasts can also be developed fairly quickly. But, on the negative side, they are always biased towards the group who develops them, and because they are subjective, they are not consistently objective over time. Some executives may not even understand the firm's sales situation since they are too far removed from the marketplace.

### *3.2.2.2 Objective forecasting methods*

Objective forecasting methods are those in which the forecast is derived from an analysis of data. There are different ways of analyzing data.

### *Time-series analysis*

Time-series analysis assumes that statistical analysis can find the causes for past sales. Time-series analysis consists of breaking down the original sales into four components – trends, cycle, season and erratic components – then recombining these components to produce the sales forecast.<sup>22</sup> Different factors in the business environment affect cycles and long-term trend patterns of growth or decline, while seasonal fluctuations are more closely related to weather factors and holidays. The erratic components consists of unpredictable events such as earthquakes and strikes and are identified for the purpose of

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<sup>20</sup> Kotler et al., (1999).

<sup>21</sup> Chase and Charles, (fall, 1997).

<sup>22</sup> Kotler et al., (1999).

being removed from the past data in order to see the more normal behavior of sales.<sup>23</sup>

#### *Statistical demand analysis*

Statistical demand analysis views past and future sales as a function of demand factors instead of as a function of time, which is the case in time-series analysis. Statistical demand analysis is statistical procedures used to unveil the most important factors affecting sales and also the relative influence of these factors. Commonly analyzed factors are prices, income etc. A casual model uses data from sources other than the series being predicted, that is, there may be other variables with values that are linked in some way to what is being forecasted.<sup>24</sup>

The major advantage with time-series methods is that they are well suited to situations where sales forecasts are needed for a large number of products. They also work well for products with fairly stable sales. Another advantage is that they can smooth out small random fluctuations and they are simple to understand and use, partly because software packages are readily available. The same is true for casual models. The major disadvantage is that they require a large amount of historical data. This makes them even more vulnerable to markets where there is little or no historical data available. These kinds of forecasts also adapt very slowly to changes in sales, partly because a great deal of searching may be needed to find the weighted value. For long-time forecasts they are useless and large fluctuations in current data can create large errors in the forecasts.<sup>25</sup> Casual methods are also best used in short and medium termed forecasts, because accuracy depends on a consistent relationship between independent and dependent variables. Causal methods require a strong understanding of statistics and are therefore more time-intensive. They are also less easily systemized than time-series methods, and require large data storage. Finally they tend to be more expensive to build and maintain.

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<sup>23</sup> Kotler et al., (1999).

<sup>24</sup> Kotler et al., (1999).

<sup>25</sup> Chase and Charles, (fall, 1997).

3.2.3 Forecasting as a tool

Forecasting is of little use to the decision taker unless it enables him to make better decisions than otherwise. When planners are offered the best available data in a structured and systematic way they will have a clearer vision of the future than by intuition alone. Forecasting can by no means form a decision by itself. Instead it serves as a helpful tool in the decision making process by reducing some of the uncertainties in the environment.<sup>26</sup>

Critics often question forecasting by claiming it impossible to foresee critical events, such as for example the fall of the Berlin Wall. But these critics have misunderstood the role of forecasting, which is not to provide definite predictions of what will happen in the future. Although there will be some unpredictable events, their frequency is sufficiently low to not make purposeful planning invalid. Forecasting can help to clarify future consequences of current developments in the absence of unforeseen events. It can also, through a systematic examination of the environment, reveal changes that might otherwise have escaped attention.

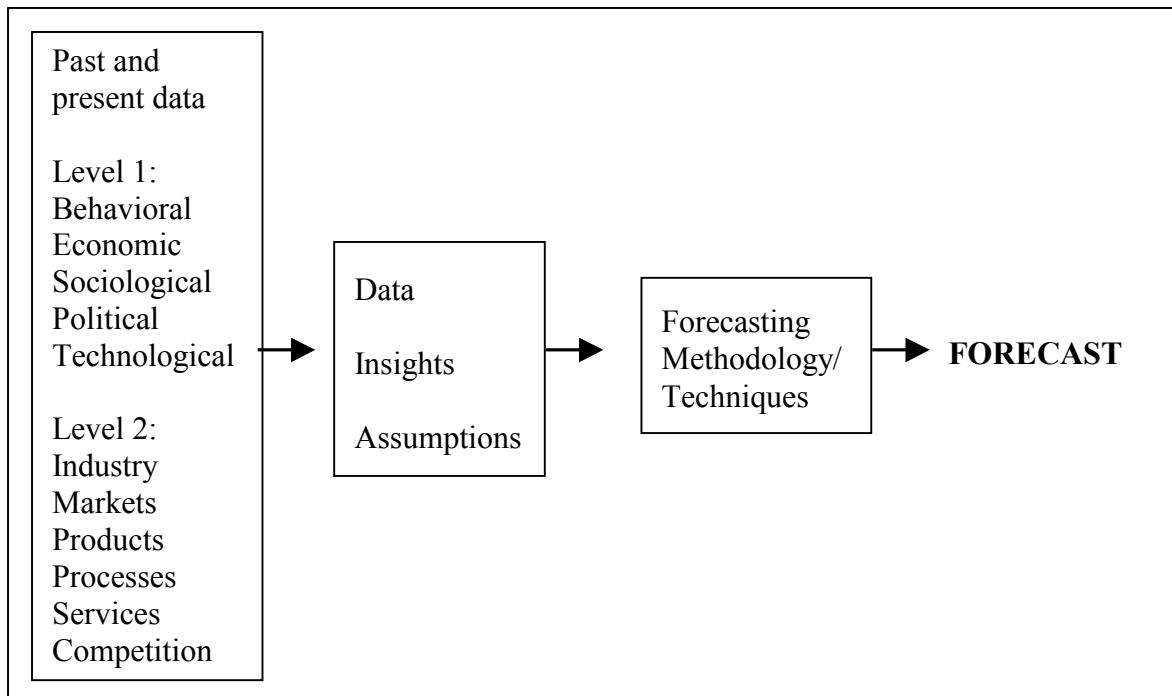


Figure 3.2 The forecasting process  
Source: Adapted from Jones and Twiss (1978).

<sup>26</sup> Jones and Twiss, (1978).



The past and present data in level 1 of figure 1.1 indicates external changes to a company as a whole and therefore to the industry itself, while level 2 data influences a part or parts of the business in a single company. Our interest is mainly focused on level 1 data since our thesis takes into consideration the industry as a whole and not a single company.

In many foreign, and in some cases less developed countries, it is difficult for researchers to find good and reliable secondary data. It is therefore important to understand making forecasts is not only a mechanistic process. A vital element in forecasting is the systematic search of the environment and the discovery of trends. Analytical and mathematical abilities are important in the analysis of data, which is the most time consuming and detailed activity within forecasting. But these are of little value if the forecaster is examining the wrong information, the wrong problem or has overlooked an important development beyond his normal field of expertise. Without a breadth of vision and insight, attention can be focused on the wrong things and lead to ill-founded confidence in the future.<sup>27</sup>

A highly qualified staff is needed to carry out the detailed work, but they will achieve little if they are not linked with widely experienced managers in the organization.<sup>28</sup> An ability to communicate between planners and decision-makers is vital to make forecasting effective. But it is important not to forget the clear distinction between forecasting and planning decisions, where forecasts are only an input to planning.

### 3.2.4 Indicators

As stated earlier, forecasters need to be aware that there are variables that can cause structural changes, and therefore cause a break in the trend or relationship between the past and the future. Hence, there needs to be a system in place, which can give an indication when such structural changes are about to occur. For the purpose of this thesis, what a forecaster is looking for is an

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<sup>27</sup> Jones and Twiss, (1978).

<sup>28</sup> Jones and Twiss, (1978).

indicator, and more than that, a leading indicator, which shows when a current trend will break.

A question that arises is what a leading indicator is? Is a leading indicator the most important of many, maybe hundreds of indicators? Or is a leading indicator an average of a series of indicators, or could a leading indicator even be one or several descriptive or explanatory factors behind an indicator?

Many companies seem happy with finding one leading indicator that correlates to the sales of their products. This approach might work well for some time, but it has its severe drawbacks. What happens when there is a structural change in the demand for products? The leading indicator is no longer valid, and the company has to look for another leading indicator to substitute the invalidated one. To make things worse, structural changes in demand seldom occur at times of relative calmness, they usually happen when things take a turn for the worse. During such times, most companies are very much occupied with trying to cover rising cost, improving efficiency as a result of lost revenues etc. Usually there is little time or energy for finding new market indicators.

An average of a series of indicators seems to be a more rational way of going about it. Then a company doesn't have to rely on a single indicator, which at some point might turn out not to work anymore. The problem with this thinking is that, as hard as it is to find one leading indicator, it is even a larger task to find several indicators to draw the average on.

It seems logical to assume that it would be in any company's interest to search for explanatory factors behind one or several indicators. By understanding what affects the indicators which forecasts are based on, searching for indicators would go from being a random operation to a structured and methodological approach. But there are some drawbacks with this approach. One is that it is very time consuming, and a second is that there are today no complete models on how to go about with such an approach. It is very much based on human judgment, combined with a good proportion of common sense and experience.

This thesis leans more to this third approach or way of thinking. During preliminary interviews with managers in our case company, we have realized that there is a need to develop a system, or model, for finding indicators. We have reached the conclusion that in order to accomplish that, we have to go beyond just picking indicators at random and then testing them to find if they happen to be a leading indicator. It is important to establish cause and reaction, which means it's as important to explain why a certain indicator is chosen, as it is to test its validity. It is almost impossible to create a model on how to select indicators if one cannot explain why it is important to look in some direction for specific indicators.

### 3.2.5 Leading indicators

*A leading indicator is:*

*"A time series that changes in the same direction but in advance of company sales." <sup>29</sup>*

According to Niemira and Klein (1994), leading indicators have three key strengths:

1. They are easy to interpret
2. They are easy to communicate
3. They relatively inexpensive to formulate.

Leading indicators can deliver a message quickly and efficiently without requiring management to read through a long report. But it is important to understand that no single indicator is perfect, and it is therefore better to use an average or index derived from a group of leading indicators.

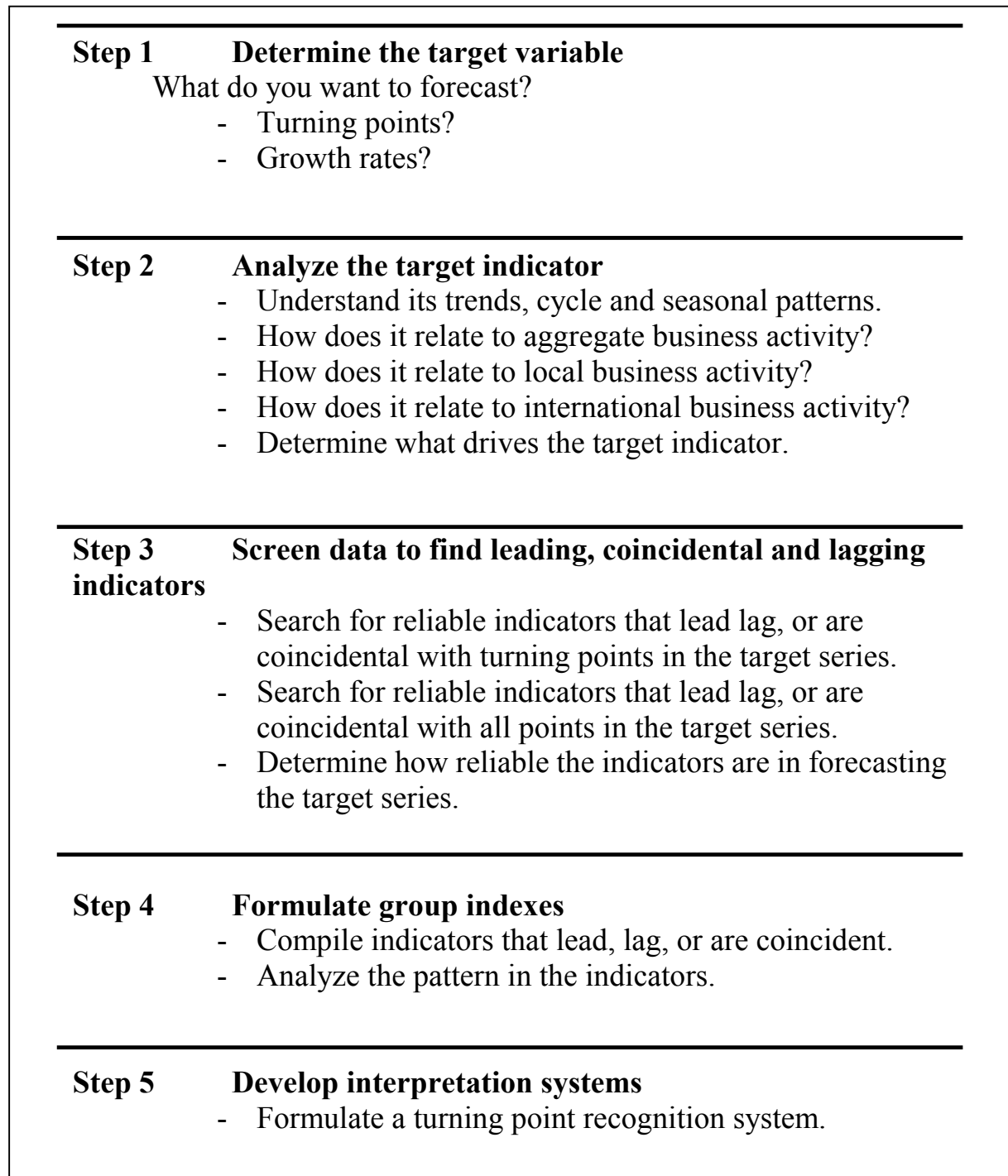
A good indicator has the following properties:

- data is of monthly frequency
- displays high and stable correlation with the total market
- reflects exclusively on macroeconomic developments
- does not reflect structural or other changes in the market
- is not a forecast of the total market

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<sup>29</sup> Kotler et al., (1999).

Niemira and Klein (1994) have created five steps to formulate a leading indicator system (see figure 3.3).



**Figure 3.3 Steps in formulating leading indicator system.**  
Source: Niemira and Klein, (1994).

### 3.2.6 Scenario planning

One of the great limitations with forecasting is that most forecasts are based on the assumption that the past can be extended into the future. The problem with forecasting is that when the environment is characterized by a high degree of uncertainty, which is the case with many emerging markets, forecasting is not very accurate. The reason is that there primarily no past data to base assumptions about the future on, and second that changes in the environment are often very radical.

In order to increase the ability for companies to rapidly respond to environmental change, scenario development techniques are useful. The two most important components in scenario development are identifying the environment surrounding the company, and the company's current strategy. After identifying environmental factors they are judged according to their perceived level of uncertainty. Then the impact of the environment on the firm and its strategy is evaluated, and scenarios are created to match the strategy with the development of the environment.

Scenarios that are jointly developed and understood by a multifunctional leadership create a fundamental and shared understanding of making decisions about the future. As different scenarios are created, one or many models for successful adaptation to the environment can be developed. The long-term vision of the company has to be viewed in the light of different scenarios, to identify the key elements for success. Once scenarios have been developed and the impact on the vision is identified, management should work backward from the envisioned future to articulate the pathway to achieve the vision. The pathway also identifies "wake-up-calls", that is, leading indicators of positive or threatening developments in markets, regulations, and other aspects of the future business environment. By referring to this pathway, management can identify actions to influence outcomes in a desirable direction.<sup>30</sup>

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<sup>30</sup> Lancaster, (1996).

The goal with scenarios is to describe different futures to prepare the decision-makers of a company for different opportunities and threats that the organization might face. By using the developed scenarios as a management tool, the organization improves its preparedness to take action more reflectively and rapidly.

Scenario development is therefore an important part of the total forecasting approach of a company. It is rarely useful for short-term predictions, but the longer the time frame and the higher the uncertainty, the more useful scenario development is. Scenario development is not further explored in this work, but it is important to recognize this approach and its usefulness.

### 3.2.7 Summary of forecasting theories

Every company have to approach forecasting bearing in mind that it is nearly impossible to forecast every event that may affect the demand for certain products. When an economy is in relatively slow incremental change, forecasting may be done based on historical data. But when demand fluctuates, more effective forecasting methods have to be used. This is increasingly true as the world economy globalizes, and events in one part of the world may have unexpected effects in another part of the world, and where many of the factors effecting demand are interconnected.

There are different approaches to forecasting depending on markets and economic situations, as well as the resources of the company. Neither objective nor subjective forecasting methods should be neglected, since both have their weaknesses and strengths. Regardless of the method(s) used for creating forecasts, it is necessary to define what the objectives with forecasts are. This is critical when searching for indicators. Additionally, it is important to define what the margin of error is with an indicator.

Scenario planning is a useful tool in laying the ground for forecasting, because scenarios are build by considering the trends and uncertainties in technologies, markets, industries, regulations and the political/economical environment. But

the act of creating them requires a dialogue among people who are knowledgeable about the diverse areas.

### **3.3 Theories on customer behavior**

Marketers are rarely able to experience their customers' perspective directly. However, they can, and should, educate themselves about their customers. Successful forecasting requires a need to know customers needs and want, as well as how the customers make decisions about buying and using products.

This part of the theoretical framework is concerned with establishing determinants for customer behavior. It is also concerned with the concept of risk, and how risk affects the behavior of customers. Different customer types are also discussed, both business, government and reseller customers. Important aspects of this section are:

- Which are the factors affecting customer purchase decision?
- What determines when a customer makes a purchase?
- How are different types of customers different from each other?
- How can risk best be understood when determining a purchase decision?

#### **3.3.1 Customer purchasing behavior**

When attempting to map the purchasing behavior of the buyer, a first step is to divide the customer into segments. A broad division can be made between business markets and consumer markets. These two segments have vastly different purchase criteria and therefore the purchase decision is influenced by different factors. Since the construction equipment industry is, in most cases, involved in business-to-business purchasing decisions except in some cases for compact excavators our focus will be on business buying behavior. A third segment is institutional and government markets. It is necessary to analyze

even this segment, because in certain markets it can contribute a large part of demand for construction equipment.

*Customer behavior:*<sup>31</sup>

*"... mental and physical activities undertaken by household and business customers that result in decision and actions to pay for, purchase and use products and services."*

### 3.3.2 Determinants of customer behavior

We have divided the market environment into two broad classes, market characteristics and market context. Market characteristics refer to the physical characteristics of the surroundings in which the customers select, use and pay for products and services. Market context, on the other hand, refers to the man-made market that affects customer wants and needs. The market characteristics remain largely unchanged over a person's lifetime, but the market context can change quite rapidly and can result in discontinuity, such as the financial difficulties that swept over Asia starting in 1997 and quite fast took on gigantic proportions.

#### *Market characteristics*

Although market characteristics such as climate, topography and ecology might not seem relevant determinants of customer behavior for many industrial sectors, these should not be discarded right out of hand. Climate affects the demand for oil, which in turn affects prices. The current turbulence on the crude oil market worries more than a little, countries with cold winters when the demand for heating oil can be very high. A shortage of oil leads to higher prices, which in turn increases the demand for vehicles and heating equipment with lower fuel consumption.

Climatologically changes increase the demand for more efficient solutions and therefore climate can be a driver for technological change. As for instance

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<sup>31</sup> Sheth, (1999).



machinery is upgraded to higher technological standards, there will be a greater supply for used machinery.

Ecology will in the future play an increasingly important role in business life. Customers are increasingly demanding renewable energy and sustainable growth. Ecology affects customer behavior by making certain options less convenient or attractive, either becomes ecology itself makes certain modes of consumption less convenient or satisfying, or through government disincentives making some products or activities more costly.<sup>32</sup> An example of this could for instance be that open-mine quarries would be forbidden.

#### *Market context*

Levels of unemployment, wages, inflation, interest rates, currency exchange rates and aggregate household savings are only part of the national economy. They do not work in isolation, but often affect each other. Unfavorable economic climates influence customers' behavior in several ways, such as customers postponing purchases, elimination of purchases, discontinuation of activities and substitution to lower-priced brands. Generally one can say that the economic climate affect customer behavior by three mechanisms:<sup>33</sup>

1. By directly expanding or shrinking the financial resources or the buying power of these resources.
2. By influencing customer sentiment – optimism or pessimism about the future.
3. By driving business cycles.

The government is responsible for the monetary policy, fiscal policy and public policy. Each of theses has a large impact on customer purchases, through different regulations on for instance money supply, interest rates, procurement etc. Quotas on imports or exports and different incentives they offer also affect the buying behavior, because the laws that governments enact constrains

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<sup>32</sup> Sheth, (1999).

<sup>33</sup> Sheth, (1999).

choice, mandates certain products and services, protects the consumer and sets up facilitative infrastructures.

While hikes in interest rates may dampen household spending, it may have the reverse effect on business. As consumers spend less, businesses need to cover decreasing sales but rising cost by improving productivity. One means of raising productivity is by investing in new and more efficient equipment.

Technology can be said to increase the quality of life for consumers by introducing new technology to the development, distribution and consumption of products and services. Customer behavior is affected because of many reasons. Technology alters the flow and access to information about marketplace alternatives. It also makes available newer generations of products and services. Automation gives customers greater flexibility and control as well as improved productivity, and finally by making customized products economically feasible.<sup>34</sup>

### *3.3.2.1 Changes in the determinants of customer behavior*

Any company that can anticipate trends in customer behavior can gain a strategic advantage. Managers need to worry less about how to position their firm among current competitors and spend more time trying to envision the future needs and wants of customers. The advantage that comes out from foreseeing customer behavior is that a company can be the first to meet a new demand. This reduces fulfillment time and makes economic payback a lot quicker. It also means that a company can cut down capacity if they can foresee a downturn in demand. One must also realize that customer needs and wants change over time, and changes can sometimes happen very fast and dramatically. Changes are, to a degree, a consequence of advances in technology and the application of public policy.<sup>35</sup>

Trends in public policy are relevant to a study of customer behavior. Many governments are concerned with protection of passive consumers and on an

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<sup>34</sup> Sheth, (1999).

<sup>35</sup> Sheth, (1999).

international level government are pursuing regional economic integration. Governments are in an increasing way recognizing the power of market forces and are getting out of its way. This will lead to greater competition, which requires firms to be increasingly customer oriented. As the public requires the government to improve efficiency, the government has downsized its budgets, reducing cost, streamlining supplier pool, etc. Yet the government will have a large indirect influence over the market through investments in infrastructural projects etc.

### 3.3.3 Risk

Perceived risk is one of the deciding factors, which contributes to, and influences the purchase decision. Every purchase involves a certain degree of actual risk and perceived risk. For instance, if a producing company buys components from its supplier, there is always a risk that lower sales will result in a build-up of unused component. Another example is that a mining company's purchase of a new vehicle may increase efficiency, but if market demand for the raw material decreases, the new vehicle is not used to its full capacity.

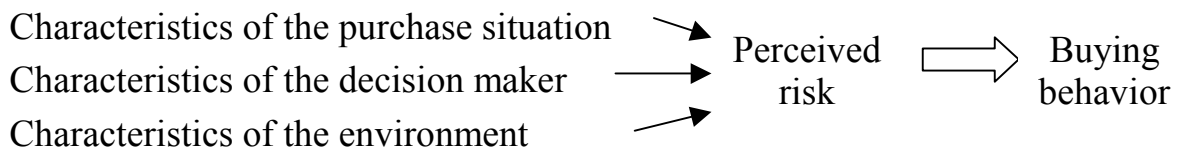
*Perceived risk can be defined as:*<sup>36</sup>

- "1. The degree of uncertainty that a choice may be wrong.*
- 2. The amount at stake should a wrong choice occur."*

There is no good way of measuring risk, because it often involves a high degree of experience of the business and sector. Nor is risk static, it changes along with other factors of the company, the environment and the economy. Different decision-makers also have different thresholds for risk acceptance. But it can be assumed with a great degree of certainty that the higher the actual or perceived risk, the less likely a buyer is of making a purchase.

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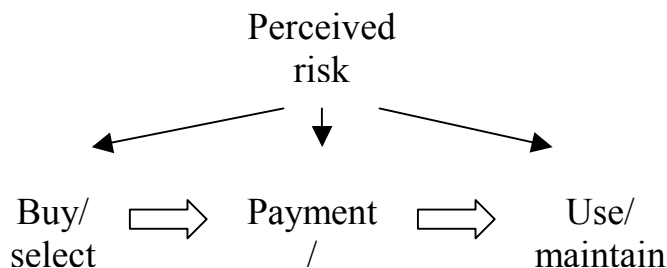
<sup>36</sup> Sheth, (1999).



**Figure 3.4 Underlying reasons for perceived risk**  
**Source: Håkansson and Wootz (1975).**

As can be seen from the model above, how a decision-maker perceives risk depends on several factors, both external and internal, which means that the buying behavior will change depending on the situation, the company and the decision maker.

As a marketplace transaction occurs it requires at least three customer roles, which is buying (selecting) a product, paying for it and using or consuming it. Each role will involve different, and degree, of risk for the user or customer.



**Figure 3.5 The influence of perceived risk**  
**Source: Our own**

Uncertainty stems from the absence of prior design/performance and from lack of experience with potential seller/supplier. Findings have shown that when businesses perceive risk to be high, they adjust their buying behavior to protect themselves and their organizations.<sup>37</sup>

<sup>37</sup> Johnston and Lewin, (January, 1996).

Important questions for the seller are therefore:<sup>38</sup>

Why do certain processes occur in the manner they do?

Which characteristics of customers themselves determine their behavior?

What environmental factors influence customer behavior processes?

It is our purpose to show that by understanding which risk factors affect the customer, and therefore enabling a seller to understand the purchasing behavior of the customer, it will be possible for a company to back-trace turning points and give indications as to what to base forecasts on. For example, if a seller knows that the deciding factor for a purchase relates to financing of the deal, several interesting questions arise:

Why is financing a risk/problem?

Do financing difficulties relate to difficulties in acquiring bank financing?

In that case, what is the fiscal policy of the government?

Is a certain type of fiscal policy an indication of certain general economic conditions?

By learning about customer behavior, business people can understand why customers buy and what they buy, or, more generally, why they respond to market stimuli, and conditions, as they do.<sup>39</sup> This means that by knowing a customer/end user, the environment and the need of it, a producer or seller is able to anticipate the buying behavior of the customer. i.e. predicting future customer behavior requires that a company predict the factors that influence customer behavior<sup>40</sup>

### 3.3.4 The business market

The business buyer faces many decisions in making a purchase, and the decisions depend on whether the purchase is a straight rebuy, a modified rebuy or a new task. Straight rebuys are characterized by reorders on routine basis and

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<sup>38</sup> Sheth, (1999).

<sup>39</sup> Sheth, (1999).

<sup>40</sup> Sheth, (1999).

they often propose automatic reordering systems. Modified rebuy is a situation where the buyer wants to modify the product specifications, prices, delivery requirements or other terms. Finally, the new task is a buying situation in which a purchaser buys a product or service for the first time. The new-task situation is the marketer's greatest opportunity and challenge, and generally it can be assumed that the greater the cost and, or risk, the longer the time to decision completion.<sup>41</sup>

Business buyers are subject to many influences when they make their buying decision. Buyers are in general influenced by four groups of factors, environmental, organizational, interpersonal or economic.<sup>42</sup> Some are most influenced by economic factors, others are more influenced by personal factors such as favors, attention, or risk avoidance. In most cases, a mix of both factors influences buyers. Generally it can be stated that if different suppliers give substantially similar offers i.e. there is little basis for rational choice, more weight will be placed on personal treatment. Vice versa, if competing offers are very different, buyers will pay more attention to economic factors.<sup>43</sup>

#### *Market characteristics*

The environment affects any company where it operates. In the increasingly globalizing world economy, not only factors on the immediate environment may affect the company. These factors are for instance the level of demand for the product, the economic outlook and interest rates. In a contracting market, marketers can do little to stimulate total demand, but they can make efforts to increase or maintain their share of demand.

But except for purely demand-related factors, buyers are also affected by technological, political/regulatory and competitive developments in the environment. An example of this is how the buyers increasing awareness of pollution and the environment affect demand, and this has brought forward socially responsible buying.

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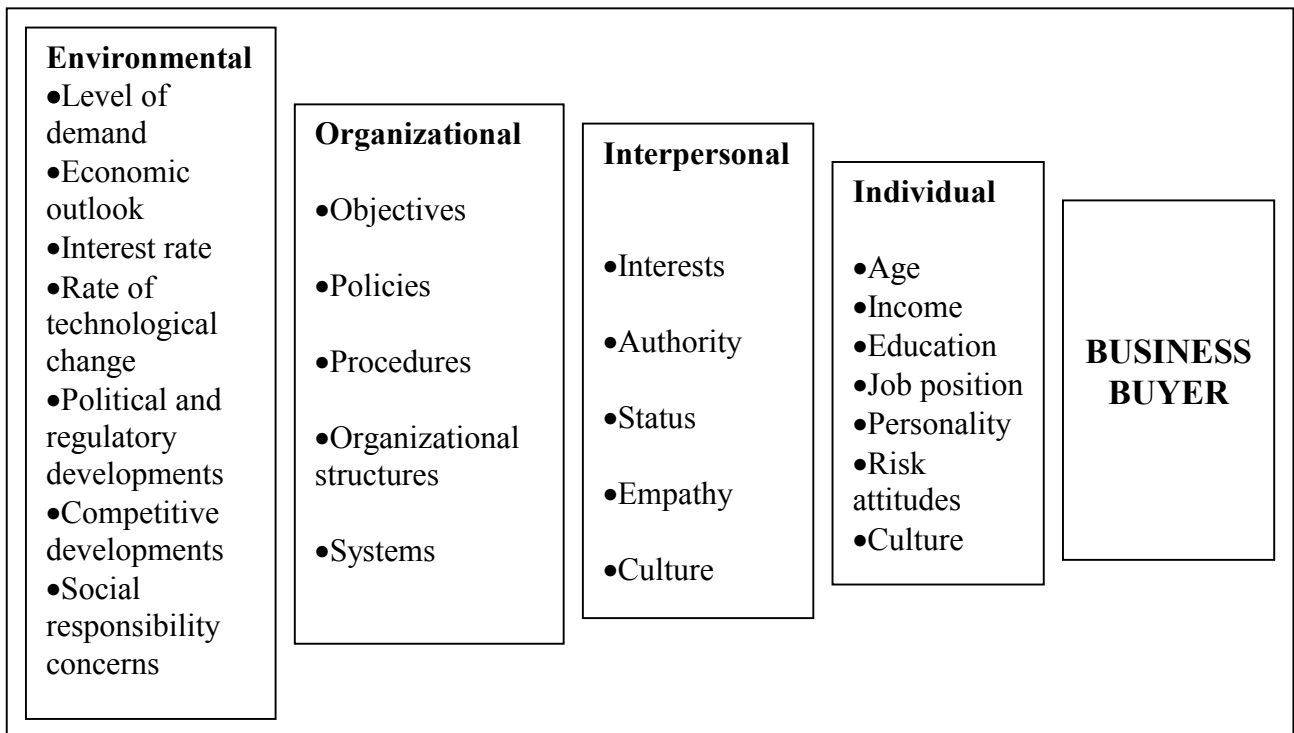
<sup>41</sup> Kotler, (1996)

<sup>42</sup> Kotler, (1996).

<sup>43</sup> Kotler, (1996).

### *Organizational factors*

Every buyer has specific objectives, procedures, structures and systems, and the seller should be aware of some of the organizational trends that are affecting the purchasing situation. Buyers are also increasingly initiating or even demanding long-term contracts with reliable suppliers.



**Figure 3.6 Major influences on industrial buying behavior**

Source: Kotler (1996).

It is also important to remember that each participant in the buying process has a set of personal motivations, perceptions and preferences. Because factors can vary drastically between different countries and cultures it is of outmost importance to understand and adapt to local business cultures and norms. For the purpose of identifying influences for the construction equipment industry, environmental influences are the most important aspects to investigate. But interpersonal and even individual influences have an impact on the buying situation when single individuals, for instance farmers, acquire compact equipment.

3.3.5 The reseller

Resellers are in the business of acquiring and reselling products that their customers need. The major types of resellers are distributors, brokers, wholesalers and agents. At least in theory the decision about what to buy depends on whatever products or services are in demand by their customers and that they can be obtained at a desirable trade discount. But rarely are reseller decisions so straightforward. Not only do resellers differ in the way they do business, they also have limitations on storage space, capital etc.

A resellers buying behavior is a function of several factors,<sup>44</sup> such as merchandize requirements, supplier alternatives and situational characteristics.

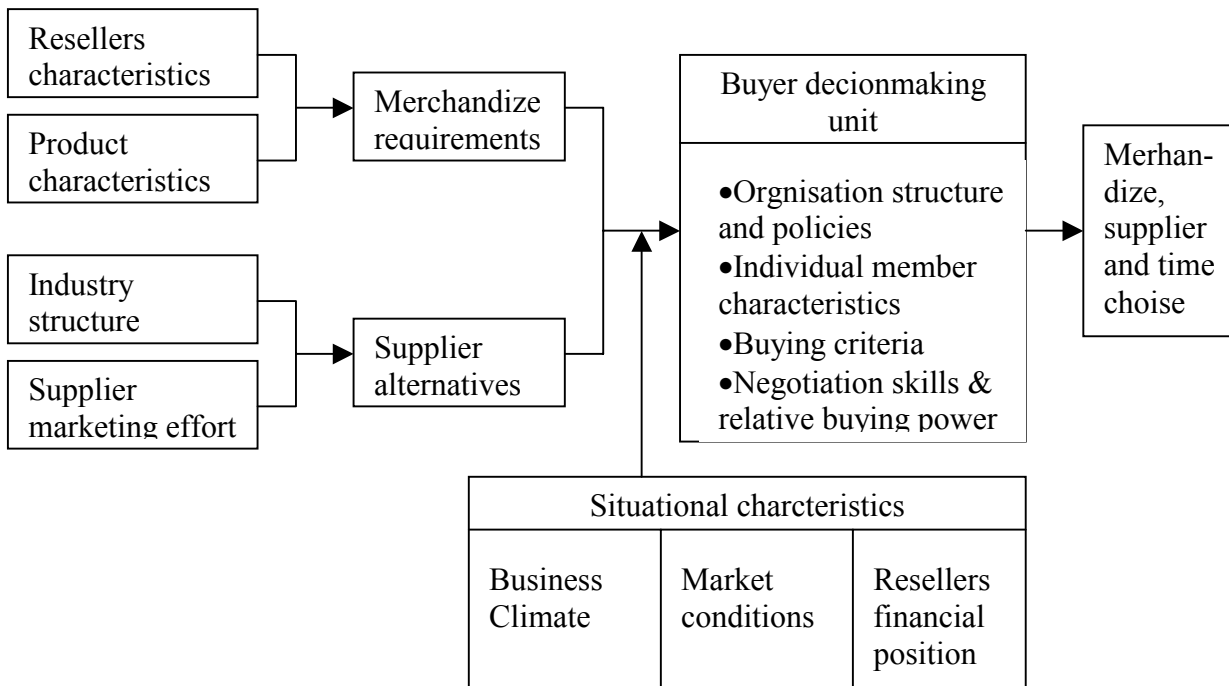


Figure 3.7 Reseller merchandize buying behavior  
Source: Sheth (1999)

From a forecasting perspective, situational characteristics are interesting. While reseller and product characteristics identifies preferences and hence makes one suppliers more favorable than another, the situational characteristics are interesting when trying to determine what makes resellers make decisions at a

<sup>44</sup> Sheth, (1999).



certain point in time. From a forecasting point of view, it is interesting to investigate how situational characteristics affect the behavior of resellers.

The business climate refers to the condition of the national or international economy at the time of a purchase decision. The national or world economy might for instance, be going through a recession or inflation, and the interest rates might be high or low. During an inflationary period, when the interest rates are high, a reseller might be looking for liberal credit rates. Market conditions refer to unpredicted events causing a shortage or surplus or changes in access to markets. The reseller's financial position represents its current profitability and liquidity, and the reseller's position changes from one business cycle to another

Since the buying behavior of resellers is to a large extent affected by the state of the economy, can it be assumed that the reseller (or wholesaler) has a good insight into the state of the economy? Is it equally possible that the reseller might get indications in advance of changes in demand by his or her understanding of the factors influencing customers?

### **3.3.6 The institutional and government markets**

Doing business with the government represents a huge opportunity for businesses, and many firms exist solely as government suppliers. Many of the aspects that are valid for business markets are also valid for institutional and government buyers. But there are some aspects of these buyers that need to be highlighted. First of all, government typically follows well-specified and rule-driven buying procedures, such as direct purchase methods or competitive procurement. Low budgets and captive clientele characterize many of these institutional organizations, which have to provide goods and services to people. The buying objective is seldom profit and nor is cost minimization the sole objective. The government monitors quality and delivery tightly and usually a suppliers has to be extremely low-cost.

On the other hand, government organizations are in many countries major buyers of goods and services. Normally contracts are awarded to the lowest

bidder, but sometimes the government unit will make allowance for the suppliers' superior quality or reputation for punctuality. This means that suppliers make considerable effort to bring their cost down.

Other parallels between government and business buyers are that purchases involve repetition of previous purchase, some variation or a new purchase situation.

On the negative side, governments tend to favor domestic suppliers over foreign suppliers, although this practice is increasingly under pressure from multinationals operating abroad. Another characteristic is that government organizations require considerable paperwork because spending decisions are subject to public view. Government purchases are in many countries open-access information, where names of contractors and prices of awarded contracts can be found in different journals.

### **3.3.7 Summary of customer purchasing behavior**

Understanding customer behavior represents a huge task for most companies. Nevertheless, undertaking activities to understand the customer behavior is a basic necessary requirement for any company. In the context of corporate forecasting, understanding customers offers insights into future demand. After all, demand is a function of customers wants for products and their ability to finance these purchases. Further, business customers themselves are affected by the general state of the economy, and hence the factors that affect the economy. Since the economy constantly changes, trends come and go and one cycle replaces the other, there is a certain amount of risk involved in every business decision. The amount of risk a customer is willing to take also affects the long-term behavior of customers.

To understand customer purchasing behavior implies that a company goes beyond the obvious purchasing rationale. Companies need to probe deeper into the "chain of events" that lead to a purchase decision. More specific questions have to be asked in order to determine why customers make their decisions at certain points in time. Market characteristics are most likely one factor greatly

affecting purchase decisions, but also government policies or restrictions, market sentiments, risk perception etc. The ‘chain of events’ leading to a decision may not be sequential, it might be one single factor, a mix of factors, or even a web of inter-linked factors. How these factors inter-relate with each other is a topic for research, and will be partly covered in the section covering the institutions network theory.

### 3.4 Theories on institutional network analysis

No company exists in isolation of its environment. Institutions in the macro and microenvironment affect companies in different ways. The institutions may also affect demand in several ways. As the name of the theory suggests, these institutions are connected in a network manner to each other. The greatest difficulty for any company is to determine how the different institutions affect demand, how they affect customer purchasing behavior, and how to assess the effects when creating forecasts. It is also a great task to identify the most relevant institutions.

In this chapter of the theoretical framework we attempt to take the forecasting process one step further by introducing the institutions network approach it is especially useful for multinational corporations acting on emerging markets, and the typically turbulent environment that prevails in these markets. Emphasis is put on identifying those institutions, which affect customers, how they affect customers, and what the effect might be on forecasts. Important aspects of this part are:

- How to identify relevant institutions for forecasts in a market?
- Which institutions have the greatest impact on demand?
- Is it possible to include the impact of institutions on customer behavior in forecasts?

### 3.4.1 Institutional network analysis

The institutions networks model is an overall model for analyzing the environment of the MNC. The model identifies two levels of institutions in the environment of the MNC. These two levels are interesting from a forecasting point of view. The first level is the organizational field and the second level is the societal sector. These two levels correspond to the micro and macro environment that is used in many marketing theories. The organizational analysis should identify if a company has an effective forecasting system, and whether a company is able to fulfill all information needs, if different departments are used in an effective way, if the company is able to draw the right conclusions from for instance indicators etc. The external analysis attempts to identify those institutions, which will have the greatest impact on how customers behave. Because we have earlier stated that understanding the behavior of customers will improve forecasting, it is of course important to identify the influences on the customer.

The approach in the institutional network analysis is divided into four stages. In the identification stage the environment is scanned for those institutions, which will have the greatest impact on the MNC. From a forecasting point of view, the identification stage is very important. The second stage, which explains the institutions in more detail, may not be as important, unless it is believed that some institution will have a critical impact on demand. It may therefore be necessary to describe that institution in detail in order to get a better understanding of it. Stage three is explanatory and studies the influence of the institutions on each other and on the MNC. This stage can be time-consuming to carry through, but the inter-influences should be mapped for the sake of understanding how changes in one institution eventually influences the customer and therefore has an impact on the forecast. In the fourth and last stage a future prediction of the institutions is carried out.<sup>45</sup> A company should not place too much focus on this stage while making a forecast. But for scenario planning, which we believe is one part of a total forecasting system. This stage is of great value. By making future predictions of how an institution

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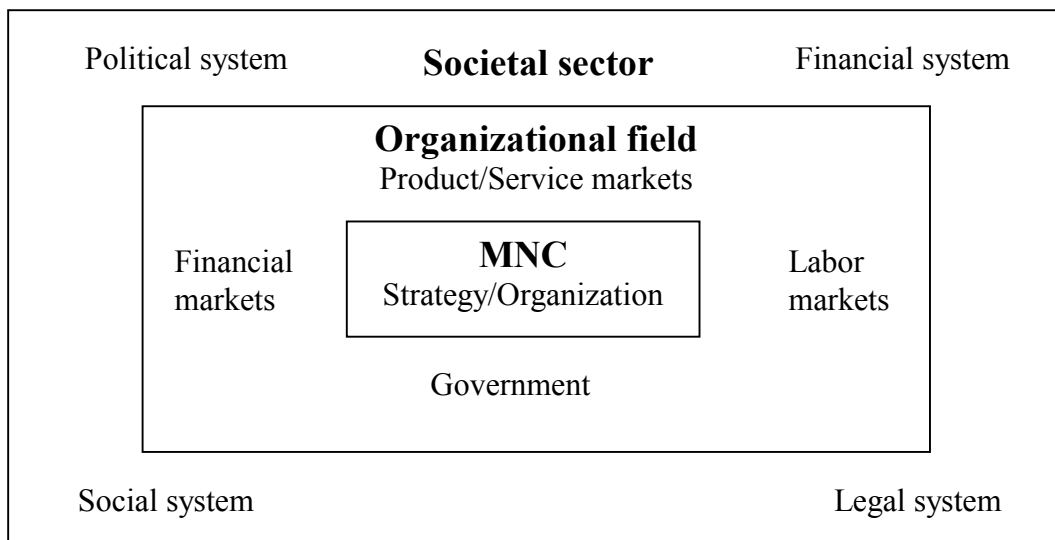
<sup>45</sup> Jansson, (2000).

could change, it is possible to establish early warning indicators, which would require an evaluation of the current forecast.

An outside in approach, which is starting with the institutions, is most useful when trying to clarify how the institutions are impacting the behavior of an organization's customers. There are some models that can be used when trying to identify institutions in the environment. The PEST model<sup>46</sup> is a useful model in institutional analysis, as it distinguishes four relevant societal segments:

1. The **political** segment deals with the political milieu and the regulatory environment
2. The **economic** segment focuses on the general set of economic factors and conditions confronting industries in a society
3. The **social** segment is concerned with demographics, lifestyles and social values of a society.
4. The **technological** segment focuses on the technological progress or advancements that are taking place in a society

In the institutions model there are also four segments in the organizational field: the government, labor markets, product/service- and financial markets.



**Figure 3.8 Basic institutional model**  
**Source: Adapted from Jansson (2000)**

<sup>46</sup> Fahey and Narayanan, (1986).

One characteristic of institutions is their rule-like nature. Another characteristic is that they are signified by predictability. Institutions standardize behavior and transfer rules norms and ways of thinking between individuals. Uncertainty is reduced by anticipation of repeated behavior. This can be worked into the forecasting system, and the greater the predictability of institutions, the more reliable the forecast.

Regarding the institutional analysis, a company should never neglect the interactions between the institutions. All institutions are either directly or indirectly linked together. The direct connections can be one-way or mutual. The awareness of institutional interactions and interdependence is an essential step towards performing a successful, reality-based institutional analysis.

### 3.5 Theories on management information systems

Today's companies must often handle large amounts of information from its markets. It is therefore important that the information is handled efficiently, which means getting as much value as possible from the information at minimum cost and time consumption concerning the production as well as the use of the information. The purpose of a information reporting system in a company is to organize and manage the collection, the processing and the reporting of the management information in a way that satisfy the above mentioned demands<sup>47</sup>.

Important aspects of this part of the theoretical framework are:

- What type of data can be collected?
- How can information be distributed within a company?

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<sup>47</sup> Lekwall and Wahlbin, (1993).

### 3.5.1 Information reporting systems

To make the handling of information as efficient as possible and to keep the cost at a minimum level is very closely linked to how good the information is adapted to the needs of the user concerning content, time and place. To be able to face these demands there are three things the information must fulfill:<sup>48</sup>

1. The information must be relevant, because it is very easy to collect a ton of material that is not really important and, because of that make it almost impossible and very time consuming to find the data you are looking for. It also has to be accurate and free from errors as well as complete so that no information is missing and thereby is a direct cause for a misleading conclusion.
2. The information has to be available and easy to access for the user at the exact time he wants to use it. When it comes to availability it is vital that the links to the sources of information are well developed as well as the channels to the users. It is very common in a company that the information is there but it is spread out on different people and it is therefore not known who knows what or who has got which information. It also has to be up-to-date.
3. Finally, since the information usually comes from different individuals/places and therefore varies in reliability, it is necessary that the user can develop and form his own opinion of the reliability of the information he chose to access.

The demands on relevant and accessible information makes it appropriate to regard the way a company is managing information as a system, an Information Reporting System (IRS). An IRS is the most common form of management information system and provides managerial end users with information products that support much of their day-to-day decision-making needs<sup>49</sup>. The IRS primarily supports the operational management level, but if the system is

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<sup>48</sup> Lekwall and Wahlbin, (1993).

<sup>49</sup> O'Brien, (1993).

closely connected to decision-making (it generates tailor-made supportive information to certain decisions) it primarily supports the tactical management level and therefore sometimes called a Decision Support System (DSS).

A functional way of organizing the information is to start from the origin of the information and divide it into three different kinds (Internal records, marketing intelligence and marketing research). An information analyses system then processes the information to make it more useful for the managers.

The *internal records* are information gathered from sources within a company and generates outcomes and result based data i.e. data about the actions taken and the results of these. The information gathered is information concerning data on orders, deliveries and payments etc. The internal statistics can also deliver information about the order bank, cancelled orders, expected orders etc. The internal records are often used for making day-to-day planning, implementation and control decisions<sup>50</sup>. They are also usually quicker and cheaper to get than information from other sources.

*Marketing intelligence* is everyday information about developments in the marketing environment that helps managers prepare and adjust marketing plans<sup>51</sup>. It should continuously and rapidly give a company information of different events happening all over the world that can have an impact on the company and its markets.

It is very difficult to decide in advance what kind of information is going to be useful, but instead it is relatively easy to name the actors in the environment that needs to be monitored<sup>52</sup>. Many persons in the company manage this marketing intelligence daily as a part of their daily routine. It is vital that a company “sell” its people on their importance as intelligence gatherers, train them to spot new developments and urge them to report intelligence back to the

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<sup>50</sup> Kotler et al., (1999).

<sup>51</sup> Kotler et al., (1999).

<sup>52</sup> Lekwall and Wahlbin, (1993).



company. A company must also persuade suppliers, sales companies, resellers and customers to pass along important intelligence<sup>53</sup>.

A very common problem is that the distribution of this kind of information is not formalized in any way. This means that very important information can be held by one person without reaching the person with the actual need for it, and the one who could use it for the benefit of the company. There is also a lot of information gathered by different authorities, public organizations and private companies that can be looked upon as intelligence information as it provides the development of in the external environment of a company.

Managers cannot always wait for certain specified information to arrive from the marketing intelligence system, hence there is a need for *marketing research*. Marketing research allows managers to receive tailor-made information, and to conduct different types of surveys needed for a special occasion or strategic issue either by using internal resources or by hiring people from the outside.

When creating an IRS there are many issues to think of, below is a list of some of the most important of these issues taken from Lekwall and Wahlbin (1993):

- Which sources of data should be used to get information of the development of each market? Shall it be only external sources or should it be gathered internally (by asking salespeople, surveys etc.). Shall only hard facts (volumes of purchasing, sales, investments etc.) or only soft facts (judgments etc.) or a combination be used?
- Which internal data should be a part of the system and how shall it be presented?
- Who should have access to all data?
- Who should be doing the analyses? Should consultants be used or should it be done internally? Shall standard programs be used or should a company develop its own programs?

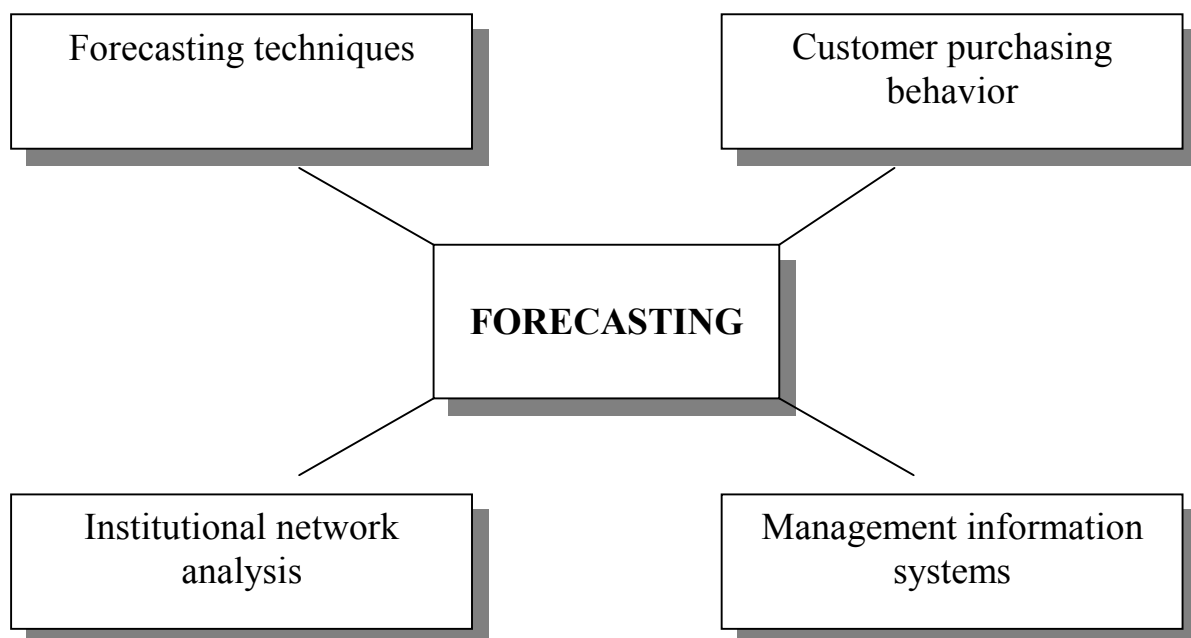
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<sup>53</sup> Kotler et al., (1999).

- Should the technical analyses be presented directly or have a review session? Who is going to put the final “touch” on the analyses?
- How shall the results be presented? Written reports? Oral presentations? Routinely reporting or on request by the user?
- Shall a user be able to make his analyses on his own, for example when making scenarios about the future?

### 3.6 Conceptual discussion

The focus in literature on forecasting is solely on the technical aspect of forecasting i.e. the different types of forecasting techniques. Although the different forecasting techniques are an important part of the forecasting methodology, we consider the forecasting methodology to include more than just the different types of forecasting techniques. To discuss only the different methods does not communicate the complete scope of the forecasting concept. We have identified a strong relationship between forecasting and three additional theoretical approaches. Together they constitute the four cornerstones of our forecasting approach.



**Figure 3.9 The four cornerstones of forecasting**  
Source: Our own

### **Chapter 3 Theoretical framework**

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In order to create accurate forecasts it is vital to get an understanding of how the customer behaves and reacts to changes in the environment. One must also understand how different types of customers, for example institutional and government or business buyer, behave. We therefore started by including different theories on customer purchasing behavior by different authors such as Kotler and Sheth. The ability to able draw conclusions on what drives a customer to purchase at a certain occasion serves as the backbone of our view on forecasting.

We used the institutional network approach by Jansson to map the different aspects in the macro environment and the different markets affecting customers in a systematic way. We believe it is a requirement to systematically go through all aspects affecting the customer in order to decide which institutions should be taken into consideration when making a forecast for an individual market.

The last cornerstone is management information systems. The main issue is how a company can satisfy the information need for forecasts, and how a company can handle the information flow so that information reach those who need it. The access information is also a determining factor when choosing forecasting techniques because some forecasting techniques require certain types of information.

## 4. Empirical evidence

*This chapter is concerned with presenting Volvo CE and its forecasting process. We will start by giving a presentation of Volvo CE. This is followed by a presentation of the forecasting process of Volvo CE. The main focus of this section is devoted to mapping the process itself, starting from the collection of data, through responsibilities to evaluation and review. Attention is also given to internal communication and information flows.*

### 4.1 Volvo CE

Volvo CE is one of the worlds leading companies within the construction equipment industry and in 1999 Volvo CE was the fourth largest company in the construction equipment industry with a 6% market share. The dominant market leader is Caterpillar, an American company with a 27% market share. The other two companies leading Volvo CE are Japanese Komatsu (11%) and CNH Global (8%).

Volvo CE has been associated with the Volvo Group since 1985, and became a fully owned subsidiary in 1995. Today, it serves as an important and very strong business unit within the Volvo Group. In 1999 Volvo CE had approximately 8900 employees and achieved sales of MUSD 2,332 and profits of MUSD 210. Volvo CE's product range includes more than 150 different models divided into two major product groups: General Purpose and Production Equipment and Compact Equipment (see appendix for specifications).

#### 4.1.1 Product and component companies

The company has manufacturing facilities on four continents and has developed an independent distribution network, which is complemented by wholly owned marketing and sales companies in selected countries. The headquarters of Volvo CE is located in Brussels.

The manufacturing facilities are located in Sweden, Germany, France, Korea, the United States, Canada and Brazil. The manufacturing of products and components are organized into 6 companies:

- Compact Equipment
- Volvo Articulated Haulers AB
- Volvo Wheel Loaders AB
- Volvo CE Korea Ltd.
- Volvo CE Components AB
- Volvo CE Cabs AB

The product and component companies are all organized around specific product lines and they all have a global responsibility for developing and manufacturing these products.

The manufacturing and development of Compact Wheel Loaders is situated in Konz-Könen, Germany, while the other compact machines, the Compact Excavators and Compact Dumpers are developed and produced in Belley, France.

The six models of Articulated Haulers are developed in Braås, Sweden, and are manufactured in Ashville for the North American market, and in Paderneiras for the South American market. Just recently Changwon in South Korea started to manufacture one of the Articulated Hauler models. The development and manufacturing of Excavators are focused to Changwon.

Wheel Loaders are developed in Eskilstuna, Sweden, and manufactured in four different locations: Eskilstuna, Asheville, North Carolina, in the United States, and Paderneiras in Brazil. The Asheville manufacturing plant manufactures the biggest wheel loader models for the global market, and small and middle size models for the South American market.

Motor graders are developed and manufactured at Champion Road Machinery Ltd. in Goderich, Canada as well as in Cambridge, Canada and in Charlotte, North Carolina.

There is also the headquarters and production plant for Volvo CE Components AB in Eskilstuna, and it has the global responsibility for manufacturing driveline components. Hallsberg, Sweden, is the site for manufacturing of complete systems for cabs, hydraulic tanks and fuel tanks, as well as sheet metal components.

#### **4.1.2 Sales and marketing companies**

The sales and marketing companies are responsible for the total business within their respective geographical areas.

<b>Region Europe</b>	<b>Region NAFTA</b>	<b>Region International</b>
Volvo CE Europe Ltd. Volvo CE Europe GmbH Volvo CE Europe SA Volvo CE Europe AB	Volvo CE North America, Inc.	Volvo CE Australia Pty, Ltd. Volvo CE South America Volvo CE East Asia (Pte) Ltd. Volvo CE International AB Volvo CE Korea Ltd.

**Figure 4.1 Volvo CE’s sales and marketing companies**  
**Source: Volvo CE**

Volvo CE’s sales and marketing of products and services are organized through a network of independent dealers, salespeople working directly from the sales companies (in markets too small to have a dealer) and the company's own marketing organization. The strategy is to use as many individual chains as possible.

Volvo CE has two objectives. The first is to have as few dealers as possible. One dealer is preferable, but not always applicable in some of the larger countries such as Germany. On the other hand it is possible to have a common dealer in some of the smaller countries as in the case of Belgium and the

Netherlands that today is run by one sales company. Fewer dealers make it easier to develop a better relationship between Volvo CE and the dealers, as Volvo CE can spend more time per dealer, and it also improves the communication and feedback.

The second objective of Volvo CE is to use dealers only carrying the Volvo brand. This is a reachable objective in most cases except for the really small markets where the dealers have to carry both Volvo CE and its competitors in order to survive. In some countries the distributors handling Volvo CE's products also carry Volvo trucks and/or buses.

### *4.1.2.1 Worldwide distribution and customer support*

Volvo CE has worldwide distribution and customer support where they provide products, service and support to both sales companies/dealers and customers. The worldwide distribution and customer support is divided into seven areas: Europe, North America, Central America, South America, Africa, Middle East and Asia/Oceania. Asia/Oceania is further divided into four smaller areas: Australia, East Asia, International and Korea. The salespersons, product specialists and mechanics are trained at Volvo Training Centers in a number of locations in various parts of the world.

### **4.1.3 Volvo CE sales in 1999**

Volvo CE has sales in more than 100 countries and in 1999 the North American region's share of the company's sales was 36% followed by the Western European region with 28% as can be seen below. There are two product lines that combine for almost 60% of Volvo CE's sales; Wheel Loaders and Articulated Haulers. Volvo CE's largest customer segment is by far construction with 52%. Primarily customers in sand and gravel operations, quarries, industrial handling, rental/plant hire and mining also use the products.

## 4.2 Mapping the forecasting process at Volvo CE

In this section of the thesis we will present how the forecasting process works in Volvo CE. We will examine what the forecasts are used for, how the process works, starting from information and data gathering to evaluation and reviewing of the forecast. We will also examine which actors are involved, what is expected from a good forecast and how the results are transmitted throughout the company. To clarify the process, we have somewhat simplified the process and sorted out some information, which we believe does not add any complementary information about the forecasting process. The reason for this simplification is that it is difficult to separate all interconnected flows of information between different actors, since the approval of a forecasting requires a lot of two-way negotiations between different actors.

The main actors in Volvo CE's forecasting process are:

- Headquarters (HQ) in Brussels
  - market research and planning department
  - business controllers and management
- Sales Companies (region NAFTA, region Europe, region International)
  - Dealers
- Product Companies

### 4.2.1 Purpose of forecasting at Volvo CE

Forecasts are used for several activities in Volvo CE. Manufacturing utilizes the forecast to plan and schedule production. Since Volvo CE uses Just In Time scheduling, where a minimum of inventory is required, levels of inventory are also based on the forecast. JIT production requires close relationship with both external and internal suppliers, and therefore they are also affected by Volvo CE's forecasts, not to mention inventory levels at dealers and sales companies. Currency movements are also based on forecasts, since Volvo CE is hedging against currency risk from doing business in several countries. Other activities that are affected by forecasting are distribution, finance, sales of existing



products, needs and availability of raw materials, changing skills of workers, interest rates, capacity requirements and inventory levels.

### 4.2.2 Forecasting methods

There is no standard method for making forecasts in Volvo CE. Different departments use different methods for creating their forecasts. The market research and planning department is widely looking for similarities between different macro economic indicators and demand for specific products. Several macro economical databases, for example as EcoWin, and data from various government institutions are the main sources of information, such as housing starts, price of oil, consumer indexes, etc. These indicators are then compared with sales statistics to see if too see if demand for a specific type of construction equipment follows the behavior of the indicator. If there is a historical behavioral similarity over a period of several years, this macro economic indicator is used as a leading indicator for this product. They do not use any mathematical models to study the correlation between demand and macroeconomic indicators.

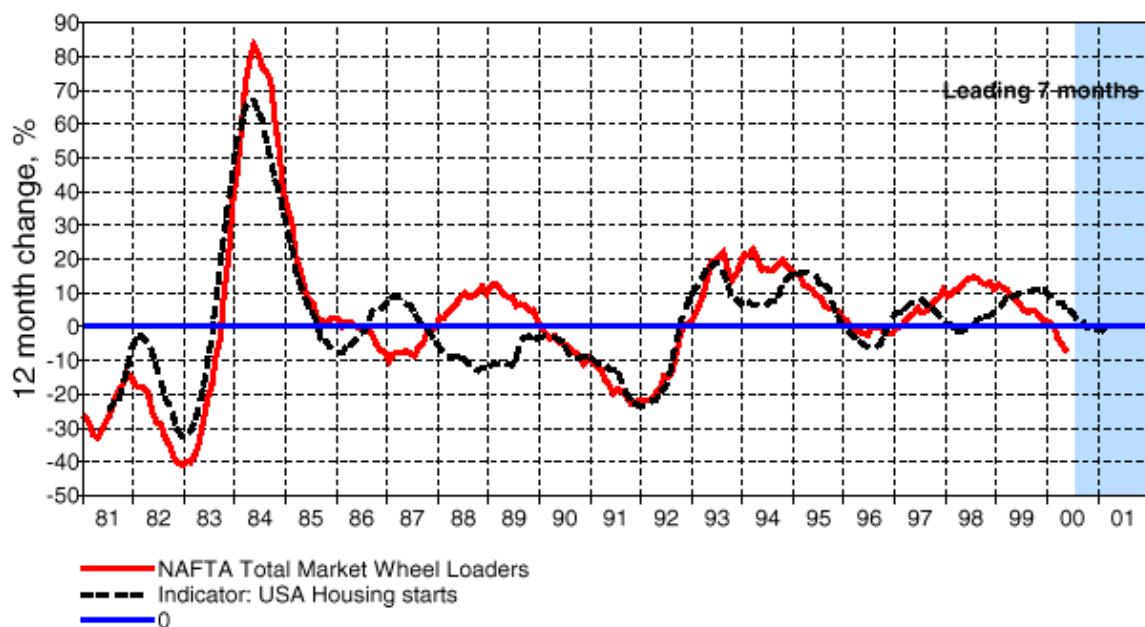


Figure 4.2 Example of a leading indicator  
Source: Volvo CE

Management of international markets uses a different approach to forecasting. Information about government intentions, political risk, and economic trends is identified using various publications and channels, such as newspapers, the Internet and television. Discussions are also held with regional sales managers, but mostly when they have a different view of the future than the marketing department. These methods are similar to subjective forecasting methods, although there is no clear or systematic structure to the management's approach.

The sales companies are using a combination of the two methods mentioned above. A majority of the forecasts are made based on macroeconomic data, but there is a greater emphasis on following local newspapers and sometimes also government publications. The dealers also use historical sales statistics to identify trends in demand, but more emphasis is placed on following local economic events, from sources such as newspapers, government bulletins and national branch publications.

Products companies, on the other hand, are for the most parts, using quantitative methods, because they currently have little contact with the market. All information is mainly internal information and internally prepared forecasts.

### 4.2.3 The process

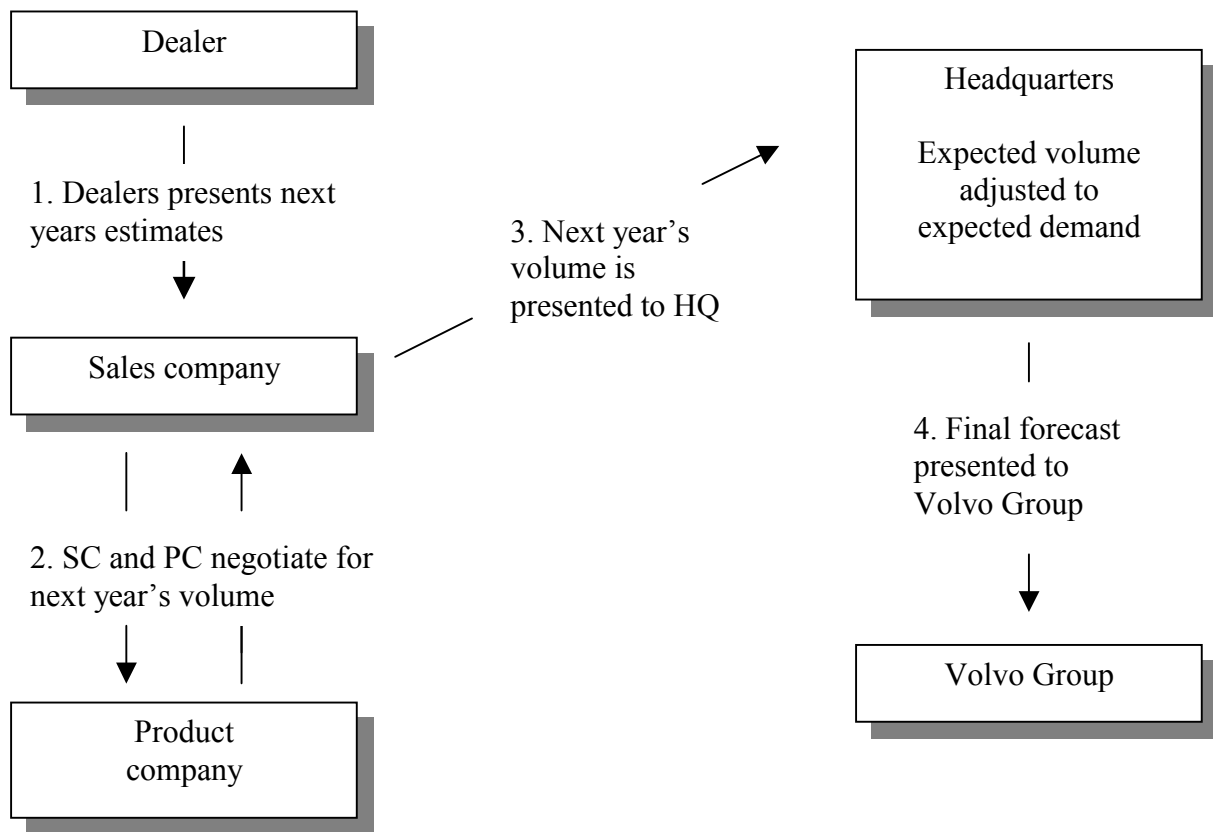
Currently forecasting in Volvo CE is going through some changes. But at the moment of writing, the following is true of forecasting in Volvo CE. Forecasting is divided into three quarterly reports. In addition to the three quarterly reports, there is one yearly report. Since the process of creating forecasts is a lengthy process, and because there is little flexibility in the process, forecasts may not even be changed during the creation process although the fundamentals of the market has changed. Forecasting next year's demand goes through the following four processes.

1. The forecasting process begins with sales people and dealers collecting information about the customers' intentions for the coming quarter. The information is summarized and compiled together with historical data. This summary is the sales volume for the next year. The information is sent to the sales company.

2. After that the sales company and product company gets together and starts negotiating on the next year's volume. The sales company presents their forecast for the next year. The product company is required to find means of increasing production according to the required increase in demand. The product company puts together a production plan and the sales companies get a certain amount of machines each month according to the forecast. Three weeks from the start of the forecasting process the sales company presents a final forecast to the Brussels headquarter.

3. The headquarters at Volvo CE does a final comparison between the sales forecast of the sales company with their own forecast of world market demand. The world market forecast is mainly based on the competitive situation (environment), macro information and other economic data. Sales managers also make 1-year forecasts, which Volvo CE headquarters then spreads on a monthly basis.

4. After roughly two months the Brussels headquarter reports the forecast to the Volvo Group. All in all the duration for making the forecast is about 2.5 months, so by the end of the November the Volvo Group has taken part of the forecast and approved it.



**Figure 4.3 The forecasting procedure at Volvo CE**  
**Source: Own interviews and Andersson and Nylander, (1999)**

The forecasting process is scheduled along four major events taking place within the year: the Business Reviews. BR consist of a thorough analysis of the business and the company's performance from a volume, financial and production view point. The base and benchmark is the conclusion of the first review of the cycle, whose primary goal is to assess the objectives of the next fiscal year in terms of growth, strategies and revenues. This takes place in the third quarter. Reviews and assessments of the BP follow then every 3-4 months.

There is a strong link between Volvo CE's forecasting and Volvo AB, because Volvo CE has to fit into Volvo AB's overall strategy. Volvo CE also has to go where Volvo AB wants them to go in terms of development. Although Volvo AB's forecasts are long-term, up to 10 years or more, there is a large need for short-term forecasts. But the shorter the forecast, the more they are driven by

financial activities on an operational level. Volvo CE also has to look not only at Volvo AB's forecasts and drivers but also at industry drivers.

A new situation has arisen since Volvo AB sold its Car division. Now Volvo sells products that are to most parts sold to business customers, which means that Volvo AB's long-term strategies and forecasts are applicable to all divisions. On the negative side it means that there is an even strong top-down approach to planning and forecasting.

### 4.2.4 Responsibilities

Each department within Volvo CE is ultimately responsible for their own forecast. The market planning and research department is responsible in terms of forecast of the unit sales volume level. Financial impact analysis is the responsibility of the Business Control function. Together with management, the department consolidates the forecasts from all product and sales companies before presenting them to the Volvo Group. Another function of the research and planning department is to negotiate with the product companies about production plans. They are also responsible for keeping management up to date about economic trends, which are relevant for the demand for CE products. They have to present the current state of the economy, where it is heading, which markets are declining or growing, stable or depressed.

Management at Volvo CE headquarters is responsible for keeping a dialogue with regional sales managers about future demand for products, especially if there is a large discrepancy between the forecast of the research and planning department and the regional sales offices. They have to forecast the cash flow requirements as well financial planning. Management is also the link between Volvo CE's business strategy and the corporate strategy of the Volvo Group and submits yearly forecasts to Volvo AB.

Sales companies are responsible for preparing forecasts every quarter, by gathering information from the dealers and sales personnel, as well as their own sources of information and data. Monthly forecasts are also prepared, but more for production purposes.

Production companies create their forecasts, such as parts requirement forecasts, plant stock and HR allocation plans based on the forecasts from the consolidated forecasts from Volvo CE headquarters.

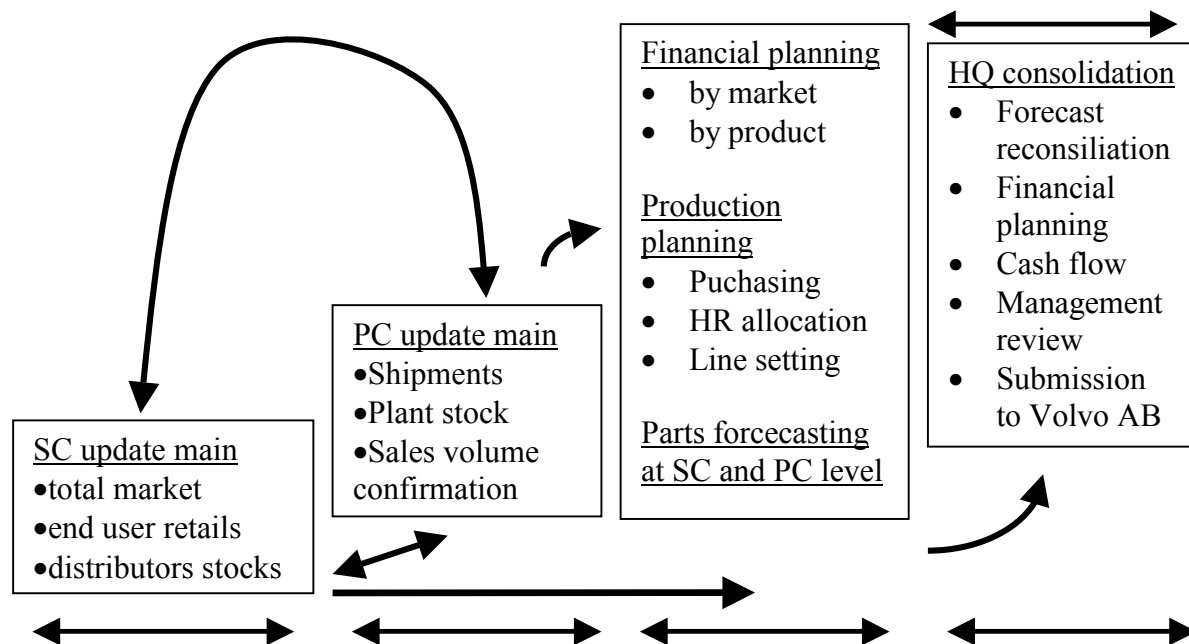


Figure 4.4 Current responsibilities and procedures  
Source: Volvo CE

#### 4.2.5 The information gathering process

The information need when creating forecasts is very large, and there are a lot of factors that need to be taken into consideration. To make matters even more complex, many of the factors taken into consideration are also interconnected and it is not always clear how changes in one factor affect the other.

In general terms, the forecasting process is based on three things:

1. Past sales statistics - full-year sales divided into weekly sales based on weekly information.
2. Macroeconomic trends
3. Information from salespeople – number of deals they expect to get in the next three months.

The marketing research and planning department base its initial forecasting upon:

1. The analysis of the current performance of Volvo CE and the market along with the message given by early warning indicators, identified within the company, the industry and the economy.
2. For medium and long term forecasting, historical trends and cycles are used to identify the position of each market/product in a standard business cycle, in order to anticipate future developments.
3. A causal analysis approach is used to assess possible scenarios linked to a new situation. This is used to identify historical patterns fitting into a current development, in order to understand and assess the way the market/product has adjusted to change.

Since the process of making a forecast is several fold, information from a variety of sources is used. Below is a discussion of how different entities in Volvo CE gather information.

The process begins with sales managers gathering information from the dealers/sales force every quarter. There is no systematic way of doing it, rather, they have informal meetings where they discuss the situation. After the sales manager has gathered the opinion of the dealers/sales force he fills in the necessary documentation, makes a forecast and sends it to headquarters. The sales companies base their forecast on some of several factors, such as past sales statistics and information from sales people. Sales statistics are mostly full year sales, which are divided into weekly sales based on weekly information. The information from the sales people is for instance the number of deals the sellers expect to get in the next three months. Different kind of macroeconomic data is also gathered, for instance branch specific such as construction confidence evaluations, and general economic information, such as economic development - country by country and each month. Parameters such as order books, building permits, new home sales, and housing starts are also important sources of information. On occasions internal surveys of

customer confidence are prepared by the headquarters and are sent to selected customers.

The information, which is received from the dealers/sales force and sales companies, is based on both the business environment and the industry environment. Some sales managers use the PEST-analysis (Political, Economic, Social and Technological), but generally information is gathered from different sources, such as newspapers, TV, government bulletins etc. The information, which has to be sent to HQ, is about trends, macro economic data and industry figures. In addition to general economic development data, such as GDP, inflation etc, they also look at branch specific data such as construction confidence evaluations, building permits, new home sales, housing starts and order books.

When collecting much of the information, dealers and sales people use a so called SACS-system (Sales & Customer Support system), which now has been renamed VFO (Volvo Front Office). The VFO-system looks at old notes and has information about when customers plan to make a purchase and it also separates between hot and cold deals. The sales people, according to their judgment, make this separation on the chance of a deal going through. This system primarily serves the pre-sales activities (creation and maintenance of customer information, identification of deals, follow-up of negotiations, preparations of quotes, etc.) Because of its positioning in the sales process, information from SACS/VFO serves as an indicator to assess the market activity and future (short-term) developments.

At Volvo CE HQ, both the business controller and management as well as the market research and planning department gather and evaluate different kind of information. The information available in the system is for instance prospect lists, hot deals, won orders, orders, collected through a so called salesman's account management system (Volvo Front Office). After analyzing this data, external information is brought in.

The market research and planning department focuses on macroeconomic data, such as confidence indexes, mining & mineral production, civil engineering



output, industrial production etc. The business controller and management covers both external and internal information, but emphasis is put on external factors, where both unpredictable factors and macro trends are taken into consideration. The president for region international for example, has regular discussion with regional managers about the prospect for the future and evaluates the forecasts, while the product companies do no regularly talk with dealers/regional manager. The business press and Internet are important tools when covering for instance political events in important markets.

At headquarter level the forecasts are made on country/market level for the major markets and for groupings of several countries in regions with smaller markets such as Africa (with the exception of South Africa), Middle East etc. The level of analysis depends on the activity of a country whether it should be examined by itself or in a larger group. Forecasts are made separately for individual product groups.

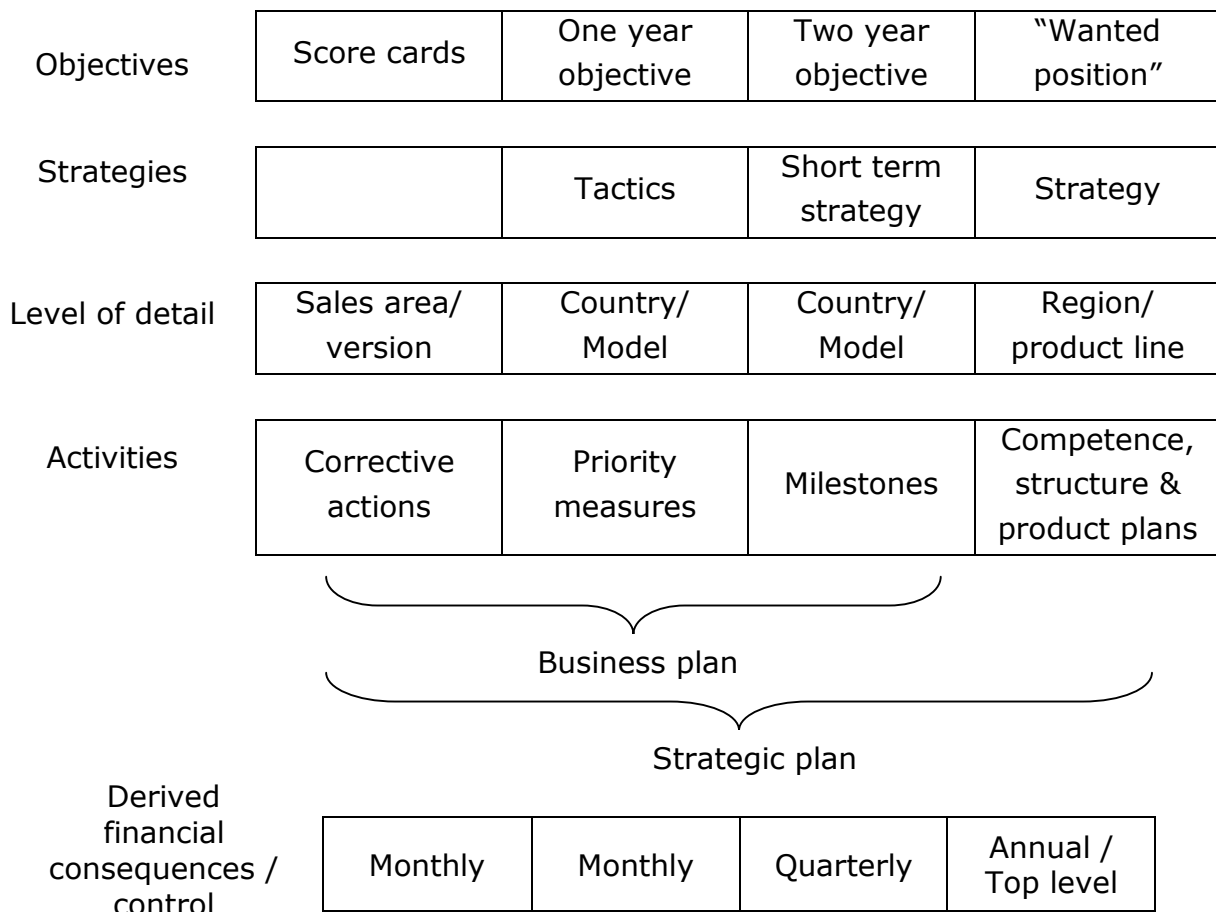
### 4.2.6 Using forecasts

Forecasts are expected to give Volvo CE the anticipated demand from end users so that they can translate it into production and plant shipments. The forecasts have to give Volvo CE indications on the whole industry, but also for total CE market and the market share of Volvo CE. For the Product Companies, the most important thing with a forecast is to make sure that production is able to fulfill the delivery times that the customers expect. Because a lot of production is also made according to customer specifications, forecasting changes in preferences and demand is very important. Otherwise Volvo CE will end up with a lot of machines in stock, which is problematic especially in Europe Volvo CE seldom build to stock. The PC makes monthly forecasts, and the forecasts steer how many X of machine Y should be build. The forecast is therefore the base for the delivery plan.

Because different factories produce different types of machines, there is a need for somewhat different forecasts. For instance Eskilstuna produce smaller machines and are able to produce them faster and therefore more build-to-

order, while Arvika builds larger machines and the delivery times are therefore longer.

Volvo CE uses different forecasts based on their objectives.



**Figure 4.5 Different forecasts on different objectives**  
**Source: Volvo CE**

The product companies within Volvo CE are mainly interested in short-term operational forecasts to plan production and financial activities, while Volvo CE headquarter is generally more interested in medium to long term forecasts. These forecasts attempt to find out trends, cycles and up or downturns in demand. For long-term forecasts, causal and trends analyses become essential. Comparisons are also run on historical data using monthly sales averages.

### 4.2.7 Indicators

Finding leading indicators for the construction equipment industry requires a lot of experience of the business. The indicators that are used correlates to as high a degree as possible to the demand for any given product. There is a delay of several months before the demand follows some of the indicators. The reason for this is that although the customers or end users are affected by the state of the economy, it takes time before they react on increases or decreases in projects. Since the purchase is considered a fairly large investment, it also usually takes some time to complete negotiations.

A consistent problem with most indicators has turned out to be that they might be correct for long periods of time, but without warning they are suddenly not valid. The problem is that this first usually becomes evident after some time when demand is expected to follow the indicator. This means that Volvo CE is constantly looking for new and better indicators, just in case a previously used one becomes invalid. Neither does Volvo CE use just one indicator, but a group of indicators to minimize the forecasting error.

Unexpected event may also turn out to have an effect on demand, such as the recent protests against high oil prices in Europe. By blocking refineries, protestors managed to cut of the supply of fuel, and by traveling at slow speeds on the highways, they managed to create traffic problems. The result for the construction industry was that dealers were not able to visit customers, people were not able to come to work, which in turn had a negative effect on demand. The lesson learned was that oil indeed is an indicator to follow up, which in turn means that for instance the peace process in the Middle East, which has had an impact on oil prices, is something to take into consideration.

Other examples of indicators, which are currently analyzed, are building permits, housing starts, mining output, road construction output and total building output. One of the greatest problems at the moment, with these types of indicators, is that the general economy does not seem to be in line with sales of construction equipment, especially in the US. In the USA housing starts were considered to have a good correlation with demand for CE. But in late

1999 housing starts were still strong but demand for CE started to decline from the end of 1998 / beginning of 1999. Demand for heavy trucks in the US was seen as another leading indicator. In 1995 Volvo CE started experiencing an increasing gap, when demand for trucks went down but not CE demand.

In Europe the economy is more in line with the demand for equipment, and therefore indicators are still valid. One of the major concerns, however, are the emerging markets, especially Asia, where the recovery of the construction equipment markets is taking much longer than the recovery of the general economy. Previously this was not the case, and most indicators used earlier are not valid anymore.

Finding out what lies behind indicators, what affects them and how they are interconnected with other factors of the economy is no easy task. Many of the managers' interviewed agreed that they have yet to find a good way of analyzing an indicator, other than by accepting that it is working. Many managers know exactly what to look for when determining future demand, but most do not exactly know why for instance a slow-down in the sales of large excavators will lead to a slow-down of sales of other products within 6 months.

### **4.2.8 Forecast accuracy**

Total market forecasts are generally quite accurate. But there are larger variances in single market forecasts. Furthermore, although the total market forecast may be accurate, it does not show if the forecasts were able to place the right amount of equipment in the right market. There have been several occasions where total forecasts have been accurate, but machines have been produced at the wrong production plants. At one time the forecast for the South American market was much too low, while the forecast for the North American market was much too high. This means that Volvo CE had to ship equipment from north to South America, which is very costly. These kinds of right but at the wrong market problems are frequent at Volvo CE.

Forecast General Purpose Equipment

		NAFTA		Europe	
		HQ Fcst	Actual	HQ Fcst	Actual
1999	Vs 1998	38.000	38078	35000	36273
2000	Vs 1999	33510	34000	38760	38700

**Table 4.1 Volvo CE Forecast for market for General Purpose Equipment vs. Actual**  
**Source: Volvo CE**

**4.2.9 Evaluating the forecast**

The headquarter reviews and evaluates the forecasts four times a year, every quarter before the new quarterly forecast is made, but upon request the market research and intelligence department evaluates the forecast and runs risk analysis at the end of each month. The review and evaluation must be done in order to give Volvo CE a true picture of the situation in the previous quarter and also serves as a solid base for the new forecast. There are no other regular and more frequent evaluations of the forecasts from the headquarters probably because today's systems do not allow it. An evaluation will only take place if a certain occasion or event so requires.

To evaluate the last quarter the Volvo CE's headquarter uses a six steps forecasts review:

### 6 Steps in the Forecast Review

1. What happens to the fundamentals?
  - Select approximately 6 economic indicators
2. What are the trends? Up? Flat? Down?
3. What happens to the industry?
  - Look at the 12 month moving, YTD and last 3-month change rates!
4. What is our market performance?
  - Moving market shares % 12 months ago / Year end / Last month / YTD
  - Increasing? Decreasing?
5. What is our current order / retail growth rate 12 months moving / YTD
6. What do we have home compared to previous year?
  - Retail sales YTD plus Order-backlog?
  - What volume remains in order to achieve the full year forecast?
  - What are the monthly rates versus what we have achieved so far?

**Figure 4.6 The Six Steps in Volvo CE's Forecast Review**

Source: Volvo CE

Each entity runs a monthly review to re-asses their planning functions (sales, purchasing or production). Some sales managers would like to do evaluations and reviews on a daily basis, but the current system within Volvo CE does not allow such actions to be taken. The production companies have a need for a much more structured way of forecasting in comparison with the sales department. This is due to the fact that the product companies are less flexible because of their dependence of raw materials and a steady production rate. To maintain this good production planning they have to reassess the forecasting every day.

When a forecast is wrong, the Volvo CE HQ tries to find out why there sales went up or down in comparison with the forecast. They also discuss the up or down in sales with the sales managers. They look for the reason that caused the

error in judgment and are satisfied to find out what happened, but do not continue searching for the underlying reasons why something happened. The main reason for that is that they are too busy trying to correct the error and creating new forecasts. The corrections and the new forecasts are very time consuming hence they do not have enough time left to do a thorough evaluation of the forecasts.

When forecasts have gone wrong more than once, Volvo CE tries to identify what has been good or bad for a period of time (2-3 months) and make a little more thorough evaluation. The evaluation includes discussions with sales people, if necessary, and there are also informal evaluations on different levels. But there is no systematical examination why forecasts go wrong and Volvo CE wish to have a more structured way to handle this issue. But once again time is the enemy.

When the production companies evaluate the forecast and find something that is wrong, the action plan is adjusted as quickly as possible in order to get back on line/plan. But they are, as the Volvo CE headquarter, satisfied to find out what went wrong and do not look into the reasons why something went wrong.

### **4.2.10 Internal communication and information flow**

Volvo CE and the dealers do not communicate with each other very often. The dealers do not have access of any of Volvo CE's database, neither have they access to VIOLIN (Volvo's Intranet). The existing communication is mostly handled through Volvo CE's regional sales companies.

The dealers do not have any direct communication with the product companies as the communication goes through the different regional sales companies, and the dealers must always turn to the regional sales companies when they want to place an order for machines they want delivered to them or to customers. There are some exceptions such as Bilia in Norway and Swecon in Sweden. Both Bilia and Swecon used to work directly with the production companies and they thereby use their "old" connections and communicate with the product

companies. But many dealers do not use “old” connections, as most dealers have not historically had direct contact with the product companies.

### *The internal records*

Volvo CE is constructing a new process that will take all information collected from the dealers and put it into a data warehouse. It will contain information such as concerning sales, stocks, how many meetings they have had with customers, how many meeting generated quotations, and how many of these generated demos and then eventually sales. It also involves when a dealer talks with a customer and discusses the needs and wants of the customer.

The people working at Volvo CE can access to all internal data and databases and have constant access to it and use it in their daily operations.

The dealers have their own internal data system that they use to send and share information, sales statistics etc, among the headquarters and the sales personnel. But from all the data dealers and Volvo CE do put in to the Volvo CE’s information system, the dealers can only access the information they reported themselves, which is their own sales statistics. They do not have access to any of Volvo CE’s databases, for example VIOLIN (Volvo’s Intranet), which they believe could be very useful in day-to-day operations. They have no access to forecasting material.

The earlier mentioned SACS or VFO (Volvo front office) is a tool helping to improve the internal records. The idea is to make it easier for all sales people to monitor the activities in their territories.

### *Marketing intelligence*

The marketing intelligence of Volvo CE is based on hard facts as well as on soft factors. The Market Planning and Research Department collects the hard facts, and the soft facts are supplied to a very large extent collected by the presidents of the regions on their visits to different sales area managers and



dealers. Information is also collected through media. Volvo CE also sends marketing intelligence to every dealer concerning “his” markets every quarter.

The dealers we have met have build up networks or channels to get useful information about the intentions of their customers. They also monitor the actions taken by the government very carefully. The dealers use their experience and knowledge of the behavior of the market when interpreting signals from the market.

Much of the information comes from the sales people who meet the customers on a daily basis, and it is also a part of the “talk of the town”. For this type of collection of marketing intelligence there is no formal structure or system, instead it is collected and reported to the sales managers in an informal way. The dealer managers also collect marketing intelligence all the time for example when talking to competitors. The collection of marketing intelligence has been accepted as a daily routine among all salespeople as well as the managers and soft factors are discussed a lot.

In Norway for example, the dealer (Bilia Maskin AS) does have cooperation with their competitors (Caterpillar, Komatsu etc.) in order to get a good total picture of the industry. They exchange sales statistics with each other and there is an agreement to only use it internally and not publish any of the information. They also have The Machine Distributors Society that puts together a report every quarter (with a one moth delay) with complete sales statistics of all models sold divided into different weight-classes and districts within Norway where they are sold. Bilia and its competitors are the source of this information.

### *Marketing research*

Volvo CE does some of its own market research, but the dealers also subscribe to different kinds of marketing research from their own country.

### 4.3 Summary of empirical evidence

Volvo CE is a global company and has production companies, marketing and sales companies, distribution and customer support worldwide. Sales are organized through a network of independent and Volvo CE owned dealers and/sales companies.

The main actors in Volvo CE's forecasting process is the headquarters in Brussels, the product companies, the sales companies and the dealers. The forecasts are used to schedule production and other activities such as distribution, finance, sales of existing products, needs and availability of raw materials, changing skills of workers, interest rates, capacity requirements and inventory levels. The forecasting takes place four times a year and starts with the sales estimates from the dealers. The sales companies then discuss the estimates with the product companies before it is sent to the headquarters where there is a final adjustment.

Data used in forecasting is historical sales statistic, quantitative data such as different macro economic information and data from various government institutions and other market information. Government intentions, political risk, economic trends are obtained through publications and local channels, such as newspapers, the Internet and television. The information, which is received from sales people and sales companies is based on both the business environment and the industry environment. The marketing intelligence of Volvo CE is based on hard as well as on soft factors.

Finding leading indicators requires a lot of experience, and the main problem with indicators is that they might be correct for long periods of time, but may suddenly become invalid. Examples of non-economic indicators used by Volvo CE are building permits, housing starts and road construction starts. Finding out the underlying reasons for the behavior of indicators is no easy task and time limitations on employees at Volvo CE add to the problem of understanding the underlying factors for indicators.

Volvo CE and the dealers do not share all the information and data they possess, and the dealers do not have access of any of Volvo CE's databases. Nor do they have access to VIOLIN (Volvo's Intranet). The existing communication is mostly handled through Volvo CE's regional sales companies, but a few dealers have direct contact with the product companies.

Volvo CE has a large customer base, consisting of both business customers, private customers and in some extent the government. It is important to recognize that all types of customers behave in different manners. It is common that most business customers consider the purchase of construction equipment as an investment. The private customer base is growing rapidly because Volvo CE is adding small, compact machines to the product portfolio. The government is mostly an indirect customer through public spending, such as highway construction and other infrastructure projects.

To get a better understanding of forecasting, it is also necessary to put the theories in the concept to the industry. We will therefore briefly outline the business environment and the customers in an industry analysis.

## 5. Industry analysis

*This chapter attempts to present parts of the current industry environment of Volvo CE relevant to our studies. We will start by describing the business environment, since it is going through some changes. These changes also have some effects on Volvo CE's forecasting, and therefore we believe it is of interest to identify the customer characteristics.*

### 5.1 Business environment

Volvo CE is facing changing market characteristics in its major markets. This has affected Volvo CE's forecasting in a variety of ways. Historically, demand for construction equipment in both Europe and NAFTA used to follow the general economic trends. Although this is still to a large extent true for Europe, it is not so for the NAFTA market. Although the American economy is as strong as it has been for decades, demand for construction equipment is sluggish. Efforts are under way in Volvo CE is determine the reason for this, but increasing sales to leasing companies is believed to be a partial reason.

The Asian market is another problem story for Volvo CE, because it has proven to be very difficult to forecast the recovery of the economies after the financial crisis that started in 1997. Although most economies in the region are showing promising signs of recovery, demand for construction equipment still fluctuates greatly, and total demand is still well below pre-1997 levels. One reason for the difficulty in predicting the recovery of the region is that there has traditionally been very little reliable macroeconomic data for many of the markets. Another reason may be Volvo CE's rather late entry into the Asian market. The acquisition of Samsung heavy industries should have given Volvo CE valuable knowledge about the Asian economy, and forecast accuracy for the region as a whole should be expected to improve.

The South American market for construction equipment has been depressed for some time now, and there are some signs of improvement, especially in Brazil.

But the decline in demand has been going on for several years, and therefore Volvo CE does not expect large leaps in demand.

### 5.2 Customer characteristics

Volvo CE has a large customer base, consisting of both business customers, private customers and in some extent the government. It is vital to understand the difference between these customer types in order to understand how they are influenced by different factors.

#### *Business customers:*

The group business customers consist of a variety of companies. One of the larger customers are the construction companies. But, these companies have different characteristics in different markets. It is very common in Europe that the big building companies are not big buyers of construction equipment themselves. Rather, they usually hire contractors for their projects. They do have a certain size machine park, but they are reluctant to tie up capital in large equipment parks. Smaller companies are therefore hired for a specific period to carry out certain activities on the construction sites.

But the big building companies are usually very sensitive to the swings and cycles in the economy, and as the economy slows down and there are fewer projects, one can see a distinct downturn in the amount of outside equipment they hire. This in turn has a consequence for the smaller companies, which are then left with equipment standing idle, and therefore not in need of replacement.

Another large customer is the mining companies, which need machines to run around the clock. These kind of companies usually have pre-made replacement programs for their machines, since malfunctions can mean that a whole process is standing still. It is rather easy to calculate the replacement cycle, since the machines are running most of the time, and since it is easy to follow up the capacity and production of the mines or quarries. These companies are very

sensitive to economic cycles, and a slow down in the economy can easily be recognized by the willingness of mining companies to replace their machines.

Forest industry is another big customer, which has replacement programs for their equipment. As with mining companies, these companies are very sensitive to economic cycles.

There are also a growing number of leasing or rental companies. They usually buy large amount of machines, but are typically not very brand loyal. Therefore it is difficult to acquire information from them about replacement cycles.

There are also a large number of one-man companies, by the industry called plant-hires, which is a company owned by one person and who runs the machine himself and gets projects from bigger companies. The plant hires fall in the broader definition of the rental segment. These plant-hires tend to use their machines until there is little left to use, but are on the other hand usually very brand loyal. If Volvo CE manages to serve the customer without making any errors, there is a great likelihood that the company will make a re-buy with Volvo CE.

Common for all types of business customers is that a purchase of construction equipment is always considered an investment, and a purchase of most larger machines require some form of financing from the customers side. Brand loyalty is usually high among most business customers, but poor service performance is usually a guarantee that a customer will change brand. Another characteristic is that customers tend to be somewhat technology driven. This understands that if a customer knows that there is a new model coming for sale, with improved technology, the customer usually postpones his investment until the new product is available.

### *The government:*

The government is mostly an indirect customer, in that they give out different project, such as highway construction, bridge construction, public buildings etc., as public tenders. These tenders are in Europe public information and all

companies are allowed to apply for them. But, this is not the case in many of the emerging markets, where public tenders are given out on a far less distinct basis. Most government, usually local governments, has a small machines park to fill their need for different services, such as snow plowing, road maintenance etc. Governments are in many ways difficult customers. First of all, they do not have a particular brand loyalty. Purchase decisions are always based on the best offer, with regards to price, and some governments also prefer local or regional producers.

### *The resellers/distributors:*

They usually have a small number of machines in stock, but larger machines are sold after an order is confirmed. Some distributors may be fully independent companies, but there is a strong link with Volvo CE and they follow the same principles as Volvo CE owned sales companies.

### *Private customers:*

There are a growing number of non-business customers since Volvo CE is placing more and more emphasis on small compact machines. These machines are rather easy to produce and delivery times are as low as 2 weeks. But since these machines aren't used for commercial reasons, i.e. the users do not have a need for profit, it is rather difficult for Volvo CE to forecast these customers.

Farmers are also considered private customers, although their purchase pattern is different. Farmers acquire larger machines, and they are used in the daily running of the farms, and necessary for the survival of the farm. There is no great fluctuation in the demand for machines by the farmers, since there is always a steady demand for dairy products regardless of the state of the economy.

A general finding that relates to all customer types is that they are very sensitive to perceived risk with buying construction equipment.<sup>54</sup> The industry is characterized by low risk willingness. This is understandable since the purchase of construction equipment usually is considerable investment. There

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<sup>54</sup> Lapide, (2000).

is also a correlation between risk willingness and the state of the economy. Interviewees pointed out, on several occasions, that a large part of a positive business cycle is confidence in future growth, not growth in itself. Media plays a big role in this, since a lot of the customers have a great belief in different types of media. Therefore it is common that if media gives negative signals about the economy, the industry usually starts a downward trend.

Consolidation is a growing trend within the industry as in many other industries today. One good example is the merger between New Holland and Case, today called CNH Global, which created the third largest company within the construction equipment industry.

As we have finished mapping the forecasting process at Volvo CE and related it to the industry, the following analysis of Volvo CE's forecasting process gives our views on the shortcomings in their forecasting system.



## **6. Analysis of Volvo CE's forecasting process**

*In this chapter we will analyze Volvo CE's forecasting process. The first part takes up problems, which we have identified during our interviews with various individuals in the organization. We have grouped these problems into four problem areas. The other part of this chapter is concerned with analyzing the underlying reasons for the problems.*

### **6.1 Identifying areas of problem**

As we have studied the forecasting process in Volvo CE we have come across several problem areas. All in all we have diagnosed four areas for improvements. Some of these problems were fairly obvious, but some of the problems were more difficult to narrow down, partly because they had to do with the forecast process itself and partly because there were different opinions about the nature of these problems. We have chosen to give several aspects of the four shortcomings discussed below.

#### **6.1.1 Lack of formalized and systemized forecasting procedure**

The very nature of a forecast is that it is inaccurate. Every person involved in forecasting tries to minimize the gap between actuals and forecasts. But in a large global company, with operations in very different economies, the different entities within the company must all work towards the same goal, with the same premises, methods and tools. The current problems with forecasting in Volvo CE are related to these arguments, and bearing those in mind, we have identified the following shortcomings:

- There is a lack of a common approach to forecasting among the sales companies, dealers and the headquarters. A common approach does not mean a standardized method for everyone. It is always necessary for the dealers to have individual forecasting methods, because different markets have different characteristics. The real issue is how the information gathered is evaluated and analyzed, and further, what is reported to various

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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departments in the company. It is all about understanding the needs of various departments and working with common “language” to provide different departments what they really need.

- Currently there is no clear connection between the forecasts of the headquarters and the dealers. One reason for this is that the headquarters base all of their forecasts on statistical data, i.e. historical data. Historical data is good when it comes to comparing past trends with current, but of less value when it comes to providing dealers with indications of future demand. The headquarters have very good statistical data, but the historical data that the headquarters distributes to the sales companies is “late” data, and as such of limited value. Because of inadequate communication, dealers do not seem to understand what headquarters produces, and even more importantly, understand what lies behind the figures that headquarters produce.
- There is no process for evaluating and reviewing the forecasts. For different reasons forecasts made by Volvo CE, its sales companies and dealers are seldom evaluated, which means that those involved with making forecasts cannot gain valuable information about the reasons leading to inaccurate forecasts. Large gaps between actuals and forecasts should signal that the forecasting process itself might be in need of a revision. Consecutive forecast errors are also valuable because they give the forecaster an opportunity to isolate the factor or factors causing the error. Currently the headquarters is working on improving forecast evaluation.
- There is no clear structure and sharing of responsibilities, because responsibilities are not shared according to where the expertise lies. Headquarters has an excellent knowledge of unit sales volume levels, but they do not emphasize this expertise and the dealers and salesmen are not used for their area of expertise. The top-down approach to forecasting does not seem to be effective. Headquarters has the total overview of the market and the processes, while the dealers have the expertise of the dynamics of the individual markets.

### 6.1.2 Time consuming forecasting process

Since the construction equipment industry is very cyclical, demand can fluctuate very much. There is also an increasing tendency for demand not to follow the historical trend patterns. As Volvo CE adds more markets to its market portfolio, the cycles in the target markets are less and less aligned to each other. This requires a lot of flexibility in the forecasting processes, and it requires that forecasts have to be produced in time. But the forecasting process at Volvo CE is not well suited to meeting changes in the volatile environment. There are several reasons for this:

- The forecasting period is too long. There is a time span of approximately five months between the start of the forecasting period and when it will be applied. Since there is a lot of dynamism in many markets, especially in emerging markets (see Chapter 1.5 for our definition of emerging market), many things may occur that render the forecast highly unreliable or even unusable. The total market forecast may get the numbers right, but as they are split down to individual markets or groups of markets, the forecasts may give either the wrong amount of machines or the right amount of machines but at the wrong market, or even both.
- The forecasts of the HQ are reactive in nature, because of the heavy dependence on past statistical data. Whether historical data is acquired from own sales records, or from various external public or private institutions, a dependence on historical data makes forecasts to a large extent reactive, instead of pro-active. A reliance on historical data also has great implications when there is no past sales history for a market. Another problem with historical data is that Volvo CE HQ is not the first to know about trends and news of the market. This would not be the case if the dealers and sales personnel were used for what they really are – front line people and the ears and eyes of the company.

### 6.1.3 Acquiring information for forecasts

Creating useful and accurate forecasts requires that a lot of signals and information from the market has to be processed. There is a large amount of good market information and data both at headquarters, at the dealers and at the product companies. But the information doesn't seem to find its way from one place to another. It is not clear that everybody places the same emphasis in collecting information and using forecasts. We have identified some aspects that needs attention:

- There is virtually no system integration between the product companies and the dealer's sales organization in the field. Information from the dealers does not reach the manufacturers, i.e. the product companies. Therefore there is no system that allows for joint analysis and decision to firming up the forecast numbers. One major reason for this shortcoming is that there is no incentive for raising interest in such a system.
- The internal information system is not effective. It requires too much manual work to input information, and it is not a user-friendly operation environment. The basic structure of the internal information system can only report facts and figures, and it does not provide simulation/analysis capabilities. Currently the forecasting system is just a data collection system, which helps little to improve quality, and it does not provide quality information to the users. Because of this, there is little incentive for the salespeople to involve themselves in the system and process.
- There are large variations in the quality of forecasts from the dealers. Inexperience with the forecasting methods could be one reason and inexperience of new managers another. One conclusion could be that Volvo CE is focusing on a lot of new, emerging, markets, and does not have the experience in these markets. Managers in new markets are also new to Volvo CE and may be unsure of how many units can be sold. Headquarters stated that some dealers claim that they are not able to find the information that headquarters was requesting.

- Not all of the dealers have an understanding for the need, purpose and value of forecasts. The smaller dealer seems to be less concerned with forecasting, because they have a more practical view of business. The smallest dealers may not even do any forecasting of their own. This indicates that Volvo CE is not able to make them understand the need for forecasts and how it can help the dealers themselves. It may also indicate that there is no fundamental reason for the small dealers to do their own forecasting.

### **6.1.4 Difficulties in identifying factors affecting forecast accuracy**

Throughout our interviews we have received the same answer to our inquiry on factors affecting demand, which is that those we interviewed do not know exactly the factors affecting demand. The interviewees were only able to give a few direct factors that affect demand, such as the interest rate. On the other hand, the interviewees claimed that a lot of the forecasting is based on experience, the ability of building and maintaining informal channels of information and relying on the experience of salesmen. We have identified some aspects that explain part of the difficulty in understanding how and why errors in forecasts occur:

- The forecasting process is very focused on numbers. Our interviews have revealed that as the market planning and research department becomes too isolated from the market, they become very dependent on one form of data, which in this case is macro economic data. Although other sources of information are available, these are not used, and hence there is no mix of forecasting methods. A narrow focus on one method makes the forecasting extremely dependent on access to a certain kind of data fitting that method. Macro-economic data can be difficult to get in some markets where information is not frequently collected or reported by the government.
- Both quantifiable and non-quantifiable factors affect demand. If non-quantifiable factors, for instance government policies, are not included in a forecast, the forecast may not be able to reflect the future development of the market. Even though numbers and hard data are easier to process, there are methods available for measuring and analyzing non-quantifiable input.

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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- There is a lack of a “common language” between the external and internal actors. As we discovered talking to dealers and salesmen, there is a fundamental lack of mutual understanding between them and Volvo CE HQ. The dealers do not understand the underlying factors and thoughts of Volvo CE strategies. Neither does headquarters understand “the language of the customer”. It is therefore very difficult for headquarters to understand what motivates and drives customer demand in specific markets. The dealers and the salesmen on the other hand have the experience of the market, the customers and demand in their specific markets. The bottom line is that poor and non-mutual communication is bad for motivation.
- All too often interviewees have told us: “We don't know why it is this way, but we are happy”. This is of course a handy comment when forecasts are accurate. Another frequent comment was: “We don't know why this has happened, but we should analyze it”. That is not a good approach when a forecast is inaccurate. Both comments imply that people ignore finding out and understanding what factors affect demand, which could improve the accuracy of forecasts.

### **6.2 Establishing the causes for problems**

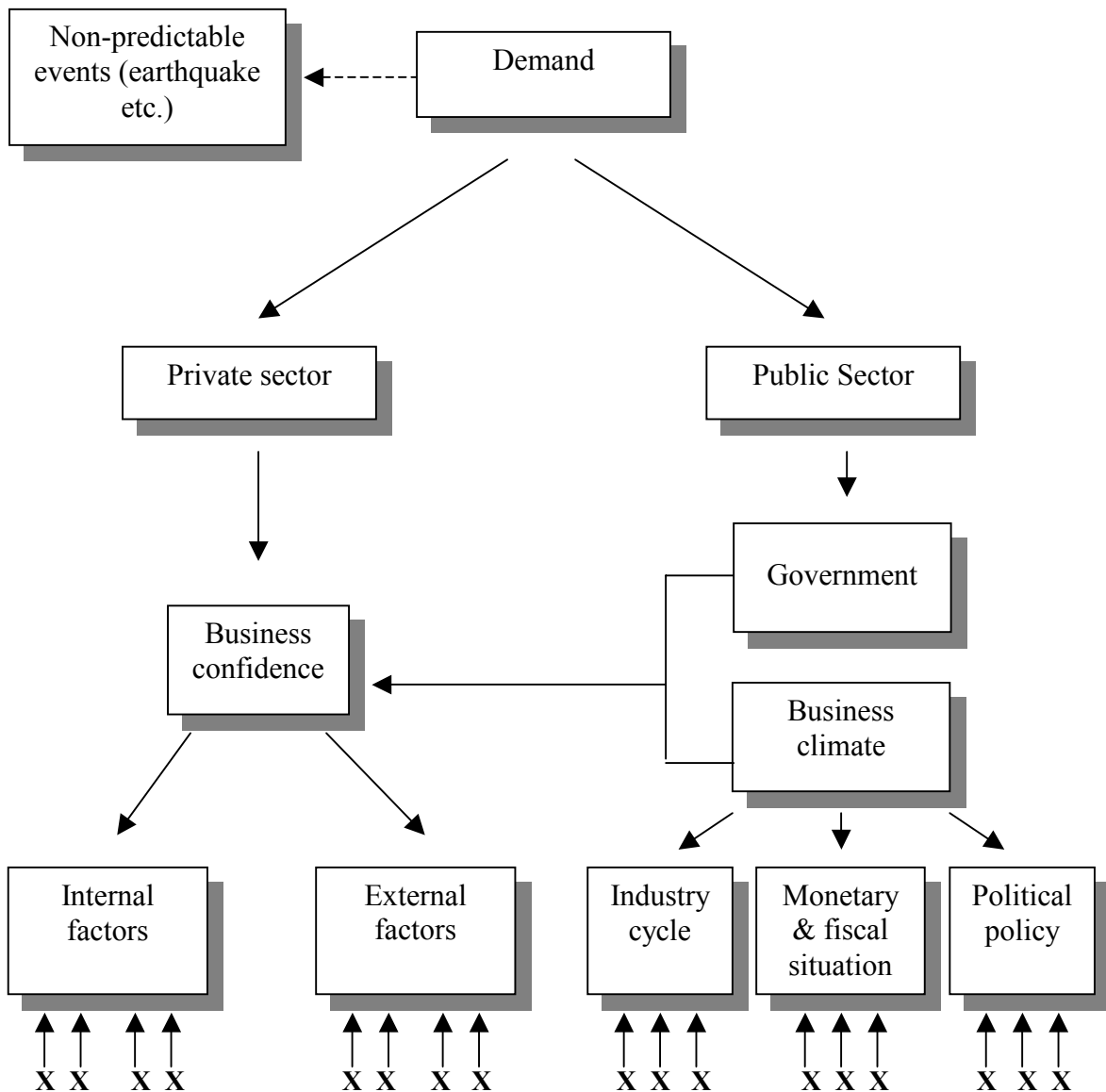
Now that we have made our “diagnosis” we will study the underlying reasons for the shortcomings in the forecasting process. This is done by an in-depth analysis of the problems we identified. The analysis is focused on internal aspects of the problems, because the company can influence these problems and find a cure for them.

#### **6.2.1 Limited emphasis on analyzing the drivers for demand**

There seems to be a strong correlation between the accuracy of forecasting and increased understanding about factors influencing demand. By tracing a series of ‘incidents’ back from a changed pattern of demand to the cause of this change, it is possible to reveal several factors that affect demand (see figure 6.1). Tracing back the causes of errors will give valuable information about events that affect demand in one direction or another. This is a reactive method,

## Chapter 6 Analysis of Volvo CE's forecasting process

instead of proactive, but a necessary step in building up knowledge about factors influencing demand. One may call this traditional market analysis, but without understanding the market and the industry, there is little chance of finding indicators that will identify future shift in demand. It also takes a lot of time to establish this chain of events and its effects. But if this 'detective work' is built into the forecasts review process, it will be automatically activated when there is an unprecedented error in the forecast.



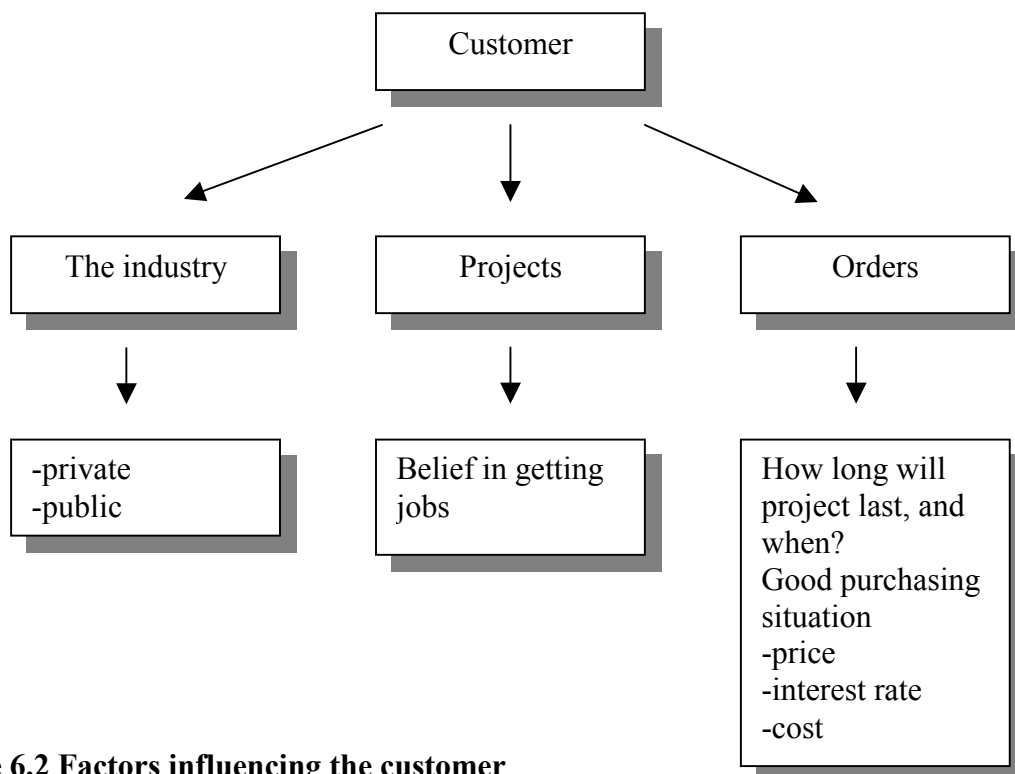
**Figure 6.1 Factors influencing demand**  
**Source: Our own**

Almost with no exceptions, all interviewees agree that external factors are the main considerations of customers, and of these, the interest rate is the main driver behind demand for construction equipment. This is logical since a

## Chapter 6 Analysis of Volvo CE's forecasting process

purchase of construction equipment requires a sizeable investment of money. Most small and medium sized companies therefore need external financing for these investments. Interest rates have two critical aspects. One is that when the interest rate is high, it reduces the overall purchasing capability of the customers. The other is the competitiveness of the available financing alternatives, and therefore interest rates become part of the pricing.

Going beyond the obvious, it becomes more like detective work in order to determine the motives, reasons and problems of any customers' decision to invest in a new machine (see figure 6.2). Customers do not acquire machines just for the purpose of having a modern machine park. The amount of projects the customer believes he is able to get is the factor determining his willingness to invest in a new machine. Actual orders, or projects determines how much the machines are used, and therefore when they need to be replaced. A third factor influencing the customer is the state of industry itself, which is, as mentioned earlier, a result of actions both by the private and public sector.



**Figure 6.2 Factors influencing the customer**  
Source: Our own



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Two conclusions can be made about customers for construction equipment:

- 1) all large construction companies are project driven, and
- 2) the non-project driven companies, i.e. quarries, mines, forest industry adjust their capacity according to demand for raw materials from the market.

The non-project driven companies have a fairly stable production schedule and have replacement programs. Unless there is a slump in demand for a certain commodity, they will run their machines according to capacity requirements. They also own their own fleets, and therefore it is easier to analyze their buying behavior. Projects driven enterprises, on the other hand, are affected by a set of different factors, because there is a larger amount of influences on them.

The trend among construction companies is that they are to an increasing extent relying on rented capacity. The large construction companies are not interested in tying up capital in large machine fleets. They prefer hiring equipment for the duration of any project. This way they are both able to set the prices, that is press them as low as possible, and also to quickly lower capacity when there are less projects available.

Total market growth in the private sector is determined by the confidence companies have in the economy for long-term projects. Financing availability and the cost of financing are usually obstacles for rapid conclusion of a project and sometimes a cause of loss of a deal.

There are several examples of how a series of market events can influence demand for construction equipment. But it is not our purpose to map every single event and trace its causes and results. It's not even possible because we have only been able to interview one customer. What we are attempting to accomplish is to promote a way of analyzing the customer. We want to emphasize that market events and other factors effecting demand are interconnected. It is therefore not enough to single out macroeconomic indicators. By backtracking or mapping the series of factors and events leading up to an error in a forecast, a great deal of understanding will be gained about the behavior of the customers.

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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Although we only interviewed one customer and five dealers/salesmen, the analysis of customer behavior point in one direction – a need for greater monitoring of the actors in the market, and a greater understanding of which institutions are most relevant in different markets.

All the dealers and salesmen we were able to interview had a strong understanding of local market dynamics. Based on their experience, communication with customers and past sales statistics, they have been able to identify several working indicators. They also agree that the driver of the market is the customers' *confidence for the future*. The drivers of the customers' confidence are for example certain economic indicators such as oil price, interest rates, price/rent/cost of acquiring a machine, delivery times and the actions and budget made by the Government. The annual budget is an important indicator since it reveals the planned governmental spending. This implies a greater emphasis on researching customer confidence.

### **6.2.2 No approach to monitoring the government**

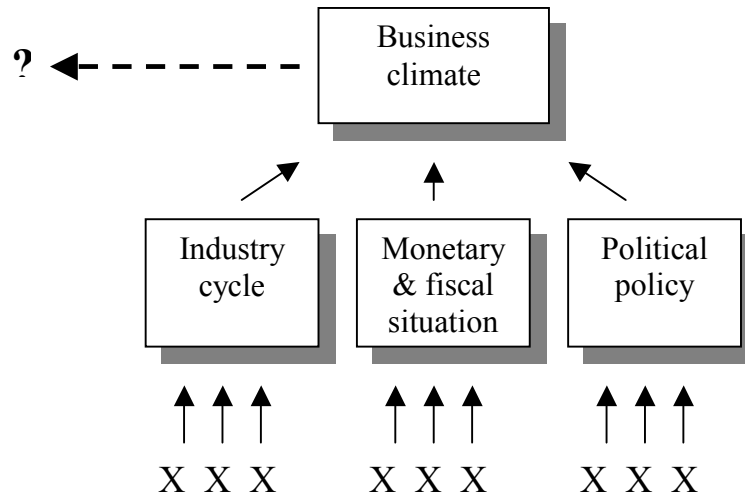
The near unanimous consensus among all interviewees, as well as in literature, is that the government is a major driving force for the construction industry.

Governments are sometimes driven by political agendas although two of the persons we interviewed claim that most government intervene in times of slow or retracting economic development, and become passive in times of economic growth. The implication for this is that the government's cycles are opposite to the economic cycles.

But governments are more complicated than that. Except for creating demand, they can also alter the competition among suppliers through different barriers to trade (customs, tariffs etc.) Governments are also required to enhance the competitiveness of the national economy, through varying fiscal and monetary policies (see figure 6.3).. The government may also be driven by a need for protecting domestic markets or producers. Not all governmental decisions are transparent and the level of transparency differs greatly among different governments. Some interviewees agree that they have, occasionally, failed in

## Chapter 6 Analysis of Volvo CE's forecasting process

their ability of monitoring the government. Some governments are even known for being highly discriminative, which means that projects are given to preferred entrepreneurs without any market communication.



**Figure 6.3 Factors affecting the business climate**

Source: Our own

It has become evident, throughout our process of writing this thesis that it is extremely important to monitor the actions taken by the government. Currently Volvo CE does not have a system of monitoring the government, but tries to accomplish that by using different sources of information. It is understandable that it is difficult for the headquarters in Brussels to monitor the actions of various governments, because they are too distant from the market and do not have the required information channels. Hence it is up to those closest to the market, to have the “antennas” out on the market and collect information. The sales companies are therefore best suited for this task. The sales companies have the different channels and sources of government information, through access to local newspapers, television channels and also informal information from customers. It is also important that this information is systematically collected, analyzed and then shared.

The dealers we interviewed monitor the actions of the government very closely. The dealers also claim that monitoring is even more important when there is a change of government, as the new government may not follow the investment policies of the old regime. They therefore consider it important to find out at an early stage what the new governments' policy will be on expenditure and

public investment. New governments also affect the purchase patterns of the dealers' customers, because the customers choose to postpone investment while waiting for a public announcement of the government spending policy. Except for setting the rules of the market, governments are also buyers of construction equipment. But public tenders are problematic. Governments may postpone signing contracts for long periods of time, but can then sign up for hundreds of machines at one time, and there is not a lot of profit in this market.

### **6.2.3 Poor forecast evaluation and reviewing**

Forecasts are not evaluated often enough. It does not have to be a time consuming or complicated process, but there is a need to determine if the forecast is on the right track and if there are some adjustments that have to be made. If there is a need for adjustments the forecasting process must be flexible enough to allow it. The sales companies and the product companies are doing their reviews more often than Volvo CE.

When a forecast proves inaccurate, all efforts are concentrated on revising the forecast, not asking why the error has occurred. It may in worst cases take up to 3 months of consistently misleading or inaccurate indicators before actions are taken to correcting the problem. And if there is an evaluation, the process is in most forms informal and consists of measuring the forecast against Volvo CE market performance, such as performance against the previous year. Although most managers agree that inaccuracies in forecasts has to be accepted, they would welcome a model or process that would help explain how and why a certain event has changed the result or outcome of a forecast. There is a uniform consensus among the interviewed employees involved with forecasting that there must be a possibility for changing forecasts when needed, in order to meet changes in demand in the volatile environment. It must be possible to adjust a forecast to small as well as large events, but currently there is no tool for doing it. In other words, there is a lack of flexibility, dynamism and pro-activity.

We believe that the six-step forecast review used by Volvo CE (see Chapter 4.2.9) is more of an analysis of the present situation than a review of the

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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forecast or the process. The six-step model is more concerned with what the industry and the current situation look like than how actuals compare with the forecast.

We have identified a trend where HQ and sales companies are satisfied if they manage to identifying that an indicator is no longer correct, or that sales is lower or higher than expected in a market or region. What is missing is an attempt of identifying the reasons behind lower or higher sales or misleading indicators. Since forecasting is much of a trial en error process it is vital to learn from past errors and mistakes.

Frequent comments from interviewees, such as “we do not have any time, it costs too much to go through the process of finding the underlying reasons”, is just a further reason to research if the methods used for forecasting does not address these matters. The question that should be asked is;

*What is the cost of not finding out the underlying reasons for errors in a forecast or variation in demand?*

### **6.2.4 Inappropriate organizational systems**

Internal communication between the dealers we interviewed and Volvo CE used to be excellent when the dealers were a part of Volvo CE. But since Volvo CE became more global the lack of communication and exchange of information between Volvo CE and the dealers, and the product companies and the dealers has become inadequate.

In our studies we have identified two communication gaps that need to be addressed. The first gap is the distance the dealers feel exist between them and the Volvo CE HQ. The dealers' feel that they have been cut off from the planning and production processes, and therefore they do not understand the underlying thoughts and motives driving Volvo CE's strategies. An understanding of the thoughts and motives driving Volvo CE strategies is important in order for the dealers to have the right marketing and to align themselves with Volvo CE's strategies. The dealers also feel that the distance

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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to the Volvo CE HQ is bad for motivation and the way they approach important mutual interests, such as forecasting.

The second gap we have identified is the current distance to the production companies. There used to be excellent communication between the dealers and the product companies, such as frequent discussion about sales, forecasts, pricing etc. Today the dealers have to go via sales companies when communicating with the product companies, which has created one additional level of hierarchy between the dealers and the product companies. The dealers feel that the regional sales companies sometimes make it harder for them to relay specific product requirements and specifications to the product companies. The sales companies are most often very useful, but they cannot replace the product knowledge that exists in the production companies. The product companies' experts and specialists have a vast knowledge of the products and they closely monitor the actions taken by competitors. They also have the specific information about development and improvement of products.

Direct communication between the dealers and the product companies is very important and is a prerequisite for successful forecasting because it brings together the two units with the most knowledge about the markets, products and the customers and their behavior.

### *The internal records*

Volvo CE's internal information system includes various kinds of important information and data. But Volvo CE does not give access to data systems to the dealers. By not allowing the dealers access to parts of Volvo AB's VIOLIN system, for example country information, Volvo CE does not help the dealers to improve the dealers' information base for forecasting. If the dealers were able to access information at any time without delay or having to request it from the Volvo CE HQ, it would probably improve their forecasting performance (given that the information is of relevance). At present the dealers feel that the information they receive from Volvo CE HQ is of limited value, because they do not know what the figures represent, what lies behind the figures and how accurate the information is.

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Access to some raw data would also make it possible for the dealers to interpret and analyze the information themselves. If they would come up with similar conclusions as the Volvo CE HQ it would strengthen the arguments of the headquarters. The new data warehouse Volvo CE has under construction together with the SACS-system is a step in the right direction as they aim to facilitate the day-to-day activities of the dealers and their sales people. But the project has been delayed several times and the investment cost for the dealers will be rather high.

### *Marketing intelligence*

The dealers in Norway and Sweden claim that some of the material the HQ sends to the dealers every quarter is hard to understand and interpret and therefore of limited use. There has to be a continuous discussion on what kind of information the dealers should receive and how they can use it. Today valuable information may be lost to the dealers because of difficulties interpreting it and because the dealers usually already have the information themselves. The information also has to be sent in time to the dealers so that they are able to use it in the forecasts. Currently the information arrives a few days before the forecasts are done and thereby plays a very small role in the dealers forecasting.

A formalized process would ensure that the dealers receive all the material they need for their forecasting process, so that no important information gets stuck with different people at headquarters. It could also make it possible for the dealers to access different kinds of information when they need it. The dealers also believe that they could use other types of information from the Intranet to support them in their daily operations.

The product companies and the dealers also collect large amounts of information, both hard and soft, from their daily meetings with customers, from other networks or channels and by "living" in the market.

It is also important to identify the information need of the headquarters, so that the dealers can provide them with relevant data. Currently the internal

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information collected by dealers usually remains at the dealers and is not passed on to Brussels. One reason is that the information is often very detailed and requires the experience and knowledge of the dealers to be interpreted correctly.

Volvo CE has realized the need for a combination of both macroeconomic data and soft information when they make forecasts. The main reason for Volvo CE HQ's reliance on macroeconomic data, such as past sales statistics, economic development data in different market and different indexes, is that the market planning and research department is very distant from the market and do not have access to specific sources of information for soft factors.

### *Marketing research*

The centralized and standardized market and customer surveys made by Volvo CE headquarters have had negative effects for the dealers in Sweden and Norway. The surveys have been too extensive and time-consuming for the customers, and have turned out to be a source of irritation among the customers. One reason is that many of the customers are small companies without any administrative staff. Another reason is that filling the surveys takes too much time because of the level of detail. A third reason is that the surveys do not address the unique characteristics of different markets. Although there is a need for standardized surveys, since it is the only way to compare results between markets, they must not create negative reactions among the customers.

Although external sources, such as consulting firms, can produce objective reports and research material, they are not experts on the construction equipment industry. The experts are the dealers, and it is hard to understand why they are not involved and used more extensively.



### 6.2.5 No consensus for the need and usefulness of forecasting

The different departments' responsibilities when creating the quarterly forecasts are well defined. However, the workload is much greater at HQ level than at PC, SC or dealer level. One explanation is that at HQ level there is a greater overview of the whole process, whereas SC's, PC's and dealers have a much narrower view of the organization, total market, strategies and the competitive situation. Another explanation is the forecasting process itself. It is the responsibility of HQ, along with the market research and planning department, to reconcile all forecasts. Information trickles its way up from the dealers and sales managers to the HQ, where the information is evaluated. Although the sales managers are responsible for creating their own forecasts, the process of HQ consolidation is very lengthy.

This lengthy process could be an indication that there is a lack of consensus and reliability in forecasts from the dealers, sales companies and product companies. It could also indicate a disparity in the "language" used by the different departments – a lack of a "common language". The dealers have different views and requirements than headquarters, and an example of this difference in views is that some sales people get annoyed when asked about forecasts. Although some understand the process and the necessity of forecasting, other feel as if they are being spied upon when they get requests about forecasts from sales managers or headquarters. Since there is a lack of a "common language" it is difficult make the smaller dealers understand the need for forecasts, and how it can help them as well.

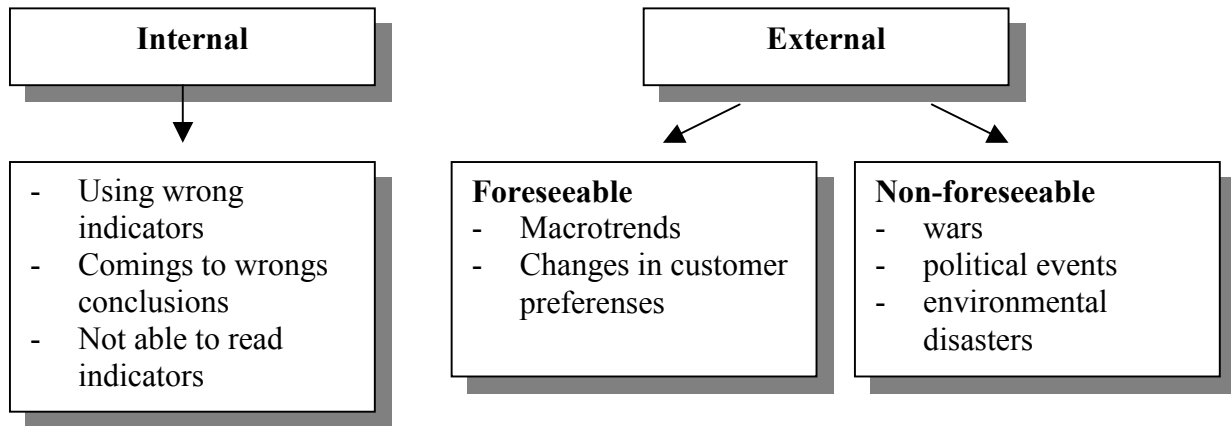
The marketing department is best able to understand a forecast at a national rather than a regional level, since they have little to no visibility into local market dynamics. Since it is also responsible for new product introductions and promotional/pricing programs it is likely to have a better understanding of promotional uplifts that might impact future demand. In addition, the marketing department is often better at long-term rather than short-term forecasts.

The sales department on the other hand has a good understanding of local market dynamics. It therefore best understands the trends taking place on a

## Chapter 6 Analysis of Volvo CE's forecasting process

geographical and customer account basis. It is often better at short-term rather than long-term forecasts.

As a summary it can be said that accurate forecasting is not only about foreseeing trends and reacting swiftly on non-foreseeable events. It is also about internal competence, and managing to engage everybody in the forecasting process (see figure 6.4).



**Figure 6.4 Assumptions about the forecasts**

Source: Our own

### 6.2.6 Indicators

It is very important to understand the logic and reasoning behind choosing indicators, in order to increase reliability and validity of them. If there is no clear connection to the industry, product or what they are leading it is only a coincidence that there is a correlation. The people working at Volvo CE possess great knowledge about how to pick different indicators, which is based mostly on experience gathered throughout the years working with forecasting. But there is no systematic approach or model of how to choose indicators, which would make it easier for other people within the organization to understand the logic behind the selection process.

When creating a model of how to select the correct leading indicators, it is vital to understand what affects the indicators. It is not an easy task to find these underlying reasons, but it has to be done. It is all too common just to accept and be happy with indicators that work. But to get reliable and sustainable results it

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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is required to develop an understanding for the underlying reasons, i.e. how they relate to certain business activities and what drives the target indicator.

Finding a group of leading indicators is a hard task, finding just one is much easier. But using only one indicator to serve as a source of information the chances of something going wrong is much higher than using a group or index of indicators. We therefore believe that using an index of indicators would help to minimize errors.

There is a type of indicator that has a more indirect effect on the market such as effecting the possibilities of transports, visit customers etc. Although these indirect indicators do not affect demand itself they need to be monitored. One example of an indicator serving as both direct and indirect indicator is the prices of oil.

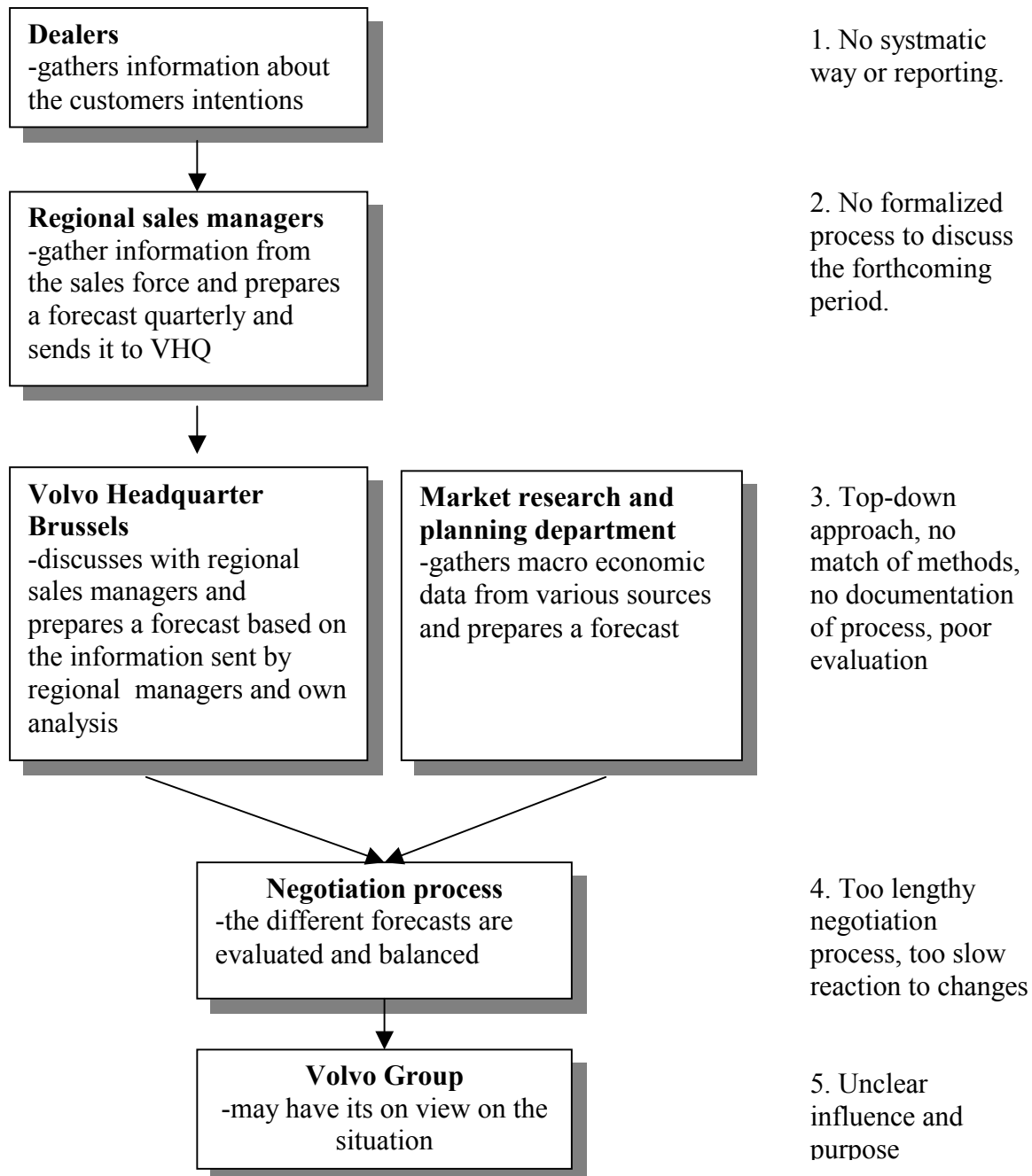
The problem with leading indicators is that though they might seem very reliable for a period of time, they can suddenly change. The indicators are often more reliable in the western industrialized countries because they generally have stable markets. In markets such as South America and Asia, the volatility of the markets makes it much harder to find reliable indicators.

### **6.2.7 No attempts of reviewing the methods and process**

One major problem with the forecasting process (see figure 6.5) is that there is no formalized process or systematic way of gathering information and preparing reports and forecasts. Different managers and dealers use different methods for preparing reports and forecasts, and there is no documentation on these methods, either at dealer level or HQ level. Most commonly sales managers have informal meetings with dealers and sales people where they discuss the coming period. There is no standard set of variables taken into consideration, and the HQ does not even see the data and information that dealers and sales managers base their forecasts on, There also seems to be no unified "language" and goal within different parts of the company (dealers, PC, SC). It also became evident during the interviews that some sales people tend to become annoyed when asked about forecast. The sales managers feel that it is

## Chapter 6 Analysis of Volvo CE's forecasting process

very difficult making all involved understand the need for forecasts and how it can help them. The end result of such a non-structured approach is that the quality of the reports is usually poor. Most people we have spoken to also admit that they are too busy in putting the forecasts together, which leaves them with less time for discussing and following up the forecasts. There is also no regularity on follow-ups of forecasts, because the system does not allow an ongoing follow up of forecasts.



**Figure 6.5 Five major errors in the forecasting process**  
Source: Our own

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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Further it can be argued that there is too little sharing of experiences between headquarters, sales companies, product companies and the dealers/sales people. This is evident by the fact that not everybody sees the importance and value of forecasts, that different methods are used for gathering information, that there is no common way of analyzing data. Because there is no common language among everybody involved in forecasting there is a huge likelihood of misinterpreting reports and data.

The isolation between different actors in the forecasting process causes to a lot of the problems currently experienced at Volvo CE. It makes the whole process very time-consuming. By the time a forecast is presented, market conditions may already have changed and invalidated the forecast. But since this is not recognized by the forecast, i.e. its not revised, the PC still base their production plans on the quarterly forecast. Another example is that although the sales companies may come down to giving their view on the future on a monthly basis, production makes resource planning on a weekly basis.

### **6.2.8 Different markets, different characteristics**

One fact, which cannot be overlooked, is that different markets have different characteristics. This may seem obvious, but it is not clear that it is always taken into consideration at the forecasting unit at the HQ. The practical implication for this is that different markets require different forecasts, so that the unique characteristics of a market are taken into consideration. Although it may be rational to group smaller markets into clusters, one has to realize that the markets within the clusters will behave in different manners, when it comes to this stage in the economic cycle, customer purchasing patterns, institutional settings etc. One example of a group of smaller markets is South America. Although the South American construction equipment market is much smaller than the European, it still consists of over 15 different markets, with variations in language, economic development, government involvement etc. The geographical distances are also huge. All this requires that the sales company in Brazil as well as the HQ must take into consideration these characteristical variations. The organization must support a two-way dialogue between the sales company in Brazil and the different markets. Otherwise there is a great

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chance that dealers in other markets won't accept the forecasts from Brazil, and even less, from Brussels.

Volvo CE does not determine the interdependence of markets within clusters i.e. to what extent do events in one country affect the other(s)? One only has to look at the Asian crisis in order to understand how important it is to have knowledge of how markets within regions are affected by each other. Without an understanding of the role and extent of the involvement of overseas Chinese business networks in Asia, there was little chance realizing what kind of effect a financial crisis in Thailand would have on most markets in Asia.

Once again, this is possible only if markets are analyzed on an individual basis. This in turn requires that the expertise of local dealers and sales companies have to be used in an optimal way. It requires, as mentioned earlier, organizational structures, which encourage and develop a mutual understanding for the need of forecasting. It also requires a systemized approach as well as support systems that enables fluent communication. The current top-down approach is quite ineffective, with the result that total market forecasts may be rather correct, while forecasts for individual markets are sometimes extremely inaccurate. One can question if Volvo CE has the right organization for this? For instance, what are the effects of a foreigner coming to Argentina to tell them how much they can sell? Would there be another effect if there was a dialogue where people from abroad would bring data for analysis and opinions of what would be possible? Is it not logical to assume that since the markets in Europe all have unique characteristics and develop at different pace, that the same is true for the other markets?

Another source of problem is that there is a difference of making forecasts for a stable economy, like many of the European economies, and making a forecast for an emerging market like Malaysia. Emerging markets are often accompanied by a degree of political turmoil, and therefore forecasts are very much dependent of factors outside the scope of actual business.

The implication for the statements above is that the different dealers have different needs for communication and support from the sales companies and the Volvo CE HQ.

### **6.3 Summary of analysis**

A lot of the problem Volvo CE is experiencing currently with its forecasts is related to the fact that events are taking place in the global economy, which have not been experienced earlier. Most notable is the facts that although the American economy is almost over heated, the demand for construction equipment is decreasing.

Another basic problem relates to the facts that Volvo CE is establishing a presence in new markets all over the globe. Since Volvo CE does not have a history in these markets, it is struggling to create a base to build forecasts on. Especially in Asia this is a large problem, because Asia has recently gone through a major economic downturn, and Volvo CE is finding it difficult to forecast the revival of the economy.

Volvo CE is also focused on a limited amount of forecasting tools. In the past these tools may have been sufficient, but as Volvo CE adds new markets to its portfolio, old and tried methods are not valid. New methods have to be introduced, but organizational restructuring keeps personnel busy with internal changes and matters. Therefore forecasting has been placed in "the shadow" and did not receive attention until problems started occurring.

Another aspect that we have identified is that during the early 90's when there was a industry trend of reducing cost and streamlining processes. As a result, dealers, product companies and the headquarter became increasingly isolated from each other. Good communication was taken for granted, but as the dealers became independent, and sales companies were reduced in numbers and located in key countries, the exchange of information deteriorated gradually. Now it has come to the point that dealers do not receive the right kind of information from the headquarter, while there is no means for the headquarter to gather non-macroeconomic data from the dealers. Furthermore the mutual

## **Chapter 6 Analysis of Volvo CE's forecasting process**

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discussions between the product companies and the dealers is scarce. It could be said that the organizational systems do not support forecasting adequately.



### 7. Recommendations

*This chapter is devoted to our recommendations to Volvo CE. The recommendations are based on the analysis of the forecasting process. Since some of the recommendations are to some extent of an organizational nature, we will not offer a complete description of how they would be actually implemented. We also realize that to fully comprehend the forecasting process and give complete recommendations, we would have to spend more time at researching the demand factors for different product groups, the dynamism of the supply chain and cost considerations.*

#### 7.1 Ten recommendations for Volvo CE

The recommendations we are suggesting are more than a just non-academic part of the thesis aimed at giving practical recommendations to the case company. The recommendations are also the answer to the research problems that we posed in the beginning of the thesis.

The first problem was concerned with the aspect of identifying indicators:

*What should be taken into consideration when trying to identify leading indicators?*

The second problem was aimed at looking at the information need for forecasts:

*How can the information need, which is required when identifying indicators and creating forecasts, be satisfied?*

We have therefore come up with 10 recommendations that give an answer to both our research problems. The first recommendation is not directly linked to a research problem, but is an important prerequisite for successful forecasting. Recommendations 2-5 address our first research problem, and recommendations 6-10 concern the second research problem.

### **1. Communicate the importance of forecasting to everyone involved**

It would be in the interest of Volvo CE to get the whole organization and all dealers to understand the usefulness, and need, of forecasts. The only way of achieving this goal is to abolish the current top-down approach to forecasting. There is a strong possibility that there would be a greater understanding for forecasting if everyone had a clear understanding of how the process works, what the difficulties are, what part they fill in the process and what the results are. Volvo CE also needs to inform dealers and salespeople what can be expected from a forecast. Although there are events that cannot be forecasted, the value gained from making accurate forecasts on changing demand patterns should be shared among everybody in the organization.

### **2. Develop a new method for measuring total market size**

Macroeconomic data seems to be a frequently used method for evaluating total market. But, it is our opinion that macroeconomic data should only be an indication of the potential market for any given country. Import/export statistics is especially troublesome, since it does not show re-export or imports, and this gives a wrong total market evaluation. For new markets it is extremely important to evaluate it correctly, because it serves as a basis for deciding whether to enter or not. In the case of emerging markets with little statistical data, the only real way of doing a total market analysis is to use whatever sources of information there is. In the case for Volvo CE in Asia, the experience of Samsung has to be used to its fullest extent.

Again, as mentioned so many times earlier, the dealers can be of much help in evaluation total market. Although they may not have the information themselves, they do have access to different local and national branch magazines. These branch magazines represent all customers in the country and can be trusted to be objective in the evaluations.

### **3. Use the dealers and salesmen for what they are – ears and eyes of the company**

Not only collection of information, but also communication between the different units within Volvo CE and the dealers must be improved, i.e. between Volvo CE and the dealers and between the product companies and the dealers.

To get the dealers to contribute as much as possible to Volvo CE there is a need to motivate the dealers. To “alienate” them by not involving them on the Volvo CE’s thoughts about growth and the future will only make it harder for the dealers to align themselves to Volvo CE. Volvo CE should improve communication with the dealers and promote communication and exchange of opinions between the dealers and product companies.

We believe it is very important to “allow” the dealers to communicate and discuss the forecasts directly with the product companies in order to maximize the use of the people with the most knowledge about customers and products. An official information channel between the dealers and product companies would replace the current “unofficial” or informal exchange of information. This would involve all dealers, not only those few dealers who have been the longest “in business” and have personal contacts in the products companies.

The dealers must also be more involved in the forecasting process, since they are a very valuable asset to Volvo CE. This is not only valid for making forecasts, but also evaluation, reviewing and analysis of the forecasting methods. After all, the dealers are the eyes and the ears of Volvo CE on the market! The dealers have over a period of time built their own information channels and are able to get information that Volvo CE HQ will never be able to collect by themselves. They is, however, a risk of the information being biased, but generally they should be believed unless there is some really good reason not to.

#### **4. Make the right customer surveys**

Customer surveys are an excellent way of getting market information. The information is front line, current and also promotes Volvo CE. Not only customers should be used for surveys of customer behavior. Dealers should be used as internal consultants and barometers of local business climate. Regional sales managers should also be used frequently as expert opinion.

But customer surveys need to be delicately created. They should be formulated in such a way that they give Volvo CE all the information they need. But at the same time it is very important to consider what it will require from the

customer. Some customers don't have an administrative staff to deal with such manners. Neither do most companies want to spend too much time on any survey. The customers also need to be motivated to fill in the surveys.

As a consequence, there are several matters that need to be taken into consideration. If the surveys are too detailed, customers will not answer them, and even be frustrated with the dealers. But if surveys are too general, they will not give any valuable information. Also, it may be necessary to let the customers take part of some of the results of the surveys, and even involve them in designing the survey.

### **5. Use all forecasting methods available**

Volvo CE today has a very large focus on finding leading indicators and seems to see it as a kind of ultimate forecasting method and savoir. Putting too much emphasis on one method such as leading indicators also means not spreading the risks, and this in our opinion makes Volvo CE more vulnerable. We instead believe the focus should be put on several different forecasting methods to avoid "putting all eggs in one basket". We have mentioned several different types of forecasting techniques in this thesis and we believe Volvo CE could use a better mix of both objective and subjective methods. One example could be to gather different dealers and people from the product companies to form an expert panel.

A statistical baseline produced by quantitative methods is used as the baseline from which to develop a final forecast. The value of this forecast is that it's an objective, unbiased and unemotional view of the future. The statistical forecast, however, is rarely the last word, since it cannot incorporate every factor that might impact demand.

### **6. Make the forecasting system flexible and include simulation/analysis tools!**

The weaknesses of the existing forecasting system is the limited simulation/analysis capability, being just a data collecting system that little helps the improvement of the quality. The system does not have a self-measurement process to provide quality information to the users. Because

dealers and salesmen can only get prepared information there is a lack of participation of the dealer salesman.

There must be a possibility to change forecasts at all times, as there are changes in the volatile demand environment. Forecasts should be able to change to both small and large events. Currently there is not tool for doing this.

### **7. Make sure to find the underlying reasons for errors in forecasts**

When a forecast is wrong Volvo CE HQ has to find out why there sales went up or down in comparison to the forecast. It is not enough to find the reason that caused the error in judgment, but instead Volvo CE must search for the underlying reasons why something happened. Volvo CE is therefore in need of a systematic way to organize/handle the evaluations in order to learn from their mistakes and improve the quality and results of the forecasts. An analysis also has to be made to find out if there's any process/system failure that requires fixing. There should also be an automatic check if any external factor has changed with consequences to the subsequent periods of forecast.

### **8. Higher system integration between the manufacturer and the dealer's sales organization in the field.**

The forecasting system should start with salesmen activity planning (such as customer visits and visit reporting system with sales perspective indication). This type of information should be transparent between the dealers and the factory for joint analysis and decision to firm up the forecast numbers. Automated tracking system to evaluate the salesmen performance tied up to a compensation/rewarding system would raise interest on filling the system. Sales activity should not become bureaucratic activity.

### **9. Increase the information exchange with dealers/salespeople**

There is a need for a new way of handling the information flow. All units within Volvo CE and the dealers should be able to easily access all data and information they need when doing forecasts in order to make the operations as efficient as possible.

We therefore suggest Volvo CE to create a more structured way to manage the information flow in order to prevent information from getting stuck with a

certain person and not reaching the persons in need of that information. A more structured way of distributing information will make it easier to take care of all information available collected by Volvo CE, its sales companies, its product companies and the dealers.

### **10. Don't isolate units from the market**

It has become evident that different departments have become too isolated from each other in order to create useful statistics and information. Although headquarters sends information every quarter to the dealers and sales companies to support their forecasting, this information is not always of use to them. Many feel that they have more actual or better information themselves about their market. The most probable reason for this phenomenon is that different departments have become either too isolated from each other, or even worse, too isolated from the market.

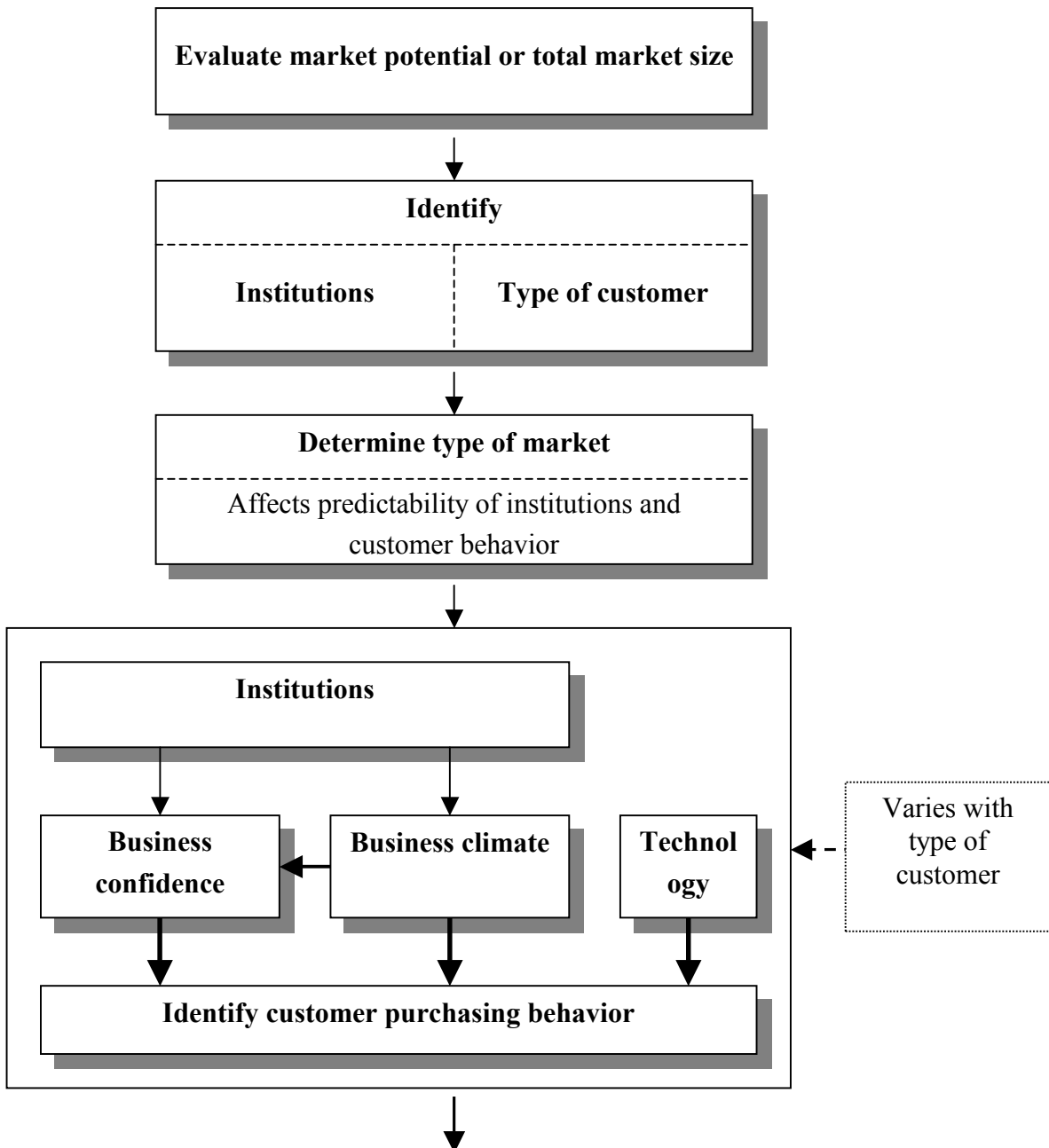
There seem to be too much trust in information that is not good or even true. A solid database of historical data is the best way to discover how past trends or business cycles compares with present trends. And there is hardly any doubt that headquarters, and most of the dealers in Europe and America, have solid historical data, but there is a difference in the focus of the data. While headquarters is able to gather data on a supra national level, dealers and sales companies are able to gather national and even regional data from all kinds of national sources. The Norwegian dealer, for example, has access to the national association of machine entrepreneurs' quarterly statistics. This focus on national data makes them more up-to-date on actual statistics.

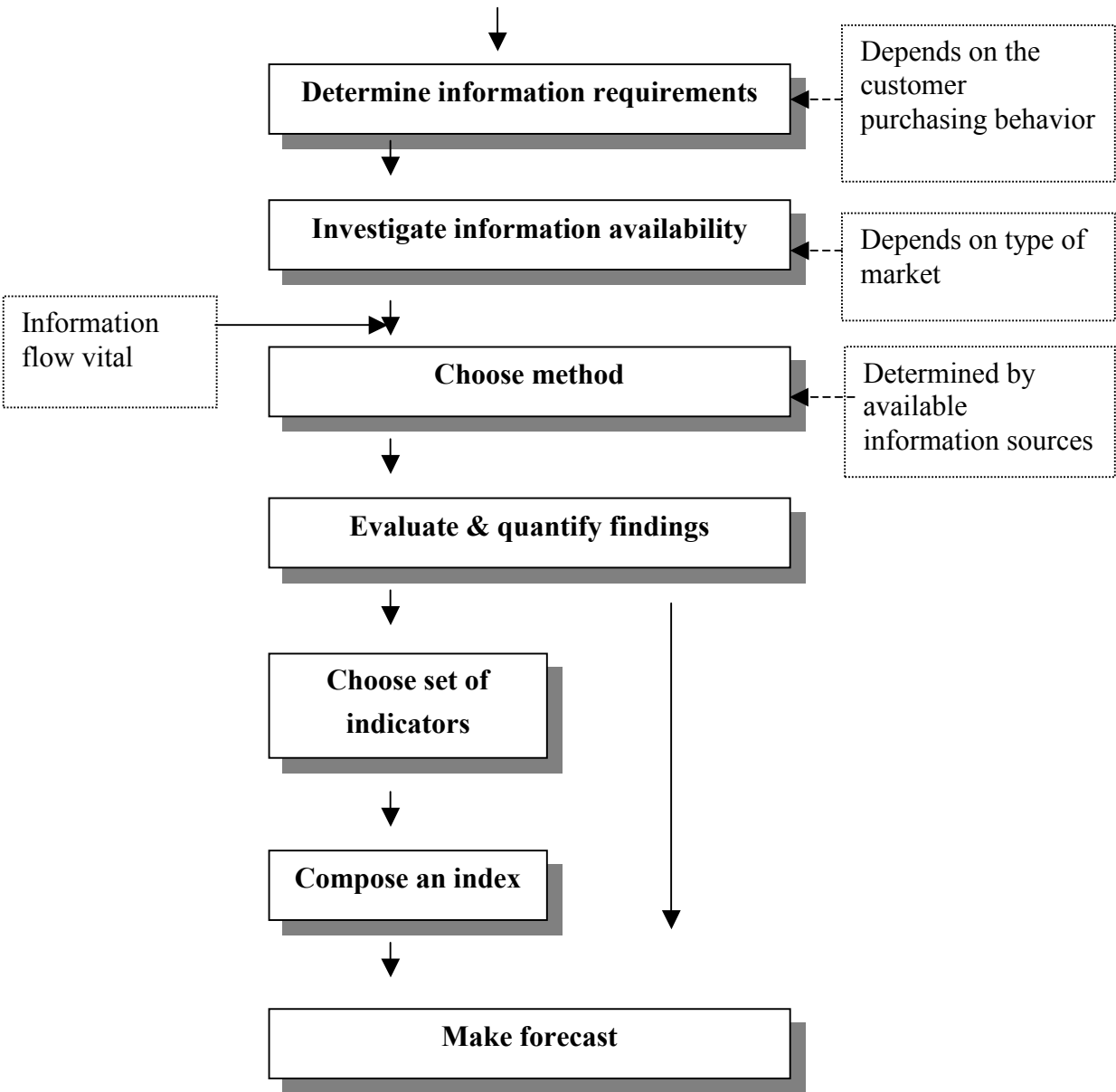
The headquarters is of course somewhat isolated from the markets, but with better two-way communication this problem would not exist. The headquarters and dealers would be aware of each other's information need and could develop the tools and channels to share and analyze this information. That way, headquarters would not be isolated from the market and the dealers would get insights into the figures that lie behind the headquarters forecasts.

## 8. Conclusions

*To solve the main problem we have come up with a model to explain how a company in the construction equipment industry should approach forecasting and selecting indicators in a systemized and methodological way. The model emphasizes critical aspects in the forecasting process. We have chose to divide the model into four stages, but for the purpose of giving an overview of the whole model, we have compiled the four stages into one model.*

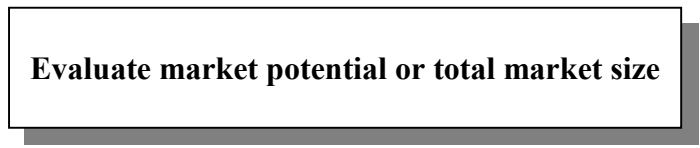
### 8.1 Overview of the model





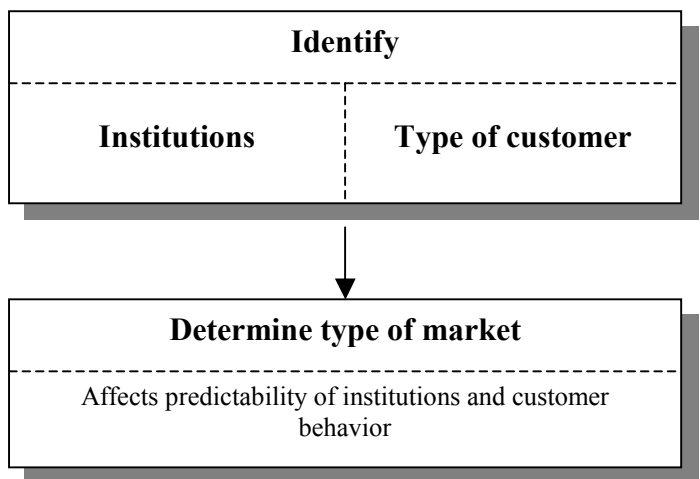


8.1.1 Stage 1



Evaluating the correct total market size is critical for a correct forecast. The total market size is the base for all calculations. Therefore, there is a need for any company in the construction equipment industry to develop a method for measuring the total market, or in the case of a new market entry, a method to evaluate market potential.

8.1.2 Stage 2

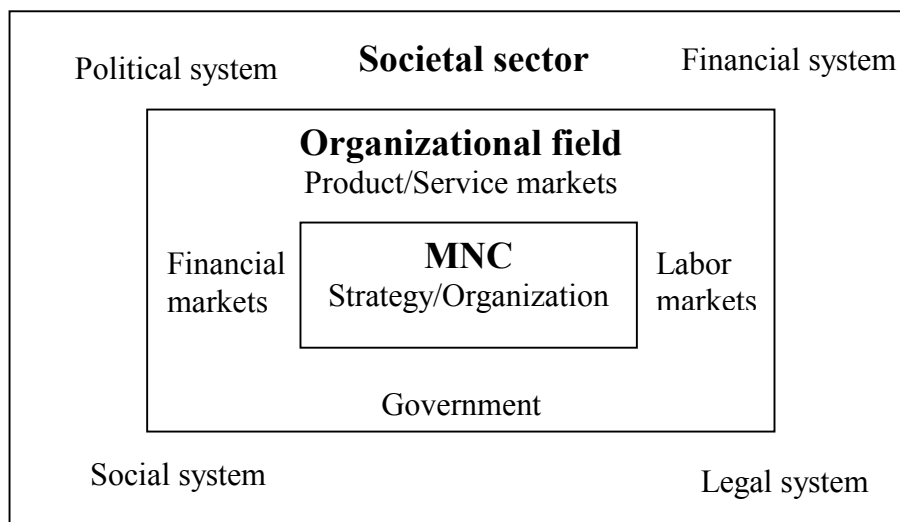


*Identifying the relevant institutions*

During our interviews, it has become evident to us that the total process of creating a forecast is a delicate matter, and requires great knowledge and understanding of market dynamics. Not only factors which seems directly connected to the industry affect the demand but also factors which may seem remote influences the market. It is also a difficult task of interpreting all the factors, or indicators, which are gathered from the market place.

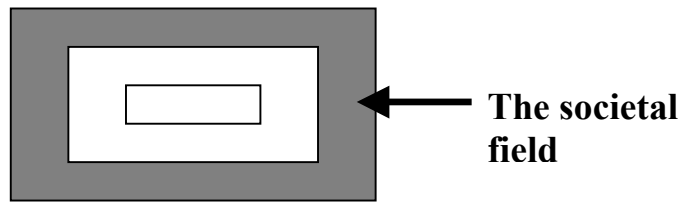
Therefore, we have made a distinction between two sets of factors, i.e. external and internal. The external factors are further divided into two categories, i.e. those which cannot be predicted (wars, political events, environmental disasters) and macro-trends, which in part can be predicted. External factors cover such aspects as informal policy decisions, barriers to trade etc. Internal factors, which affects the outcome of a forecast, relates to the ability of choosing right or wrong indicators, the ability of reading the indicators and drawing the right conclusions from them.

Although a complete institutional analysis requires a deep insight into a market, it is not necessary to focus on the whole model in order to make a first, general analysis of a market. The aim is to determine the nature of the market, and the propensity for change for the different institutions.



This first level of analysis is based on historical data, which in most cases is readily available from different data sources. Initially, questions such as, how stable have the institutions been over time, what is the current status of the institutions, how dependent and interconnected are the institutions, should be asked.

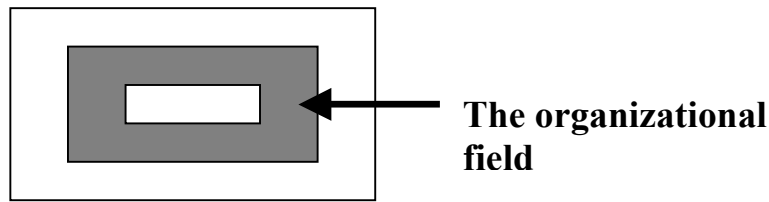
**First level analysis**



The societal field can greatly affect the business climate of any given market. It is therefore necessary to determine the characteristic of this field. A weak legal system or a political system characterized by great turmoil indicates that for instance, trade and customs policies may change rapidly and without prior warning. A weak or underdeveloped financial system may give small events huge proportions, such as the effect of the financial crisis in Thailand on most of the economies in the Asia region. The social system may seem irrelevant to this analysis, but must not be overlooked. Some markets are characterized by a high degree of interconnectedness between the social and economical sector. In Malaysia, for instance, the economic life is never separated from life as a whole. The success of doing business in such a market, and the ability of predicting the market, is by understanding how business is conducted.

By studying how the institutions in this field have behaved over a certain period of time, it can be determined if a market is predictable, and if not, what is the likelihood of changes. By analyzing the past behavior of the institutions, it can also give information about indicators that preceded a change of events. Although some factors are impossible to predict, such as wars, political upheavals, this level of analysis can determine if there is a great or small likelihood for such events in a particular market.

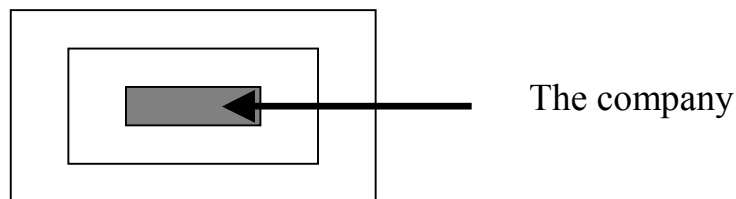
**Second level analysis**



Analyzing the organizational institutions requires a more in-depth and detailed view of a given market. The analysis is focused on how the institutions are connected with each other, what the specific characteristics are and how these influence demand. It attempts to determine what the specific policies of the government are, how the product and service markets are regulated, its size and how customers obtain financing for different acquisitions and purchases, i.e. its financial institutions etc. This analysis also determines which factors the company can influence, and which attractive the market is. This is more relevant for short to medium term forecasts, but nonetheless, an important part of the total pre-forecast analysis.

This level of analysis is closely connected to an analysis of macro factors and trends in a market. It can also give an indication of some indicators, which at hand can be discarded when making forecasts. This means that it can narrow down the number of indicators to analyze when attempting to find correlation between an indicator and the demand for a product.

**Third level analysis**



This level of analysis is completely concerned with the internal capabilities of the company. The analysis has to bring forward an understanding of the company's ability concerning specific markets. It is also concerned with evaluating the capability of the company in selecting, reading and interpreting the information, which is gathered from a market. It is of little use for an

organization to select a number of indicators which forecasts are based on, if it cannot understand what the indicators tell them. It is also of no use if an organization is not able to quickly respond to changes in the demand for products and update their forecasts accordingly. This requires a dynamic and flexible system, which can quickly gather new information from the market and prepare new forecasts. This is a key strategic capability for the company. In order to meet the changes in the volatile demand and environment, there must be a possibility to change the forecasts all the time. It must be possible to adjust forecasts to tiny events as well as large events, and the organization must have the tools to do these adjustments.

### *Identifying type of customer*

Identifying and segmenting the type of customer is important because it determines primarily how much and in what way institutions affect them, and secondly, different types of customers can be expected to behave in different manners. This will have an effect on the end forecast, in the way of information requirements.

### *Determine the type of market*

The type of market will have a large influence on several aspects of the process. First of all, depending on the type of market, the predictability will vary. Developing markets are often more unstable than industrialized markets, both regarding government policies and economic development. Although emerging markets can be expected to be more stable than many transition economies, economic turmoil usually has a greater impact on these markets than on developed markets, because of weaker financial system, banking sector, currency etc.

Industrialized markets – characterized by high stability and thus high predictability:

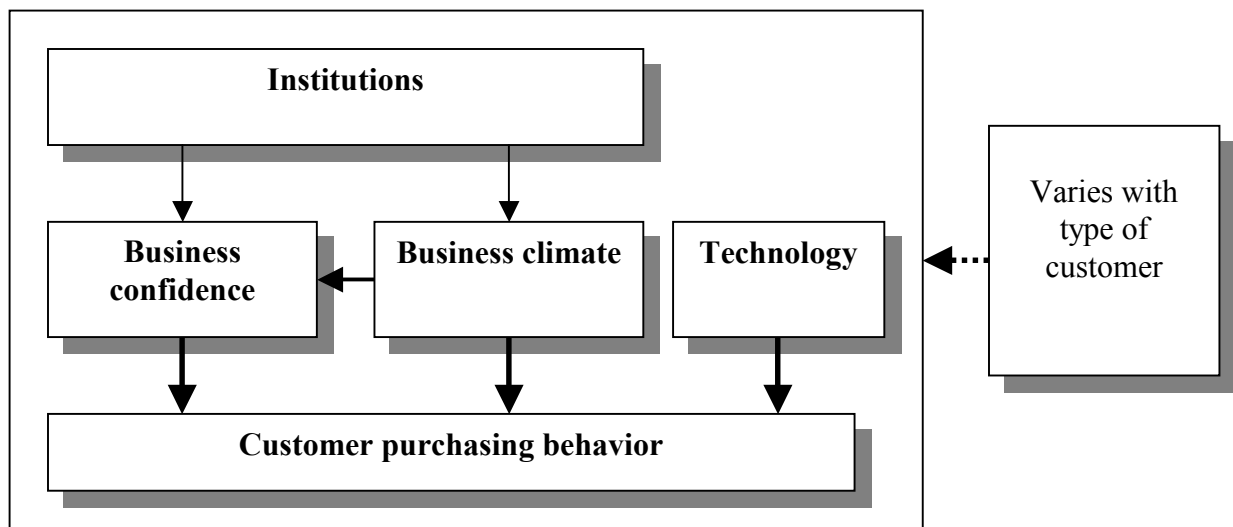
Transition markets – high volatility and low predictability

Emerging markets – modest stability and medium predictability

Developing markets – relative stability but difficult to predict

The second aspect of identifying type of market relates to sources of information. There are good and reliable sources of information for industrialized countries, while developing markets are on the other side of the scale. In transition markets information may change even on a weekly basis, while information in many emerging markets may be of questionable quality and reliability.

**8.1.3 Stage 3**



Stage 3 in the model is concerned with establishing how changes in the environment change customer purchasing behavior. Those institutions, which were identified in stage 2, are used in this stage. The purpose of using the institutions in this stage of the model is to determine how they affect business confidence and business climate.

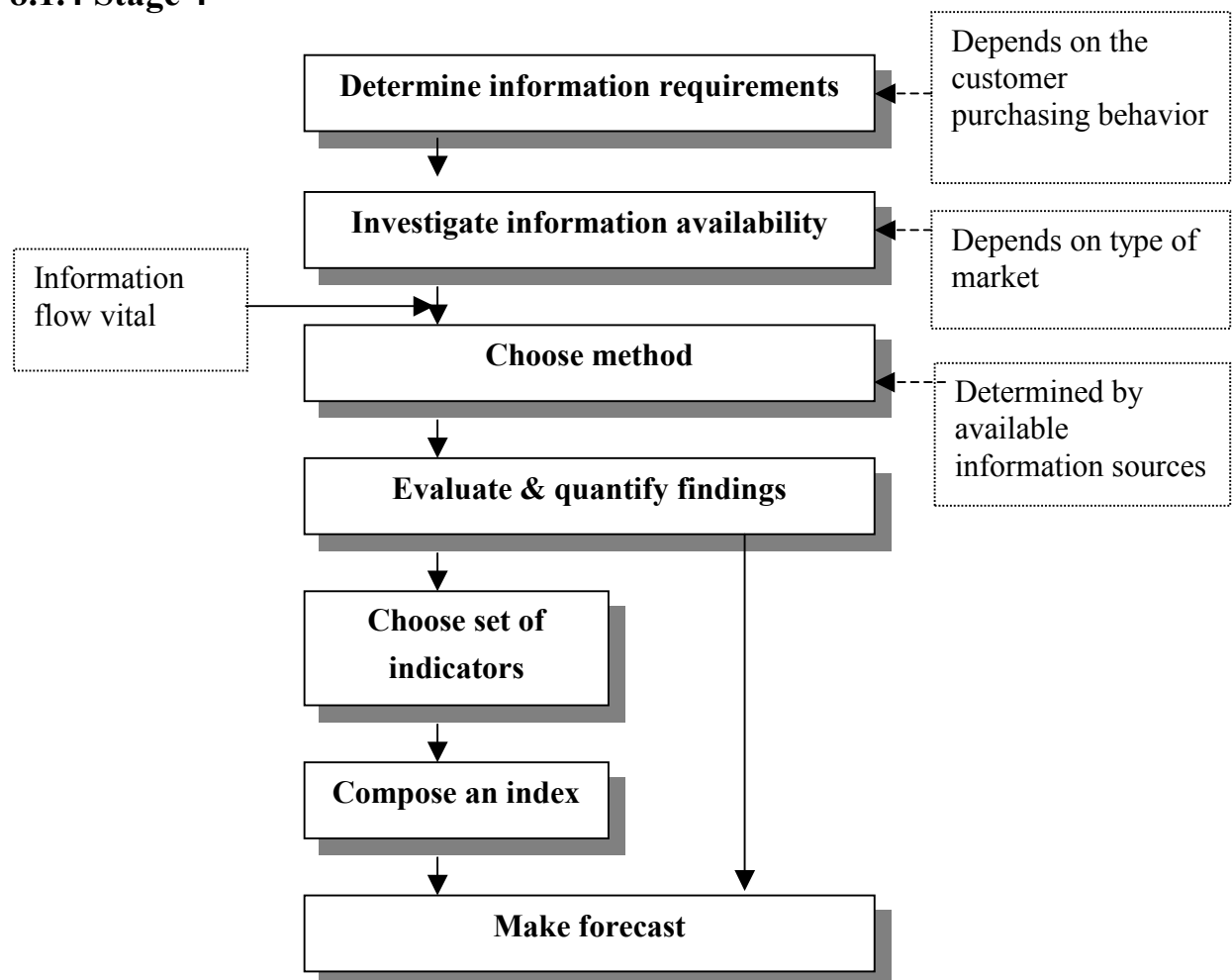
The model identifies that customer purchasing behavior is affected, in addition to business climate and confidence, by technology. Since we are not experts on construction equipment technology, we will not attempt to demonstrate how various technological improvements can affect customer behavior. But it has been documented in our thesis that technology has an affect on customer behavior.

Business confidence of customers is a good indicator of how a customer perceives the future, while business climate gives the overall state of current market situation. It is therefore important to analyze how changes in any one

institution will impact business climate or confidence, and how this will relate to demand. Since different customers are affected to various degrees to changes in business confidence and climate, each customer type should be analyzed individually.

The methods for finding out how institutions affect business confidence and climate, and how it affects customer behavior are by conducting an extensive amount of interviews with several types of customers. The interviews can be very specific, since the purpose is to gain information about what internal and external factors influence business confidence, and how changes in the current industry cycle, political policy and fiscal and monetary situation affect the customer. Such an extensive study will also provide the company with early warning indicators for changes that will cause large changes in customer behavior.

**8.1.4 Stage 4**



When it has been determined how different factors and institutions affect customer behavior then the next step is to collect information for creating the forecast. When information requirements have been identified, it is vital to investigate how much of the required information is actually available in the market. The availability of information normally has a high correlation with the type of market, e.g. it is much easier to find information in industrialized countries than it is in less developed countries.

The information sources available determine what type of forecasting method is to be used. Objective forecasting methods can be used to a higher extent if there is plenty and reliable macro economic data available. Subjective forecasting methods get more focus if statistical data is not available.

As the data and information is put into the selected forecasting methods, the results need to be evaluated and quantified (if possible). The results are then used to either select a group of indicators, or to directly make a forecast.



## **9. Concluding thoughts**

*This chapter addresses three concluding thoughts. The first issue is if there is a need for forecasting in today's corporate world with information technology and just-in-time production. The second issue is the use of indicators and how it is a very important part of forecasting, but not the single solution. Finally we offer a benchmark of the forecasting system at Cable and Wireless.*

### **9.1 Is there a need for forecasting?**

How important is forecasting to a company? Is it maybe possible to utilize information technology to make forecasting unnecessary in a company? Long-term visions are part of any company's strategic development. It is a necessary tool for setting the goals for growth. But how important is it to combine these visions with forecasts? General forecasts of market trends may be of value, since it can indicate the growth potential of a market or product. But today's technological solutions offer companies the possibility of tracking demand in real time. Just in time production also means that inventory levels are kept at a minimum and parts and supplies are only delivered once an order has been placed. It is also possible to exactly track sales, which means that as soon as a products has been sold at the site of a reseller or wholesaler, the deal shows up at the company's production, as well as other, such as the financial and marketing units.

Recently, researchers<sup>55</sup> have argued for less forecasting since it is mainly wrong. Instead, a company should focus on a more flexible production method that reduces the importance of making correct forecasts. The manufacturing facilities should be flexible enough to produce on order. Although it is very true that some of the machines in Volvo CE's inventory require a longer production time, we believe it is possible to cut lead times. The organization should focus on prevention system and analysis that provides instant comparison of the cost of each alternative on market variations to maximize the opportunities. In

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<sup>55</sup> Abrahamsson & Brege, (1995).

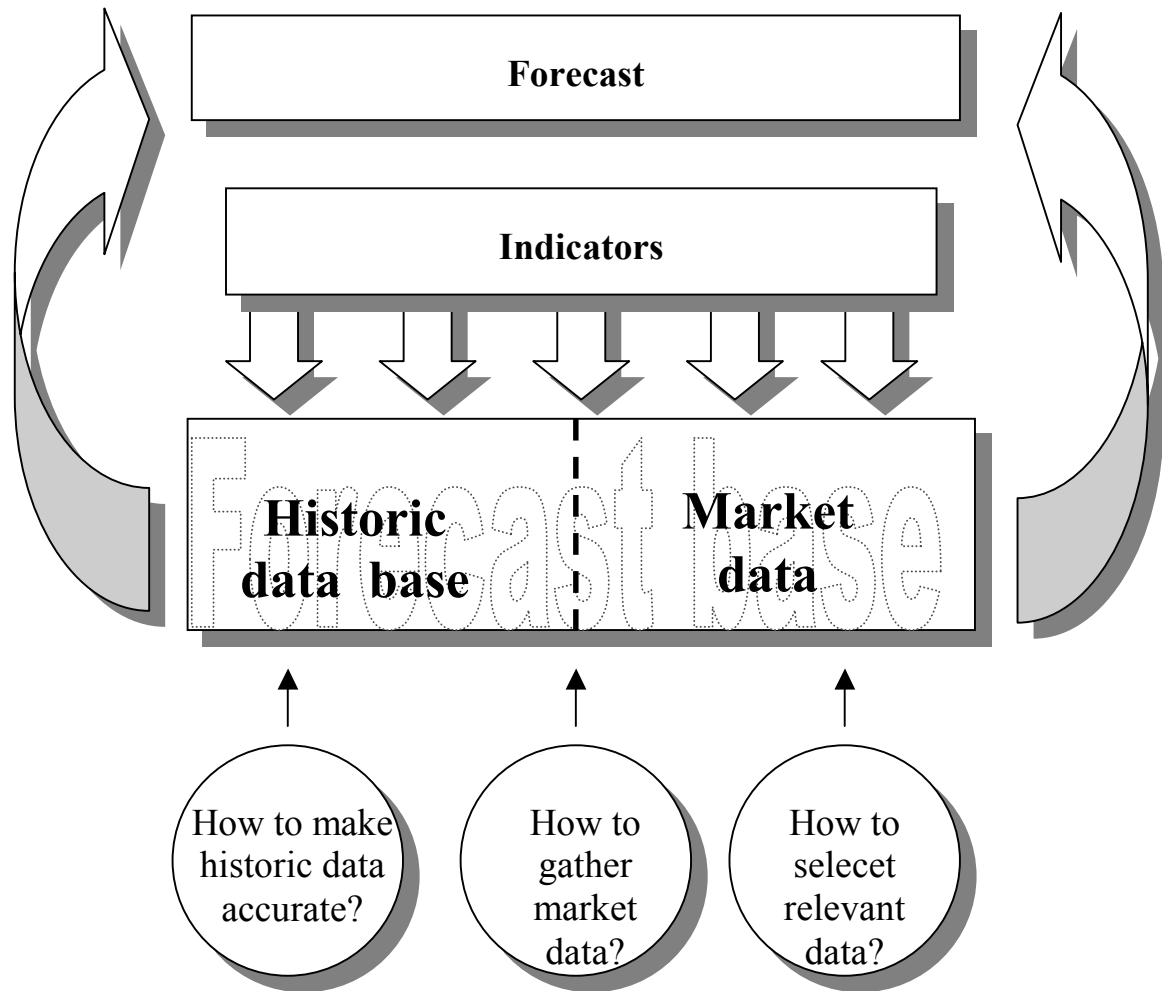
today's global market environment, reaction capacity could be more beneficial than excessive investment in forecasting systems.

### 9.2 The use of indicators

We would like to question if the use of indicators should receive the kind of faith they receive in Volvo CE. First of all we would like to focus just shortly on the word indicator itself. Indicator, or to indicate, implies a prediction of a turn in events. It does not however imply that it offers absolute numbers. As such, indicators would be good to show that there is a trend change about to happen. Another aspect is that indicators need to be used on historical data in order to point at a possible change in a historical pattern.

As one dealer pointed out, indicators are useful for testing possible scenarios on historical data. The idea would be to use several indicators and see what the affect would be given that one of another indicator comes through. Based on that, scenarios can be created to account for different outcomes to a forecast.

We do not claim that indicators should be abandoned. On the contrary! But, indicators should be *a part* of the total forecasting system (see figure 9.1). Datamining and regression analyses, two mathematical forecasting methods, are widely used when working with indicator. They are designed to select and evaluate a large amount of macro economic indicators, and then calculate correlations between different factors that the forecaster chooses. These two methods come to their full use in markets where there is an abundance of statistical data and where the company can input a large amount of correct sales statistics. Combined with the Delphi-method and business confidence surveys, this approach should be highly reliable. In markets where there is no reliable statistical data, datamining and regression analysis cannot be used, and therefore subjective methods are the only way to create forecasts.



**Figure 9.1 The total forecasting system**  
 Source: Our own

### 9.3 Benchmarking

The forecasting system at Cable and Wireless Works at three levels:<sup>56</sup>

At corporate strategy level, the corporate strategy unit in consultation with the CEO and the Regional Business Office carries out forecasting. The forecasts are in line with the mission and scope of the organization, as well as with the mission of the company according to the mission statement. Factors influencing forecasting include the company's culture and resources, the environmental opportunities and threats, which are provided by policies, regulations and changing customer expectations. These forecasts are usually qualitative, using

<sup>56</sup> Gwenocia, (winter 98/99).

such techniques as scenario and Delphi forecasting. The outcome of this is to formulate specific objectives that are disseminated to the functional departments.

Forecasts at the departmental level are formulated with a view to meeting targets set at corporate level, e.g. promoting growth and adding customer value while optimizing the use of resources. The forecasts attempt to answer questions such as; what level of resource deployment is necessary by each department in form of manpower and capital; what teams need to be set up to accomplish these goals; what market and market segments should be targeted? Forecasting at this level is both qualitative and quantitative, and the outcome is to develop market strategy and formulate objectives that will guide activity at the product and service level.

At marketing level forecasting is mainly quantitative and seeks to answer questions such as; what is the demand for each specific product and service; how can the customer's interest be stimulated; what are the competitive conditions in the market for each product or service; at what phase are existing products in their life cycles; can further growth be stimulated and at what cost?

Although this model is not applicable to all industries of companies, it points at the importance of involving every department within the company in the forecasting process. It also shows that different departments have different knowledge of the market and the customers. It is extremely important to utilize the knowledge and information that exist throughout the company. It is also important to carefully define the roles of different departments. This requires a thorough formalized process, including information flows, requirements, aims, goals etc.

## **10. Suggestions for further research**

*In the last part of this thesis we will discuss areas in need of further research and study connected to our thesis. We did not have the opportunity or time to investigate these areas. We believe the suggestions could be of interest for both Volvo CE and as research at university level.*

### **10.1 Using the model on different markets**

We never had the opportunity to apply and test our model. We believe it could be very useful for Volvo CE to test the model to map the indicators affecting the customer purchasing behavior in the large and important, but still very volatile markets in South America, Africa and Asia.

It could also be interesting from a research point of view to map the strengths and weaknesses of the model and see how it works “in reality”.

### **10.2 How to optimize the information flow and communication between dealers and other parts of the Volvo CE organization**

We did not have the opportunity to study organizational issues or technical solutions about communication systems. Communication is hampered by the current organizational structure and it does not support communication between for example the dealers and the product companies. This area of study could be important to Volvo CE since better communication should enhance the quality of the forecasts.

It could also be interesting to address the issue of creating an information system to make it easier for all concerned parts to contribute with new information as well as access and use the information whenever they want.

### 10.3 Studying factors affecting customer behavior

Since we did not get a chance to interview more than one customer of Volvo CE, we have not been able to determine all possible factors that influence the buying behavior of customers. During the interviews we had with dealers, manager and the forecasting department at Volvo CE headquarter, it has become evident that there are a lot of factors influencing the buying behavior or customers. It would therefore be useful to conduct a large amount of interviews with different types of customers. Except for choosing different customer segments, it would also be useful to choose a few countries do more in-depth interviews. Interesting countries would be those with different characteristics, such as Germany, Brazil and one country in Asia. This would give indications of how differently factors in the environment impact on the customer. Once the results of the interviews have been analyzed, it would be possible to identify several indicators that are related to demand for construction equipment. It would also give early warning indicators, not for use in forecasts, but as warning light that a forecast need to be revised because a change in demand is going to occur.

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Josefsson, Hans

President Region International Markets    Interview    Brussels    2000-10-13

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Björkman, Magnus			
Business Controller Region Int. Markets	Interview	Brussels	2000-08-28
	Interview	Brussels	2000-08-29
	Phone- discussion	Göteborg	2000-09-27
	Interview	Brussels	2000-10-13
Thams, Uwe			
Vice President Market Research and Planning	Interview	Brussels	2000-08-28
	Interview	Brussels	2000-08-29
	Phone- interview	Göteborg	2000-10-05
	Interview	Brussels	2000-10-12
Dumail, Marie-Hélène			
Senior Analyst & Project Leader	Interview	Brussels	2000-08-28
	Interview	Brussels	2000-08-29
	Interview	Göteborg	2000-09-06
	Phone- interview	Göteborg	2000-10-05
	Interview	Brussels	2000-10-12
Bertholet, Veronique			
Market Research Analyst	Interview	Brussels	2000-08-28
	Interview	Brussels	2000-08-29
	Interview	Göteborg	2000-09-06
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Information Analyst and Homepage  
Editor

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Phone-  
interview Göteborg 2000-10-05

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Decroos, Bart,

Vice President Excavators European  
Region

Phone-  
interview Göteborg 2000-10-19

### **Volvo Construction Equipment Europe AB, Växjö, Sweden**

Schnabel, Thomas,

Market Analyst

Phone-  
interview Brussels 2000-10-13

### **Volvo Construction Equipment Europe S.A., Trappes, France**

Ferry, Bernard

Sales Administration Manager

Phone-  
interview Brussels 2000-10-13

### **Volvo Construction Equipment International AB, Eskilstuna, Sweden**

Boberg, Torbjörn

Director Market Planning and Research

Phone-  
interview Brussels 2000-10-13

**Volvo CE South America, Curitiba, Brazil**

Kawakami, Yoshio  
President Volvo CE South America      e-mail      2000-11-13  
questions

**Dealers****Swecon AB Swedish Headquarters, Eskilstuna, Sweden**

Nilsson, Jan-Olov  
Forecasting and Marketing Manager      Interview      Eskilstun      2000-11-10  
**Bilia Maskin AB, Kolbotn, Norway**

Henni, Knut  
Marketing Manager      Interview      Kolbotn      2000-11-14

Andersen, Terje  
Product Manager Excavators      Interview      Kolbotn      2000-11-14

Olsen, Sven  
Salesman      Interview      Sarpsberg      2000-11-14

**Swecon AB, Göteborg, Sweden**

Hultgren, Göran  
Sales Manager      Interview      Göteborg      2000-11-20

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Anonymous  
Owner      Interview      Sarpsberg      2000-11-14

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## Appendix 1 – Volvo CE’s product range

### Wheel Loaders



Wheel Loaders are used in heavy primary production to load, carry and unload stone, gravel and earth.

### Excavators



The Volvo and Samsung branded Excavators are used in construction work and civil engineering projects, among other applications. Volvo’s product range includes two different types of excavators; wheeled excavators and crawler excavators.

### Articulated Haulers



Articulated Haulers are used for transport of large volumes of material where roads are nonexistent or poorly developed. Volvo is the world leader in the market for articulated haulers.

### Motor Graders



The Champion branded Motor Graders are used in civil engineering projects and in all work related to the construction and maintenance of highways including clearing snow during the winter months and as haul road operations in forestry applications.

### Compact Wheel Loaders, Excavators and Dumpers



Volvo Compact Wheel Loaders, Volvo Compact Excavators and Pel-Job Compact Dumpers are used in lighter duty and serves as versatile “all-purpose” equipment.

## **Appendix 2 - Questionnaires**

### **Questionnaires (in order of when the interviews were conducted)**

#### **The Questionnaire for the Brussels visit 12-13 of October 2000**

##### **Questions for the Volvo CE HQ**

1. What is the result you expect from a forecast?
2. Do you get the result you expect? If no, Why not?
3. For which purposes do you need to use the forecasts?
4. Can you use the forecasts for these purposes? If no, Why not?
5. How does the forecasting process work?
6. What kind of information do the dealers and salespeople gather?
7. How do they collect the information
8. Do the dealers/salespeople analyze the information?
9. What is the forecast made by the HQ based on?
10. Do you have a margin of error in the forecast?
11. How do you evaluate the forecasts and how often?
12. If the forecasts go wrong, what do you do?
13. Do you use any subjective methods in the forecasting process? If yes, What methods?
14. Are you looking for a single indicator?
15. Are you forecasting single markets or do you forecast regions?
16. Are you making scenarios?
17. How often do you speak with dealers and customers?
18. How well do you know your customers?
19. Do you see the compact market as a business market?
20. What kind of information do you collect on each market (institutional, macro economic etc.)?
21. Do you have any measurements of how much the customers use the equipment on a daily basis?

##### **Questions for dealers/salespeople?**

1. What do you think about the communication with the producer?
2. How often do you talk to the customer?

3. How do you see the market, what is driving the industry?
4. What are the major factors influencing the customers' purchasing decisions?
5. What do you base your forecasting/planning on?
6. What are the effects of public/government procurement?
7. How closely do you watch the actions taken by the government?
8. Do you think the government is influential to the purchasing of equipment?  
If yes, In what way?

### **Questions for customers**

1. Does government policies impact your purchasing decisions?
2. Labor costs, public construction, environment policies, interest rates etc.
3. Which are the drivers for a purchasing decision?
4. Risk willingness
5. Are you prepared to take a high degree of risk?
6. Are you affected by competitor actions?
7. Is financing a deciding factor?
8. What about technology?
9. New technology drives new purchases
10. How does the economic situation in the country affect you?
11. What do you base your forecasting/planning on?
12. What drives you customers to purchase?
13. Do you expect to get the product right away or...?
14. Who makes the decision to purchase in the firm?

### **Follow-up Questionnaire for Volvo CE HQ**

1. Can you give us an example of indicators that you were using earlier but which proved to be inaccurate? For how long were these indicators accurate? Do you know what happened that caused them to become invalid?
2. Are you able/allowed to give a concrete example of indicators you are using right now for some of the product groups?
3. For the USA, what indicators were you using earlier? For how long has the general economy not been in line with sales of construction equipment?



4. What are the current problems in Asia with regards to forecasting? Have you had any reliable indicators for Asia? For South America?
5. Could you supply us with some information and data of a forecast being accurate, and not accurate? For which product group? How large was the difference between the forecast and the outcome? How much have you missed the actuals for total market for one/ all product groups? When and how good has a really accurate forecast been? How close did you come to actuals? You can for instance give us the results of some of last year's forecasts and how they turned out.
6. What do you think were the reasons that you came so close, resp. why you missed actuals?
7. Can you give a short description of the SACS system?
8. Is the SACS system the same as the account management system?
9. How often do you meet with other people, for instance sales managers, sales companies, to talk about the forecasting procedure itself, (not the forecasts)?
10. Is there a consensus of how the forecasting procedure should look like in Volvo CE among all diff. Participants/entities?
11. Can you give a list of the largest customers/ types of customers? Which is the largest customer, mining companies, construction/building companies, rental companies, etc? Can you provide a list of say your 10 largest customers and what type of business they are in?

**Questionnaire for interviews with Swecon AB and Bilia AS (dealers)**

1. Are you in contact with other dealers to discuss forecasts?
2. How does your forecasting process work?
3. What do you base your forecasting/planning on?
4. How do you collect the information?
5. How do you evaluate the forecasts and how often?
6. If the forecasts go wrong, what do you do?
7. Are the forecasts subjective, or do you only use numbers?
8. How often would it be optimal to do forecasts?
9. Do you do customer surveys of buyer intentions?
10. How do promotion effect demand?

11. How often do you have promotions?
12. What kind of promotions do you have?
13. How do you relay information to the HQ?
14. Do you have access to Volvo databases?
15. What do you think about the communication with the producer?
16. How is the internal information system?
17. Is there room for improvements?
18. How often do you talk to the customers?
19. In what way can you gather information about the customers?
20. Who in the buyer organization is most responsible/in charge of a purchase?
21. Do your customers actively do forecasts?
22. Do customers tell you about problems such as problems with payments, number of projects etc.
23. Do customers get orders/projects from governments and if so what type of orders/projects?
24. How do you see the market, what is driving the industry?
25. What are the major factors influencing the customers' purchasing decisions?
26. Which factors affect customers to a large degree
  - Interest rates
  - Oil prices
  - Political decisions
  - Customer barriers/trade barriers
  - Other...
27. Do you monitor for government tenders?
28. How often are you in contact with HQ?
29. How often is HQ in contact with you?
30. Are there room for improvements?

### **Questionnaire for Brazil**

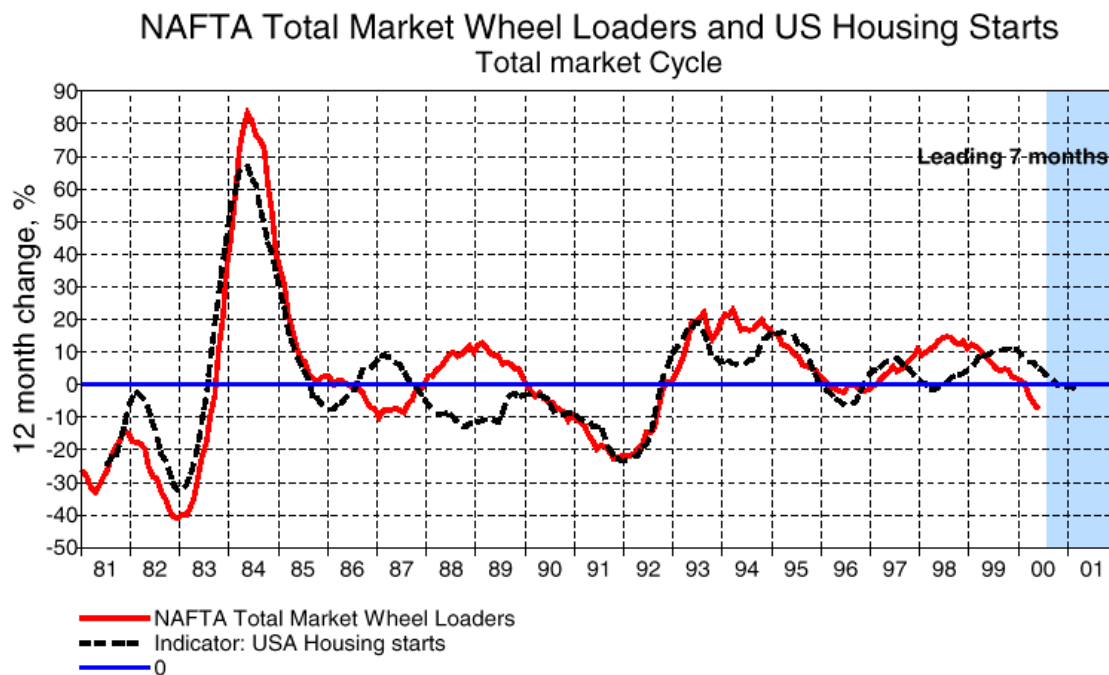
1. What do you think of today's forecasting methods?
2. Is there room for improvements? If yes, what kind of improvements?
3. What do you think about your information exchange with dealers/salespeople?
4. How often do you talk with dealers/salespeople?

5. How do you see the market, what is driving the industry?
6. What are the major factors influencing the total market growth (e.g. the customers' purchasing decision)?
7. What kind of information do the dealers and salespeople gather?
8. How do they collect the information?
9. Do the dealers/salespeople analyze the information themselves or just give it to you?
10. How do you evaluate the forecasts and how often?
11. If the forecasts go wrong, what do you do?
12. How often would it be optimal to do forecasts?
13. How do you relay information to the HQ?
14. How is the internal information system working?
15. Is there room for improvements?
16. Which factors affect customers to a large degree
  - Interest rates
  - Oil prices
  - Political decisions
  - Customer barriers/trade barriers
  - Other...
17. Do you monitor for government tenders?
18. How often are you in contact with HQ?
19. How often is HQ in contact with you?
20. Are there any other weaknesses you would like to mention?
21. Are there any other improvements you can think about?

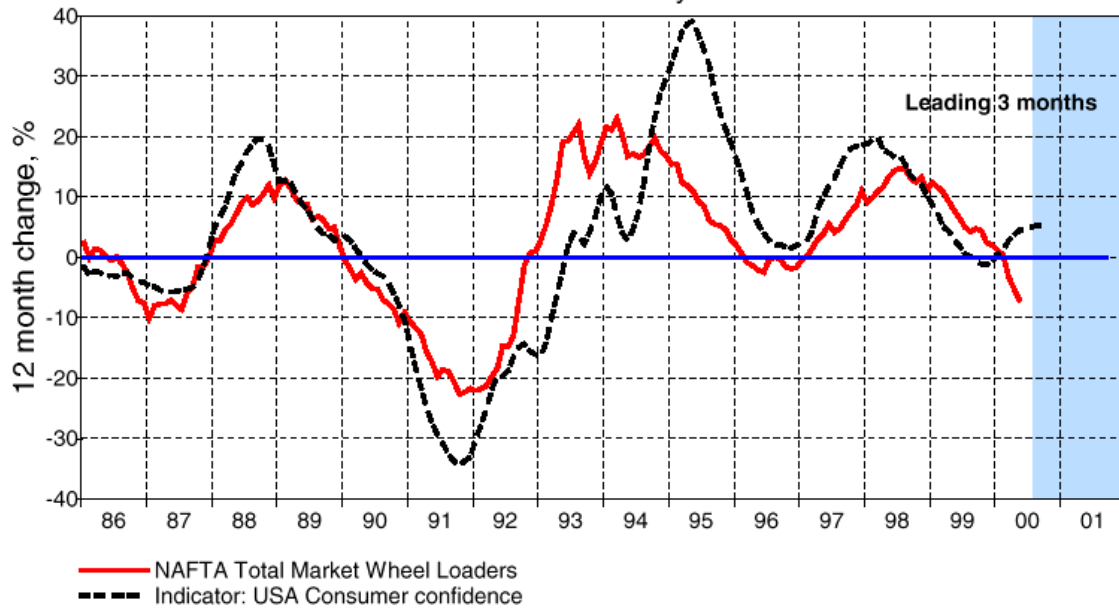
## Appendix 3 – Volvo CE’s leading indicators

### USA

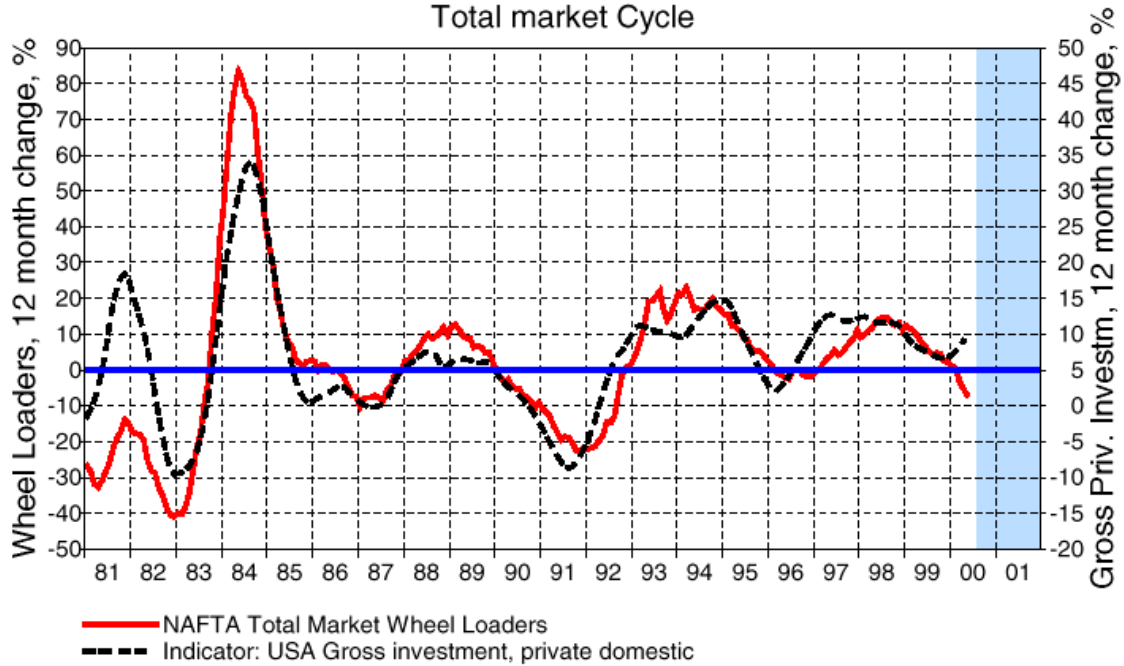
- The market for construction equipment is, as in Europe, 3- 6 months ahead of the truck market in the economic cycle. The market is showing especially high correlations with the housing sector and investment indicators.
- Yet, over the past six months the total market for Wheel Loaders have been weaker than what the macro economic indicators suggest.
- Opposite to the actual development seen so far this year, the majority of the EWI’s still suggest that the construction equipment market will show neutral to weak positive growth by year- end 2000.



NAFTA Total Market Wheel Loaders & US Cons. Confidence  
Total market Cycle

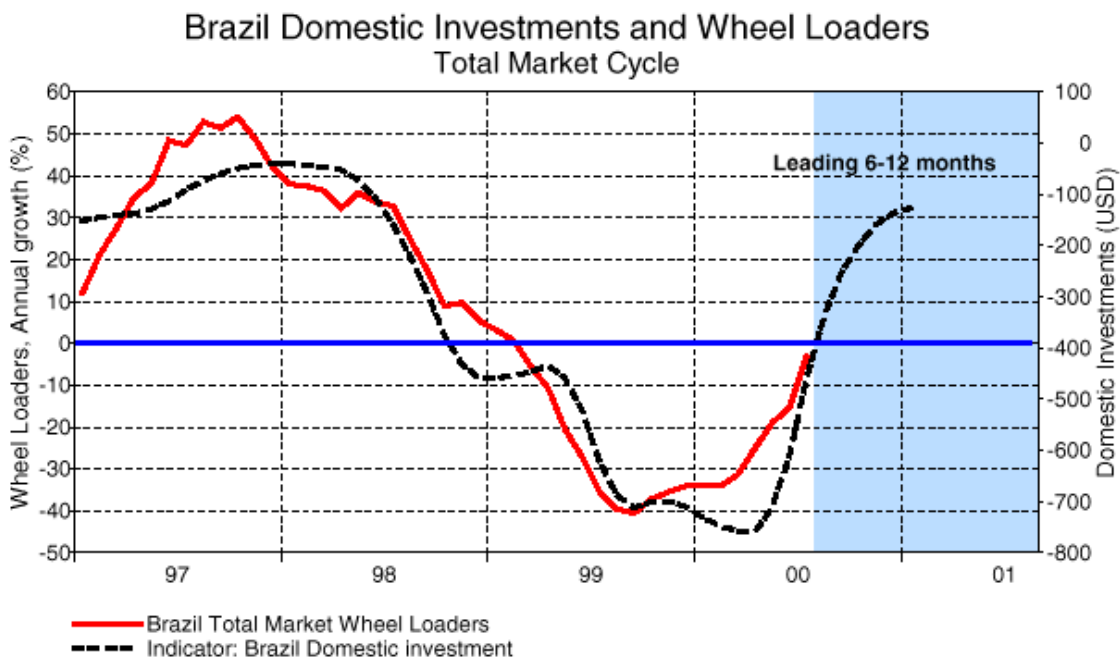


NAFTA Total Market WL and US Private Domestic Investments  
Total market Cycle

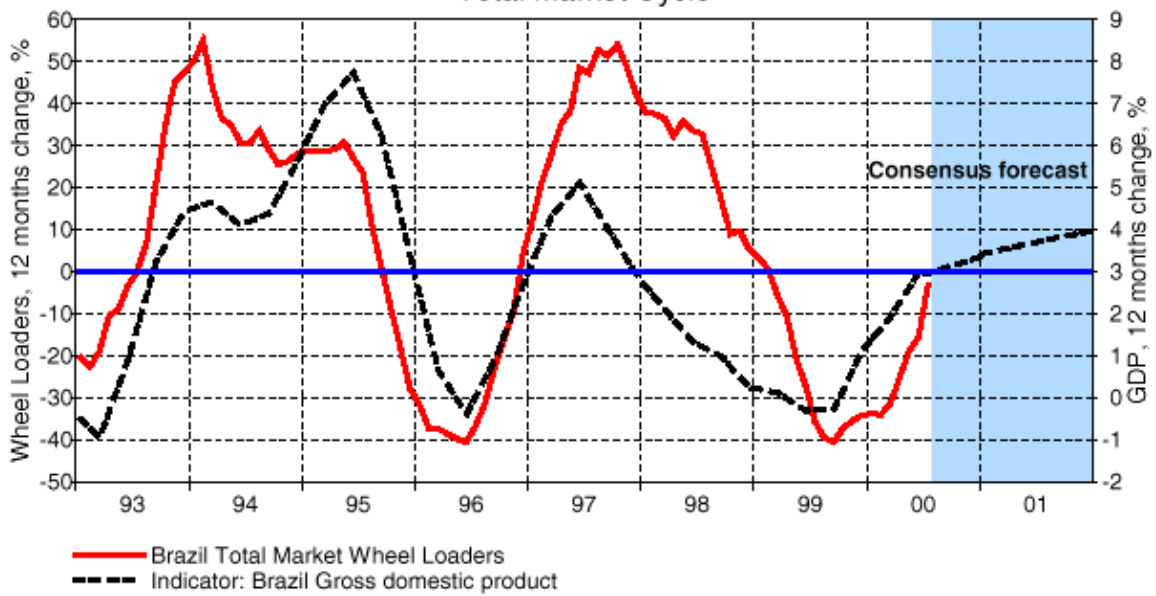


**Brazil**

- The Brazilian market for construction equipment is 3- 6 months behind the truck market cycle. Graders are showing the highest volatility. The cycle of Excavators has historically deviated somewhat from the cycles of Graders and Wheel Loaders, but they move closely together recent years.
- The market for construction equipment show high correlation with the overall cycle of the economy; GDP growth and industrial production. Asset prices and commodity prices hold a high correlation in particular.
- The market for construction equipment are bottoming out as expected. The positive development in Brazil will be supportive of the construction market throughout the year. This view is further supported by the EWI indicators, suggesting a positive growth rate in 2000 around 20- 25%.



Brazil GDP and Total Market Wheel Loaders  
Total Market Cycle



Brazil Business Cycles  
Construction Equipment, Trucks and Buses

