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# Poor quality costs

## a case study in VBS

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# ABSTRACT

This is a case study of poor quality costs in the accounts payable process in Volvo Business Services AB (VBS). VBS is a new company that was set up three years ago as a shared services centre for the Volvo Group. Their main purpose is to co-ordinate parts of the business administration in all of Volvo's Swedish companies and business units, and the accounts payable is one of the services provided.

The purpose of the study is to find poor quality costs that exist in VBS, define their causes, and give recommendations to VBS as to how to improve quality. Primary data collected through brainstorming, interviews, discussions, and observations is the primary source of information used for the results and analysis.

The results show that the largest poor quality costs exist in the activities of handling interest invoices and payment reminders. This is quite natural since these activities are at the end of the process, and are the result of problems occurring throughout the invoice process. Another problem causing large poor quality costs are incomplete invoices that cannot be processed by VBS because information is lacking or is incorrect.

There are problems in both VBS as well as in their customer companies causing the poor quality costs. Some problems are caused by the customer companies not carrying out their parts of the invoice process correctly, another is the stressful working situation in VBS, as well as the relationship between VBS and the customers, where the responsibilities of each part are not always clear.



**Key words:** quality, poor quality costs, accounts payable, invoice processing, shortcomings, shared services

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# 1 INTRODUCTION

*This chapter will include a background description, and problem analysis on the subject of this study, and the reason why this is an interesting area to investigate, both for the specific company chosen, and for ourselves. The purpose with the study will also be stated, as well as the delimitations made. The chapter will end with a layout of what will be included in this thesis.*

## 1.1 BACKGROUND

Quality and poor quality has always been an interesting area of study, but the attitude towards quality and the meaning of quality has changed over time. This has been especially obvious during the last decades, with the increased focus on quality. A long time ago, the quality of products was high since they were purchased directly from the craftsmen, and the customers' requirements were known. Because of this, the craftsmen were forced to maintain high quality, otherwise they would stand the risk of loosing their customers. The situation on the market has then changed, with the introduction of mass production methods at the beginning of the 20$^{th}$ Century, companies became more specialised. Some large companies produced high-volume products and each worker became a specialist within his area. Most companies focused mainly on producing large quantities, in order to meet the market's demands for high volumes. (Lund et al, 1990; Tisell, 1991; Jönson, 1995; Sandholm, 1997) Today, more and more companies are providing services, and the competition on the market has intensified. This forces the companies to continuously improve their quality, and most companies today have started to undertake quality improvement activities. Companies have become aware that improved quality will lead to more satisfied customers who will return, which in turn leads to higher market shares and hopefully higher profits.

Quality is interesting primarily because it is a potential source of large costs, but also a way to decrease total costs by having better products and processes. Previously, the main focus was on quality in manufacturing processes, and trying to improve production. During the past decade companies have also started to focus on quality in service

production, since we are moving from an industrial society towards a service producing society. As the products become more and more similar it has been important for companies to focus on the services they provide, and ensuring that they are of high quality. (Gummesson, 1996) Moreover, with the high level of competition that exist in almost every industry today, it is necessary for all companies to try to reduce their costs and capital tied up, e.g. in fixed and current assets. This can be done by having high quality in both the final products and the processes, where high quality is usually the result of more efficient operations and less non-value adding activities. (Sörqvist, 1998) One way of doing this can be to set up a shared services centre, which can provide both high quality services and lower costs, by consolidating some operations in one location, thereby trying to reach economies of scale. The increased interest in quality the last time-period has also lead to that companies are looking for new methods and new ways of organising their businesses. To be process-oriented is one recently developed strategy that many companies have used in order to try to improve their quality level.

## 1.2 PROBLEM

The concept of quality is very comprehensive and includes many different concepts. Quality is abstract and subjective, e.g. some feel that good quality is a perfect product without defects, and some feel that it is products delivered in time, and this variation creates a problem. After going through literature on quality, we can see that there is no single definition that is accepted by everyone. Since definitions of good quality differ, definitions of poor quality, and its costs, differ as well. Looking at poor quality costs is one way of working with quality, i.e. finding out how much is spent/lost on not having good quality.

Some instances of poor quality, e.g. scrap, rework, and delayed payments, are fairly easily found and their effects (costs) are known and measured. However, most of the poor quality costs are difficult to identify and calculate because many are ‘hidden’, i.e. not reported in the regular accounting system, or even known. One example of a hidden poor quality cost is the cost for having inefficient routines.

Most companies are not aware of that they have inefficient routines, and those who are aware have difficulties in estimating the value, or cost of this problem. Especially in service companies the poor quality costs can be difficult to find since there are no tangible products to control and measure. Since poor quality costs in administrative and support processes are often estimated to 20-40% of their total budget, it is important to pay attention to these (Harrington, 1987). This estimate is consistent with the judgement made by Swedish industrialists, stating poor quality costs in their companies to be well over 20% (Sörqvist, 1998). Since definitions of poor quality, and its costs, can differ between companies, leading to that they measure different items when assessing their poor quality costs, the poor quality costs are specific for each company. Thus poor quality costs amounting to 20% of the turnover in one company is not necessarily better than poor quality costs of 30% in another company. (See also section 5.6.6.)

Today, quality in products and services has become an important success factor for many companies, and thus also an important part of every company's economy. All companies must consider their costs and keep them under control, and this includes costs of quality. We find the topic of quality costs to be interesting and we wanted to learn more about quality, and how a company is financially affected by quality and poor quality. One way of learning would be to look at poor quality costs in a specific company. Through personal contacts within Volvo Business Services AB (VBS) a discussion came up that we could do a project there.

VBS is a fairly new shared services centre within the Volvo Group, providing business administration services to their customers and they have a process organisation. The company was created nearly three years ago with the aim of finding economies of scale in the different processes, and to be able to make rationalisations. The company's organisation is built up around processes rather than around traditional departments, in order to try to achieve a smoother flow within each process. The main process is the accounts payable (A/P) process, employing more than one third of the workforce. The main product, or service, being provided by the A/P process is to pay their customers' invoices, and the service is delivered when an invoice has been

correctly paid to the right supplier. The A/P process is divided into two parts, one dealing with production material invoices, and the other with non-production material invoices, because invoices for each type of material are processed quite differently.

Setting up VBS meant that business administration within Volvo started again from scratch, by setting up new processes, implementing a new business system, introducing new work methods, and moving people to a new location. As any company starting from scratch, VBS experiences difficulties with creating a well functioning organisation with efficient processes. Also, the work being moved from the customer companies to VBS was much larger than expected, and most of the time so far has been spent on just trying to do the job, and solving old problems, rather than being able to actively work with improvements and rationalisations.

In Volvo and VBS, the goal is to have uniform processes, i.e. processes where the tasks are carried out in the same way by everyone working there, where people have a good understanding of the processes, and of how their work fits in to the overall picture. Mostly because of the heavy workload, people have not been able to entirely reach a uniform way of carrying out their work, thus a good and stable quality level has not yet been reached. The lack of uniform work routines is seen as a shortcoming, or instance of poor quality. As a service producing company, VBS is dependent on the customer, and the customer performing part of the service as a co-producer, e.g. the customers purchase goods and thereby initiates an invoice, and must also approve the invoices. VBS feels that another part of their quality problem is that their customers do not always perform their part of the service correctly. VBS is aware of these quality problems, and is interested in having them evaluated, i.e. have their poor quality costs identified.

With our interest in the financial side of quality, and their need for an evaluation of possible poor quality costs in the A/P process, it was decided that we would perform such an evaluation. The A/P process was suggested by them since this is where they feel the largest need for an assessment. After some discussions, it was decided that it would be beneficial to VBS if we studied the poor quality costs in the non-

production material part of the A/P process, as VBS felt that they did not have an overall picture of the quality problems that might exist there. Finding out the poor quality costs can also help VBS to prioritise between improvement projects, i.e. which problems to start focusing on. Moreover, it can be useful in negotiations with the customers if VBS can show them the costs for not performing their part of the process correctly, and in time. The study was not a project ordered by VBS, but rather the result of discussions of things they might need and things we were interested in doing.

## 1.3 PURPOSE

Our purpose is to conduct a study of the non-production material part of the accounts payable process in VBS, in order to assess poor quality costs, and analyse them, as well as giving recommendations to VBS for how to improve their quality. By analysing the poor quality costs we mean to calculate their size and frequency, and to find the causes behind them.

## 1.4 SCOPE AND LIMITATIONS

Mainly because of the time limitations for this study there are certain limitations for the scope that need to be done. This study is done in order for us to be able to take a model and use it in a real company and see what we come up with, as well as showing what poor quality costs can be found in VBS. It is outside the scope of this study to evaluate all possible methods that can be used to find instances of poor quality and to calculate the costs. Also, with the study being the first one of poor quality costs in VBS, we follow the recommendations given by Sörqvist (1998) that a first time study should be a rough assessment that is kept simple in order to find the major problematic areas and the costs for these. Therefore we have chosen to limit this study to be an implementation of one such assessment model described by Sörqvist, including a deviation analysis (described in section 5.8.2).

This study has been performed between September and November, 2000, and thus included those poor quality costs that existed in VBS during this time, and how common they have been during this period.

Our study looks at poor quality costs only in the non-production material part of the A/P process, as VBS feels that they do not have an overall picture of the quality problems that might exist there.

There is also a need to limit the study in regard to what poor quality costs that will be included. Because of the time limit we concentrate on activities carried out at VBS, and try to find poor quality costs that arise in VBS, and not in those parts of the process carried out in the customer companies. The problems causing the costs can lie in the customer companies or in VBS, but the effect of the problems is extra, unnecessary work and thus poor quality costs at VBS. That the costs arise in VBS does not mean that VBS stands for all these costs. The customers are charged through the standard price for the services, and some are charged extra for extra services provided beside the standard service. It is outside the scope of this study to discuss how the costs are divided between VBS and the customers, and who actually stands for the costs, or whether VBS can fully influence the costs themselves or not. This study includes those poor quality costs that arise in VBS.

## 1.5 CHAPTER LAYOUT

This thesis contains a total of nine chapters and five appendices. The report is structured so that the information is presented to the reader in a logical sequence, and so that the necessary background information is presented before going further into detail. The contents of the chapters are as follows:

*Chapter 2, Method,* will describe different aspects of methodology, things that one must consider before starting the research study. For example, different ways of carrying out a study will be discussed as well as different ways of collecting information. The purpose of this chapter is to make the reader understand our methodological choices.

*Chapter 3, Shared services,* will explain what is meant by the shared services concept and how it has developed, as well as the advantages and disadvantages with shared services centres. The aim of the chapter is to give the reader enough information to better understand the specific circumstances of VBS.

*Chapter 4, Processes,* will provide an insight into what processes are, how process-orientation effects an organisation and its operations. The purpose is to show how process-orientation can be a step towards improving the quality of a company's business.

*Chapter 5, Quality concepts,* will give an overview of quality and different quality concepts, such as poor quality, as well as the costs that may be caused by quality, or poor quality. The purpose of this chapter is to provide an understanding of the basic concepts behind the study and why it is important for companies to consider such costs in order to be more competitive.

*Chapter 6, The case study,* will describe VBS and the accounts payable process. The descriptions are based on information from written material such as a business plan and brochures, as well as documents from the Volvo Intranet, and first hand information from interviews and discussions with personnel at VBS. The chapter will also include a discussion about how we look upon quality and poor quality. The purpose with these descriptions is to provide a picture that will help the reader understand the results.

*Chapter 7, Results,* will present the identified shortcomings, the costs that follow from these, and the causes for the shortcomings. This will be presented for each activity in the non-production material part of the A/P process.

*Chapter 8, Analysis,* will analyse the poor quality costs and the causes. Also, the root causes, and the consequences of poor quality will be discussed.

*Chapter 9, Conclusions,* will present the conclusions drawn from the study, and give some recommendations as to how the results can be used, as well as giving suggestions for further research.

*References,* includes a list of direct references from the text, indirect references, e.g. background information, and a list of interviews.

# 2 METHOD

*This chapter will describe different aspects of methodology, and things that one must consider before starting the research study. For example, different ways of carrying out a study will be discussed as well as different ways of collecting information. Each paragraph will end with a motivation for the choice we have made for our study. The chapter ends with a research plan and description of the steps taken in the study.*

## 2.1 RESEARCH APPROACH

There are mainly two different ways to approach science and scientific studies, the positivistic and the hermeneutic approach. The main theme in the positivistic approach is the faith in scientific rationality. Knowledge must be tested empirically and measurements shall replace judgements and estimates. There are high demands on the methods used to provide reliable information, and that means that validity and reliability are important. A goal with the positivistic approach is to describe and explain a phenomenon. This approach requires the researcher to locate cause-and-effect relationships where all pieces should constitute an entirety, with the overall purpose to draw general conclusions. The researcher should be objective, and must not be affected by non-scientific values and must also not let his or her own values affect the result. (Wallén, 1993)

Within the hermeneutic approach the researcher is trying to achieve an understanding of the totality, and obtain insight. The hermeneutic approach means that the researcher strives to understand another person or object, and the best way of doing this is to interpret texts, events, experiences, etc. The starting point is the so-called pre-knowledge, and this knowledge increases as one acquires more knowledge through studies and interpretations. In this approach the researcher goes from understanding parts of the whole, to the whole, and then back again. This interaction is done by using a dialogue, the researcher asks questions and is influenced by the answers he receives, and the answers lead to new questions, and thus it continues. The interpretations must be made in relation to the context, and by

interpreting and connecting the parts into a whole, the researcher can thus receive a complete understanding of the subject. (Wallén, 1993; Eriksson & Wiedersheim-Paul, 1997)

In our study, interviews are performed with different interested parties in an attempt to reach a full picture of our area of research. Our point of departure is our own pre-knowledge, understanding, impressions, thoughts, and attitudes that we possess, which is used to interpret and understand the objects of our study. The interviewees answer questions subjectively based on his or her pre-knowledge, based on their previous working experience. Our knowledge is developed as the study moves along by having interviews and interpreting other material, and then the new knowledge is the basis for the next step of information gathering, until a full understanding of the research topic is reached. The poor quality cost concept is described and explained, and the study measures their size and finds reasons for the poor quality costs in our case study company. Thus our study ends up being a mix of both approaches, hermeneutic in the way it uses newly found information to guide the next step in the study, and positivistic in they way it is trying to understand and measure a phenomenon, and finding cause and effect relationships.

## 2.2 RESEARCH PERSPECTIVE

This concerns the perspective the researcher has when approaching the empirical reality, i.e. the part of the reality that is studied. In the literature there are mainly two perspectives, deduction and induction, which are often seen as opposites. But they can overlap and even be used together. Many scientists have also discussed a third perspective, abduction, which is a combination of the other two. The choice of perspective depends on, among other things, the specific research issue. (Johansson Lindfors, 1993)

The deductive perspective means that the research goes from theory to empirical reality, and usually has an objective outlook on reality. In the deductive perspective the researcher creates a theory or model meant to reflect the reality and/or describe how the specific matter is working based on literature studies and pre-existing knowledge. The developed

model is confronted with the empirical reality with the purpose to verify whether it is true or not. This perspective requires a lot of work before the actual study or information gathering takes place. Limiting the problem, constructing a model and dividing variables into components are some of the difficult and time demanding research problems to be solved before going out into the empirical world. A risk with this perspective is that the theory model that is being tested is built on false or wrong assumptions, so even if the testing verifies the model, the whole theory may still be incorrect. (Johansson Lindfors, 1993)

The purpose of the inductive perspective is not to test a theory but rather to generate one, i.e. to discover or form a theory, by going from empirical reality to theory. The way the empirical reality is approached is primarily governed by the knowledge or understanding that is developed as the study proceeds. Therefore the research plan cannot be fully planned but must grow during the execution of the project, and the researcher must thus have an open and questioning attitude. When using an inductive perspective, most of the work needs to be done during and after the information gathering. The choice of objectives studied, and the interpretation of these and new objects is a continuos process that proceeds until the developed knowledge or theory is ready, and the researcher decides to finish. It can be difficult to know when a good theory has been fully developed and there is a risk that the created theory is not a good reflection of the studied reality. There is also criticism of the inductive approach, since the generated theory, or result, may not easily be transferred to other situations, or made general. (Johansson Lindfors, 1993)

This study uses as many inputs as possible in order to better and easier understand the empirical reality of VBS. Through the case study we are trying to describe how a phenomenon, i.e. poor quality costs, looks in a specific case. To adopt an abductive perspective is appropriate in this case study, as theory has been used to inspire us in our study, not to be tested or generated as in the previously described perspectives. In the abductive perspective there is an interaction between deduction and induction, and the researcher is continuously inspired by theory while studying the empirical reality and going back and forth between the

two. We started with a literature study to learn more about the topic and get ideas for how to carry out the study of poor quality costs. As we made interviews and observed and learned more about the case company, a plan for how to carry out the study was formed based on the theory being studied. Theoretical ideas guided us in our identification and calculation of the poor quality costs. (Johansson Lindfors, 1993)

## 2.3 RESEARCH METHOD

The method used when collecting, processing and analysing the gathered information can be either quantitative or qualitative. The use of a qualitative method means a low degree of formalisation, and data is collected through interviews and observations. The research bears the stamp of the researcher, as the researcher is the primary data collection instrument. (Merriam, 1988)

Usually much information is gathered on a few objects, thus the investigation is in-depth and this makes it possible to acquire a better understanding of the specific research problem. The purpose within qualitative analysis is to identify and determine so far unknown or unsatisfactory known phenomena, characteristics and meanings concerning their variations, structures and processes. (Starrin & Svensson, 1994)

The quantitative method on the other hand is more formalised, structured and standardised, and the information is converted into numbers and quantities that are used for statistical analyses of how much or how many of something exists. The method is broader, i.e. one has little information about many different objects, and the purpose of the quantitative analysis is to investigate how pre-defined phenomena, their characteristics, and meanings are spread in populations, events or situations. The results are usually precise and narrow, and the sample tends to be large, random, and representative. The researcher collects data without his or her influence, through e.g. the use of tests, questionnaires, etc. (Merriam, 1988; Starrin & Svensson, 1994)

Our study uses a qualitative method since it is aiming both at understanding and explaining, as well as measuring poor quality costs. The investigation needs to be broad and unstructured, and uses many different ways to collect information, primarily interviews. The first part of the study uses interviews, documents and general discussions to acquire a picture of the company and the process. When further interviews have been used to find specific problems and instances of poor quality, discussions with persons from all activities in the A/P process were held to find good estimates of the size and frequency of the problems. There is too little quantitative information about problems and poor quality available in the company to make possible the use of a purely quantitative method possible. A first time assessment of poor quality costs, such as our study, is more focused on understanding and finding rough estimates than on finding the exact costs throughout the entire company, or analysing them statistically. Therefore the use of a purely quantitative method is not quite appropriate.

Connected to the qualitative and quantitative research methods is the concept of qualitative and quantitative information. Information that is expressed in words or used to put forward a complete description of what is being studied can be called qualitative, whereas information presented by numbers used to underline measurable qualities in what is being studied can be called quantitative. Qualitative information contains detailed descriptions, direct quotes, and extracts from texts, and they make up detailed and deep raw-data from the empirical reality. Quantitative information can tell us how much and how many of something there is, and what the proportion looks like. Both kinds of information are interpretations of experiences, in one case the interpretation is through words, in the other it is through figures and numbers. Quantitative information can come from surveys, and can be used to support the results from qualitative data. (Merriam, 1988)

Our study requires both quantitative and qualitative information to reach a good understanding of the poor quality costs, and to make good measurements. Both kinds of information have also been used to support conclusions made, both in regard to what poor quality costs exist and to their size, as well as to the reasons behind them.

To use several different methods to collect data can be called triangulation and is beneficial since it combines methods whose weak sides are often the strong sides of another method, and is especially applicable in case studies. (Merriam, 1988)

## 2.4 CASE STUDY AS RESEARCH STRATEGY

There are different strategies for how to conduct a study depending on what the problem looks like, which questions it raises, and what end result the researcher is looking for. Qualitative case studies are especially suitable when dealing with critical and practical problems, and to increase the knowledge base. It is usually the best method when handling problems where one must gain an understanding before practise can be improved, as in our case study. (Merriam, 1988)

A case study is a study of a specific phenomenon and it can use any method to collect information, e.g. as tests, interviews, surveys, or documents. A bounded case is chosen because it is considered interesting and important, or because it forms some kind of hypothesis, and focuses more on insight, discovery, and interpretation than on hypothesis testing. The description in a case study is often rich and extensive, and should include as many variables as possible and describe their interaction over a longer time period. (Merriam, 1988)

So, the case study is chosen depending on the nature of the research problem and the questions being asked. This strategy should be the best way of answering the questions, and the advantages should outweigh the disadvantages. The method is anchored in real-life situations and thus results in a rich and holistic account of the object being studied. It offers insight and enlightenment in a way that will expand the reader's knowledge. These insights can also be developed into 'tentative' hypotheses that can help structure future research. However, the usefulness of a case study can be limited if it oversimplifies or exaggerates factors in a situation leading to the reader drawing the wrong conclusions. There is also a risk that the reader believes the case study to be an account of the whole situation rather than just one part of it. Finally, with the researcher being the primary

instrument for gathering and analysing the information, his or her sensibility and integrity can limit the usefulness. (Merriam, 1988)

Since our thesis is looking at one single company and aims to have an understanding of one process within the company, performing a case study becomes the natural choice. More specifically, we want to get a picture of poor quality costs in VBS and understand why these costs occur, which requires a more comprehensive study of the process and the people working within it. Identifying poor quality costs is a complex task, and theories and models are still rather new and therefore not extensively developed. In addition, poor quality costs are rather specific to each company, and the possibility of drawing specific conclusions from such a study and then try to generalise them is very limited.

## 2.5 DATA COLLECTION

Depending on the research perspective and strategy chosen, the researcher must choose methods for collecting data. The data or information collected by the researcher can be either primary, i.e. the researcher collects the material himself, or secondary, i.e. already documented material is being analysed. The information can also be either qualitative or quantitative.

### 2.5.1 Primary data

Primary data is usually collected by the researcher for a specific project through interviews, surveys, or observations. Interviews can be used in many different kinds of studies and can therefore be used with different purposes and in several different ways. In each study one must identify which kind of interview to perform, which persons to interview, which technique to use, and how to analyse the information.

Interviews can be more or less standardised. Highly standardised interviews have exactly formulated questions set in a specific order to be used in the same way in each interview. The non-standardised interviews are more flexible, and the wording of the questions and their order can be different for each interview. The point is to receive

answers that provide all the information needed. Non-standardised interviews are more suitable for collecting 'soft', or qualitative, data, for example how people judge a situation. (Lundahl & Skärvad, 1999)
Besides the level of standardisation one can also talk about the interview process being structured or free. In the structured interview the interviewer has set up the purpose with the interview in advance, the questions have been formulated in order to systematically go through the area of interest, and the interview is information-focused. The free interview has a broader purpose and is not only information-focused but also person-oriented. It aims to find the respondent's evaluations, attitudes, and opinions as well as pure facts. The response format can also be more or less structured, varying from multiple-choice questions to open-ended questions. (Lundahl & Skärvad, 1999)

The advantages with interviews are that they can be performed rather quickly, allow for complicated questions, and provide an opportunity to follow up questions. The largest disadvantages are that interviews are not good for sensitive questions, and that the interviewer can unduly influence the interview. (Wiedersheim-Paul & Eriksson, 1997)

Most of the information from VBS and their customer companies has been collected through the use of interviews. The primary data is mainly qualitative information about the company, the process, and the work routines. In qualitative studies such as ours where we do not know enough about the phenomenon to be able to ask relevant questions but rather need to learn as much as possible, the semi-standardised interview is especially suitable for collecting such primary data. The interviews in our case study were held in order to get facts, as well as opinions and estimates. Interview guides were made to make sure we covered all areas we needed information about (see appendix 1). Interviews rather than surveys were used, as the questions needed to be adjusted to each situation, and person.

There is a risk that sensitive questions about problems are not completely, or correctly, answered. There is little, if any, reason for the respondents not to be open about problems they encounter, since VBS are aware that they have problems with poor quality, and are interested in the results of our study. We also emphasised that there would be no

disclosure of who said what, and that our interest is in what problems and errors exist, not in who makes them or who has specific problems on an individual level. In interviews there is always a risk that the researcher influences the situation and what information is given. But in this case the benefits with a personal interview, where answers can be long, and topics that suddenly arise during the interview can be discussed further, outweighed that risk.

Tape recorders are sometimes used during interviews. The benefit with this is that one does not need to worry about not remembering everything that was said during the interview. A disadvantage, in general, is that some respondents can be uncomfortable with tape-recorders, and might not express their true opinion. We asked every interviewee if we could use a tape-recorder, and when the respondents permitted (i.e. they themselves said they would not mind), it was used so that we could go back and compare our notes with the tapes. The respondents discussed many problems and negative aspects of their work so we do not think that they were not open, and held back negative information. The feeling we had in this case study was that after a long conversation, the respondents were open and wanted to share their opinions with us (see section 2.8 on more details about the interviews).

### 2.5.2 Secondary data

Secondary data is data that has been collected and used for other purposes than the specific study, and has been documented in some form, e.g. books, annual reports, protocols, and Internet documents. Since secondary data is easy and fairly inexpensive to collect it is often used at the beginning of a research, in order to provide a basic understanding of the problem at hand. Sometimes secondary data is the only available information. However, one must always make sure that the information used is valid, reliable, and relevant to the study and its purpose. (Lundahl & Skärvad, 1999)

The researcher must critically view all documents used, especially in regard to source, originator, reasons for writing the document, and the circumstances in which they were made. Secondary data should be

used when it gives better, or more, or cheaper information than primary data. An advantage with secondary data is its stability, since the researcher cannot influence the material, i.e. it is objective. It is especially good for qualitative case studies since it can give the study an empirical background for the problem being studied. (Merriam, 1988)

Our study started by using secondary sources, i.e. books and articles, to get an overview of the subject and to get ideas on how to perform this kind of study. It also included documents from the VBS Intranet and reports from the accounting system. Such reports provided us with ideas for what problems exist and what kind or poor quality costs we would be able to identify and measure, and also with quantitative information used to calculate the frequency and costs of poor quality. The theoretical material read has included books, studies, articles, and theses by many different authors, and therefore we have not followed only one line of reasoning. The internal material from Volvo and VBS is fact-based and expresses no views or opinions that could be biased or misinterpreted.

## 2.6 SELECTING SAMPLES

Since it is impossible to interview everyone, observe everything, and collect all relevant material the researcher must choose some kind of sampling strategy. After defining the case to study, and when and where it will be performed, the researcher must decide on a sample. There are two basic types of sampling strategies, probability and non-probability sampling. Both can be used in case studies, but the non-probability sampling is the primary method in qualitative case studies. The difference is that in the probability sample the researcher can specify for each element of the population the probability that it will be included, whereas in the other sample there is no way of estimating the probability or even assuring that each element has a chance of being included. (Merriam, 1988)

The choice of sample must be based on the need to generalise the results, and to what purpose the sampling is made. In a case study, where generalising in a statistical sense is not a goal, the sample must

not be based on probability for something to be included. The non-probability sample can differ depending on the purpose with the sample. The purpose can be to discover and understand and gain insight and then a so-called purposive sample can be used, in order to learn as much as possible. The purposeful sample is the same as a criterion-based sample, where criteria are described for an element to be included and then one looks for a sample that fits these criteria. The criterion-based strategy is used to identify a sample in the early stages of a study, and the criteria for the sample can be e.g. comprehensive, typical-case selection, unique-case selection, reputational-case selection, or comparable-case selection. In a case study where the researcher aims to explore an area that is rather unknown to him or her, the reputational-case selection can be suitable, because then someone who is both familiar with the area of study and the persons in the possible sample can recommend suitable persons to study based on the criteria set by the researcher. Then the researcher chooses persons based on these recommendations. The questions and assumptions that are typical to qualitative case studies often lead to the use of different forms of non-probability samples. (Merriam, 1988)

In line with other criteria for qualitative case studies this study has used non-probability samples, when it comes to deciding whom to interview or discuss with. We have chosen persons after a number of names were given from the group managers in the studied part of the process at VBS (of which one is our tutor), and other experienced persons in the case company or its customer companies, as examples of persons meeting our criteria, i.e. to be experienced with good knowledge about the activities, and an ability to communicate problems and opinions they have encountered. This way we have come in contact with persons with much knowledge, who have been able to give us a rich picture of the topic of interest. This is more useful to us than trying to find ‘representative’ members of the staff since we are not looking for representative opinions, but rather to get as much information as possible about VBS, the activities, and the problems that exist. For the discussions held later in the study, about time spent on shortcomings, the sample has been exhaustive, except in the largest set of persons talked to, where we tried to have a representative sample, talking to about half of them.

## 2.7 EVALUATION OF THE RESEARCH

All research aims to produce valid and reliable knowledge in order to have an effect on theory and practise. The study must be able to present results that seem correct to the reader and other researchers. How the researcher has collected, and analysed the information, and whether these methods were suitable or not, influence the validity and reliability of the study, and must therefore be evaluated. (Merriam, 1988)

### 2.7.1 Internal validity

Internal validity concerns the question of how the researcher's findings match reality; do the findings capture what is really there? Are investigators observing or measuring what they think they are? Some points to consider when measuring validity is that the information has been interpreted by someone, what is observed is often changed somehow when measured, and that words or numbers are only representing the reality, they are not reality itself. The validity in a study is dependent on that the researcher is able to present the thoughts and ideas of the people in the case study, so that these are accounted as credible to the respondents providing the information. Especially in qualitative research, the internal validity is important since the aim is to understand the perspectives and outlooks of the persons involved in the problem of the study. In order to gain a high internal validity the researcher can use certain strategies such as using several sources of information and several methods to confirm the results, showing descriptions and interpretations to the informants to let them judge the results, or clarifying the researcher's assumptions, world-view, and theoretical orientation at the outset of the study in order to show the biases that the researcher might bring into the study. (Merriam, 1988)

The internal validity in this study has been achieved by using several sources of information in order to get a clear picture of VBS, the accounts payable process, and the poor quality costs that exist. Several interviews have been held, as well as a brainstorming session, and both written and electronic documents have been used. The interviews have been held basically with two different sets of employees, i.e. staff in the accounts payable process and purchasers in the customer

companies, and the sets of questions have been closely linked to the activities that each interviewee performs. Within each set the same set of semi-standardised questions has been used in order to make sure we get the same kind of information from each person. The results of the brainstorming, interviews and own understandings, were tested in discussions with two persons from each activity later on in the study, to see if the identified shortcomings could be confirmed. The time estimates were given by most of the employees (see section 6.2) and the time reporting system was used to check those estimates that could be controlled.

### 2.7.2 External validity

External validity regards how the results from one study can be applicable in other situations, i.e. how generalisable they are. In case studies the question of external validity is somewhat misplaced. The whole idea with a case study is to study a specific case to see how things are then and there. The study is not meant to come up with results that can be directly transferred to other cases, or situations, but patterns in the result can be discernible and transferred. However, one can discuss the generalisability of the methods used. The methods must be such that they can be understood, and used in other cases. Also the reader must understand the specific conditions of the case, in order to know which methods can be transferred, and how. (Merriam, 1988)
External validity can be judged by how well a reader or user of the study can apply the methods in the study to their, or other situation. This user must judge how generalisable the study is by asking what can be transferred to his or her situation/study. In order to improve external validity, the researcher needs to specify everything that the reader must know in order to understand the result and make a good evaluation. The researcher can also try to judge or describe how typical the case is compared to other similar cases so that the reader can compare with his or her situation. (Merriam, 1988)

External validity in our study comes from our detailed description of how the study has been carried out, in order to create an understanding of how the results were achieved (see section 2.8 case study method). The description of the case study company, and the process, will also

attempt to give all the information needed, in order for the reader to be able to assess how comparable the case is to his or her situation.

### 2.7.3 Reliability

Reliability refers to the extent to which the researcher's findings can be repeated if a new study of the same object was carried out by someone else, and is based on the idea that there is one reality that will lead to the same results if this reality is studied repeatedly, whatever instruments are used. The instruments used in the study should be trustworthy. The researcher wants to finds causes and relationship between variables. However, qualitative research is not trying to isolate laws for human behaviour but is rather trying to describe and explain the world based upon how it is experienced by those living in it. There are many interpretations of what is happening and therefore there are no set references to use in repeated studies. (Merriam, 1988)

Refining the instruments and techniques can enhance reliability in qualitative research, i.e. the researcher as an instrument in research can be more reliable through education and practise. Some mean that the traditional meaning of reliability is not suitable in qualitative research. Rather than demanding that others will come to the same result by doing another study of the same object, or case, the researcher shall strive for the results to make sense, that they are dependable and consistent. The researcher can ensure this by explaining the positions taken; explain fundamental assumptions and theories, the position toward the group being studied, the criteria for choosing formats, and the social context from which the information is taken. The use of several methods for collecting and analysing information can also strengthen the reliability. (Merriam, 1988)

Since our study is mainly a qualitative research it is difficult to discuss reliability in regard to how the poor quality costs were found. However, reliability in our study comes from the fact that we had a brainstorming session and interviews in order to find the problems that can cause poor quality costs, and saw that both methods came up with basically the same information about shortcomings. The list of shortcomings identified was also confirmed in further discussions with

persons in each activity. When the poor quality costs are calculated it is vital to assure high reliability, so that anyone coming up with the same shortcomings, also comes to the same result when calculating the poor quality costs.

## 2.8 RESEARCH PLAN

This poor quality cost study has followed a research plan including six main steps, each consisting of several activities.

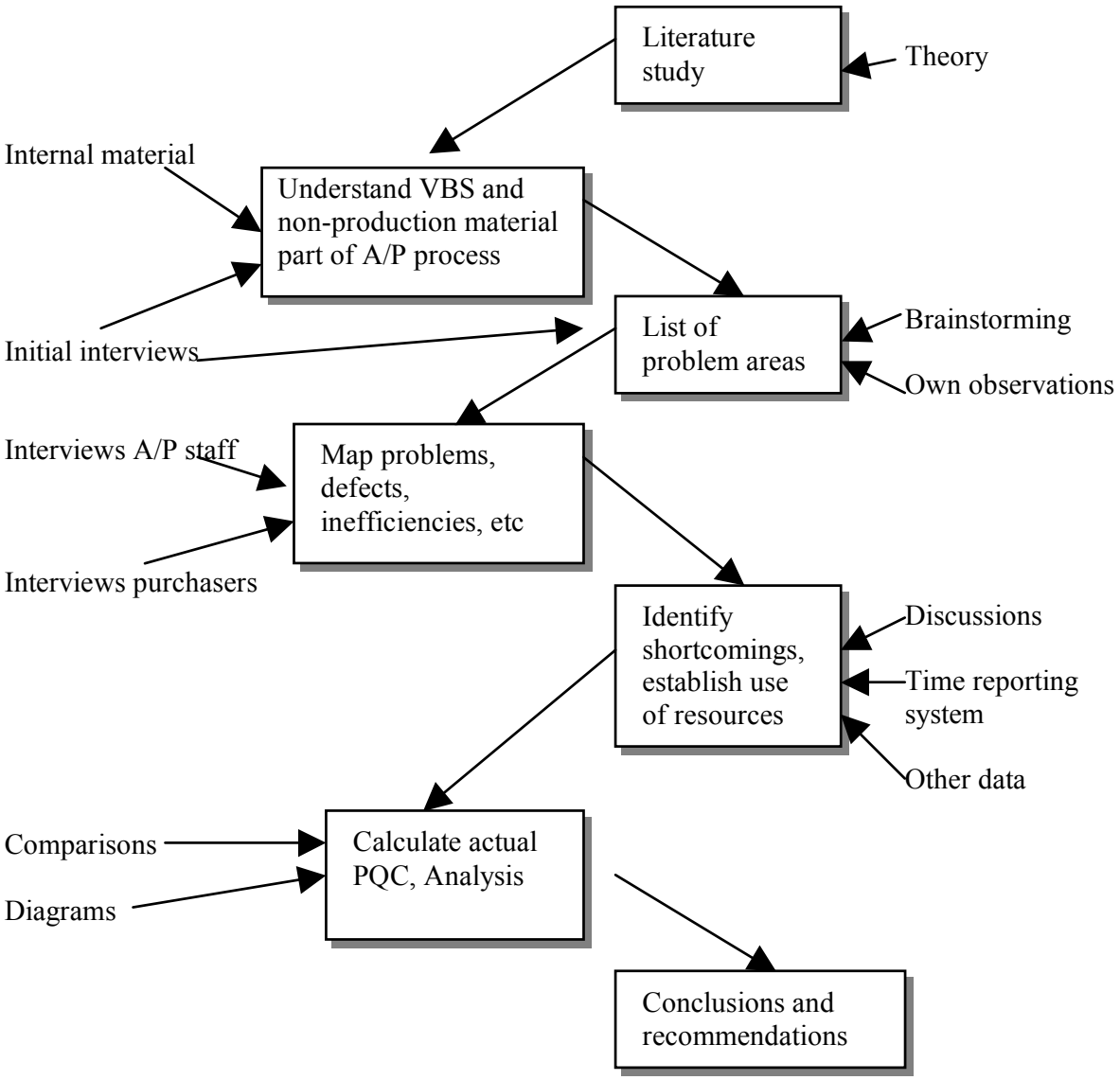


Figure 2.1 Research plan for the poor quality cost study

- Step one was a literature study, containing books, articles, and previous theses, made before starting the actual study at VBS. Primarily, this was done to learn more about what quality, poor quality, and poor quality costs are, and to learn how to locate these costs in companies and calculate them. The literature study gave us knowledge and helped us to create our opinion on quality and poor quality costs, as well as giving us an idea for how to perform the study, i.e. to follow an assessment model given by Sörqvist, including a deviation analysis (see section 5.8.2 for description). The literature study also involved reading books and articles about shared services and processes to help us better understand how VBS and the non-production material part of the accounts payable (A/P) process are working.

- Step two was to understand VBS and the processes, specifically the non-production material part of the A/P process, as well as the motives behind setting up VBS and the aim with it. This contained studying material from VBS, both written and from their Intranet, such as descriptions of the organisation and processes, work routines, quality documents, business plan, and information material, as well as interviews. The interviews were held with various employees at VBS, such as the A/P process owner, one customer contact person, group managers, and members of the non-production material part A/P staff. This gave us background information and knowledge, which was used to form a picture of how the non-production material part of the A/P process works. Furthermore, this was the basis for how we would perform the remaining parts of our study, primarily the identification and calculation of the poor quality costs.

- Step three was to make a list of the problem areas existing in the A/P process. This list was mainly based on information gained in a brainstorming session held with A/P staff, and from the initial interviews in step two. By this time we had also seen and heard a lot from just being around at VBS, and started to have our own ideas on what problems might exist, which was continually brought into the study and used in order to find and calculate poor quality costs.

- Step four was to map the problems, defects, and inefficiencies that cause poor quality costs. It included interviews with A/P staff members from the non-production material part in order to understand all parts of the process and the instances of poor quality that can arise. Interviews with purchasers in three customer companies were made to better understand the parts of the process performed in the customer companies, i.e. to understand the process that results in a written invoice, as well as to understand the activities behind the approval of an invoice. This is needed in order to really understand the processing of invoices that takes place at VBS, and the problems surrounding this. However, the aim with the interviews with purchasers was not made in order to map poor quality costs within the customer companies.

- Step five started with turning our list of problem areas into a list of identified instances of poor quality, i.e. shortcomings, followed by establishing their use of resources and/or their quantity. This was done by discussing in detail with employees in the non-production material part of the A/P process, as well as using various reports and statistics. More details about this step are given in the results.

- Step six was to calculate the actual cost for the identified shortcomings by using a cost price for hours worked. We finished this step by analysing the results of the assessment, by using Pareto analysis and ratio analysis. The causes were analysed as well, which results in an Ishikawa diagram of the different identified causes. Based on the analyses, conclusions are drawn, and recommendations given.

The selection for the interviews held initially, which gave us a background, was made to cover employees with different knowledge about, and views on, VBS from different levels in the organisation. The brainstorming session was held with 9 persons out of the 65 persons working in the non-production material part of the A/P process, which is the part being studied. This part is organised in two groups with a group manager each, who is organising four teams each, eight in total. The eight teams basically carry out one main activity (two teams perform the same activity). Each team is led by a team-

leader, who is a person with much experience of working with that particular activity, and mainly responsible for administrating the improvement activities taking place in each team besides performing the ordinary tasks of that activity. These nine persons come from the seven activities performed in this part of the process (see section 6.2.1 for further description of the organisation). The selection was made after recommendations by the two group managers (of which one is our tutor) of persons in each activity, based on these persons' knowledge and ability to communicate their ideas. Before the brainstorming, the participants were asked to think about problems they might encounter in their daily work. The aim of the brainstorming session was to get as many suggestions as possible on inefficiencies bad routines, unnecessary work, and things that do not work as they should.

The interviews in step four were held with eleven employees, initially with one from each activity. After these interviews were held, some interviews were added to provide more information from those activities where the tasks differ greatly, or where there are many problems. The criteria for this selection were also experience, expertise in one's area, and ability to communicate ideas. A number of persons were suggested by the group managers, and then we made the final choice.

For the interviews with persons from purchasing departments, 2 out of the 18 customer companies were selected, one internal service company and one commercial manufacturer, since we believed it might make a difference in how they view service quality, and their expectations on services provided by VBS. Through the customer contact persons at VBS we were put in contact with these customer companies and were thus able to get names of experienced purchasers, which we could ask for interviews. After these interviews we realised that the first two companies had well organised purchased departments, and it would be interesting to have interviews in a third company with a less structured purchase process, i.e. an organisation where routines are not good and therefore not followed, and without clear guidelines for who are allowed to purchase. Therefore, their experience of purchasing, and working with VBS could be different, and an interview was held with a purchaser in a third company.

The third company was chosen after discussions with a customer contact person in VBS, who gave us the name of his contact in that customer company, and through him we were recommended one purchaser for the interview.

Both the interviews with purchasers and employees at VBS in step four were semi-standardised, in order to cover all the topics we needed to have information about. Each interview lasted about an hour, and the interviews with employees at VBS were all held during two weeks in the first half of October, and the interviews with the purchasers were held during the second half of October. When the respondents felt it would be okay, a tape-recorder was used so that we could go back and control what they had said against our notes. Two of the administrators interviewed in step four preferred that we did not use a tape-recorder and then one of us concentrated on taking notes during the whole interview. Afterwards all interviews were typed up from the tapes and from notes taken during the interview. The interviewees were not asked to read through the transcripts, but whenever we were unsure if we had understood everything correctly we contacted that person again and asked more questions in order to clarify our understanding. The second round of interviews/discussions gave us an opportunity to check if information in the first round could be confirmed, and clarified.

We made the selection for the discussions held in step five based on choosing team-leaders, and persons working full time with the activity. All these persons have a good knowledge of the activity, and the problems that might occur, and how much time persons in the team spend on the activity and the problems. The discussions lasted about an hour.

Throughout the study we have been working at VBS every day, which has given us an opportunity to see the work carried out first hand, and continuously ask the employees questions. It has been beneficial to have the opportunity to ‘follow up’ the interviews and discussions held, in order to clarify any items that might have been unclear after the interviews, or asking new questions that have come up during the study. The observations made and everything learned from being at

VBS every day has been useful information to us when identifying shortcomings and discussing causes for these. All employees have been very open and helpful to us during the entire study.

Another way to make an assessment could have been to perform a best-practice analysis. This would include a thorough analysis of the process as it looks today, and then compare that with an ideal process. To find out what an ideal process would look like, and to make a thorough analysis of the present process there are two tasks that are very time consuming, and for that reason we chose to do a simpler assessment, looking at the problems that exist and find out how much they cost, also called deviation analysis (Sörqvist, 1998), (see further section 5.8.2). Another way of finding poor quality costs, or to back up an assessment can be to look at the budget. It would then be compared to the actual outcome. The difference can be seen as the result of poor quality. This requires a budget that is realistic and well-founded in the actual business, and the results achieved previous years must be taken into consideration. The study would have to look closely into how the budget was prepared, on what it is based on in order to know what the difference between budget and outcome really depends on, and whether it could be said to be the result of poor quality. There was not time for us to do both an assessment, and an analysis based on budget. The idea for the assessment came from literature and other PQC studies that we have read, and was recommended by Sörqvist (1998) as a good choice for the kind of first time assessment that was our purpose, and therefore we chose to follow those ideas.

The method we have chosen, and the choices we have made in regard to interviews and other discussions, influences the result we get. By asking employees what problems they encounter in their daily work, we most likely only find those defects and inefficiencies that are perceived as problems. This means that we do not find all poor quality costs that exist in the process. Also, the results we get are estimates, and no absolute figures. However, a rough assessment is useful as a first pointer to what kind of problems exist, and to the approximate size of the costs, which can then be the basis of a more extensive and deep study of the PQC in the company.

# 3 SHARED SERVICES

*This chapter explains what is meant by the shared services concept and how it has developed. It also explains when shared services should be used, how to succeed with them, and problems that might occur in a shared services centre. The aim of the chapter is to give the reader an insight into what shared services centres are, in order for the reader to better understand the specific circumstances for the case study company.*

## 3.1 BACKGROUND

In almost every industry today, companies are looking for new ways to be more efficient since the global competition is increasing the pressure on each company to be competitive. Processes must be more efficient, unnecessary administrative support costs need to be eliminated and the duplication of effort and resources must stop. There are some alternative ways to do this, and one way is to create a business unit for shared services. A shared services centre (an SSC) is a business unit, or separate entity, where a company centralises many back-office functions in one location and tries to perform them more cost-efficiently by reaching economies of scale from handling large volumes of transactions in one place.

According to Callan (1998), alternatives to SSCs to derive more business benefits, are to simplify procedures, consolidating operations, outsourcing to companies that provide these services as a business, or leveraging value networks. Value networks are groups of independent firms that join together to accomplish a business purpose. Each member of a value network excels in its focused area of competency and maintains separate business activities. When a discrete market or customer activity arises that could benefit from the network's synergy, these firms combine to create a level of value far beyond what each could have created individually. By providing access to a broad network, a company can offer its customers more and better services without having to have the staff and expertise themselves. When simplifying, you standardise around a single technology platform, and require your business units to adjust and step into line.

Consolidating all the multiple variations of back-office operations that usually exist within each business unit, and leave them accountable to the business unit, is the next proposal from Callan (1998).

The closest competitor to SSCs is probably the outsourcing choice, which is a service centre outside the company, providing the same kind of services as an SSC. Shah (1998) describes outsourcing as taking services that were formerly performed internally and contracting these services to another company. Typically, processes that can be outsourced include activities that are non-core competencies of the business, do not require knowledge of the business, and do not handle sensitive information. Shared services on the other hand are the internal consolidation of services that were formerly handled by individual business units (Shah, 1998). This consolidation facilitates the sharing of both staff and technological resources and the provision of high-quality service. Callan (1998) suggests outsourcing the non-core activities. However, Shah (1998) sees some problems with outsourcing, making him recommend shared services centres instead: outsourcing requires companies to make long term deals with an external vendor in order to achieve cost savings, the interests of an outsourcing company might be different than that of the original company, potential confidentiality issues make outsourcing a challenge, and the outsourcing company may not be able to provide additional services as needed.

Shah (1998) also discusses SSCs versus decentralisation, where each business unit has its own support functions, and different systems to support these processes. However, he sees some drawbacks with decentralisation, such as duplication of management effort, ineffectiveness from small-scale operations, non-standard systems, and duplication of infrastructure.

The first moves towards SSCs were made in the U.S. in the 1980s, typically by multisubsidiary companies. General Electric with its wide-ranging subsidiary structure, is generally seen to be the first company to develop an efficient SSC (Van Denburgh et al, 2000). This move has been further pushed by many changes in the business environment. Driving forces such as advances in information technology, increasing

competition from emerging countries, new trade alliances, mergers and acquisitions, and improved communication and distribution channels have led many major companies to use SSCs as a way to respond to these changes (Krempel, 1999). When companies expand, more and more of their activities are performed in more than one place and they see the possibility for reducing resources used and unnecessary costs by adopting the SSC concept. One of the factors causing this trend to emerge is the advent of enterprise integration systems that connect front- and back-office operations (Shah, 1998).

## 3.2 WHAT ARE SHARED SERVICES CENTRES?

One definition of shared services is given by Shah (1998), saying that "shared services has also been defined as the internal consolidation of services that were formerly handled by individual business units. This consolidation facilitates the sharing of both staff and technological resources and the provision of high-quality service". King et al (1998) and Triplett & Scheumann (2000) explore this further and say that the SSC organisational structure can combine the advantages of centralisation (standardisation, economies of scale, and a single base for improvement) and decentralisation (superior customer service). Moreover, the SSC can provide both higher quality services and lower costs by consolidating specific operations in one location, while at the same time developing a strong customer orientation.

The balance between centralisation and decentralisation can be difficult, but many companies try to achieve it by bringing activities into the SSC that are similar to each other and that are performed in many places across the company. They standardise the processes in a common design that emphasises high quality and customer satisfaction, and the performance is measured by several measurement tools, which also help to guide the improvement efforts. The standardisation is being achieved by having a process-oriented organisation. Most SSCs run their operations in processes, e.g. the accounts payable process, where they standardise the routines for handling invoices, making the routines uniform and thereby reaching economies of scale. (Triplett & Scheumann, 2000)

Shah (1998) states some characteristics of an SSC; runs like a business, low-cost-provider, high degree of specialisation, leveraged skill base, customer- and process-focused, leading edge, enabling technology, high quality service standards and measures, performance-based rewards and incentives, and continuous improvement.

The SSCs are to provide staff support to the other business units in the company, and sell those services back to them on a cost basis. The objectives of the SSCs are to reduce costs and improve corporate services. This value-added strategy should lead to standardising practices throughout the company and streamlining the other business units, allowing them to focus on their core activities, rather than worrying about administration. It will also lead to the SSC becoming streamlined and its employees becoming experts at their job. Adopting a shared services strategy involves a re-design of personnel, process and technology, and a realignment of organisational structure. The objective is to enhance value and improve the service level, and at the same time reduce the costs (Fahy & Donovan, 1999).

Most companies bring the SSC together physically in a single central location, or in a few small regional centres. How companies organise the SSC, fit it into the organisational structure, and govern it varies. Some make it into a separate unit, or subsidiary, while others may house it within the organisation's dominant business unit. (Van Denburgh et al, 2000) SSCs differ from traditional support staff functions; e.g. the decision making is moved down from top management to customer level. The operating budgets are often based on customer demands, as the centre is catering to these demands. Another difference is that the SSC is run like a business with a bottom-line responsibility, and that it is a profit centre. (Lucenko, 1998) According to Cecil (2000) a key goal is to 'empower' work teams. When setting up an SSC and consolidating the business, many layers of management are often cut and teams and individuals are given more responsibility and are authorised to make more decisions.

It takes some time to implement an SSC and get it running smoothly and efficiently. Most researchers talk about anything from 10 months to 4 years considering that it is similar to setting up an entirely new

business, with new management, staff, location, and process design. In the first two to four years, internal customers may usually not use outside providers, but after that they may seek better services and/or better prices from other vendors. Then it shows if the SSC is able to keep its customers and attract external ones as well, thereby becoming a profit centre for the company, or if it has failed to cut its costs and become efficient.

The SSC should have written Service Level Agreements with both their internal and external customers, regulating what services are to be provided and at which cost. The agreement should also contain specific requirements and parameters, cost allocation methods, and the delivery timeframe. (Van Denburgh et al, 2000)

## 3.3 WHAT TO INCLUDE IN THE SSC

An important issue to discuss when implementing SSCs is which processes to include. Usually the first choice is to start with the financial functions because this generally produces high cost savings, made possible by economies of scale since such functions are often standardised already (Krempel, 1999). The choice should be based on two factors, how well the process can be consolidated, and how well it can be standardised. The two main activities that meet these criteria are large volume-based transaction processes and expert functions. The large volume-based transaction processes tend to be repetitive, generic across the organisation and suitable for harmonisation, e.g. payroll, purchasing, accounts payable and receivable, general accounting, and cash applications. These support activities remain consistent, regardless of which business unit they are serving, and are therefore obvious candidates for an SSC, even if they are specialised to some degree. However, there is also an opportunity for co-ordinating and improving specialist functions, such as logistics, legal and IT. The investment in these functions can be expensive for smaller business units, and in an SSC it is possible to create these cost-efficiently, providing support across the entire organisation. (King et al, 1998; Van Denburgh et al, 2000)

The following characteristics in a process are also important if the process is to be included in an SSC (Shah, 1998); few interfaces with other processes and technologies, low financial or business risk, limited dependence on either customers, products/businesses, or specific technologies, and no need for being close to the customer geographically.

## 3.4 HOW TO SUCCEED WITH AN SSC

In order to succeed it is important that the SSC is 'run like a business', which requires the SSC to excel in three areas, i.e. delivering excellent customer service, driving process improvement, and making the SSC a great place to work. This means building a strong internal customer relationship, with management being sincere about treating internal customers as real customers. Managers must also continuously seek to improve the processes, especially on a day-to-day level, and a starting point could be to have a good system for performance measurement. An SSC setting up in a new location must make the right choices to attract the best staff and catering to their needs. It also gives the chance to create a new culture with focus on people, with a flat structure and an open office design. Teamwork is fundamental to the success of the SSC, and so is the setting up of good training plans for all employees, as a highly skilled personnel is needed. (King et al, 1998)

Sharma (1999) mentions three important factors for making the shared services strategy work. Firstly, SSCs must operate as a single entity, to be held accountable for managing and controlling their profits and losses. Secondly, customers must be charged for the services provided at full cost, giving a sense of realism to the SSC-customer relationship, and providing the customer with a monetary value of the service being provided. Finally, duplication of shared services activities must not be allowed. Additionally, the SSC needs to adopt a continuous improvement strategy and learn to cope with external pressure. The development of an SSC is a major project, which requires full management commitment, time, and sufficient financial resources (Krempel, 1999). A good occasion to set up an SSC is when the business is expanding, or being restructured, or when new technology is being implemented.

Critical to the success of an SSC is that it has a good understanding of its costs, and is able to impact those costs. One must understand what activities are vital for providing the services and how each activity contributes to the total cost. A good knowledge of external cost drivers controlled by customers and how they can influence the total cost is also necessary. An improved understanding of costs and cost drivers by both SSCs and customers can result in a lower total cost to the company as a whole. (Triplett & Scheumann, 2000)

## 3.5 WHY SETTING UP AN SSC AND WHAT ARE THE BENEFITS?

SSCs are often used in order for the company to achieve one or several of the following (Shah, 1998; Krempel, 1999):

- reducing costs and improving quality by integrating processes and people in one or a few locations, and thereby reducing headcount.
- Eliminating incompatible IT-systems and improving the quality of information and the speed with which it is spread.
- Increasing market responsiveness.
- Growing market share through either rapid response to new market opportunities, better brand management and support, or ease of merger and acquisition activities.
- Better customer relationships, with customers at local, regional, or global level, both internal and external.
- Better process environment by being process-based and facilitating integrated processes.

An SSC gives focus to previously dispersed and fragmented processes, and when bringing them together in one location it is more likely that investments become worthwhile as increased size can more easily carry the costs. (King et al, 1998)

A risk with not consolidating into SSCs is to lose benefits from economies of scale and best practice, with the major benefit of an SSC being cost savings through better utilisation of existing resources. Standardising all transaction information world-wide at one site makes it easier for management to make strategic decisions.

Other benefits with an SSC include its capacity to provide services across business units, its ability to transcend borders and business units, and the way it allows processes to be streamlined.

According to a study at American Express, reviewed by Lucenko (1998), an SSC can benefit the employees, the customers, and the shareholders. An organisational transition can give employees an opportunity to learn and acquire new skills and therefore they have more career opportunities. With the process-orientation there is also a clearer connection between the everyday work and the business results. Customers are likely to be more satisfied by higher quality levels that result from the focus on customers and quality existing in SSCs. Shareholders benefit from the improved quality and customer satisfaction and the corresponding improvement in results.

## 3.6 PROBLEMS WITH SSCs

Most companies that introduced SSCs so far have experienced success, but poor planning and difficulties with implementation can lead to benefits being lost (Cecil, 2000). One of the main points that must be spread in the entire company and accepted by all is that the SSC exists for the benefit of the whole company, not for the benefit of each business unit. Everyone must remember that they still work for the same company (Lucenko, 1998). This can mean that specific business units can be disadvantaged at times, either when it comes to prices and costs, or to what services are to be provided. One example of this is if customers pay a price per service, e.g. per invoice processed, not per hour actually worked. Depending on how good the input is, (e.g. invoice) some customers will pay more than it actually takes to provide that customer with the service, whereas others will pay less than the real cost for performing the service to them.

Another major problem involves the staffing situation. As activities are moved to the SSC from the customer companies jobs are lost, and then there is a large risk that critical knowledge is lost, which may be difficult to regain. After the first phase of quick changes and rapid movements the SSC becomes more stable and the activities and tasks become routine, often simple and repetitive. It can then be difficult to

keep up morale and motivation and employees are likely to move on to more exciting jobs, and the SSC runs the risk of becoming a stepping stone to further career opportunities. Especially since SSCs tend to have a flat structure with few opportunities to move on to more interesting jobs. All in all, this leads to staff turnover becoming a significant issue in every SSC, and recruiting the right staff for the activities becomes very important. (Fahy & Donovan, 1999)

According to Callan (1998) an SSC can only be successful if it is commercialised and exposed to competition. Otherwise it will not be focused enough to neither cut costs to the needed level, nor develop the high level of skills needed in order to be efficient. Few companies can afford the true cost of implementing SSCs because they cannot spread the investment cost across a large-enough customer base. There is also a risk that the implementation is in name only, that no real changes have been made to how the processes function or that the necessary customer and quality focus is not in place. Callan states that many SSCs do not reach the goal, which is to be independent entities with their own budgets, cost control and accountabilities, but rather end up being repackaged versions of the old corporate overhead with business unit service agreements layered on top.

When setting up an SSC as a group company, the visions, goals and policies of the entire group are also applicable for the SSC. However, there is a risk that these do not really fit the SSC and its particular operations. The SSC is a new company and to immediately be forced to have the same vision and goals as older, more mature group companies can often result in the focus being placed in the wrong areas. This is especially true for SSCs, where it is common to not just start up a new company but also to implement new systems, processes etc. The SSC needs to concentrate on getting started, setting up routines, and finding new, better ways of running the operations. To aim for goals set for other companies is to put the SSC in a less than optimal situation, e.g. if the company as a whole has a goal to cut all its costs with 20% during a two year period, this goal will not be realistic for the new SSC. It is more likely to need to increase costs for a while before actually being able to cut costs by rationalisations.

This chapter has discussed shared services companies and tried to give an overview of the concept and why it is interesting for companies to set up such entities. As mentioned, most SSCs are process-oriented, and so is the company in this case study, Volvo Business Services. It is important to understand the impact of processes on the operations, and how a change over to processes can affect the result by introducing new responsibilities, work-methods, and tasks. This can also affect the quality of the operations, and thus the costs of quality and poor quality. Therefore, the next chapter will discuss processes and how they work.

# 4 PROCESSES

*This chapter provides an insight into what processes are, and how process-orientation effects an organisation and its operations. This chapter tries to show how process-orientation can be a step towards improving the quality of a company's business, which is the idea behind using processes at Volvo Business Services.*

## 4.1 BACKGROUND

The increased interest in processes is related to the increased interest in quality that has taken place in the last few decades. In order to improve the overall quality, companies are looking for new methods and ways of organising their business. Today most companies have a feeling that they cannot come much further with improvements within their production, so quality improvements must take place elsewhere in order to achieve more radical changes in the level of quality. There should be opportunities for more efficient working methods in most parts of the company, and changing into a process-oriented organisation is what many companies have tried, in order to improve their company and its quality level. It is not easy to change an organisation and find new and improved working methods, but studies have shown that using horizontal processes as a starting point, and improving these, gives the right conditions for the quality improvement work (Egnell, 1995).

In Japan the industry concentrated early on making production efficient and succeeded in making high quality products to lower costs than the industries in the west. At the same time as they improved production, the Japanese also started to understand the importance of quality and co-operation with suppliers and customers. This made them look at the processes within their business rather than looking at functions or departments. Toyota was especially successful in this and came up with lean production methods, which more and more Japanese companies started using during the 1970s, making them process-oriented. Over the past few decades more companies in the west have started to focus on processes within their business, and particularly the production processes. (Egnell, 1995)

## 4.2 DEFINITIONS AND CONCEPTS

All organised activities have two fundamental needs, the need to divide the work into tasks, and the co-ordination of these tasks in order to accomplish the activity. The structure of an organisation can be described by how all the activities have been divided into tasks and how these are co-ordinated. One way of doing this division and co-ordination is by using horizontal processes. A useful description of processes is the following definition, "a process contains a series of activities with a defined beginning and end, which uses the organisation's resources to repeatedly transform a measurable object from a supplier to a pre-set measurable result to a customer" (Egnell, 1995, p.30).

Another definition is provided by Dicander Alexandersson et al (1997, p.26), "a process is that which happens in a company, step by step, until the product reaches the customer. These events consist partly of a connected series of working operations and partly of the co-operation between the employees".

From these definitions it is clear that the fundamentals of processes is that the activities are connected in a chain reaching from supplier to customer, and not only concentrates on the internal operations of a company. Characteristics of processes include the fact that it has a supplier that contributes with a measurable input to the process, and the supplier can be external or internal. It must contain one or several activities that transform the input to a result that is pre-determined and that can be measured. There is always a recipient of the produced result, and this recipient can also be external or internal. The process is delimited, i.e. it has a well-defined beginning and end. Each delimitation is an interface to some other activity or process. The process is recurring, i.e. the activities within the process are being performed regularly, with more or less even time intervals. The process uses the resources of an organisation, such as information, energy, or working-hours, in order to accomplish the transformation from input to a finished result. (Egnell, 1995)

Even after defining a process it varies very much from company to company what their processes are called, what they include, and how

they are structured. The first division is according to the scope of the processes, i.e. how much they include. Some processes are comprehensive and run through the entire company, and they can be called main processes. If they become too large, maybe complicated to handle, they can be divided into smaller parts, called sub processes. Each sub process in turn, is made up of several activities. This division can be seen in figure 4.1 below. (Dicander Alexandersson et al, 1997)

Another division is between what type of processes you have. The main processes and the sub processes can be of different types, i.e. have different purposes. A structure given in Egnell (1995) differentiates the processes according to their purpose into the three categories; operative processes, support processes and management processes. The operative processes deal with transforming the inputs and satisfying customer needs, and they often have direct contact with the external customer. Examples are product development, production, and distribution processes. The support processes should supply the operative processes with the resources they need, e.g. personnel recruitment, maintenance, and information processes. Finally, the management processes aim at setting up goals and strategies for the organisation, and to carry out planning, control, improvement and following-up of the other processes within the organisation. Examples are budget, auditing, and planning processes. Another way of describing these processes is to say that the operative, or core process, creates a direct value to the customer, that the supportive processes create an indirect value by being important for the efficiency of the operative processes, and the management processes are of a strategic importance for the company (Dicander Alexandersson et al, 1997).

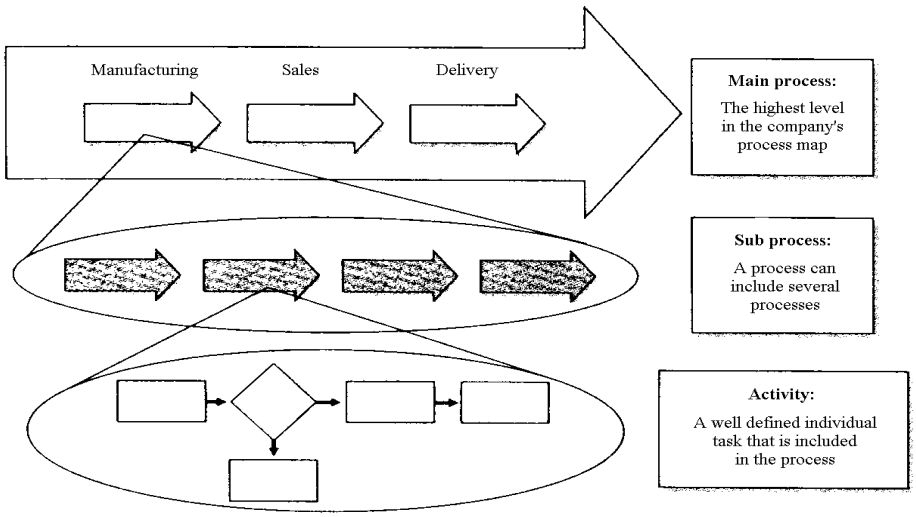


Figure 4.1 Different types of processes.
Source: Translated from Dicander Alexandersson et al, 1997, p.29.

## 4.3 PROCESS VIEW

The central theme in the process view is to focus on the customers, and fulfilling their needs and wishes. This means putting more attention into *how* things are done rather than *what* is done. The process view shows that the work is performed in flows or processes that cut across functional borders, and the interfaces that exist between the various functions. Most problems originate in these interfaces and the processes can be seen as bridges between the functions, or across the interfaces. It also shows the internal customer-supplier relationship through which goods and services are produced.

A process view means that the organisation tries to create a better balance between what is done (product) and how things are done (process). Some people think that by being process-oriented the gap between process and result can be reduced or eliminated, and that this helps the employees to see the overall picture. (Egnell, 1995)

As stated earlier, the process view came earlier to production than to other functions and much improvement work has been done to increase the quality within production. Some characteristics of a well managed production process are that someone is responsible for how the process is working (the process owner), the interfaces to other processes are

clearly defined, the work flow and the tasks are documented, and measuring is regularly performed in order to control the process and the product (Egnell, 1995). So far, this has mostly been observed in production processes, but is just as important for service and administrative processes. Some argue that quality has not been improved as much in the service and administration processes because the process view has not been applied to the same extent in these areas.

Those who propagate the use of a process view mean that this is good for the customer, the employees, and the company because (Dicander Alexandersson et al, 1997):

- The process originates from the customer.
- The chain is working up to the customer.
- The people involved acquire an understanding of both the whole and the details.
- The working method improves the communication between employees, departments, and functions.
- The working method lead to improvements, which in their turn strengthen the competitiveness and thus the profitability.

## 4.4 PROCESS MANAGEMENT

Process management is used as a collective phrase for all those methods that use some kind of process view or process-orientation to change or improve companies' quality. Egnell (1995, p.6) defines process management as "a systematic method to organise, lead, and continuously improve an organisation's processes".

According to Harrington the goal with process management is threefold, (a) to improve the quality of the process, i.e. the ability of the process to satisfy the customer's needs and expectations, (b) to improve the efficiency of the process, i.e. how well the process uses the resources of an organisation to produce the result, and (c) to improve the adaptability of the process, i.e. how well the process can be adapted to changing conditions (Egnell, 1995). In order to achieve these improvements, Dicander Alexandersson et al (1997) state that companies must focus on how their processes look today and discover

inefficiencies and opportunities for improvements in them. The processes must be controlled by eliminating inefficiencies and problems so that they deliver the same result every time. Continuous improvements, both large and small, will lead to the development of even more efficient and stable processes.

There are some problems that can arise and make process management difficult if they are not properly considered. The fact that you know what you want to do but not how to do it can lead to that the goal of the quality work is not reached. It is also common to focus too much on the measurable factors and too little on human aspects when making changes. When management is impatient and lacks endurance, there is a risk that good quality projects are abandoned because results do not come quickly enough, and new projects are launched instead. (Dicander Alexandersson et al, 1997)

The formal control of how the process looks and works is given to the process owner, who has power over the process itself, but not over the people working within it. His/her role is to see the overall picture, set goals, lead the development of the process, and take responsibility for customer satisfaction. The process owner must also communicate and motivate employees from other departments to see the need for performing certain activities in the best interest of the whole process. The most difficult task is probably to motivate the employees so that they improve the process on their own initiative. According to a study performed by Egnell, the process owner must have an overall view of the company, must have an ability to co-operate, have broad competence, and be customer focused. (Egnell, 1995; Dicander Alexandersson et al, 1997)

Other possible roles within a process organisation are the process co-ordinator, who takes part in the daily co-ordination of the process improvements, assistants to the process owners, sub-process owner, who is responsible for small parts of the process if the process is divided, and finally the facilitator, who is mostly needed in the beginning of the process improvement work. (Egnell, 1995)

## 4.5 ADVANTAGES AND DISADVANTAGES WITH PROCESSES

The idea in a process organisation is that the employees can see how their efforts fit in to the production flow and how it affects the end result, and thereby be motivated to do a good job and facilitate for the following activities. Since everyone is working towards the same end result, i.e. product or service, the individuals are probably more motivated to be interested in the result of the complete process rather than just caring for their own tasks.

According to the study by Egnell (1995), the primary advantage is that the process view has led to an increased overall understanding and customer focus within the organisation, based on the employees' understanding of how their work affects both the external and the internal customers. Other advantages mentioned were that the risk for sub-optimisation between functions decreases, the importance of continuous improvements is highlighted, reduction in lead-times, increased satisfaction at work, and lower costs. Also mentioned in the study were some positive effects on the daily work, such as responsibilities and decision-making processes becoming clearer, better follow-up and control of improvements, and increased commitment from employees to work with improvements.

However, the study also shows that there have been instances of resistance against process management. Often responsibilities and authorities have changed, and in some cases the line managers who have not received responsibility for a process have felt their positions being threatened and have worked against the implementation. The result of this is that the process owner and the members of improvement groups have not received the time they need to improve the process. With a lack of understanding of the process concept and its advantages, there has been a lack of commitment in the line managers who sometimes did not understand why a change was necessary.

This chapter has discussed processes, process-orientation, and how one can work with, and benefit from, processes. Processes are often used in order to try to improve quality, and if each process is improved, the total quality will be higher. One part of working with improvements and quality is to look at the costs of quality, especially poor quality costs. This is the main purpose of this case study, and to be able to better understand the study and its result the next chapter will go into the concepts of quality and quality costs.

# 5 QUALITY CONCEPTS

*This chapter will start by giving an overview of different quality concepts, such as quality and poor quality. This is followed by a discussion of what costs may be caused by quality, or poor quality. Finally, it goes on to describe different methods for classifying, measuring and analysing poor quality costs. The purpose of this chapter is to provide an understanding of the basic concepts behind the study and why it is important for companies to consider such costs in order to be more competitive.*

## 5.1 WHY QUALITY?

More and more companies and organisations have been convinced that tending to quality is important for their survival in the long run. It has been said by some that there is no economic value in having 100 percent quality, while most people agree on that it is highly uneconomical to ignore quality. Crosby (1988) and others estimate that the costs for poor quality amount to about 30-40% of the turnover. When improving quality, it is not enough to just say that the company is working with quality or introducing a fancy quality policy. To actually make improvements demands a lot of hard work, but often leads to many benefits both for the organisation, its employees and its customers. A crucial point to remember in the quality discussion is that poor quality inevitably leads to badwill, loss of reputation, and fewer customers, which in the end will lead to lower market shares. Some of the benefits that can be gained by improved quality are more satisfied customers who will return, happier personnel, a better position on the market, shorter lead times, lower costs for scrap and rework, and higher productivity. (Lund et al, 1990; Bergman & Klefsjö, 1994)

Quality work has a large impact on the economical situation in companies today. According to Sörqvist (1999) quality can positively affect a company's profitability in three ways; an increase of revenue, decreasing costs, and less capital tied up through less need of assets.

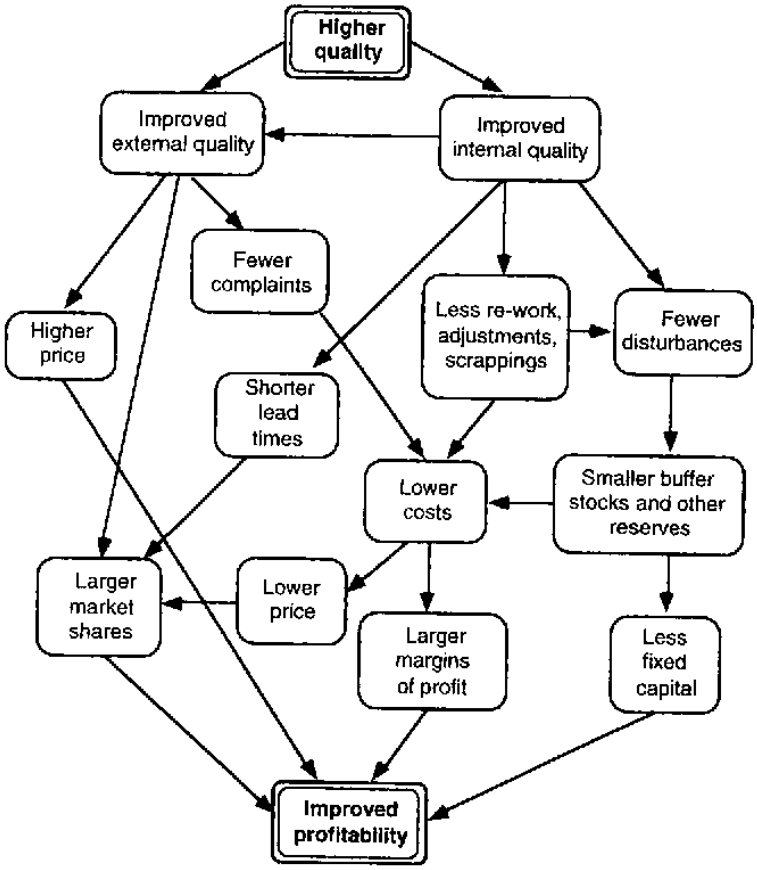


Figure 5.1 Relations between improved quality and increased profitability.
Source: Bergman & Klefsjö, 1994, p.38.

According to Harrington (1987), poor quality is poor business. The point is that having good quality is good for the company and is one of the best ways to get a high return on money invested, and it is better than expanding the business or trying to cut costs in other ways. He presents four possible paybacks from improved quality, the first one being that parts that were previously scrapped are now usable. Secondly, people and equipment used primarily in doing rework are now free to make additional good shippable products. Thirdly, as product quality improves, fewer appraisals are needed to ensure that the customer's requirements are being met. Finally, quality becomes a marketing and sales weapon. As the company's quality reputation increases, so does its share of the market and its profits.

There are other reasons than pure monetary for working with quality and measuring quality. Measuring quality can be a very good management tool as it gives a good picture of the business and its progress. It can sometimes be difficult to find objective measurements

in service companies, but even slightly subjective measurements are better than none at all. Besides providing management with useful information, measuring quality can also be a way to motivate the employees. The employees are provided with the results of their efforts, which is a good driving force in the continued quality work. What companies with successful quality measurement systems have in common is that they actively use the results to signal to the employees when quality levels have dropped, and most importantly, when quality is right. (Lund et al, 1990)

Working with quality and reaching the right quality must be done through systematic and conscious management. There are many techniques available for managing and controlling quality, e.g. measuring, controlling, auditing, and cost control. Some of them are sometimes seen as a hindrance in the daily work, but at the same time something that must be endured. Managing quality aims at understanding expectations in the market and meeting these expectations with as high quality and low costs as possible. When working with quality, there are different methods that can be used, and they can contain several tools, e.g. using quality goals and measurements. The measurements are used to describe the reality, and examples can be number of deviancies, percentage of scrap, late deliveries etc. With the right measurements the company can evaluate and follow-up their activities, i.e. find areas for improvements, have a correct basis for planning and prioritising quality improvements, and follow-up those improvements. Important types of measurements are quality costs and poor quality costs, which will be described in section 5.6. (Schultze & Johansson, 1995)

## 5.2 DEVELOPMENT OF QUALITY

Quality has been interesting to the customers since trading began, and the attitude towards quality and the meaning of quality has changed over time and especially so during the last decades. When the products were purchased by the customers directly from the craftsmen, quality was high since the customer's requirements were known and if they were not met the craftsmen stood the risk of loosing their customers. This way quality was defined by customers and their needs. The direct

contact with the customer made it possible for the craftsmen to respond immediately to the customer and pick up ideas about how to improve quality. However, as a result of industrialisation and the growing use of mass production methods in the beginning of the 20th century, companies tended to become more specialised. It was no longer possible to rely upon craft skills to prevent faulty products from leaving the factory. Each task became more specialised, each worker made a smaller part of the total process, and craft skills disappeared. In mass production manufacturing, someone else decided what to do and had the control over the process, and thus the final products. (Lund et al, 1990; Tisell, 1991; Jönson, 1995; Sandholm, 1997)

As a consequence of this, the quality concept acquired a somewhat different meaning, where quality was mostly concerned with the number of errors in production. What mattered now was to produce large quantities in order to meet the demands on the market and quality had nothing to do with customer needs. Each worker became a specialist within his area, which was meant to lead to higher productivity, but in the end rather led to quantity coming before quality. Thus, the new production methods led to a need for inspection and the emergence of a new work group, the inspectors, and the inspection departments. The inspectors were hired to sort out the faulty products, but the problem was that this was done in the end of the production process and therefore much work had already been done on products that turned out to be discarded. Another problem was that not all defects were found and some faulty products entered the market anyway. Even though the quality was increased with inspection, there were no major preventive initiatives taken. (See e.g. Lund et al, 1990; Jönson, 1995; Sandholm, 1997)

Two persons who have worked much with quality, and have had a large influence on quality work are W. Edwards Deming and Joseph M. Juran (Bergman & Klefsjö, 1994). In the 1950s they were invited to Japan, to lecture about statistical quality control and total quality control, as part of Japan's effort to increase the quality of their products and improve their reputation. This was the start of the interest for quality noticeable for Japan, which became obvious in the 1980s when Japanese products increased their market shares all over the

world, due to their superior quality in both production and finished products. For 30 years, Japan worked hard with quality, taking many techniques from the West and developing them further. The work is based on long-term planning, knowledge, and simplified applications, and it has been partly achieved by other control and motivational mechanisms than the ones used in the West. The rest of the world has been left behind and suddenly looks upon Japan as a model for excellent quality work.

A chain reaction is created by improvements in quality, and accordingly, Deming believes that improved quality will lead to both lower costs and higher productivity. The resulting higher quality and lower prices lead to an increased market share. He is also known for the Deming Circle, which describes how to work with quality. It means preventing problems from occurring, and if they do occur, acting so that they do not re-occur. (Meredith & Shafer, 1999)

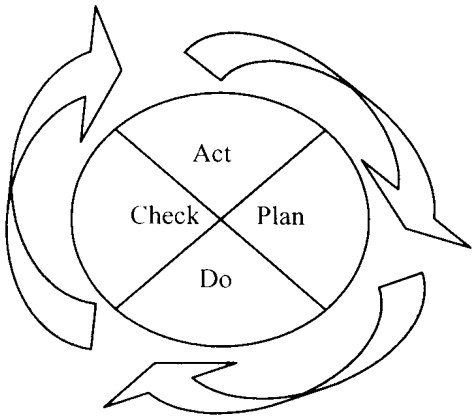


Figure 5.2 The Deming C ircle.
Source: Free from Jönson, 1995, p.28.

Juran tended to work more within the existing system, rather than trying to change management attitudes towards quality, and he focused more on quality cost accounting and Pareto-analysis than on statistical techniques of process control. Juran is probably most known for his Quality trilogy, which includes quality planning, quality control, and quality improvement. Quality planning entails those activities the company is involved in before production starts in order to secure the right quality level. In the quality control activities the company tries to

identify instances with quality problems and deviations and then take corrective action. Finally, systematic work must be done so that better quality is achieved. (Meredith & Shafer, 1999)

In the late 1960s a new concept was developed, which many became very interested in, namely that of quality assurance. Many projects at that time were large and required extremely high quality levels, such as space programs and the building of nuclear power plants. This meant that quality work had to focus on preventive activities rather than controlling activities. All employees had to take responsibility for quality and suppliers had to make sure that they delivered high quality components. (Lund et al., 1990; Jönson, 1995)

In connection with the quality circles being established in the USA in the 1960s a number of programs were introduced where the employees were trained for participation in quality improvement projects. These programs were among others ‘right the first time’ and ‘zero defects’. The zero defects concept was introduced by Philip Crosby and it attempts to prevent errors by eliminating their cause rather than correcting them after they have already been made. Crosby means that quality is conformance to requirements and that it is always more cost effective to perform an activity right the first time. He focuses more on management and organisational processes than on using statistical techniques, and he believes that a problem with quality does not exist in itself but rather that the organisation has functional problems.

A more recent concept connected to both zero defects, being more efficient, and producing things right in the first place, is Total Quality Management. Total Quality Management has a different meaning in each organisation, but usually includes the idea that employees are responsible for continuously improving the quality of products and services. Total is meant to signify that quality is the concern of all employees, and continuous improvements are needed in order to keep up with competition and customer demands. In the 1990s quality issues are more and more a responsibility of management, but also includes the whole organisation. Basically it deals with ways to manage organisations where quality is in focus. Management is involved in working with quality at the same time as everyone is participating in

trying to reach specific targets. (Jönson, 1995; Meredith & Shafer, 1999)

## 5.3 WHAT IS QUALITY?

As one can see, there has been a change in the way quality has been viewed over time, going from a rather narrow concept to today's wider understanding of quality. The quality concept encompasses an extensive area, including many meanings and definitions that vary depending on who you are talking to or what you are talking about. The many ways of looking at quality can be the cause of misunderstandings, especially if one uses a definition for quality that is set up for another organisation or situation without adopting it to one's own situation. Therefore it is important that everyone involved in quality work or quality discussions, both individuals and organisations, decide on how to view quality in each situation, and agree on a specific definition to use. But this is difficult, quality is one of those intangible concepts that everyone knows but cannot put into words. There are attempts made to produce international standards and common definitions, however, one must remember that general definitions can be without substance if they are too imprecise or do not suit the specific situation. To give some idea of how different persons and organisations look upon quality, some definitions will be presented here.

In 1979 Crosby wrote that quality is 'conformance to requirements'. This is a rather short and narrow description, mainly pertaining to production and production requirements, and tends to mean 'doing things right'. Doing things right however, does not necessarily mean that you satisfy the customer, and therefore does not achieve high quality in their eyes. A definition given by Juran is 'fitness for use', where the main theme is 'do the right things'. If the right things are done throughout all processes, the product is of such a quality that it is suitable in all instances, from design to production to end-user. (Sörqvist, 1998)

In 1994 ISO (International Organisation for Standardisation) came up with an international definition of quality, ISO 8402, which states that "quality is the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs" (Sörqvist, 1998). The problem here is that it is unclear whose needs that are to be satisfied, the customers' or the organisation's. The definition offered by D. E. Peterson (Chairman of the board, Ford Motor Company), however, clearly puts the customer in the centre, "World-class quality means providing products and services that meet customer needs and expectations at a cost that represents value to the customer" (Harrington, 1987). Harrington himself says that "quality is not the cost of providing an output. It is the value the customer receives from the output." Both these quotes show quality to be related to customers and their demands, and to how well the company manages to provide that which the customer appreciates. It is important to remember that customers are both internal and external, so quality need to be high in the whole process from supplier to final customer, encompassing the whole life-cycle of a product or service (Sandholm, 1997).

The difficulty with using these kind of definitions is to know what sort of needs and requirements the customer has, especially since the customers are not always aware themselves of what needs they have. This problem is discussed by the Japanese researcher Kano, who talks about a combination of needs where some are known, some are taken for granted and others remain unknown until they are satisfied. In the Kano model (see figure 5.3) the stated needs, implied needs and sub-conscious needs of the customer are shown, and how they create customer satisfaction. (Sörqvist 1998)

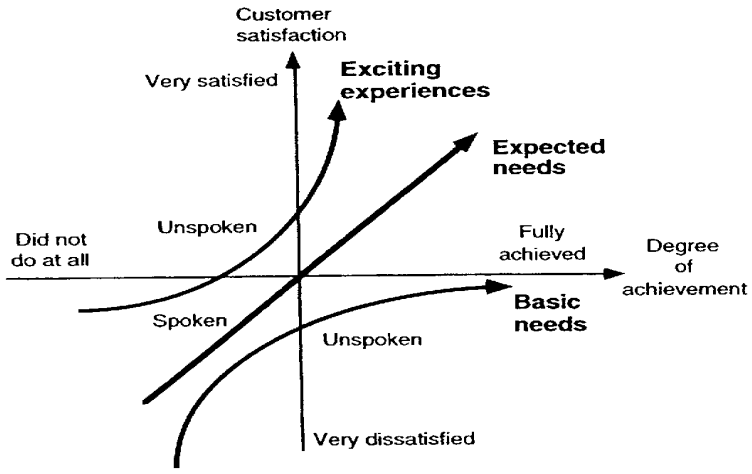


Figure 5.3 The Kano model of customer satisfaction.
Source: Bergman & Klefsjö, 1994, p.282.

In a doctoral thesis, Sörqvist (1998) summarises many of these definitions into a wide definition "the totality of characteristics of a good, service or process that bear on its ability to satisfy stated, implied and sub-conscious needs". This definition takes into account the ideas about satisfying customers, and that all the diverse parts in a product or service must be of high quality and well incorporated in the final product or service.

Another interesting way to look at quality is given by Myron Tribus in an ASQC newsletter (Bergman & Klefsjö, 1994):

> *"Quality is what makes it possible for a customer to have a love affair with your product or service. Telling lies, decreasing the price or adding features can create temporary infatuations. It takes quality to sustain a love affair."*
>
> *"Love is always fickle. Therefore it is necessary to remain close to the person whose loyalty you wish to retain. You must be ever on the alert to understand what pleases the customer, for only customers define what constitutes quality. The wooing of the customer is never done."*

## 5.4 WHAT IS SERVICE QUALITY?

In the 1970s interest in services began to increase, and there was an understanding of the differences between service production and goods manufacturing. Services were seen to be an important contributor to the economy. Within management research, service quality was seen as an interesting topic in the mid-1970s, but in Sweden it did not receive its break-through until the end of the 1980s. By this time a slogan 'the customer in focus' became popular in business, and quality went from being a primarily internal term to becoming external, it became *customer perceived quality.* (Gummesson, 1996)

The service sector has grown, employing more and more people and making up a larger part of most countries' GNP. But besides growing, services have also changed character and are more focused on handling information as part of the increasing IT-sector. There is a growth in business of knowledge-intensive methods of production, and these methods increasingly require information- and knowledge-based services. The interest in quality has increased substantially within the public service sector as well.

Another reason for this growth is that products have become more alike, and therefore it is ever more important for the companies to focus on the different services connected to those products (secondary services) in order to stand out from the competitors. Examples of secondary services are sales, guarantees, complaints handling, and maintenance. The products will always be important, but it is through the services included in the offering, which are difficult to copy, that a company ties down the customers. These services make it possible for a company to differentiate itself from its competitors. The product and service together must be valuable to the customer, and result in customer satisfaction and customer perceived quality. Therefore, it is vital for companies to work with quality in services and developing good services from the start, and it is just as vital to set up clear quality specifications for the service activities as it is for the traditional goods manufacturing. (Gummesson, 1996)

Many different ways of describing services and its characteristics exist and some of these can differentiate services from goods. Examples are given by Bergman & Klefsjö (1994, p.266):

- "Services are intangible and may be difficult for a supplier to explain and specify and some times also difficult for the customer to assess.
- The customer often takes part directly in the production of a service.
- Services are consumed to a large extent at the same time as they are produced; i.e. services cannot be stored or transported.
- The customer has not become the owner of anything when buying a service.
- Services are activities or processes and can therefore not be tested by the customer before they are bought.
- Services often consist of a system of sub services. The customer assesses the totality of these sub services. The quality and the attractiveness of the service depend on the customer's experience of the totality."

Lund et al (1990) state that the customer is often a co-producer of the service by contributing with information and performing parts of the process, and because of this and because of their unique demands and behaviours, variations in both processes and results occur. Most services arise in the direct meeting between the service producer and the customer, 'the moment of truth'. The person delivering the service becomes part of the service itself and is thereby also a part of that which the customer bases his valuation of the service upon. Gummesson (1996) talks about the concepts of inseparability, simultaneity, and interaction. This refers to the fact that the customer enters the stage before the service is produced, participates in the production, and starts to consume the service during the production process.

All these characteristics must be considered when designing, marketing, producing, and delivering services, especially when compared to companies with more production-oriented processes.

One way of defining *customer perceived quality* is the relationship between expected and experienced services from the customer's perspective. It is primarily in the unusual 'moments of truth' that the perception of quality is formed or changed, i.e. when the customer does not get what he or she expected to get, but feels that the service encounter is better or worse than expected. (Gummesson, 1996)

To be able to formulate meaningful and clear definitions of quality within a company, two important questions must be asked: quality for whom?, and quality in what?, i.e. quality in the service itself or in the service process. These two perspectives have a large bearing on how the quality concept is regarded. Edvardsson (1996) also finds it necessary to think about that it is not only the customers' needs that should be fulfilled, but there are also internal customers whose needs must be met in order to achieve quality, the employees and the principals, e.g. owners. The right quality is achieved when their expectations are fulfilled, their needs are satisfied, and their requirements are met. The customer's expectations are based on needs, earlier experiences of the service in question, and the reputation the service has on the market.

Besides the characteristics of services there are quality factors inherent to services that influence how customers perceive quality. Understanding these is part of the work of creating better definitions of quality for each service. Most quality factors are unique to each service but there are some that are common to all. (Bergman & Klefsjö, 1994) Confidence and reliability are hold to be the most important factors in several studies. Other factors are simplicity and flexibility, the competence, attitude and behaviour of the personnel, and recovery, which means the ability to handle critical situations and correct them. (Edvardsson et al, 1994)

Because of the characteristics and quality factors inherent to services, and service companies being somewhat different than those of a manufacturing company, the quality work must be slightly different in a service company. Since quality work is mostly about satisfying customers and meeting requirements, it is important to realise that in service companies the customer relationship is quite different

compared to that in manufacturing companies. The fact that the customer is a co-producer of the service makes it impossible to keep a consistent performance and quality level. Each customer's behaviour in the production process is unique, and thus quality goals and measurements must vary from time to time and must be individualised for each service being produced. In conclusion, when working with service quality it must be remembered that quality is the outcome of interaction between service provider and customer, as well as of independent actions by the provider and the customer.

## 5.5 WHAT IS POOR QUALITY?

One way of looking at poor quality is to see it as the opposite of quality. So if quality is to have conformance to requirements, or fitness for use, where one does the right things, or to satisfy customer needs, then poor quality is when those things are not achieved. Just as most researchers/authors connect quality to customers, most of them connect poor quality to customers as well. This is in line with many ideas today placing the customer in focus of everything, and that satisfying the customer is the number one priority.

As said before, good quality is when both internal and external customers are satisfied. Thus, poor quality occurs when a product or service does not meet internal or external customers' needs and requirements in some way. A company's quality work becomes difficult since all customers are different and have individual needs. As soon as any one customer is not satisfied, poor quality can be said to arise. Even if the internal customer's requirements are met, the quality will be poor if the external customer's needs are not satisfied. However, the customer's perception of quality and poor quality will not only depend on the product itself and its features, but also on how well it meets the expectations built up by salesmen and advertisement, as well as the features and quality of the competitors' products. (Sörqvist, 1998)

Sörqvist (1998) makes a division of the problems that can occur into two categories, sporadic and chronic problems. The sporadic problems occur daily, and are those occasions when machines break down or

employees make errors when filing a document. They are easy to discover and are therefore often the focus of the daily quality work where corrections are made in order to return to the normal or accepted quality level. The chronic problems are more difficult to discover since they have become inherent to the daily routines and the organisation has learned to live with them. They are taken for granted and a certain level of error is seen to be unavoidable, e.g. inefficiencies, communication deficiencies, and bad routines. The quality work must include extensive analyses and a deep understanding of the process, as well as major changes in attitudes, routines and processes in order to correct these chronic problems and reach the optimal quality level. Although much work is needed, this is where the major financial gains can be made within the quality work.

A common reason for the occurrence of faults, inefficiencies and bad routines is the fact that there are gaps in expectancy levels, both internally between processes, management and staff, and externally between the customer and the company in different ways. The gaps come from differences in views and opinions shaping the expectations about specific situations or characteristics in products or processes. They often occur at the interfaces that are formed where the processes cut across traditional functional barriers. Studying the gaps and the interfaces can probably help the company to identify numerous poor quality costs. (Sörqvist, 1998)

Edvardsson (1996) emphasises the importance of simplifying the production process in order to make it easier for the customer to 'co-produce' services without making errors. The more activities that can be made by the customer, the more flexible it becomes, which will lead to the perceived quality being higher. The right quality must exist throughout the process, which is a chain of internal customer relations that need to be designed to ensure the proper quality. The quality chain is only as strong as its weakest link. The links in the chain are not only those within the company that provide the service, but also external suppliers, partners and customers. The same view of quality, and the same requirements must permeate all the links in the chain. The challenge is to get thinking about quality and responsibility for quality

to exist within the entire company, and in the external suppliers' organisations (Edvardsson et al, 1994).

In the future, companies must realise that the importance of the customer is growing, and that customer loyalty will be the difference between surviving or not. Companies must listen to customers to understand how to satisfy them, or even delighting them, in order to win and retain their loyalty.

## 5.6 QUALITY COSTS AND POOR QUALITY COSTS

Another concept that has captured much interest lately is that of quality costs, and poor quality costs. Companies want to see the financial consequences of working with quality, and of having poor quality. When talking about costs there are two different opinions, some argue that it is quality that costs, leading to quality costs, while some argue that it is poor quality that costs, leading to poor quality costs. One of the first to write about the general concept of quality costs was J.M. Juran in his Quality Control Handbook (1951), where he discusses the economics of quality and how much money can be won by working with quality. Quality costs are all those costs that arise when trying to achieve product or service quality, i.e. they arise when the company is trying to meet the requirements set by both internal and external customers. Examples of requirements are end product specifications, operating instructions, industry standards, and any other document or customer need that can affect the definition of product or service.

Instead of talking about quality costs there has been a trend recently to talk about *poor* quality costs, since it is argued that it is not quality that costs but rather poor quality, or the lack of quality, that costs. The main difference between these two terms lies in what is seen as the cause of the costs, quality or poor quality.

### 5.6.1 Why measure the costs?

Regardless of if one talks about quality costs or poor quality costs (PQC), the reasons for why the costs should be measured are the same, i.e. reasons for measuring quality costs are the same as for measuring PQC. Therefore, in this discussion one expression can be used for both,

and for this section we will use the term PQC (irrespective of what the authors' use). According to Campanella (1999) measuring and analysing costs is an important part of the quality work undertaken by a company. Being aware of the different PQC is always important for management, and being able to reduce known costs will help to improve the overall quality in a company. Before managing PQC, there must be a general understanding that improving the quality performance of products and services will also improve PQC.

If it is possible to measure the quality improvements achieved, there will be a noticeable effect on other business measures, such as sales and market share. Working with PQC should be systematic and continuous, and not just a response to random problems. The risk when responding to a specific problem by adding for example inspections and tests is that the added costs may destroy the profit potential, and that the real cause of the problem is not eliminated. A comprehensive system will force the analysis of all associated PQC, making them appear clearly and thus be a help towards the prevention of the root cause of the problem. A PQC system has the potential of being an excellent management tool, indicating the health in many areas of a company. It should be an integrated part of any quality program since overall PQC can point out the potential for quality improvements and provide management with the basis for measuring the improvement accomplished. Campanella (1999) is of the opinion that perhaps the greatest contribution of PQC systems is showing the payoff for would-be corrective actions and justifying their accomplishment.

Many companies have worked with quality, and PQC, for years but not many have looked outside the production processes, which means that white-collar costs, or overhead costs, have often been overlooked, as well as PQC in the service sector. Harrington (1987) is of the opinion that PQC in the administrative and support processes often run to 20 – 40 % of their total budget, and therefore it is very important to pay attention to these costs as well. However, this can be difficult since the reporting systems today usually do not focus on such costs within a company. The records can then only give very crude figures, for example cost of engineering changes, added cost because bills were not paid on time, and outside education to improve performance.

But, the costs shown in the accounting systems are only a very small part of the total costs in the white-collar areas.

### 5.6.2 Definitions

Considering that there are different views on quality and poor quality and what it is that actually causes costs, there are different concepts for the costs, i.e. quality costs and poor quality costs. Additionally, each concept is defined differently by many authors/researchers. One author that uses the concept quality costs is Campanella, who defines quality costs as "the total of the cost incurred by (a) investing in the preventing of non-conformances to requirements, (b) appraising a product or service for conformance to requirements, and (c) failing to meet requirements" (Campanella, 1999, p.4). He has the opinion that it is quality that costs, and therefore all costs connected to working with quality or being the result of poor quality are called quality costs. Lund et al (1990, p.55) also discuss quality costs, and their definition is "the time and those other resources that a company must use in order to fulfil the pre-set requirements". They divide the quality costs into two categories where the first one is costs needed to ensure that quality requirements are upheld, i.e. costs for preventing and controlling the quality, and the second category is costs that are a result of deviations from the requirements, i.e. costs for correcting errors. These costs can be seen as unnecessary since they are the result of either inefficient routines, or routines not being followed, which should be avoided by doing the right things every time.

As said before, the trend today is to use the concept of poor quality costs instead, because poor quality causes costs. Another term or expression for PQC is non value-adding costs, which means that the costs do not add any value to any customer. Traditionally, there has been a very production related perspective on PQC, and the attention has been focused on costs resulting from deviations from requirements. In the end, this perspective mostly identifies PQC from not 'doing things right' but misses the PQC from not 'doing the right things'. Today the quality concept is wider, total quality is being focused, and with the wider understanding of quality comes a larger risk for poor quality to occur and thus PQC will include more elements and add up

to larger amounts. A wide definition that includes all kinds of PQC in all activities in a company is "those costs which would disappear if the company's products and processes were perfect" (Sörqvist, 1998, p.29).

Below will be given more definitions of PQC, some are more specific and some more general:

- All the cost incurred to help the employee do the job right every time and the cost of determining if the output is acceptable, plus any cost incurred by the company and the customer because the output did not meet specifications and/or customer expectations (Harrington, 1987, p.5).
- Quality is free. It is not a gift, but it is free. That which does cost money is that which is not quality, all that which mean that one does not do one's job right the first time (Crosby, 1988, p.11)
- According to IVF, PQC are the difference between the actual costs of producing and selling a product and the ideal cost if there were no errors made in the design, manufacturing, sale, or delivery of the product (Schultze & Johansson, 1995, p.16).
- According to Juran & Gryna, PQC are the costs for making, finding, repairing or avoiding deficiencies in products (Schultze & Johansson, 1995, p.16).

As can be seen the concepts have developed, with quality costs being used in the 50s when the costs related to quality was first discussed, and lately turning more into the concept of PQC instead. Sometimes the terms are synonymous and sometimes they are used to mean different things. In the international standard ISO 8402, the term quality related cost is used as a general term. Sörqvist (1998) uses the concept of PQC but includes more things in it, i.e. making the concept wider. His definition is "the total losses caused by the products and processes of a company not being perfect" (p.30). By losses he means all the effects quality deficiencies and insufficient features have on the company's income, costs, and assets. He also states that PQC includes the result of failing to satisfy the customers' stated, implied, and sub-conscious needs (as discussed in 5.3). This shows that there are quite many views on the PQC, hence companies working with PQC must

decide which definition they want to use so that it is suitable to their situation. Sörqvist goes on to say that in practice one should use the broad definition as a starting point, and in each instance decide the level of PQC one wishes to measure by defining the relevant cost parameters. (Sörqvist, 1998) A discussion of the quality and poor quality concepts, and the cost concepts in regard to this study will be given in section 6.3.

### 5.6.3 Categories

A common way of categorising the costs is to divide them into prevention, appraisal, internal failure, and external failure costs. However, there is a difference depending on if one refers to quality costs or poor quality costs. Those who use the concept of quality costs include all categories, while those who use the concept of PQC do not include prevention costs. The reason for not including prevention costs is that they prevent poor quality rather than being the result of poor quality and therefore are not a cost of poor quality. In the early 1960s Armand Feigenbaum categorised quality costs into the categories prevention, appraisal, internal failure, and external failure, and then a number of other authors have followed his reasoning. One of those who use his categorisation is Campanella, (see appendix 2). Examples of authors that use the categorisation of PQC without prevention costs are Sandholm and Sörqvist.

*Prevention costs* are the costs of all activities that are designed to prevent poor quality in products or services to arise. Examples of prevention costs are costs for quality planning, process capability evaluations, quality education, and training. (Campanella, 1999) The *appraisal costs* are those costs that occur because of the need to control products and services to ensure a high quality level in all stages, conformance to quality standards, and performance requirements. The control can take place before the production phase, during it, or right afterwards. So, the appraisal costs are due to appraisal activities, which hinder errors from being passed on to the next level in the process or to the customer. They do not reduce the number of errors, but they reduce the number of errors that reach the customer. Some examples are costs for: checking and testing purchased goods and services, quality control

and measuring equipment, field testing, product and process audits, and costs for evaluations of the business. (Sörqvist, 1998; Campanella, 1999)

The failure costs are the costs resulting from products or services not conforming to requirements or customer/user needs, i.e. problems or errors have occurred and cause the product or service to be of poor quality. They are further divided into internal and external costs. The *internal failure costs* are the costs caused by deficiencies found before delivery of products and services to external customers, which otherwise would have led to the customer not being satisfied. Deficiencies are caused both by errors in products and inefficiencies in processes. Such costs can include costs for: rework, delays, redesign, shortages, failure analysis, retest, downgrading, downtime, lack of flexibility and adaptability, poor competence, and poor management. The *external failure costs* are the costs caused by deficiencies found after delivery of products and services to external customers, which lead to customer dissatisfaction. This can be costs for: complaints, repairing goods and redoing services, warranties, extra costs for customers, badwill, losses due to sales reductions, and environmental costs. (Sörqvist, 1998)

The failure costs can be defined slightly differently. Campanella (1999) is talking about when the costs occur, rather than when defects, problems, or deviations from quality occur. According to him the internal failure costs are costs that occur before the product is delivered or the service is furnished to the customer. External failure costs are costs that occur after the product is delivered or the service is furnished to the customer.

Sandholm (1997) is more focused on PQC in service organisations. As he is using the definition of PQC he uses the categorises appraisal, internal failure, and external failure costs. The appraisal activities in services include testing, inspecting and auditing things such as what goods are delivered to customers as part of the service, what aid is available for performing services, and the activities that the customer does not see (e.g. cooking the food, order processing). Examples of internal failure costs in services are for example costs for rewriting an

invoice, costs for discarding faulty products, and costs for delays or production stoppages. When failures are discovered by external customers, they can lead to external failure costs for the reception and processing of complaints. Other examples are costs from having to cut the price, or the need to withdraw services, and finally costs from loss of reputation.

The major advantage with these categories is that they are easy to use and understand, and thus it becomes fairly easy to implement a model based on these categories in a company. These categories are well known internationally, and can be used in many multinational companies, which might motivate the employees to actually use them. The model offers a uniform way to collect and report PQC, which further increases its usefulness. (Schultze & Johansson, 1995)

There are many authors and researchers that use this kind of categorisation (see e.g. Cullen & Hollingum, 1987; Juran & Gryna, 1988; Lund et al, 1990; Edvardsson & Thomasson, 1992; Tisell, 1993; Bergman & Klefsjö, 1994; Sandholm, 1997; and Sörqvist, 1998).

Another author discussing the concept of PQC and their classification is Harrington (1987). However, he has a different opinion about the costs and what costs are to be included. He gives a slightly different model for classifying PQC, where the primary division is between direct and indirect PQC. Direct costs can be found in the company ledger and verified by the accountants. They include all the costs that occur because of the risk that people will make errors, because some actually do make errors, and because people continuously need training to do their jobs properly. The direct PQC are further divided into controllable, resultant, and equipment PQC. In contrast to the direct PQC, the indirect PQC cannot be found in the company ledger, they are more subjective, and therefore less usable for management in running the business. They are the costs that occur when the company does not manage to completely satisfy the customers, but merely meet their requirements. The indirect costs are divided into customer-incurred, customer-dissatisfaction, and loss of reputation PQC.

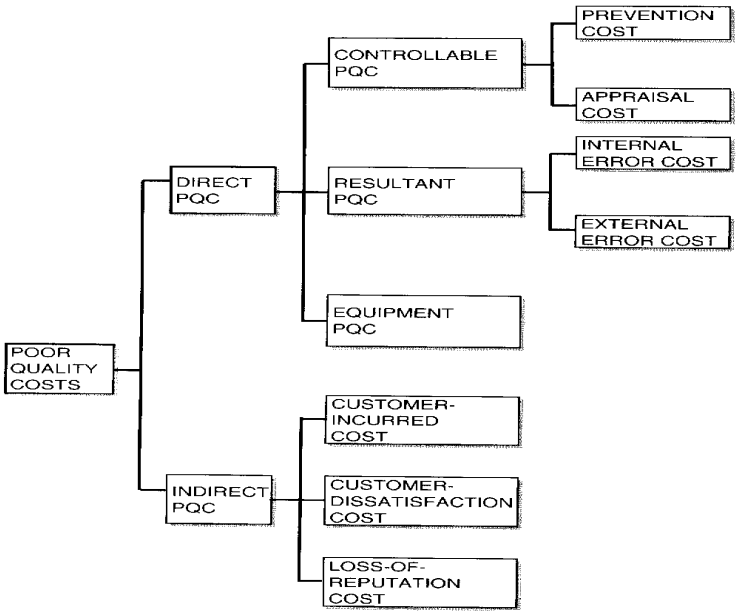


Figure 5.4 Poor quality cost classification
Source: Free from Harrington, 1987.

As can be seen from the presentation above, different definitions, classifications, and meanings of what to include exist. This is one thing that leads to problems when it comes to giving one correct definition of the quality concept. The main difference is whether one is of the opinion that it is quality or poor quality that cost. Most of the authors are quite clear about why they use one or the other definition. However, Harrington (1987) uses the term PQC, but includes prevention costs. He wants to include all costs related to quality in his system for reporting and measuring such costs, but does not want to call them quality costs. The reason for this is that he sees the term quality costs as a negative expression that reflects the thinking of the 1950s, when it was believed that it was more expensive to produce products with better quality, i.e. quality was seen to cause extra costs. Therefore he uses the term PQC, even if he is talking about all costs related to quality, i.e. costs for ensuring quality, preventing poor quality, controlling quality, correcting errors, and all other costs for not being able to meet customers' needs.

### 5.6.4 Levels of poor quality costs

When measuring PQC and categorising them, problems are likely to occur since not all costs will be easy to find and measure. There is a real risk that only a small portion of the costs will be found but still be represented as the total PQC in a company, which will lead to a false picture of the effects of poor quality. The costs that are easily found and whose effects are known are the *traditional* poor quality costs, or the obvious ones, which are measured mainly in manufacturing companies. Many of these arise in the production phase and are largely due to sporadic problems, which disrupt operations and are clearly seen as the result of non value-added activities. Examples are costs for scrap, rework, warranties, complaints, and inspections. (Sörqvist, 1998; Campanella, 1999)

Those costs that are difficult to find or measure can be called *hidden* poor quality costs, or intangible, and their effect is difficult, if not impossible, to place a value on. They affect the business but they are not revealed directly by the accounting systems, but rather they can be found under direct wages, direct material or production overhead. Many of these costs arise as a result of chronic problems and often occur within the white-collar side of a business, or in production where only some of them are distinguished and reported separately. Examples are costs for delays, inefficient systems, downtime, delivery problems, loss of revenue, badwill, and bureaucracy. PQC can be compared to an iceberg with the more commonly measured traditional costs as the ‘tip of the iceberg’, and the hidden costs below the surface making up the bulk of the costs. The hidden costs are usually responsible for many financial difficulties, as the negative effects on profits, resulting from products or services of poor quality are often dynamic. Once started, the costs continue to grow until the company is in difficulties due to the impact of an unhindered increase in costs coupled with a poorer quality and image. (Sörqvist, 1998; Campanella, 1999)

### 5.6.5 Benefits with using poor quality costs

There are many different applications for, and benefits of, a PQC system. Sörqvist (1998) summarises the applications in three areas. The first area of application is the money effect, when PQC are stated in monetary terms attitudes are influenced, and the quality concept is made more concrete. Everyone can understand the results of poor quality and what these results actually mean when turned into money. Hopefully, this understanding can motivate employees to avoid failures and give management a picture of the potential earnings to be reached with a reduction in PQC. As the monetary value is common to every area of the business, measuring PQC is suitable for both the company as a whole, and at local levels. As everybody understands the value of something when turned into money, PQC can also be very useful as an overall quality goal by showing how the profitability of the company is affected by quality and quality improvements.

The second area of application is to use PQC when working with quality improvement activities. The existence of problem areas can be demonstrated and priorities decided among them, which means that the priorities of improvement options can be ranked by studying the distribution of PQC throughout the business. Management then has the possibility to start with improvements where the financial benefits are the greatest. However, it is always difficult to know the costs for all problem areas, but being aware of the cost of some particular problem can help to justify correcting these. It is better to have some costs, and make some corrections than not do anything, and not have any idea of which problems that results in high costs for the company.

The third area of application is in the area of following-up quality improvement activities by looking at the changes in PQC over a period of time. Unfavourable trends in PQC can be found and corrected and this is a way of actually controlling quality and receiving feedback from work performed. An important effect is the opportunity to show management the return on quality improvement activities.

Juran and Gryna (1988) agree on that these application areas are some of the most important reasons for assessing PQC, but they also mention

some other important reasons for why such costs should be measured and evaluated. One is that departmental budgets can be expanded if it becomes obvious that some of their costs are caused by scrap, rework etc, which is not the sole responsibility of that department. A significant effect from evaluating poor quality costs can be that the company becomes aware of the customers' costs because products fail after delivery. Customers have costs because of downtime and other forms of disturbances, and in the end this can reduce their satisfaction and their interest in buying more products or services from that company. As a result of the evaluation the company can identify vital problem areas and try to eliminate the effects of these problems. A PQC system can also increase the possibilities to find hidden costs and costs that are often buried in overheads. These costs are not the normal costs that are obvious to all and therefore many companies fail to pay attention to them. This lack of attention can cause conventional quality programs to be less effective because some of the most serious problems resulting in high total costs or much inconvenience are not corrected.

Harrington (1987) also thinks it is important to combine the use of a PQC measuring/assessing system with an effective improvement process, i.e. to use the results found when evaluating the PQC. Besides providing a way to prioritise between problems, it also gives a full picture of the accumulated costs for a common problem arising throughout the entire process from supplier to customer. Often common errors that occur in many parts of the process, represent a major problem when they are combined, and this can more easily be discovered if the PQC are traced. By understanding the present processes, where problems arise today and what costs are incurred, it is possible to create new and better processes, and avoid having errors occurring, and eliminate unnecessary appraisal costs. Finally, Harrington is of the opinion that one of the most interesting benefits is that PQC reduction is possibly the best way to increase a company's profit since by improving the quality the company needs less personnel, material, floor space, etc, leading to decreased expenses. Moreover, improved quality will probably lead to higher market shares, which in turn lead to higher revenues.

### 5.6.6 Risks with using poor quality costs

Obviously there are not only benefits with using PQC, some risks exist as well, for example, that companies collecting and measuring poor quality costs believe that they have found the total sum of all PQC within the company. But as mentioned above, many costs are hidden and therefore difficult to find, and even if they are found they might be difficult to estimate correctly. When prioritising between improvement activities, management must be aware that unless they have made a very thorough assessment of the PQC, they might not have found the most extensive or serious problems, and therefore the improvements might not be the right or most efficient ones. In the end the company must decide between the benefits and risks of measuring. The company can either have some idea of where to start improvement activities, risking that the priorities are not entirely correct, or ignore this aspect when making improvements, fearing that the measuring shows a false picture, but then directing the improvements after some even less reliable method. Some say that it is better to do something, albeit slightly wrong, than doing nothing at all (Lund et al, 1990).

Management must also be aware of that PQC are not suitable for making comparisons between different companies, or departments, or processes, since companies include different elements in their PQC. According to Harrington (1987) these variations are based on product complexity, state of the technology used, how the customer uses the product, the elements of PQC that are included, and the level of refinement of the quality system within the company. Another risk with making comparisons is that one is comparing PQC that are different because they were assessed by using different methods, and not because the actual quality levels in the companies are different (Sörqvist, 1998).

Finally, there is a risk that companies might believe that their quality is high when their PQC are low. But this is only true if they are low because the company has measured their costs for a long time and/or effectively improved their business. If costs are low the first time a company measures them, it is more likely that the company has not found many of the PQC that exist. Studies have shown that the most successful companies are those with the highest PQC, since they have

much information about the poor quality in their company and are experienced in measuring them. Less successful companies often report low PQC since their problems remain unidentified. (Sörqvist, 1998)

When using a PQC system it is important to be aware of both the benefits and the risks, in order to draw the correct conclusions for how to operate the business.

## 5.7 HOW TO MINIMISE THE COSTS

One way of saving costs is to spend money in the right place, by which is meant that spending more on prevention costs and appraisal costs early in the product life cycle lead to lower total PQC. This means that by spending more money on prevention activities, the money spent on appraisal, internal failure, and external failure activities can decrease, leading to that a lower cost in total is spent on activities that is related to quality. (Sörqvist, 1998) If one uses the term quality costs, all these four kind of activities is included in the total quality costs. However, if one uses the term PQC the prevention cost is not included in the total cost, but still, the total PQC is affected by the increased spending on prevention activities. Irrespective of what kind of term one chooses to use, the total cost for these activities will decrease. Also, regardless of if the costs for prevention activities is seen as a PQC or not, they are still a quality related cost for the company. The figure below will show this relation more clearly.

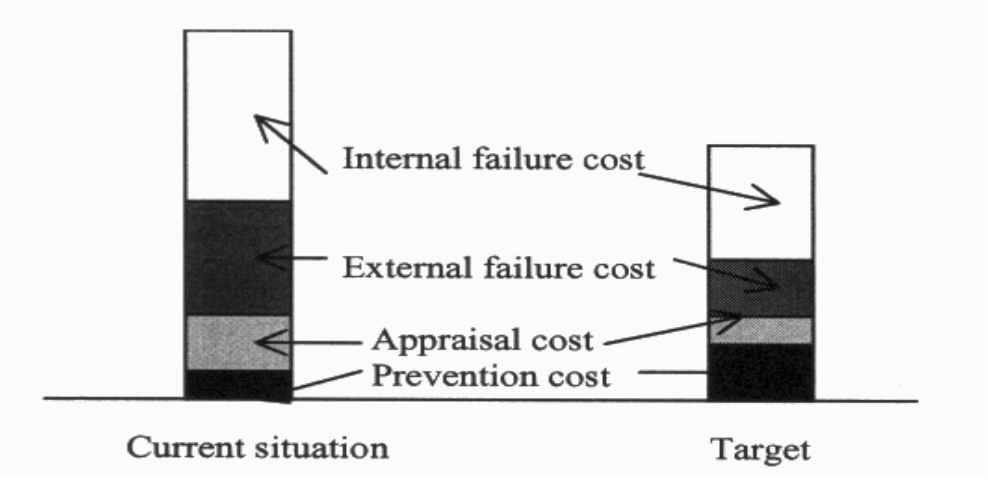


Figure 5.5 Total costs can be reduced by investing in prevention activities.
Source: Free from Sörqvist, 1998, p.33.

Earlier, it was believed that there was an optimum cost where failure costs have been reduced to a fairly good level, and if more were spent on appraisal and prevention the total costs would then increase again. Lately it has been shown that spending more on appraisal and prevention will continuously bring down both failure costs and total costs and in the end this higher quality will lead to increased sales. Clearly, the goal with any PQC/quality cost system must be to make sure that money is spent in the right place, and in the end that less money is spent on quality in total. One of the best ways to do this is to facilitate quality improvement efforts that will lead to cost reduction opportunities. (Sörqvist, 1998)

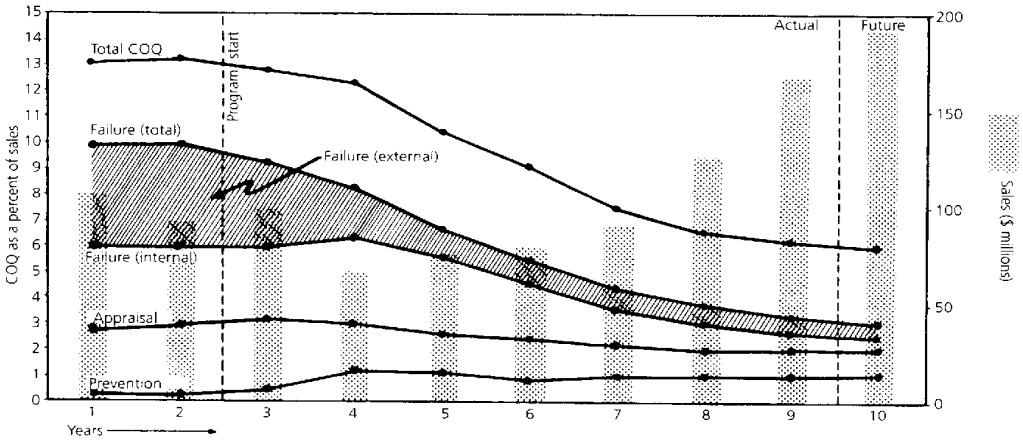


Figure 5.6 Cost of quality history
Source: Campanella, 1999, p.39.

When problems occur and failures are revealed it is important to look for the root causes and eliminate them permanently through prevention activities. A proper analysis of cause and effect can lead to the reduction of real PQC, especially the sooner in the operating process that the failure is discovered. If the knowledge learned from analyses and improvements is taken along to new processes and products, prevention activities lead to lower PQC for these new processes and products. It is expensive for a company if a customer finds defects, but if the manufacturer or service organisation had found them through appraisal activities much money could have been saved, and customers would have been more satisfied. To minimise the PQC the company should go one step further and improve their prevention activities. (Campanella, 1999)

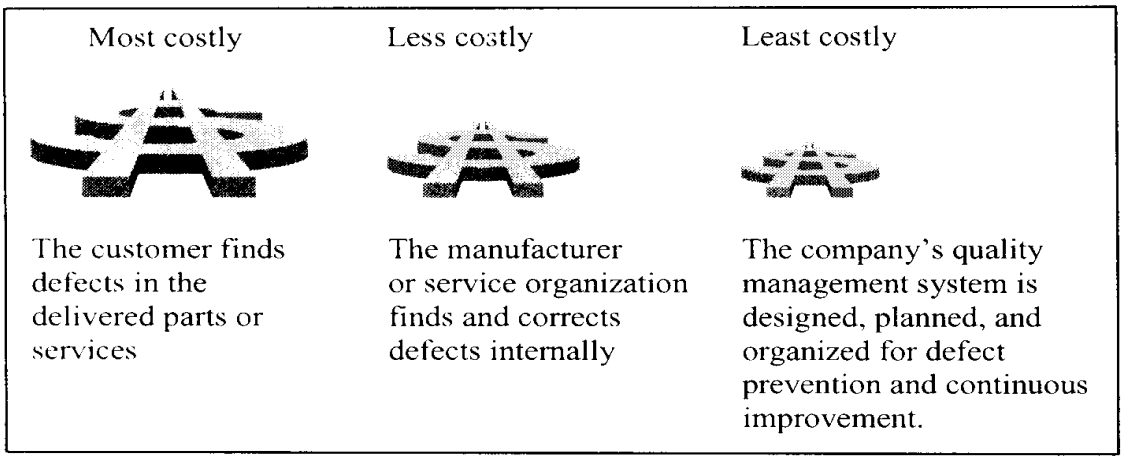


Figure 5.7 Comparative cost of quality, or poor quality
Source: Free from Campanella, 1999, p.8.

## 5.8 HOW TO MEASURE PQC

According to Sörqvist (1998) there are two different ways to collect information, in order to identify and measure the PQC. Either making an assessment of PQC in a company to get a quick view of the situation, or to implement a full PQC measuring system, which regularly measures the costs in parts of the company or in the entire company. Often the assessment can be an introduction to working with PQC, which then leads to the implementation of a measuring system. To get as much as possible out of the measuring, the company needs to know what they want to use the results for, and then adapt the measuring method to the specific business activities. This study will be an initial, rough overview of PQC, and does not aim at implementing a full measuring system, and therefore only assessments will be described here.

Whatever method is used to measure PQC it can always be a bit difficult to identify all PQC, and especially to know whether some costs are poor quality costs or not. This means that there is no general method that is useful in all companies. The well-known cost categories described earlier are a good starting point but must then be further adapted to each specific organisation. Checklists with the most commonly found costs can be used as a starting point, and from these one tries to identify specific and relevant costs for the particular situation.

Sörqvist (1998) describes how assessments can be done. An assessment can be done by a small group, including people from various functions. This group can fairly quickly and simply go through all parts of the business and obtain information about problems leading to PQC. The assessment catches information from a limited period of time. In contrast, a measurement system provides regular measurement data and continuous results. However, such a system requires that all employees in the organisation are involved and are well educated in the area of PQC, and are highly motivated since they are involved in doing the regular measuring and reporting, if the system is to function satisfactory. In an assessment, it is only the people collecting the data that need to have good knowledge about quality and PQC. If a measurement system is to function in the long run, it must be regularly maintained. Consequently, it is a more complicated and time consuming process to introduce a measurement system than to make an assessment. (Sörqvist, 1998)

### 5.8.1 The ISO models

Campanella (1999) describes the three basic assessments models for approaching quality costs/PQC that are given in ISO 9004-1:1994, the Quality-costing approach, the Process-cost approach, and the Quality-loss approach. Since Campanella sees the costs as quality costs he is including prevention costs in his descriptions (this means that these methods for assessing costs are the same irrespective of which cost categories are included). The Quality-costing approach is the traditional model of identifying costs and dividing them into the categories prevention, appraisal, internal failure, and external failure costs. This is a well-known and understood model and has been used by many companies. In this model, costs that are part of the normal operations of the plant or service are excluded, such as cost of routine maintenance and repair. This approach is usually done for the whole company but can also be applied to an individual process, and it offers a quick way of identifying opportunities for increased revenues, decreased costs, and in the end, larger profits.

The Quality-loss approach tries to identify both the intangible and the tangible costs, or losses, caused by poor quality, which mainly include

the failure costs in a company. Since the intangible costs are difficult to find and measure, they must be estimated, and multipliers have been used to approximate the intangible quality losses. In many cases this is the only model that is possible to use because of a lack of cost data, and although it only permits a rough estimate of costs and is less rigorous than the other models, it offers some benefits. For example, that it gives a more realistic picture of the PQC and the opportunities for improvements by including both intangible and tangible losses, even though they are not exact.

The Process-cost approach looks at costs for a process rather than for a product or a profit centre. The approach views quality as a wider concept by looking at cost of conformance, which are the costs incurred to fulfil all the stated and implied needs of customers in the absence of failure, and cost of non-conformance, which are the costs incurred due to failure of the existing process. The model may be especially effective for companies where the tangible costs are relatively small and who have a mature quality program. Analysing the steps of the process provides the opportunities to modify or re-engineer the process, and by this eliminate non value-added steps. Process simplification is only done through reduction or elimination of errors and the resulting increase in efficiency or productivity is directly caused by an improvement in quality. The eliminated costs could thereby be considered hidden quality costs/PQC.

### 5.8.2 Sörqvist's assessment method

An assessment aims to find information about PQC from the entire business, or area studied. It should be largely based on readily available information plus estimates of the remaining PQC if the assessment is not to require too much resource input. The employees, who are best informed in each area to provide an accurate picture, should make the estimates. When making estimates, there is a risk that the results will not be completely accurate, but with a well designed and controlled method, the risk can be minimised. Furthermore, minor deviations are not so important, as this technique is mainly used to provide a general picture of the size and distribution of the PQC. The whole assessment procedure should be kept simple in order to reduce

the risk of problems and difficulties. The scope should be selected so that the workload can be seen to be realistic, and the methods should not be more complicated than necessary. (Sörqvist, 1998)

The assessment should start with a preparation. In order to ensure necessary resources and priority for the study, it is vital to get the management's support, which can be done by informing about the importance of PQC and the resulting quality improvement opportunities. The next step in the preparation is to decide the scope of the study. The study can be of the whole company with the intention of determining the total PQC in the business, or it can be a study of specific problems and inefficiencies in order to provide a basis for decisions for improvement activities, maybe on a local level. Often it is a good idea to combine several different methods, e.g., a rough assessment of the PQC of the entire business can be improved by selecting a number of interesting cases for more detailed study. When the project group is set up, the company should gather competence from the entire business, especially from finance and quality departments.

The next phase is to plan the assessment. The group should make a written plan stating the purpose, targets, timetables, budgets, information about practises to be applied, and procedures for the work. All employees who will come into contact with the assessment should be informed early, so that they do not see the project as a threat as errors and problems arising in their work will be studied, but rather as an opportunity to improve their routines.

To be able to do a good assessment, an extensive knowledge and understanding of the company or process being studied is needed. The mapping of the business will involve identifying and analysing all the processes, functions, projects, resources and activities that exist or take place. If the analysis is carried out along the line of the process, information gathered about an early stage can be useful when analysing later stages, and help when making a picture of the process. It can also be useful to do the actual assessment of PQC against the flow of the process, as one then has the opportunity to gather useful

information about errors that take place in earlier stages but whose consequences are only observed later on.

After this it is time to start making a list of possible shortcomings in the process, or company being studied, to have as support for the assessment and analysis. This can be based on information learned so far, on interviews, brainstorming sessions, surveys etc. A brain-storming session with employees, who are considered to be particularly well-informed about the business, is a good start for finding problems and shortcomings that can cause PQC. The purpose is to come up with as many problems as possible, for evaluation later on.

The next step is to see what possible sources of information exist that could contain information about the problems in question. Much information about PQC often exists already, e.g. in the accounting system, and should be used together with other documentation about errors and problems. Sometimes activities exist only because of poor quality and will then supply useful information as well. When the available information is not enough new information must be collected from the operations. Two common ways used are to interview the employees or to make time-limited surveys of the operations.

The assessment itself can be carried out using one of two main ways. The first is to map existing faults, shortcomings, deficiencies, and insufficient features, estimate their frequency, and price them. Sörqvist calls this a deviation analysis. In the deviation analysis one concentrates on the problems that can be found in the business right away, trying to identify them and determine what resources they consume, and thus the cost can be estimated. The risk with this method is that chronic problems will not be identified, as they are often accepted and not regarded as a problem. The other principle way is to determine the best possible way of running the business and then estimate the level of PQC by comparing an ideal situation with the existing one, called a best practice analysis. The risks with this method is that one cannot be sure that it actually is the ideal situation that one has found, and that it can be difficult to make sure that the areas being compared are defined carefully enough to ensure a fair comparison. For both methods, there can be much information available about

frequency and resource consumption in the financial accounting system and other measuring and reporting systems. Documentation about quality work or projects can also be useful.

After all this secondary information has been collected, the next stage of the assessment is to collect primary data, through interviews, measurements, or time studies. In the interview, questions are asked about problems that exist, and their frequency is estimated, as well as how much non-value added time the problems or shortcomings result in. Measurements can be arranged and carried out for a limited period of time. A report form is prepared, on which the personnel report the faults and problems that arise, on a regular basis. Time studies can be carried out, e.g. by having an investigator observe the tasks carried out by the personnel, breaking down the tasks between value adding and non-value adding tasks.

Finally, the costs from the received measures should be calculated. Often it is useful to use the standards and mark-ups already being used in the accounting department in order to avoid unnecessary work. In many cases it is enough to make estimates or make a simple analysis. The work devoted to making calculations should be assessed in relation to the precision of the result that is required, and to the precision of the previous stages in the data collection process, otherwise there is a risk of estimating costs to an excessive, and pointless level of detail.

In a best practice analysis, the first thing is to determine what is the best way of doing the work. The PQC are then defined as the difference between the best practice and the actual practice studied. It is, however, often very difficult to identify the optimal way of performing a task. The analysis includes mapping the existing processes very carefully, and then through empirical or theoretical studies finding new and more efficient processes. Empirical studies often contain benchmarking, where one compares different situations and identifies the best applied practice, maybe comparing externally with other companies, or internally with other parts of the company. Then resource consumption both for the existing practice and the identified best practice must be determined.

Determination of costs can often be based on assessments, estimates and simple standard costs that have been evolved. Once the costs for each situation have been attained, they can be compared. A comparison can be made with other companies because the one making the comparison defines the areas to be included and thus knows that they are the same, and is also the one who calculates the costs and thus know that they have been calculated in the same way, including the same elements. This comparison generates a measure of PQC.

Some efficient techniques for finding costs are primarily the use of brainstorming sessions and surveys with in-depth interviews among the employees. More advanced techniques are benchmarking and process analysis, but they are more time consuming and expensive. All these assessment techniques are especially important to use in service companies or processes, since white-collar PQC are usually not found in existing accounting systems but rather need to be found through thorough observation and study of the processes. Even when poor quality costs, or losses, have been identified it can sometimes be problematic to categorise them, and also to know whether they are PQC or not. Borderline cases can include the cost of rework and scrap in the development and design process, since it can be claimed that they are a necessary part of the work. Here each company must decide for themselves how to treat those costs, partly depending on the purpose of the study. More costs should be included if the aim is to find problem areas since one wants to have such a complete picture of the costs as possible.

### 5.8.3 What to consider when measuring PQC

After studying PQC in Swedish companies, Sörqvist (1998) gives some recommendations of what to consider when measuring such costs. First of all there is the scope, i.e. what parts of the company or process are to be included? It is easier to identify costs in the production process, and often costs in other parts made up of the so-called white-collar workers are not so easy to identify and measure. Most companies in the study measured costs related to production, as that is easier, and even the service companies tended to measure mostly in the production phases. Others try to measure the total costs

in all areas, but Sörqvist's experience is that they often come up with incorrect information and then run the risk of making incorrect decisions regarding their quality work, maybe believing the largest problems are within production because those are the costs that are identified. Total quality can only be measured by looking at effects of deficiencies and of not having enough resources, as well as the effects of traditional production problems.

The purpose of the study must be decided first, in order to find and use the right methods for measuring. If the method chosen does not correspond well to the purpose there is a risk that work needs to be redone or the wrong conclusions are drawn. It is also important to decide in advance what PQC are and which are to be included in the cost categories. Otherwise the project could be left discussing this for a long time rather than focusing on the measurement stage, and it can also lead to the results not being used properly, thus not leading to the right improvement activities. Connected to the problem with identifying costs is also the issue of determining the proper responsibilities for the costs. Some companies use advanced systems for cost allocation whereas others just use simple ones, concentrating primarily on the measuring. The measurement system can also cause problems, as many accounting systems are not properly designed to find these kinds of costs. To get a more accurate picture some companies combine different methods, such as measurements of PQC, customer satisfaction indices etc.

The success of the study depends on the management being involved and showing an interest in the results. Motivation to be part of the study comes from knowing that management will use the results and make changes to improve the quality. The employees must be informed about the purpose of the study and the use of the results, in order to find it interesting to participate, correctly report the problems they encounter, and to not be afraid to report problems occurring in their work. It is important that the study is precise and that the measurements are the right ones and are correctly performed. Otherwise there is a risk that the results will not be used, or will receive less priority in the future. Finally, remember that the results

(the PQC) should not be compared between companies, as the studies can differ very much in scope and reliability.

## 5.9 HOW TO ANALYSE PQC

This is the phase in the quality work where the identified PQC are being handled in line with the purpose of the study. The purpose of an assessment can be to just find out the extent of the costs, or to go further and find out where the costs exist by finding as many as possible and then categorising them. Often the end purpose is to be able to prioritise between possible improvement activities and find where they will be most profitable. The purpose with implementing measuring systems is to be able to follow-up the development of the PQC, see what improvements have been useful, and to compare the costs over time. The analysis of the PQC can aim both at finding the reasons behind the problems and deficiencies, or to fulfil any other purpose of a PQC study.

Once identified, the different PQC can be further sub-divided into cost drivers. Cost drivers are those detailed functions, activities, or expenses that cause the costs to emerge. For example, in-process inspections give rise to appraisal costs, rework lead to internal failure costs, and customer returns lead to external failure costs. These cost drivers are different in each industry and company, even if they make up the same cost categories. When distinguishing the cost drivers, a good way is to describe the work being done that causes PQC, i.e. the unnecessary tasks that are performed because quality is not perfect. The sub-division can go on at several levels until the individual cost drivers are found. These tasks can then be fitted into the different categories depending on what kind of PQC they cause. How far to break down the PQC is decided by the purpose and the scope of the particular study. If the purpose is to find the causes behind the problems, each cost driver should be further broken down until the original root causes are found. The connections between costs, cost-drivers, and causes can be shown in a tree-diagram. (Sörqvist, 1998; Campanella, 1999)

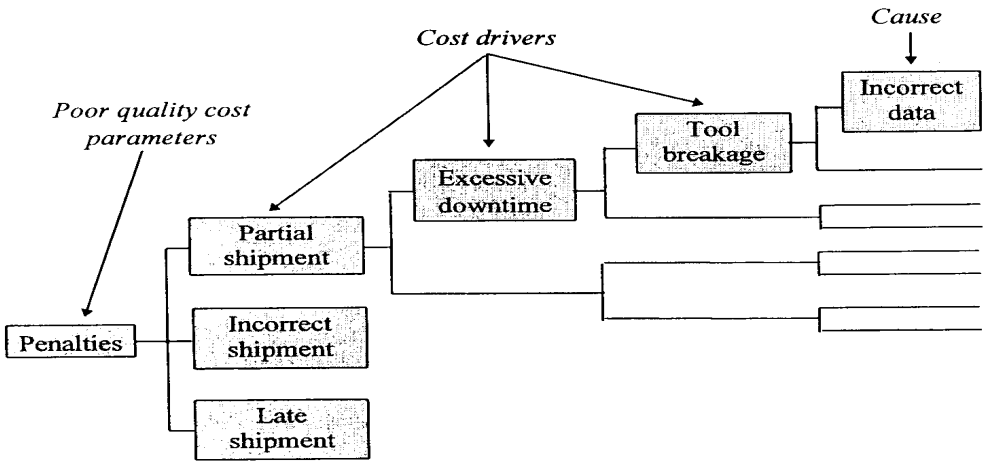


Figure 5.8 Tree diagram of costs, cost drivers, and root causes.
Source: Sörqvist, 1998, p.58.

### 5.9.1 Ishikawa diagram

Another way of finding the root causes can be to make an Ishikawa diagram. This diagram can be made by using a systematic analysis of the quality problem at hand, where it tries to show the causes and events that are behind a certain effect or result, and thus it is sometimes called a cause-and-effect diagram. Identifying the problem should be followed by an attempt to find the main causes that can produce this problem. These causes can often be referred to any of the seven M's: management, man, method, measurement, machine, material, and milieu. Irrespective of how the causes were found, it is important that as many causes as possible are found and put into the diagram. The difference between an Ishikawa diagram and a tree-diagram is that the first-mentioned does not show the connection or logic between the different causes. It is rather an effort to make a total list of possible causes behind an event and group the causes in logical or functional groups. A possible problem with the Ishikawa diagram is that it does not show whether several causes must occur simultaneously to cause the problem, or if one cause is enough. The main purposes with making this kind of diagram are to define a problem, to identify possible causes and to try to distinguish the most important ones, and develop solutions. Further uses are to make it easier for employees to come up with ideas, investigate the root cause of a problem, and indicate important connections. (Tisell, 1993; Bergman & Klefsjö, 1994)

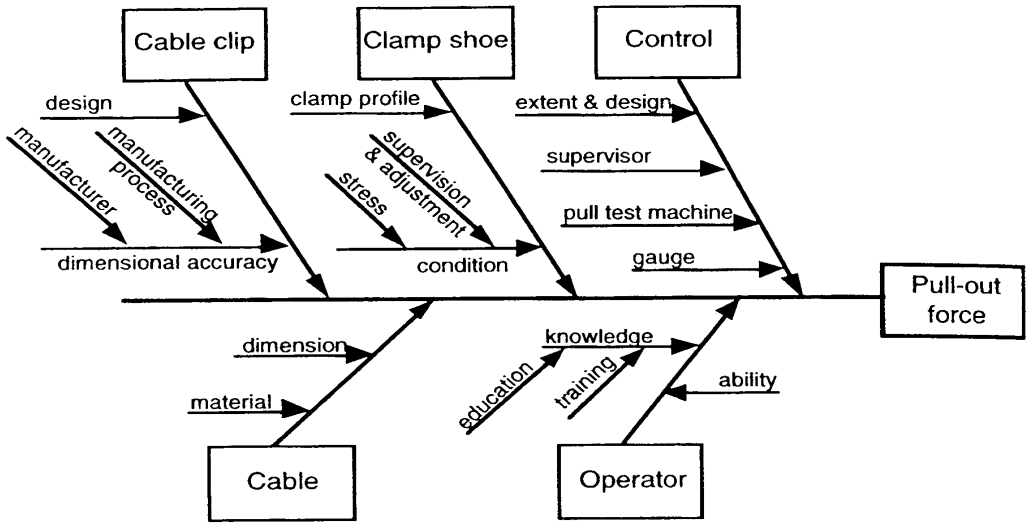


Figure 5.9 Ishikawa diagram
Source: Bergman & Klefsjö, 1994

## 5.9.2 Pareto analysis

When the total PQC have been identified, and it has been established where in the company they occur and what the causes are, it is time to analyse the costs further with the purpose of prioritising between improvement activities. A Pareto analysis can be carried out to show which problems that are most worthwhile dealing with. Based on the information collected about the costs and their causes, the identified potential for improvement is ranked on the basis of its financial and strategic consequences for the company. The problems can be classified after how difficult it is to reduce them; those that are easily correctable, difficult to correct, or very difficult to correct because how to correct them is not yet known. The priority decisions depend on such factors as the return on the investment, the magnitude of the improvement, the degree of urgency, the degree of difficulty, sustainability, and resistance to change. When making priorities it is very important to remember that there is often not a complete picture of all PQC and their distribution within the company. (Sörqvist, 1998)

Pareto charts are a good way of showing the various problems and their costs in relation to each other. It is mostly used to make priorities among improvement alternatives, since in the Pareto chart the most serious problem is clearly visible. It can be used to show total number

of errors, i.e. their frequency, or the costs. The costs can be classified by cost element, product, article, process, costs centre, cause, type of fault etc, and they can be shown either in tables or graphically with figures. In a complete Pareto chart the factors are arranged in order of size, each factor is numbered by size and their cumulative proportion is calculated. The Pareto chart often shows that a few number of the factors are responsible for large number of errors, or a high proportion of the total PQC, and then it is easy to find the vital few problems that are most important to deal with. (Sörqvist, 1998)

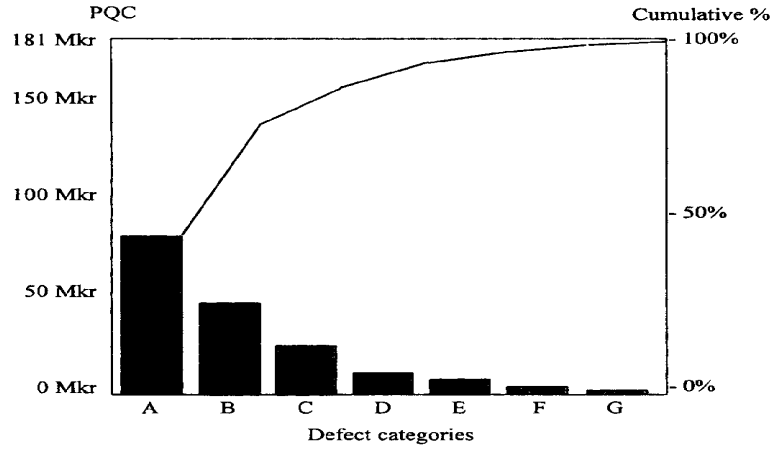


Figure 5.10 Pareto chart
Source: Sörqvist, 1998, p.176.

## 5.9.3 Ratios

When making an analysis of PQC it can be important to state the costs as ratios instead of absolute figures, especially when comparing problems in different parts of the company and making priorities. This can be particularly interesting when following costs over time since ratios compensate for changes in the value of money caused by things changing such as the size of the company, production, sales, and the market place. The best bases are those that are already key measures of production, and the idea is to use meaningful, on-line, and well-known bases relating to the amount of business activity in each area, and related to the management emphasis already being placed on specific areas for improvement.

Different types of bases can be used such as cost bases, e.g. production cost, sales bases, e.g. turnover, payroll bases, e.g. the number of direct hours worked, and numerical bases, e.g. number of units produced. The time range and type of operations performed must influence which bases to use, and one should try to use bases from the time period when the costs were incurred. Suitable examples of ratios to use are internal failure costs as a percentage of total production/service costs, external failure costs as an average percentage of net sales, operations appraisal costs as a percentage of total production/service costs, and total PQC as a percentage of production/service costs. (Sörqvist, 1998; Campanella, 1999)

In order to understand how quality and poor quality look in reality, a case study has been performed in the accounts payable process at Volvo Business Services, which is being discussed in the next chapter. The problems in this study, and the results of it, must be understood in regard to its circumstances, i.e. the company and the process. Therefore, the next chapter begins with the background of the company and the process, and how they work today, before moving on to the actual results of the case study.

# 6 THE CASE STUDY

*This chapter will describe the company and process in this case study, Volvo Business Services AB and in particular the accounts payable process. The company and process descriptions are based on information from written material such as business plan and brochures, as well as documents from the Volvo Intranet, and first hand information from interviews and discussions with personnel at Volvo Business Services. The chapter ends with a discussion about how we understand and define the concepts of quality and poor quality. The purpose with these descriptions is to provide a picture that will help the reader understand the results, which are presented in the next chapter.*

## 6.1 VOLVO BUSINESS SERVICES

### 6.1.1 What is Volvo Business Services?

Volvo Business Services AB (VBS) is a shared services company within the Volvo Group, also called Volvo (by which is meant AB Volvo and Volvo Car Corporation). The company has existed for two and a half years and its main purpose is to co-ordinate parts of the business administration in all of Volvo's Swedish companies and business units. VBS is a service provider set up as a subsidiary to AB Volvo, in order to clearly show its role within the Volvo Group. VBS operates without making a profit, charging their customers on a cost basis only. The company is built based on the personnel that already existed in the various finance and business departments in Volvo.

The establishment of this shared service centre is part of a major change process within Volvo, with large demands for new work methods, and an advanced leadership and motivational work. The creation of VBS means radical changes in the organisation and in traditionally well-known structures, working methods, roles and identities. The changes in Volvo are not only connected to the creation of VBS, but also involves new structuring of the business administration, the implementation of a modern business system, and a larger focus on what to be accomplished.

VBS is organised as a process-oriented company where customers and VBS work closely together to develop the best possible processes. The services offered by VBS are account receivable, cash & bank management, accounts payable, fixed assets accounting, and general ledger with closing of accounts.

The standard product that the customers are charged for is the number of products or services delivered, e.g. how many invoices are being processed. They are also charged for the amount of hours spent on add-on products, such as reminding coding and approving agents in customer companies (see section 7.5 for description). The time spent on both standard and add-on products are registered by each employee in a time reporting system, which is the basis for the costs charged of the customers for add-on products.

#### *6.1.1.1 Mission Statement, Vision, and Goal*

VBS shall (Vision and Strategies, VBS Brochure):

> *"Offer Volvo companies in Sweden carefully designed and efficient administrative services that conform to and/or exceed the specified customer requirements. We shall, in co-operation with our customers, actively and continuously develop our services and the related processes so that they adapt to changing needs of Volvo".*

Their vision is to be (Vision and Strategies, VBS Brochure):

> *"Volvo's preferred partner for financial administrative services".*

VBS' ambition is to be active, and to act as partner and supplier of services. This requires much sensitivity to the customer demands for quality and deliveries on time, as well as their demand for competitive prices. VBS want to be an attractive partner by consciously concentrating on process-orientation, quality and competence development. The aim with VBS is to create a uniform method for handling business administration within Volvo, while the customer

experienced quality and the value of information increase at the same time. The vision expresses that the services and the products being delivered shall be well adapted to the needs of the customer. The achievement of the vision is based on four important elements; clear customer/supplier interfaces, quality, competence, and competitiveness. Their overall goal for the end of 2000 is to be the best shared services centre in Sweden in the business area.

### 6.1.2 Background

Within the Volvo Group, there has been a strategy during the past few years aiming at concentrating on core activities and focusing on some long-term product lines and businesses. There has also been a pressure to create synergies, which will bring optimisation and better use of resources and competencies that traditionally have been spread over many different organisations. Co-operation and concentration of competence is also interesting for business administration activities.

In 1997 there was increasing irritation in Volvo centrally over the fact that companies within Volvo reported their results in different systems, and it was difficult to get a complete overall picture. There was a decision to use one system, SAP R/3, in all Volvo companies worldwide, and the CFP project (Common Financial Project) was started to accomplish this. Even though the decision had been taken by all CFOs, not everyone out in the individual legal companies were happy about the idea. A consequence of all these factors was the decision to put all business administration in one company, and by January 1, 1998 VBS was formed.

It was decided to set up VBS in a new location, neutral to everyone. During spring and summer 1998 most of the Gothenburg-based business departments moved to VBS and started working, some with their old systems and some in the new system, SAP R/3. After education and training during the autumn most employees started using the new system. VBS also educated employees in the Volvo companies (the customers). The first year meant a heavy workload for the employees at VBS, routines and systems were new, customers were not always aware of the need for them to change their work methods as

well, and a lot more people than expected moved from the customer companies to VBS (the customer companies were not quite sure of how many actually worked with these tasks before they moved to VBS).

The decision to make VBS process-oriented was well in line with the overall strategy within Volvo. The Volvo Quality Council set up as a goal during 1997-1999 that all Volvo Group companies should identify their core processes and appoint process owners. The CFP project, developing a uniform system and working methods also started outlining processes. Process owners were appointed at VBS when it started, and have continued to work with the processes there. The main idea in VBS was to have common processes across all customer companies, in order to reach a uniform work method throughout all of Volvo. This has mostly been done within VBS today, but a few companies still have a fair share of company-unique solutions.

By setting up VBS, Volvo wanted to be able to rationalise in the customer companies, and be better at business administration by concentrating all the resources and competence in one place. By using processes, each activity was mapped and there is a better control over the business administration. Employees are better qualified at what they are doing, experts in their own tasks, and eventually get a better understanding of the whole process and where different tasks fit in the overall picture. The formation of VBS has led to a clearer picture for most of the customers of what is included in the business administration, how much work is done, and what are the actual costs.

### 6.1.3 The organisation and structure of VBS

VBS has a flat organisation with a management group and five core processes, and some support processes (see appendix 3). The basis for VBS is to have clearly defined processes that are common to all companies and units within Volvo. Process-orientation is a success factor that needs to permeate the entire organisation, for everyone to understand what, how, and when something shall be performed, and to which expected costs and quality requirements.

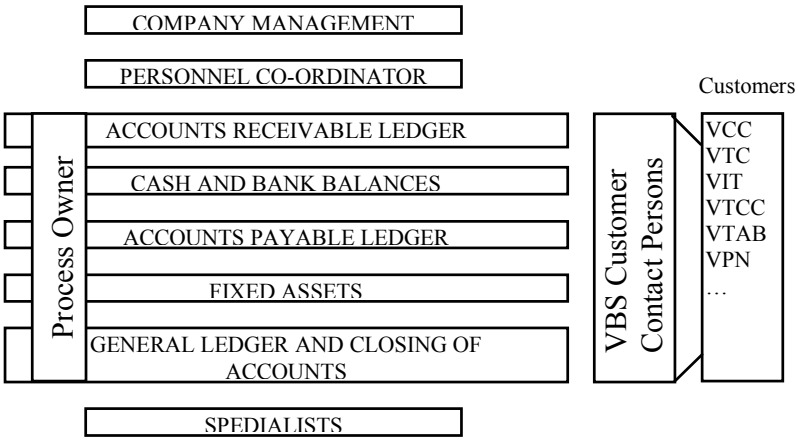


Figure 6.1 VBS Organisation and Processes
Source: Internal material, VBS.

Each process in VBS has its process owner with responsibility for the continuous improvement of the process, in order to make it more efficient and flexible, and safeguard quality. The process owners' main responsibilities are to define the scope of the process, interfaces, and communicate purposes and goals with the process. They should also choose appropriate measurements for following-up of the process. The process owner should organise the co-operation with other processes within VBS, and other processes in Volvo. They should also organise the improvement projects within the process, and deal with suggestions coming from customers and employees. The process owners do not have any personnel responsibility for the staff in the process, but are just responsible for the 'technical' development of the process.

The individual processes are divided into groups working with different parts of the process, or with specific customers. Each group has a group manager who is responsible for leading, planning, and developing the groups' work methods so that the targets for the process are met or exceeded. They shall make sure that goals and targets are set, communicated, and followed-up. They shall also create, develop, and lead the adequate resources and competencies for their part of the process. As managers, they have responsibility for the personnel, and to allocate the daily work within the group so that quality, based on the customers' needs, is achieved. They are also responsible for the costs in the group.

As a link between customers and VBS, the customer contact person is responsible for ensuring that both parties understand and agree on what VBS shall provide and how the customer is charged. They should have an efficient dialogue with customers, process owners, and process group managers in order to further develop the services and adjust them to the customers' needs. They are responsible for some specific customers and their businesses across all the processes in VBS. Most contacts with the customer will be handled through these persons. They negotiate and set up the service level agreements with the customers, defining what services are to be provided and in what quantity, and at what price.

### 6.1.4 Quality in VBS

In VBS, having good quality means firstly that the customers' requirements and expectations are satisfied, and hopefully exceeded. Secondly, the employees, their competence and knowledge, are seen as an important factor, since VBS is a service company. It is also important that the employees feel good, and that VBS manages to help them develop. The third part of good quality is that the business lives up to rules and regulations, and that there is a good internal control within the company. Good quality in the accounts payable process is to deliver the services correctly, and in time. The attitude towards quality in VBS follows the overall quality policy set by the Volvo Group. This policy states that all Volvo's business operations shall be characterised by the highest quality, and that the need of their customers shall be satisfied and their expectations shall be exceeded. This will lead to that Volvo's products and services are chosen by customers. A part of the latest plan for quality work in Volvo (Quality challenge 2000) is also to look at 'quality-related costs' (see appendix 4 for 'quality-related costs' in Volvo). A part of the quality work at VBS is striving to be certified according to different ISO standards. The formal definition of quality in Volvo is the one given in the ISO document nr8204:

> *Quality is the totality of characteristics of a product or process that bear on its ability to satisfy stated and implied needs.*

The strategy to reach this in VBS is based on four factors; customer focus, leadership, participation by everyone, and process-orientation. The customer decides if the achievements and results are merely passable, satisfactory, or outstanding. Managers have to be committed to quality by communicating clear objectives, delegating authority and responsibility, and develop the employees and create an open dialogue. All employees should be active members in their team and well-informed, share objectives, and develop skills needed to contribute to fulfilling the objectives. Moreover, the processes should be continuously improved going towards 'zero defects', in working towards targeted objectives, and by comparing with others and learning from the best.

The Volvo quality policy is reflected in the daily operations in VBS. The customers together with VBS set the scope for the processes, services, and the quality level of those services. VBS is a flat organisation that tries to put responsibility and the power to change in the hands of the employees. VBS clearly embraces the process-orientation concept aiming for more efficient processes that will compare with the best.

Since VBS is a fairly new organisation, they still work with basically improving their processes and routines. Process owners and group managers have the responsibility for making such improvements, by strong involvement of all employees. Today much of this has been delegated to the employees themselves, e.g. in the accounts payable process with the implementation of a new group and team structure during the summer of 2000 (for further description see section 6.2.1). The teams are responsible for different activities in the process, such as registration or handling payment reminders, and are now responsible for pinpointing problems and ways of solving these. This will also result in more efficient routines in general.

An important part of the improvement and quality work is the 'Improvement log', where employees can log opinions and suggestions on what may be changed, or improved. Opinions from the customers are logged by the customer contact persons. The process owner is to address all suggestions, and the goal is that a plan should be presented

within 28 days. The use of this log aims to ensure that necessary steps are taken, implemented, and are possible to follow-up and correct, as well as ensuring that the necessary documentation is drawn up.

Another part of the quality work in VBS is the use of internal audits, where employees audit processes to make sure that the routines are followed, but also that the routines describe the actual work performed. It is also an opportunity to show employees other or better ways to perform their tasks, and to continue to improve the processes and routines. The process owner of the quality process presents a plan for the audits of the different processes, where each process is audited at least once a year, sometimes twice if there is a special need to look at it more closely. Four persons, who are employed in the core processes, in VBS work part time with internal audits, and audit the different processes. All deviations that are found during an audit are to be logged in the Improvement log, and thus they must be addressed by the process owner. This gives VBS a chance to improve their processes and know where to direct their educational efforts.

This overview of VBS, how it is organised and how it works with quality is hereafter followed by a more detailed description of the accounts payable process.

## 6.2 THE ACCOUNTS PAYABLE PROCESS

This is the largest of the five core processes in VBS, and involves the processing of all supplier invoices within the Swedish companies and business units of Volvo that are customers of VBS. The purpose of the process is to perform a correct and efficient processing of supplier invoices to result in a correct payment to the supplier and that VAT (value-added-tax) will be correctly dealt with. VBS meet this by setting up routines for how to execute all activities included, and make sure that everyone works according to the same routines. The overall target is to have an efficient and optimal accounts payable ledger, which is the best in Sweden.

The accounts payable (A/P) process serves most of Volvo's companies and units in Sweden, and processed 1,3 million invoices during 1999.

These invoices were delivered from some 25 000 to 30 000 suppliers world-wide, and amounted to more than 1 billion SEK per week. Around 1000 purchasers in the customer companies place the orders, approximately 120 invoice handlers process the invoices at VBS, and 5000 persons in VBS and customer companies code and approve them. Connected to the main system (SAP R/3) are 18 invoice control systems and 100 other smaller systems involved in purchasing or invoice processing. There are 18 Volvo companies being served by the A/P process, from the large Volvo Car Corporation and Volvo Truck Corporation, to a number of small sales companies. These customers buy a service from VBS, i.e. to have their invoices paid. But the companies actually receiving the results of the service are the supplier companies, and thus they can be seen as customers as well, and as being part of the invoice process since they deliver the invoice and receive the payment.

The A/P process starts when an invoice arrives to an administrator in the A/P process at VBS, and the process ends with the invoice being paid to the supplier. There are a few different ways an invoice can be processed, partly depending on the form it arrives in (paper or electronic form), and partly on what type of goods the invoice refers to.

### 6.2.1 The organisation of the process

The invoices concern two main categories of goods, production material[*], and non-production material[†]. The process is therefore divided into two main parts, one for each type. The non-production material part of the process is also meant to perform all activities surrounding the registration activity, such as payment reminders and incoming payments. It is the non-production material part of the process that is in focus for this study and thus will be described in more detail.

[*] Production material is material that is used in connection with manufacturing of e.g. cars, trucks, busses and engines. Some spare parts and maintenance material is also included.
[†] Non-production material is 'everything else' than production material that can be charged to any Volvo company, such as freights, tools, investments, courses, literature, consultancy fees, personnel expenditures, and other services.

This part of the process employs some 65 persons, ranging from young persons to old, from new to experienced, and persons with a very varying background when it comes to education and working experience. The non-production material part is sub-divided into two groups, with their own group managers, in order to make administration of the staff easier. Both groups administer the invoice-flow, and some of the other activities in the process are divided between the groups. The first group includes the following teams; Group invoices, Payment proposals, and Interest invoice investigation. The teams in the second group are Incoming payment and Negative balances handling, Matching, and Payment reminders. The final teams in both groups are the administration teams, and they deal with the normal invoice-flow, i.e. register invoices. Each team has a team-leader and the team sets its own agenda, goals, and how they intend to reach them. The team leader is not the manager of the team, but is mainly responsible for co-ordinating the improvement work within the team. Most teams have a mixed personnel in regard to education and work experience at VBS, but there is quite much rotation between teams and activities, or at least has been so far, and thus the circumstances for each team are continuously changing.

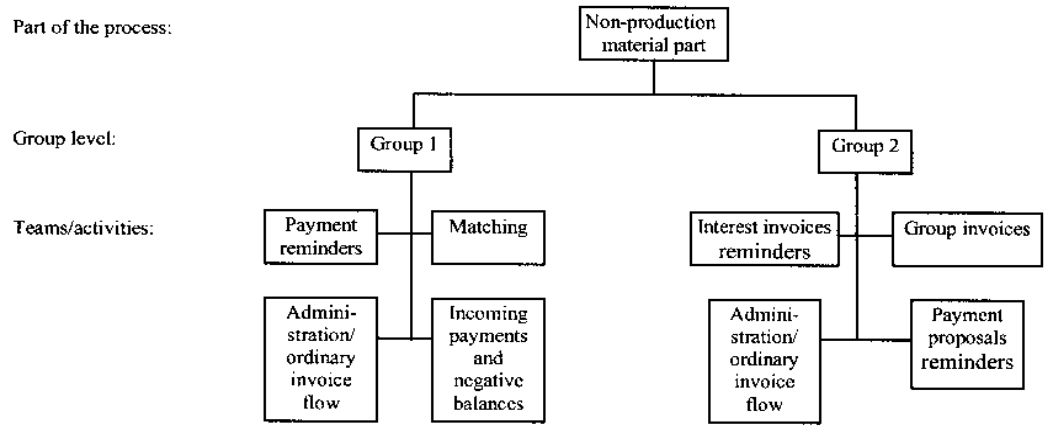


Figure 6.2 Organisation of the non-production part of the A/P process.
Source: Our own

### 6.2.2 From purchase to payment

VBS processes the invoice from purchase to payment. However, there are activities being done in the supplier and customer companies as well. The starting point for an invoice is when a need for something arises in a Volvo company, which leads to a purchase being made by authorised purchasers. Most customer companies have purchase organisations to ensure that there is a uniform way of ordering and purchasing goods and services. Orders usually need to be signed by department managers, or project managers before being sent to the purchaser. There are normally a few authorised purchasers who negotiate deals and sign contracts. The order to the supplier should contain certain information, such as invoice address, receiver of goods, references, and order number, which should all be goods specific and given to the purchaser by those who need the goods or services (see appendix 5). The supplier then sends an invoice to VBS, which should contain all the information given on the order. If information is lacking or incorrect when the invoice is received, it will lead to problems later on in the invoice processing. Most important is the order number or reference, which both refer to the person or department placing the order, because this shows how to allocate the costs.

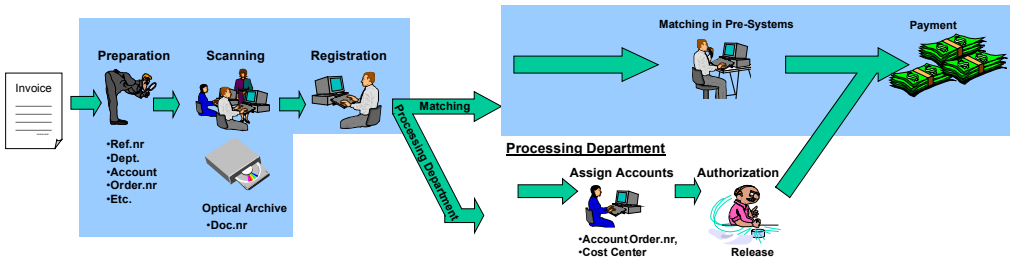


Figure 6.3 The invoice way
Source: Internal material, VBS.

The invoices can be sent either in paper form or in electronic form, a so-called EDI-invoice (Electronic Data Interchange). The paper invoices are sorted and given to the different invoice handlers based on firstly, which company is to pay the invoice, and secondly according to order number or reference. The invoice handler starts by preparing the invoice, i.e. marking important information on the invoice that is to be registered later on. The next step is to scan the invoice and file it.

The scanner reads the paper invoice and turns it into an electric format file that is sent to an electronic archive. This means that after scanning, the invoice is only handled electronically, no papers are sent around between different parts of the process. The scanned invoice is registered, or parked*, by the invoice handler, and then sent out to the customer companies for assignment of accounts, and authorisation (i.e. approval).

When registering an invoice some information is entered, and most importantly a reference number is assigned to the invoice, thus sending it to the proper account assignment agent who is responsible for the invoice, who usually placed the order as well. After this person has assigned the account, i.e. coded the invoice, it is passed on to the approval agent, who approves the invoice and releases it for payment. At this time the invoice goes back to VBS and is posted†, which means it is ready and waiting to be paid.

In some cases the invoice must be matched with a received-goods report, to be found in the invoice control systems. This matching can be either manual or automatic, and takes place at VBS. When the goods have been received and this has been matched against the invoice in different invoice control systems, the invoice is automatically coded and approved, and finally released for payment.

A few days before payment is due, a payment proposal is prepared by A/P staff for each customer company, which states how much money is to be sent to each supplier, alternatively each specific account (postgiro or bankgiro), and in which currency. The last and final step in the invoice processing is the payment, an activity performed by the cash and bank process at VBS. Payment proposals and payments are made twice a week to Swedish suppliers and once a week for payments to foreign suppliers.

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* A parked invoice is entered into the system/the A/P ledger and is preliminary booked against a supplier. Information about supplier, document number, invoice number, amounts, and VAT is given.

† The invoice is booked (posted) in the A/P ledger, thus it has been coded and approved. It is in the main ledger and can be paid.

The kind of system where invoices after registration are sent around as electronic files is called Workflow, and most customer companies use this system. However, there are still a few companies who do not, and the Non-Workflow system they use is slightly different. Here the invoice handler at VBS registers the invoice and then sends the actual invoice together with a coding form to the proper account assignment agent in the customer companies. They assign the accounts manually and sends all documents on to the approval agents, who approves the invoices and then send them back to VBS for a final posting. This means that the administrator at VBS must handle the invoice at least twice, making the Non-Workflow system more time and resource consuming.

The EDI-invoices are sent on file to VBS from the supplier and goes through a gateway, i.e. a first entry control, which will return those invoices that clearly have an incorrect format. If everything goes as it should, the EDI-invoice automatically passes through the process and is paid. If something goes wrong anywhere, the EDI-invoice is removed from the EDI flow and comes to the invoice handler, who corrects the errors and passes it on, either back to the EDI flow, or into the Workflow system.

### 6.2.3 Other activities in the A/P process

Parallel to the invoice processing are those activities dealing with the invoice in case the invoice flow has deviated in some way from the ordinary processing. The first step a supplier takes if not being paid on time is to send a payment reminder to VBS, asking for payment. There is a team at VBS that take care of the payment reminder activity. As a consequence of a payment being late there will most likely be interest invoices to be paid. These invoices are investigated by another team, to find out whether the overdue interest should be paid or not, depending on who is responsible for the delay.

There are two more activities in the process that are in some way connected to the fact that errors are made, and that is the handling of incoming payments, and of negative balances. Negative balances exist when the A/P process has claims on suppliers, and one activity is to

send out payment reminders to the suppliers for these claims. When payments have been made to the A/P process, i.e. incoming payments, there is a team investigating these, and making sure they are booked to the proper accounts.

As can be seen the A/P process includes many different activities, that all need to work together to ensure a smooth and efficient invoice handling. The present process is fairly new, as both systems and routines were changed when the invoice handling were moved from the customer companies to VBS. The new organisation where all these activities have come together in one location and in one process offers many opportunities for improvements and rationalisations, by gathering all knowledge. However, the physical distance between purchasers and invoice handlers has increased, and that can sometimes be a disadvantage. Some of the activities are simple but many are complex, and performed within several different systems, such as matching invoices in different invoice control systems. Unfortunately, all these things make room for mistakes and misunderstandings, possibly leading to poor quality.

## 6.3 DISCUSSION ABOUT QUALITY AND POOR QUALITY

After having looked at VBS and the non-production material part of the A/P process, it is time to move on to another important part of this case study, and that is how we look at the different quality concepts and how we understand them. As stated in chapter five, there is much disagreement about this area, and no clear definitions for the different concepts exist. Before moving on to our results we need to clarify these concepts, so that the results can be understood and interpreted in the light of our attitude towards these concepts, most importantly the poor quality costs. Our own definitions have guided us in the study and influenced how we have perceived things at VBS.

First of all there is the discussion about what quality and poor quality really is. Quality is concerned with perception, with how persons inside and outside the company perceive the company and its products and services. Quality is partly connected to products being measured

against certain tangible requirements, such as a light bulb being able to be turned on for a specific number of hours, and partly connected to more intangible features, such as whether the customer appreciates the light radiating from the bulb. This makes it difficult to know what quality is, what is good quality to some might be poor quality to someone else, because they have different expectations and needs.

Something that most authors referred to in chapter five have in common is that they connect quality to the customer, i.e. quality exists when customers are satisfied. For the end result to be satisfactory to customers, both doing the right things and doing things right is needed, i.e. that the product or service has all the features that the customer wants, and works as the customer expects. We also see quality as being related to the customers, and that they are satisfied with the product or service being provided. Based on this, our definition of quality is:

> *Good quality is when all customers, both internal and external, are satisfied, which occurs when their expectations are met, in regard to how and when the product or service is performed and delivered.*

In this case study this means that good quality is when the invoices are paid correctly, and in time. Good quality in the invoice process exists when all activities are performed correctly, and in time as well, leading to that no unnecessary work has to be carried out.

Poor quality is often seen as the opposite to quality, i.e. when customers are not satisfied. When the work is not carried out correctly, or efficiently, the internal customers are not satisfied, e.g. the next link in the process does not receive the product or service in the way that is needed. This most likely leads to the final product or service being defect in some way, thus making the external customer unsatisfied. In our case poor quality exists both when there are problems within the invoice process creating more problems and unnecessary work for other employees in the process, and when the invoice is not paid correctly, and in time, which can also lead to extra work having to be performed.

Thus instances of poor quality in this case study are all problems, errors, inefficiencies etc, that lead to that unnecessary work must be performed.

There are costs related both to quality and poor quality, as discussed in chapter five. This study was set to look at poor quality in the non-production material part of the A/P process in VBS, and the costs thereof. Therefore it is poor quality costs that are in focus in this study. As stated above, poor quality leads to extra, unnecessary work and therefore we see poor quality costs as the costs that result from the extra, unnecessary work needed. Hence, our definition of poor quality costs is:

> *Poor quality costs are those costs that arise as a result of unnecessary work, i.e. all work that did not have to be done if the process was perfect from the beginning.*

After having defined poor quality costs it is also necessary to discuss what is included in the term. We feel that the exclusion of prevention costs from PQC is correct (as discussed in section 5.6.3), as those costs are not a result of poor quality, but rather are connected to ensuring that good quality exists in the company in the first place. So, we have included the appraisal, internal failure, and external failure costs in this study, i.e. we have looked for, and included, activities, problems or shortcomings leading to these three kinds of costs.

# 7 RESULTS

*This chapter will present the results from this poor quality cost study. For each activity carried out in the non-production material part of the A/P process in VBS the identified shortcomings will be discussed, as well as the costs that follow from these, and their causes. Some general shortcomings, that are not specific to any activity, will also be discussed.*

This chapter will present the results from the case study at VBS, based on all kinds of secondary and primary data found. The primary data used throughout the study includes interviews, discussions, own observations etc. The results include instances of poor quality (from now on called shortcomings) that we have identified, the calculated PQC for the shortcomings, and the causes that we have been able to find. Finding causes is part of the purpose of the study, and they are therefore included in this chapter, i.e. they are a result of the study and not an analysis. The search for shortcomings, PQC and their causes has been done for each activity in the studied part of the process. The activities are presented in the same order they are carried out when an invoice is processed, i.e. starting with registering. Some shortcomings have been identified as general shortcomings, which means that they are not specific to any particular activity. The PQC for these general shortcomings have not been estimated because their consequences are intangible and very difficult to put a value on. An attempt to find financial effects, i.e. PQC, for such intangible phenomena could be seen as artificial, and therefore not very credible.

The result of this study is the result of one possible way of finding and calculating PQC in a company. As mentioned, another way could have been to perform a best practice analysis (see section 5.8.2). The result is a rough, first time assessment of the problems that are most obvious, and thus identified in our kind of study. The PQC that have been identified are for activities taking place in VBS. Some of them can be influenced by VBS, such as errors leading to the need to correct payment proposals, whereas others are not totally within VBS' control, such as the PQC for handling payment reminders where the problem can lie in the customer companies. Thus, entire activities can be seen

as PQC, because they constitute activities that would not have to be performed at all if there was perfect quality right away throughout the entire process.

The PQC identified are not necessarily a cost *for* VBS, or VBS alone, but could also be a cost for the customer companies. Some costs are recharged to the customers, sometimes as add-on products. But, since the criteria for including the PQC in this study is not that they are PQC for VBS alone, but rather that they *arise in* VBS, the results will include PQC for both VBS and for customer companies. This means that even shortcomings that are add-on products where costs are charged from the customers are included. As a result, the recommendations given in the last chapter are not only for VBS to carry out, but often things that VBS together with the customers need to work at. It is interesting for VBS to have estimations of PQC that are not entirely 'their own', because it is useful in discussions with customer companies to be able to show what kind of costs that arise in VBS, partly as a result of things happening in the customer companies and which the customers will pay for, either through the standard price or as add-on products.

The assessment of PQC started with informative interviews and a brainstorming session to find and explore problems, errors, and deficiencies. Based on this information along with written documentation, such as the improvement log and the time reporting system, and our own observations, we identified specific shortcomings in the individual activity, and possible ways to calculate their costs. Discussions were held with two persons from each activity to find the frequency of the shortcomings and how much time people spend on each, as well as finding the causes. They were also asked to confirm whether our identified shortcomings are the important problems they experience in that activity. After that, we talked to most of the administrators involved in the different activities, to get their estimates, as well as using the time reporting system to quantify time spent on different activities or shortcomings. Important to know when reading the results is that those who do not work full time with one activity, spend the rest of their time on regular invoice flow and/or other activities.

The basis for the cost calculations is time spent on each shortcoming, which is then multiplied with an hourly rate. This is one way to calculate PQC when making a rough assessment, and it is fairly easy since time is usually easier to estimate than frequency (Sörqvist, 1998). If frequencies (number of times something occur) are used instead, the cost for each occurrence must be known, which requires a more sophisticated system that measures many different parameters and gathers wider information about the entire process. An alternative to such a system would be very detailed measurements that are carefully filled out by each employee, or careful observations. In service production where people and not machines, form the products, such a study is almost impossible to carry out in a limited time frame. Moreover, many problems exist that cannot be measured by numbers, but must be measured by time spent, e.g. answering phone calls from suppliers asking about payments.

The hourly rate used in this study is a cost price rate. It is based on the total cost for the non-production material part of the A/P process divided by all hours worked within this part, which gives us a cost for each hour worked in this part of the process. The same rate is used for all activities to simplify comparisons, and because shortcomings can arise in several activities and the cost must be the same all over. And, with persons working with several activities it is difficult to get a fair rate by trying to divide the costs and hours for each activity.

The total cost includes all direct costs for this part, as well as half of the costs for the A/P process owner, and half of the costs for an expertise group tied to the A/P process. The last two costs are divided in half since the costs are for the entire A/P process, of which the non-production material part is one half. After discussions with our tutor, who is a group manager within the non-production part of the process, it was estimated that the non-production material part of the process uses half of the costs of the process owner and expertise group. The number of invoices processed are somewhat larger for the production material part of the process, but the amount of resources used, e.g. for systems and expertise group, is not directly corresponding to number of invoices. Overhead costs for the A/P process, such as rent, system costs etc, have been allocated to the process owner and are thus

included in the cost price calculated. The costs and hours used are for the periods eight, nine, and ten, i.e. August to October, which is basically the same time as the study has been carried out. Three months have been used to get an average rate. The general opinion of the staff in the studied part of the process is that these three months can be seen as representative for the operations during the year, with the exception of the summer months (when Sweden takes vacation). The operations in VBS are not seasonal, as their customers carry out their business fairly evenly during the whole year. The total cost is approximately SEK 4 640 000 per period, and the amount of hours worked per period is 13 000. This results in a cost price of SEK 357 per hour for the non-production material part of the A/P process.

Most costs will be calculated per period. At Volvo the year is divided into 12 accounting periods, where some are 4 weeks and some are 5 weeks long. The average period is 4.3 weeks long, and this will be used when transforming weekly numbers into periodical numbers.

All PQC, except the overdue interest payments, are based on estimated time spent on a specific shortcoming. Estimates are obviously not always entirely accurate, and therefore we will make sensitivity analyses to see how much the final cost for a shortcoming is changed, if the time estimates are changed, considering that the estimate can be incorrect. In most activities, the times estimated are from half an hour up to around eight hours per person. Under that circumstance it is reasonable to believe that the estimates can be up to 20% incorrect. For example, if someone is guessing five hours, the time spent could just as well be four or six hours. However, in some activities the time to be estimated is between 20 and 40 hours per person. Then it is more unlikely that the estimate would be 20% incorrect, therefore we use 10% when calculating how much the time spent can vary[*]. We will calculate the variances in the poor quality costs resulting from the changed time estimates.

[*] The use of 10% and 20% has been chosen by us because we deem them to be reasonable levels to use, depending on what kind of estimates are made by the respondents, i.e. a lower rate is more likely when the time estimated by each person is large.

When interpreting the results, it is interesting to know some facts about the A/P process:

| | The A/P process | Non-production material | Production material |
|---|---|---|---|
| Invoices per week | 28 000 | 13 000 | 15 000 |
| Invoices per period | 121 000 | 57 000 | 64 000 |
| Value per period (SEK) | 13 000 000 000 | 6 000 000 000 | 7 000 000 000 |
| Value per week (SEK) | 3 000 000 000 | 1 400 000 000 | 1 600 000 000 |

Table 7.1 Facts about the A/P process, autumn 2000.

## 7.1 INVOICE PROCESSING

This activity includes preparation of the invoices, removal of incomplete invoices that are to be sent back to the supplier, scanning, and registration of the invoices (for detailed description see section 6.2.2). Approximately 45 persons are occupied by this set of activities. Some work with this full time, and others split their time between this and other activities and responsibilities. All in all, they estimate that the total number of hours spent on handling the invoice flow is approximately 1480 hours a week, including 130 hours on processing Group invoices, i.e. invoices for various relations between Volvo-companies. The tasks in this activity are somewhat different depending on which system is used for processing the invoice, for example, workflow and non-workflow.

Out of these 45 persons, nine are processing Group invoices. Group invoices are those invoices that are sent from one Volvo company to another. VBS deals with two Groups, the Ford Group that contains Volvo Car Corporation and its subsidiaries, and the Volvo Group that contains Volvo AB and its subsidiaries. Up until October this year both Groups used a netting system, where a Volvo company charging another Volvo company immediately received the money, whether the invoice was registered and approved or not, a so-called ‘claim-driven’ system. With this system, there is less urgency for the invoices to be correct in order to be registered and paid, and thus giving correct references and order numbers can have low priority in the customer companies. In the ‘claim-driven’ system, where the payments were

made right away, the invoices had to be registered and incomplete invoices could not be sent back to the Group company sending the invoice (the supplier). This led to the invoice handlers having to try to find out which account assignment agent, i.e. which cost centre, to send the invoice to. If it was impossible to find the proper account assignment agent, the invoice handler had to re-invoice the supplier, so that the money was taken back.

The Ford Group has now changed to a 'debt-driven' system, where the money will not be received until the invoice is registered and approved. The Volvo Group is about to change to this procedure in early 2001. It now becomes very important that all Group invoices are registered and approved, which requires the invoices to be of good quality, i.e. contain necessary information such as reference or order number. In the 'debt-driven' system, payments are not made until an invoice has been approved, and the need to re-invoice disappears, since no incorrect payments are made. In the 'debt-driven' system, incorrect or incomplete invoices are sent back to the supplier, and thus it lies in the interest of the sender to make a correct invoice right away.

### 7.1.1 Identified shortcomings

In this activity we have identified two shortcomings. The first one we call *incomplete invoices*, i.e. invoices where pieces of information are lacking or are incorrect. Examples are invoices without reference/order number, incomplete or incorrect reference/order number, or invoices with incorrect address. The incomplete invoices that lack reference or order number cannot be distributed to the invoice handlers since one does not know who is to process them, and are therefore put in a special pile for each company when all invoices are sorted at the post office. Each day there is one invoice handler from each of the large companies responsible for taking care of the invoices in their special pile, which means trying to find out the proper reference. If that is not possible, they send them back to the suppliers asking for new and complete invoices.

However, some invoices, especially those with incorrect address, are not sorted out at the post office, but do come in the mail to the invoice handlers who must then deal with these themselves. Those that cannot be easily solved are sent back to the suppliers. In smaller companies, not that many persons are working with purchasing, and do not become involved in handling invoices. It is then easier to know the people there, and who normally orders certain products, or who are working in the different departments. Thus one knows where to send the invoice, and do not need a proper reference, leading to only a few invoices being sent back. Because of the special circumstances with Group invoices, the problem with incomplete invoices has, so far, been larger for processing Group invoices.

The second shortcoming is *returned invoices*. By this we mean invoices that are returned to the invoices handler from the account assignment or approval agent for some reason. Reasons for returning an invoice can be that it was sent to the wrong agent, it has been registered to the wrong supplier, wrong amount, wrong currency, or that some of the information on the invoice was incorrect. If the invoice was sent to the wrong agent, the invoice handler can simply redirect the invoice to a new agent, but if some information was incorrectly registered, the invoice must be deleted and then scanned and registered again. Invoices that contain incorrect information must be deleted, and sent back to the supplier, together with a request for a correct invoice. Those handling Group invoices, however, do not see returned invoices as a problem, because when references do exist, they are usually correct and therefore very few invoices are returned.

There are also some other shortcomings in the process. One is *inefficient scanning capacity*, occasionally leading to one having to wait for some time before the scanner has archived the invoices, i.e. has sent electronic files with the scanned invoices to the invoice handler. This happens especially when the entire system is overloaded or when the archive system is down. How often one must wait, and how long, varies. It is not easy to estimate how much time is wasted here, especially since improved systems can never remove the entire waiting time, and one therefore does not know how much time can actually be cut.

Another shortcoming that causes poor quality is the fact that there are *different systems* for invoice processing, such as Workflow, Non-Workflow, and some customer unique systems. The consequences of this are that people cannot work uniformly, or help each other, and it may be difficult to rationalise the entire process. This is obviously difficult to put a value on, but the savings resulting from rationalisations might be substantial. There are many customer companies that do not want to change their specific systems until they are sure that they can be replaced by something better, or because they just do not want changes. Another consequence is that it makes it more difficult to implement uniform processes and routines, and more difficult for personnel in VBS to help each other and work as back up for each other.

### 7.1.2 The poor quality costs

The information about the time spent on specific shortcomings in this activity has been gathered in two ways. Firstly, about half of the staff involved in registering invoices (i.e. 20 out of the 45 persons) have been asked about how much time they spend on processing invoices, handling incomplete invoices, and returned invoices respectively. These three questions were discussed with each person for about 15 minutes. From this we got a percentage of total time spent on the shortcomings. Secondly, the total time spent on processing invoices each week by the others has been taken from the time reporting system. By using the percentage proportion received from the first group, we got their time spent on each shortcoming. Added together we get the total time for each.

These proportions were assumed to be the same for the other 25 persons since the first 20 persons are recognised as representative for the whole group working with invoices. This group is representative because it includes both new and experienced personnel, full timers and those who work part time with this activity, and those that have good connections with the customer companies which makes their work easier, as well as those without such connections. Additionally, they have different sizes of incoming invoice flow, and the amount of

time they need to spend on incomplete invoices varies from no time to ten hours per week.

All nine persons involved in processing Group invoices were also asked about how many these were incomplete, how much time they spend on these, as well as how much time they spend on them in total. The estimated time has been multiplied with the cost price to get a total poor quality cost for the shortcoming in this activity

| | **Returned invoices** | **Handling special pile of incomplete invoices** | **Handling incomplete invoices individually** | **Handling incomplete Group invoices** |
|---|---|---|---|---|
| **Hours** | 40.5 | 30 | 34 | 31 |
| **Cost (SEK)** | 14 500 | 10 700 | 12 100 | 11 100 |

Table 7.2 Total amount of hours spent and the PQC, per week, in invoice processing.

The PQC for handling returned invoices is around SEK 62 500 per period (14 500x4.3). The PQC for incomplete invoices includes time for taking care of the pile of incomplete invoices and time for handling individual incomplete invoices, both regular and Group invoices, that reach each invoice handler. The PQC for this shortcoming is SEK 145 000 per period [(10 700+12 100+11 100)x4.3]. However, this is a cost both for VBS and the customer. The customers are, for example, charged a penalty sum for each of the incomplete invoices that have to be sent back.

The sensitivity analysis shows that if the time estimated is 20% too high, i.e. less hours than estimated are spent, the PQC for handling returned invoices would be SEK 50 000 per period (instead of SEK 62 500). On the other hand, if the time estimated is 20% too low, i.e. more hours than estimated are spent, the PQC would be SEK 75 000 per period. For the handling of incomplete invoices, the analysis shows that the PQC varies from 116 000 SEK to 174 000 SEK per period (instead of the estimated SEK 145 000), with a 20% variance.

It is interesting to discover that out of the 1 480 hours spent on processing invoices, approximately 135 hours are spent on these shortcomings, showing that almost 10% of the time is spent on handling problems. Out of the 126 hours per week spent on processing

Group invoices, almost 25% (31/126) is spent on incomplete Group invoices, showing that this is a considerably larger problem for Group invoices than for the regular invoices.

### 7.1.3 The causes

That some invoices are without references or order number can depend on either that the customer company does not provide the supplier with this information, or that the supplier does not print all the required information on the invoice. Our experience is that the problem often lies within the customer companies who do not provide this information to their suppliers. The reference or order number is sometimes incomplete or incorrect, and this may be caused by the customer companies giving incomplete or incorrect information to the supplier, or the supplier simply making an error when writing the invoice. An incorrect address is usually caused by an unclear order, where the supplier has misunderstood or has not been properly informed about who is actually going to pay the invoice, since one company/department sometimes places orders that are to be paid by another company/department.

Some of the invoices are sent to the wrong agent because the reference or order number on the invoice is complete but incorrect. Another reason is that incomplete invoices are registered anyway, because the invoice handler believes that he or she knows which agent to send the invoice to, which however turns out to be wrong. Finally, the invoice handlers on occasion make errors when registering.

## 7.2 MATCHING

An extra step is required for processing invoices concerning certain product, i.e. tools, investments in fixed assets, prototypes and test material, furniture, and office material. This is only done for three of all the customer companies. These invoices are registered by the seven persons (administrators) in the matching team at VBS in an invoice control system, where the invoices are also matched. When matching, the administrators make sure that the number of products and the price is according to the order, that the products have been reported as

received, and that tools or prototypes were accepted by the Volvo customer. If all of the information entered is correct, and the products were received, the invoice is matched, and automatically coded and approved (except in one system where this has to be done manually), thus becoming posted. The posted invoices are sent from the invoice control system to SAP R/3 as electronic files containing information about account, cost centre, order number, amount, and what kind of products the invoice refers to. Hence they become registered in the SAP R/3 system, and are ready to be paid.

If any of the information on the invoice deviates from the original order made, the invoice cannot be matched, and the administrator at VBS must then contact the purchaser and ask whether the invoice can be paid or not. If the answer is to go ahead and pay, the invoice is matched and will be paid. If the answer received is to not pay, the invoice stays in the system until it is accepted. It is the responsibility of the purchaser to contact the supplier and sort out the deviations, and thereafter to report back to VBS with further instructions.

If VBS lacks a goods-received report, the administrator must try to find out why. Maybe another delivery has been matched against the incorrect goods-received report. The administrators can also go into the goods-received system, to see what is reported, if a report has been deleted, or whether there has been a deviation in number of products received. If the goods-received report still cannot be found, the administrator must send the invoice to the customer company for investigation, and ask for a signed delivery note/bill of lading. When an answer is received to go ahead, the invoice is matched.

### 7.2.1 Identified shortcomings

As could be understood from above there are numerous points were mishaps could be initiated. One shortcoming here is the time spent to handle *deviating invoices*, i.e. invoices that deviate from the original order. Estimates made at VBS show that up to 30% of all invoices deviate in one way or another. A large part of handling deviating invoices is to communicate with purchasers. This often takes a lot of time because of inefficient routines, and very often the purchasers are

late with their answers to the questions. The main shortcoming in matching is the *lack of goods-received reports*, i.e. that the goods arrived are not reported as received, and then the invoice cannot be matched. The investigation at the customer company often takes time, and causes the invoices to be delayed in the further processing. About 50% of the invoices have no goods-received report to be matched against, when the administrator registers the invoice and tries to match it for the first time.

### 7.2.2 The poor quality costs

The costs for the shortcomings have been estimated by talking to all of the administrators working with matching, asking them how much time they spend on these shortcomings, especially the problem with deviations. The problem with lack of goods-received reports is something that VBS has recently started to specify in the time reports in order to more easily be able to charge the customers for the costs of investigating this problem. It is an add-on product and not part of the standard products. We have also looked at the time report to confirm the estimated time spent on this shortcoming. The estimated time has been multiplied with the cost price to get the cost of the shortcoming.

| | **Deviating invoices** | **Lack of goods-received report** |
|---|---|---|
| **Hours** | 32 | 57 |
| **Costs (SEK)** | 11 400 | 20 300 |

Table 7.3 Total amount of hours spent and the PQC, per week, in matching.

The PQC per period for deviating invoices is SEK 49 000 per period (11 400x4.3), and the PQC for lack of goods-received reports is SEK 88 000 per period (20 300x4.3).

The sensitivity analysis shows that if the time estimated is 20% too high, i.e. less hours than estimated are spent, the PQC for handling deviating invoices would be SEK 39 300 per period (instead of SEK 49 000). On the other hand, if the time estimated is 20% too low, i.e. more hours than estimated are spent, the PQC would be SEK 60 000 per period. For the shortcoming of lack of goods-received reports, the analysis shows that the PQC varies from SEK 70 000 to SEK 105 000 per period (instead of the estimated SEK 88 000), with a 20% variance.

### 7.2.3 The causes

Deviations between invoices and orders can arise for a number of reasons; prices are not updated, referrals are made to old orders so that this particular purchase has no order number, order numbers are not given, etc. Sometimes the order numbers for a project is closed before all invoices for the project have been paid, and then those last invoices cannot be matched against that order number. Another reason can be that article numbers are not correct, that the price is not correct, or that number of products or articles delivered does not match with the order. Reasons for goods-received reports to be missing can be that the goods have arrived but have not yet been reported, goods have arrived but there is no goods-received report registered, goods have arrived but have not yet reached storage, or simply the goods are missing.

## 7.3 PAYMENT PROPOSALS

Payment proposals are made for each customer company two to three times per week. There are nine persons working with this, and together they make 35 proposals per week. Some companies pay their Swedish suppliers twice a week, and then two proposals for Swedish payments must be made for that company. The proposals are run on certain parameters, such as supplier, foreign or Swedish currency, type of account (postgiro or bankgiro), and which due dates to include. The proposals are divided into parts specifying how much money is going to each supplier, by each account they might have. If the proposals are in foreign currencies, they must be made a few days in advance, to give the cash and bank process at VBS a chance to require the currencies needed. However, one always tries to make the proposal as close to the payment date as possible, in order to include as many posted* invoices as possible, and try use as much as possible of the free days of payment.

* A posted invoice is booked in the A/P ledger, i.e. it has been coded and approved. It is in the main ledger and can be paid.

Making a proposal, i.e. setting the parameters, normally does not take very long, but going through the proposal to see that everything is correct can take a while. If there are errors, or exceptions, corrections must be made, followed by a new proposal.

### 7.3.1 Identified shortcomings

The identified shortcoming in this activity is to *make corrections* and run a new proposal, since these tasks ought not need to be done at all. Examples of errors and exceptions are that the payment is made out to the wrong supplier, or to the wrong account, or that there is a credit note or negative balance included in the proposal. If a credit note or negative balance is included it must be removed, so that it does not block part, or the whole of the payment going out.

### 7.3.2 The poor quality costs

The cost for this shortcoming is based on estimates on how much time is spent on making corrections. Everyone working with this has been asked to estimate how much time they spend on making proposals and how much of this time they spend on making corrections. The estimated time is multiplied by the cost price to get the total cost for the shortcoming.

| | **Payment proposals** | **Corrections** |
|---|---|---|
| **Hours** | 28.5 | 18 |
| **Costs (SEK)** | --[*] | 6 400 |

Table 7.4 Total amount of hours spent and the PQC, per week, in payment proposals.

The PQC per period is SEK 27 500 (6 400x4.3). The sensitivity analysis shows that if the time estimated is 20% too high, i.e. less hours than estimated are spent, the PQC for correcting payment proposals would be SEK 22 100 per period (instead of SEK 27 500). On the other hand, if the time estimated is 20% too low, i.e. more hours than estimated are spent, the PQC would be SEK 33 200 per period.

[*] Since making a payment proposal is not a shortcoming, there is no cost calculated for this.

There is a quite high proportion, approximately 60% (18/28.5), spent on corrections out of the total hours spent on making payment proposals. This is because making the actual proposals, and see that everything is correct does not take very much time, but to actually take care of the incorrect items, correct them and have a new proposal made can take a lot of time.

### 7.3.3 The causes

Errors and exceptions that need to be corrected are usually caused in connection with the registration of invoices, e.g. choosing the wrong supplier, or entering the wrong account or bank connection. A possible reason is that one was not careful enough when choosing and entering data for supplier or account.

## 7.4 NEGATIVE BALANCES AND INCOMING PAYMENTS

A negative balance exists when the A/P process has claims on suppliers. These claims can be credit notes issued by a supplier, compensation claims sent from customer companies to suppliers, forwarded invoices for guarantee costs from customer companies that wants the supplier to stand for part of these costs, or claims on suppliers who incorrectly received money from a customer company. A negative balance for a supplier exists when the total amount of claims on that supplier exceeds the amount of payments due to that supplier. Thus a negative balance can include several separate claims, that each need to be taken care of. There is also a possibility that payments due exceed claims and then no negative balance exists, and the claim will not be investigated.

Those dealing with negative balances request the suppliers to pay the claims. The activity starts with reports being compiled from the system, showing which negative balances exist for each supplier and customer company. Reminders are written and sent to the suppliers for those claims that are found. Writing these reminders and answering questions from suppliers that might come in after reminders have been sent, takes up most of the time spent on negative balances. Handling

negative balances is on the whole a very time consuming activity, often involving intricate investigations.

Incoming payments are the payments made to the A/P process from suppliers, including incorrect payments being returned from suppliers, and payments from suppliers for their debts to the customer companies. Incoming payments come to the cash and bank process at VBS, which deposits these payments on a transit account and notifies the A/P process that money has been deposited. Those in the A/P process that handle incoming payments go through the payments and reverse these, directing them to the correct accounts. All the incoming payments must be taken care of, i.e. be reversed and deposited in the right accounts, as soon as possible.

### 7.4.1 Identified shortcomings

Most claims on suppliers exist because the customer thinks that the invoice does not correctly correspond to the product or service delivered, and therefore does not want to pay the amount due. If each step from delivering services or products, to writing a correct invoice, had been done correctly from the beginning, a claim would not exist. Thus, *handling negative balances*, i.e. claims, are a shortcoming. The need to go through the negative balances, demanding claims to be paid, is an activity that should not have to be performed, and therefore we identify the entire activity as a shortcoming for the Volvo companies. However, some negative balances exist without any errors being made, for example a credit note when the customer did not need the whole lot being delivered. If so, handling claims that cannot be avoided is not a shortcoming. But they are so few and would most likely by straightforward to handle, that one should be able to handle these together with the regular flow of invoices.

Those involved in handling negative balances at VBS see two things that could be improved. The first is that at present VBS cannot get an integrated reminder letter and statement of accounts showing the open items from the SAP R/3 system to send out to suppliers with outstanding claims. The second is that the lists of negative balances are not compiled for each currency but only in Swedish kronas. Both these

problems make the handling of negative balances inefficient, and more time consuming than necessary, which negatively affects the quality of the service.

The *handling of incoming payments* in the A/P process is working fairly well, and those involved do not see that there are problems in the activity causing them to spend unnecessary time. However, in line with the reasoning on negative balances, most incoming payments are unnecessary as they are caused by errors or mistakes, either with the supplier and the products or services being delivered, or with the invoice processing at VBS. Therefore the entire activity of handling incoming payments is unnecessary, and is a shortcoming for the Volvo companies. As the activity is performed at VBS, it is included in the study.

### 7.4.2 The poor quality costs

The cost for the two shortcomings in handling negative balances, i.e. lack of letter templates and lack of detailed lists, is not calculated, since extra time spent as a consequence of these cannot be estimated. Correcting these shortcomings can lead to less hours being spent, but can also lead to an improved level of quality for this activity, but such an improvement is very difficult to put a value on. Therefore, the PQC for these shortcomings are not calculated separately, but is a part of the total PQC for handling negative balances.

The costs for the two activities seen as shortcomings: *negative balances* and *incoming payments* are calculated, and based on how much time the ten persons working with these has estimated that they spend on these activities respectively. The estimated time is multiplied by the cost price to get the total cost for each shortcoming.

| | **Negative balances** | **Incoming payments** |
|---|---|---|
| **Hours** | 107 | 50 |
| **Costs (SEK)** | 38 200 | 17 900 |

Table 7.5 Total amount of hours spent and the PQC, per week, in negative balances and incoming payments.

The total PQC for negative balances per period is SEK 164 000 (38 200x4.3), and the total PQC for incoming payments per period is SEK 77 000 (17 900x4.3). The time spent on these two activities amount to quite many hours for four of the persons involved, who handle both negative balances and incoming payments. Together they spend 103 out of the 107 hours spent on negative balances, and 47 out of the 50 hours spent on incoming payments. The other six spend the remaining time (4 and 3 hours) on these activities, the rest of their time they spend on regular invoice flow and/or other activities.

In this case, where each person estimates so many hours, we do not believe that the estimates are 20% wrong, but rather 10%. Therefore the sensitivity analysis is based on a 10% variance. The sensitivity analysis shows that if the time estimated is 10% too high, i.e. less hours than estimated are spent, the PQC for handling negative balances would be SEK 148 000 per period (instead of SEK 164 000). On the other hand, if the time estimated is 10% too low, i.e. more hours than estimated are spent, the PQC would be SEK 181 000 per period. For the handling of incoming payments, the sensitivity analysis shows that the PQC varies from SEK 69 000 to SEK 84 500 per period (instead of the estimated SEK 77 000), with a 10% variance.

### 7.4.3 The causes

Most of the causes for negative balances and incoming payments are the same. Claims on suppliers exist because the customer charges suppliers for guarantee costs, credit notes are issued for delayed deliveries of products or services, differences in agreed price, wrong number of products delivered, and customer demands miscellaneous compensations. The suppliers are charged for guarantee costs when a customer company has to pay their customers a guarantee, but wants to recharge some of the cost to the supplier whilst the problem originally occurred in a component from that supplier. These claims are usually few and for high amounts.

Most incoming payments are payments that are returned from the supplier because an invoice was paid twice, the wrong supplier was paid, the wrong amount was paid, or the payment was made in the

wrong currency etc. These errors usually originate from VBS when the invoices are registered. Most incorrect payments are returned by the suppliers right away, and if not, claims on the suppliers arise later and can lead to a negative balance. This is the most frequent reason for negative balances and incoming payments, although not so important from a monetary point of view.

## 7.5 PAYMENT REMINDERS

There are a number of persons (administrators) engaged in handling payment reminders. Four of them work with this full time, and others work with it more or less, from half an hour a week up to 15 hours a week. The variation depends on the size of the customer companies and how many invoices they have, e.g. some of the smaller customer companies might have as little as five reminders per week.

When payment reminders reach VBS the administrator goes through them to check the status of the delayed invoice, i.e. has it been paid yet, is it parked[*], or it is missing (not registered in the system). Those invoices that have been paid need not be dealt with further. If the invoices are parked, the administrator can call or send memos to the account assignment agent or approval agent that has the invoice, and remind them to complete the invoice and clear it for payment. This task is an add-on product that is bought by most of the larger customer companies. If the invoice is not in the system, the administrator contacts the supplier, by a special request letter to get a copy. When received, the copy is given to the proper invoice handler, who should register it right away, to be paid within one day.

### 7.5.1 Identified shortcomings

The entire activity of *handling payment reminders* is seen as a shortcoming, as it is entirely unnecessary. It should not have to exist at all if the invoices were correctly processed right away, from an order being placed to the payment being made. However, payment reminders do exist and need to be taken care of, and the activity includes several

[*] Parked invoices are those invoices waiting either to be coded and released, or to be matched.

tasks that are more or less unnecessary. One such task is to go through reminders for invoices that have already been paid. The time it takes to control this is felt to be unnecessary by those working with reminders, and can amount to quite many hours per week. Another task is to ask suppliers for copies of those invoices that are not in the system, and this takes a lot of time. Also, establishing that invoices are parked, and reminding agents to finish their task of assigning accounts or approving the invoice, is a quite time consuming task. The costs for these tasks are calculated as well, but presented as parts of the shortcoming handling payment reminders.

### 7.5.2 The poor quality costs

First of all, a discussion was held with two persons working full time with payment reminders. They were asked about what problems exist within the activity, and how much time they spend on different problems or tasks, e.g. reminding agents. We also discussed how much time it takes to establish the status, i.e. to see why the payment reminder was received. It was agreed that it takes approximately two minutes to do this. If a copy of a missing invoice must be asked for, that takes about five minutes all in all, two for seeing that it is missing and three for writing the letter.

To get the total time spent on taking care of payment reminders, everyone involved in this activity has been asked about how much time they spend on this each week. This is multiplied by the cost price to get the total cost of this shortcoming. There are reports made on how many reminders are paid, are missing, or are parked. From this we can calculate the time spent on each by multiplying the number with the estimated amount of time for handling each.

Statistics for payment reminders show that there are some 2500 reminders being dealt with at VBS each week. The total time spent on handling payment reminders is estimated to be 180 hours per week. Furthermore, with the estimate that it takes two minutes to establish the status, the time being spent on this amounts to 83 hours per week, with the cost of that being SEK 29 600. The statistics also say that almost half of the invoices have been paid, and thus some 40 hours are spent

on checking invoices where the reminder did not have to be sent at all. Close to 40% are missing, and establishing that status takes 31,5 hours per week. Writing letters and asking for copies of invoices that are missing takes an additional 3 minutes per invoice. That makes 47,5 hours per week with a cost of SEK 17 000 per week. The problem of invoices being parked too long, i.e. coding, approving, or matching takes too long, can be seen to involve two tasks. To find out that the delayed invoice is parked takes in total twelve hours a week. Reminding agents through memos or phone calls takes 20 hours per week.

| | Payment reminders | Missing invoices | Reminding agents |
|---|---|---|---|
| **Hours** | 180 | 79 | 32 |
| **Cost (SEK)** | 64 500 | 28 200 | 11 400 |

Table 7.6 Total amount of hours spent and the PQC, per week, in payment reminders.

The total PQC for handling payment reminders is SEK 277 000 per period (64 500x4.3).

The time spent on this activity amounts to quite many hours for four of the persons involved. Together they spend 155 out of the 180 hours spent on payment reminders. In this case, where each person estimates so many hours, we do not believe that the estimates are 20% wrong, but rather 10%. Also, even if the others are guessing 20% wrong, the total time will only change by another five hours. Therefore the whole sensitivity analysis is based on a 10% variance. The sensitivity analysis shows that if the time estimated is 10% too high, i.e. less hours than estimated are spent, the PQC for handling payment reminders would be SEK 249 000 per period (instead of SEK 277 000). On the other hand, if the time estimated is 10% too low, i.e. more hours than estimated are spent, the PQC would be SEK 305 000 per period.

### 7.5.3 The causes

When a payment reminder arrives at VBS, it can either be established that the invoice has been paid, or that it has not. The problem is the invoices that are not paid when the reminder comes. That an invoice has not been paid shows that somewhere along the process, one or

several things have not been carried out correctly right away. The main reasons are that the invoice is missing, or that the invoice is parked.

The reasons for payment reminders coming for invoices that have been paid already can be that the supplier and Volvo use different due dates. The supplier looks for the payment 30 days after the invoice was written (normally 30 days, can also be 10 days), whereas Volvo pays 30 (or 10) days after the invoice has arrived to VBS, which is in full compliance with the general payment terms. Often there can be a few days between these dates as mail is not always delivered the next day, especially when the invoices were mailed from foreign suppliers. If the invoice address was incorrect, it will take a few extra days for the invoice to reach VBS.

Reasons for an invoice to be missing can be that it never reached Volvo, neither the customer company nor VBS. It can also be that the invoice is directed to the customer company, although it should go directly to VBS, i.e. the invoice address was incorrect, and was then not sent on immediately from there to VBS. A quite different reason for an invoice to be missing, i.e. not being in the system, is that it has been registered once but removed. Often this happens because the purchaser does not accept the invoice, but has not properly informed the supplier about this, or the supplier is informed but the two parties have not agreed on new terms for that particular purchase. Another reason is that an invoice has been returned to the supplier because it was incorrect or incomplete, and then the supplier never sent a new one, and also did not stop the reminder from being sent. The supplier might not have more or better information based on the order that was placed, and requires more information from the customer before a new invoice can be sent, and this can sometimes take a long time.

When invoices are parked, they are either waiting to be coded, and/or approved by agents in the customer companies, or they are waiting to be matched in an invoice control system. The coding and approving can be late for several reasons. If there are problems with the invoice, or information is lacking, it might be difficult to know who is to pay for it and therefore hard to code. A reason for this can be that the purchase was made by an unauthorised purchaser, not knowing the

proper purchasing routines. This might also lead to the invoice not being approved until the customer and supplier agree on a solution. Sometimes there is not enough, or correct, information about who made the purchase, and therefore the invoice can be sent to the wrong account assignment agent, and is now passed around between persons who did not make the purchase and do not want to pay for it.

There is also a problem with agents not knowing that they should assign accounts or approve invoices, and thus usually do not know how to do it, or even know that they have an inbox, where invoices are placed while waiting to be coded or approved. Most of these agents will ask for help or send it back to the source at VBS. Unfortunately, some of them do not understand how important it is that these tasks are performed, and performed quickly. The invoices can also be waiting a long time to be coded because the persons placing the order or making the purchase, i.e. the coding and approval agents, are often busy with other things, and handling invoices is a very small part of their work, and therefore often given a low priority. The reasons for the matching not having been done in time are discussed in detail in section 7.2.3.

## 7.6 INTEREST INVOICES

There are five persons (administrators) taking care of the interest invoices, three work with this full time and two about 75% of their time. The customer companies receive, in total, around 850 interest invoices per period, where each interest invoice can include a demand for overdue interest for several invoices that were paid late. Interest invoices for five of the customer companies make up two thirds of the total number.

When an interest invoice arrives at VBS, the administrators go through them to see whether the interest claim is justifiable or not. Each interest invoice can include interest amounts for several invoices that were paid too late, and the administrator must check to see what has happened with each invoice that resulted in the payment being late. When doing this, the arrival date is controlled, as well as the history log, which shows what has been done with each invoice and how long time it has been with each person. Based on this, the administrator can

decide where the problem arose and whether the overdue interest will be paid or not. Those who are rejected are sent back to the supplier with a letter explaining the reasons. Those that will be paid can either be coded and assigned by the administrator at VBS, or sent out to the department responsible for the delayed invoice so that they can code and approve the interest invoice. The overdue interest can be paid either by the customer company centrally, or by the departments themselves.

### 7.6.1 Identified shortcomings

We see the entire *handling of interest invoices* as a shortcoming, since payments should not be late at all. This leads to poor quality costs, both in terms of costs for employees doing this job, and in terms of costs for the overdue interest payments made by the customer companies. However, the interest invoice handling at VBS works well, and does not give rise to unnecessary work, or any separate shortcomings.

### 7.6.2 The poor quality costs

We met two of the administrators in this activity to discuss what problems might exist, and how much time they spend on handling interest invoices. They had also been asked to get this information from the other three working with interest invoices. Besides calculating the costs for the time spent, this poor quality cost will also include the interest payments made by the customer companies, which is taken from statistics made at VBS over interest invoices handled. The interest payment calculation is based on statistics for the weeks in October 2000. We have tried to back this up by looking at other months, but the statistics are not accurate enough for those months since a common way of reporting this was not implemented until the beginning of the autumn. However, after discussions with administrators working in this activity, October is held to be a fairly standard period, which should make the period figure for October fairly representative.

| | Handling interest invoices | Interest payments |
|---|---|---|
| **Hours** | 180 | --[*] |
| **Costs (SEK)** | 64 500 | 280 000[†] |

Table 7.7 Total amount of hours spent and the PQC, per week, in interest invoices.

The total PQC for interest invoices is SEK 1 481 000 per period (64 500x4.3+280 000x4.3 = 1 481 000).

This PQC is made up of the cost for the time spent, and interest payments being made. The time estimate is the insecure figure in the cost calculation and therefore only this number will be dealt with in the sensitivity analysis. This shortcoming also requires quite many hours per person, just as the payment reminders do, and for the same reason the variance used here will be 10% instead of 20%. For the handling of incoming payments, the sensitivity analysis shows that the PQC varies from SEK 1 453 000 per period (249 000+1 204 000) to SEK 1 509 000 per period (305 000+1 204 000), instead of the estimated SEK 1 481 000, with a 10% variance. That the total PQC does not vary so much depends on the fixed cost of SEK 1 204 000 per period being much larger than the variable cost.

### 7.6.3 The causes

The real cause for an interest invoice is normally that the invoice was paid late. That it is late can depend on several different things. The main reason is that it has taken a long time after the invoice was registered until it is posted and ready to be paid. If this has happened the interest cost is paid, and some 80% of all interest invoices paid have this cause. This can be further divided into two main problems. The first is invoices not coded and approved on time, and this is the major reason in most customer companies. The second problem is invoices that are late because there were problems when matching the invoice, either with deviations or with goods not being received. Of all interest invoices, this latter part is not very large. But in the non-production material part of the process, there are a few companies that

[*] These are the actual overdue payments made, and making the actual payments is included in the time spent on handling the interest invoices. Therefore there are no hours specifically for this.
[†] These are the actual payments made, and they are taken from the reporting system where all overdue interest payments are reported.

need to have invoices matched, and for those companies it is the primary reason for interest invoices. Other noticeable reasons are that invoices were registered late, or that errors were made when registering an invoice and it has to be registered again, making the final payment late.

## 7.7 GENERAL SHORTCOMINGS

The following are areas where there is room for improvements. No costs have been established for these points (see discussion in beginning of this chapter), but it is important to be aware of that they exist and that they affect the quality of the services provided at VBS.

One point is that there has been, and to some extent still is, much movement, both in terms of people leaving the process and new being hired, but also much rotation between tasks. The fact that old and experienced persons leave means that much knowledge, experience, and many valuable connections with customer companies is lost. These are things that are difficult to replace, and can jeopardise the quality of the service being delivered. One problem with many new persons is that there is a risk that they are taught how to perform their tasks by someone who has not been at VBS very long herself.

However, there are not only problems with rotation, but advantages as well. It does make people acquire more knowledge about the whole process, and an understanding for all activities and tasks. It is easier to find back ups when many persons in the staff has rotated and worked with different tasks. However, the staff in the non-production material part of the A/P process mention turnover more as a problem than as an advantage. The customer companies are also not so happy about this, since they are affected by knowledge being lost, and they lose some good contacts in VBS.

The personnel also see the SAP R/3 system to be a disturbing factor, mainly because it is often slow or down. Many windows are illogical, and do not support how the personnel want to work. There is also much irritation over the incompatibility between systems, such as archiving and scanning system, invoice control systems, and certain

customer unique systems. This can negatively effect the quality and efficiency, since the personnel become stressed when they cannot do their job properly, or in time. Much of this can depend on that Volvo only implemented SAP R/3 three years ago and it has not been perfected yet. However, there has been an upgrade of the SAP R/3 system during November, and hopefully this has positive effects.

Another problem is that people sometimes do not follow all the routines, especially the preparation routine before registering invoices. That people carry out tasks differently than stated in the routine can lead to errors being made or problems arise somewhere along the processing of the invoice, which in the end can lead to lower quality on the service being provided. The major consequence is that the process is not uniform and thus the products and services being delivered do not always have the same level of quality, and content.

A factor that can have a great impact on the content and the quality in the service provided, and how the customers experience the quality, is that many of the personnel at VBS feel that it is not clear enough what is to be included in the service being purchased by the customer. This is possibly caused by too unclear guidelines from VBS to its personnel on these issues. This can lead to many employees giving different answers and information, one doing the extra that the customer asks for and one not doing it. Many still feel a connection to the customer company where they used to work and a pressure or desire to help out and do more for the customer. Because of this, a customer can receive different service from time to time, depending on whom he is talking to, and also different customers can receive different services, even if they pay for the same service.

The final shortcoming that will be discussed is the fact that there is often a lack of understanding between the staff in the customer companies and the employees in VBS. When one does not know or understand what the work performed by the other party involves, it is difficult to know how the other party may help, or to have the right expectations on what they can do. Also, misunderstandings can easily happen, and cause the work to be more difficult for the other party. When VBS was formed, Volvo implemented new systems, new

routines, and created processes for performing the business administration, thus the tasks have changed, both in the customer companies and in VBS.

There seem to be a better understanding between the smaller companies and VBS, probably because in small companies many people work with many tasks and have an overall understanding of the activities, which they brought with them when coming to VBS. Also, the smaller companies are more aware of their costs, and how to keep track of them, and therefore are more careful in making sure the job gets done properly. In many of the large companies, taking care of invoices is a relatively small part of the work of those making orders and purchases, and can be seen as unimportant and unnecessary, especially if they do not know or understand what it is that VBS is doing. When both parts are aiming at doing the job right, as smoothly as possible, it is easier to keep up a good dialogue, and help each other.

# 8 ANALYSIS

*This chapter will present the analysis of the identified poor quality costs and their causes. The costs will first be summarised in a Pareto analysis, followed by a ratio analysis. Then the different causes will be discussed, and summarised in an Ishikawa diagram. The aim of the chapter is to present the findings in a way that is clear and understandable, and to point out interesting and important relationships and comparisons.*

When analysing the costs for poor quality, identified and presented in the previous chapter, it is interesting to look separately at each cost, but also interesting to look at all of them together and compare them. A comparison and discussion of both costs, and causes, will give an overall view and understanding of what kind of PQC exist in the non-production material part of the A/P process in VBS, and why they exist there. One way of making such a comparison is to make a Pareto analysis, showing each cost and its individual share of the total PQC in this study.

| | Shortcoming | PQC (SEK) | Percent | Cumulative (%) |
|---|---|---|---|---|
| A | Interest payments | 1 204 000 | 51 | 51 |
| B | Interest invoices | 277 000 | 11.5 | 62.5 |
| C | Payment reminders | 277 000 | 11.5 | 74 |
| D | Negative balances | 164 000 | 7 | 81 |
| E | Incomplete invoices | 145 000 | 6 | 87 |
| F | Lack of goods-received reports | 88 000 | 4 | 91 |
| G | Incoming payments | 77 000 | 3 | 94 |
| H | Returned invoices | 62 500 | 3 | 97 |
| I | Deviating invoices | 49 000 | 2 | 99 |
| J | Corrections of payment proposals | 27 500 | 1 | 100 |
| | Total | 2 371 000 | 100 | |

Table 8.1 Pareto table of identified shortcomings, per period.

As seen in the Pareto table, there are five large poor quality costs. This is not surprising since three of them concern whole activities that are identified as shortcomings. They are entirely unnecessary activities, and thus become large. Besides, they are all carried out at the end of

the invoice process, and are caused by several problems that have occurred along the way. The later problems are discovered, the more expensive they are to handle. It can be especially expensive if they are discovered by the customer, since it can be more time consuming to correct things that have had time to cause many problems for both the company and the customer. When the poor quality cost is based on the extra, unnecessary time caused by the problems and shortcomings, then the most time consuming also become the most expensive.

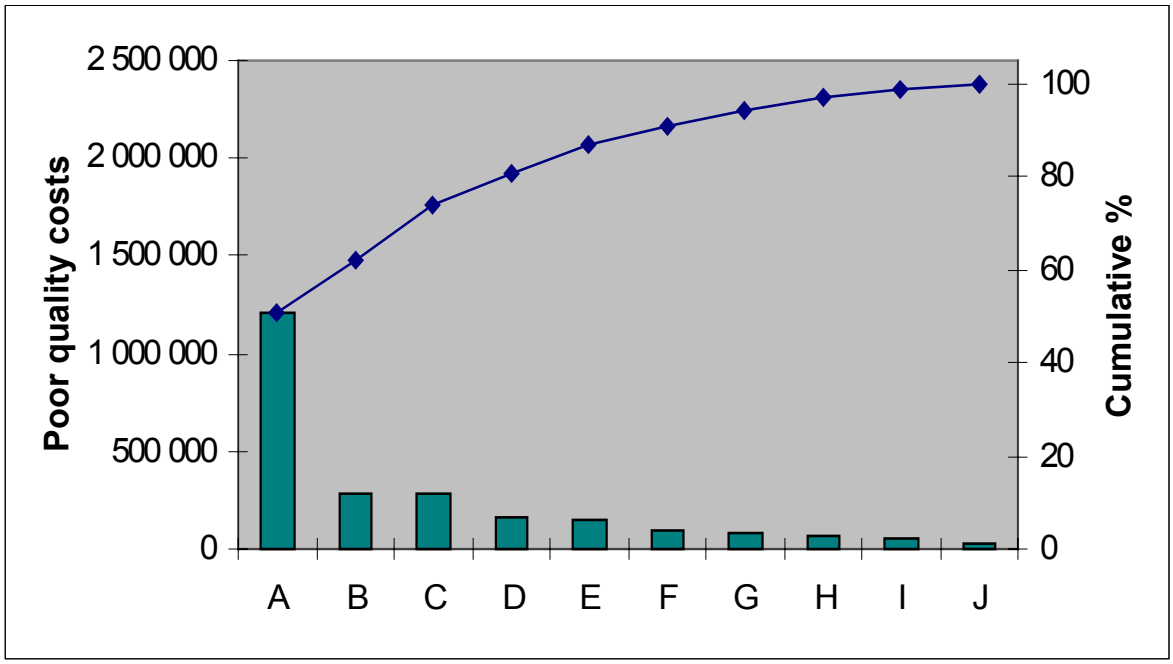


Figure 8.1 Pareto chart of identified shortcomings, per period.

When comparing the different costs it can be seen that the two largest PQC, except the overdue interest payments, are for handling interest invoices and payment reminders. If only the shortcomings in activities that are carried out at VBS are included in the total PQC, the new total PQC is SEK 1 167 000 per period. Thus these two shortcomings make up almost 50% of the PQC related to activities performed at VBS.

Interesting to see is that the PQC for negative balances and incoming payments, which are two related shortcomings with similar causes, are so different in size. The PQC for incoming payments is only slightly less than half the negative balances PQC. The difference is that handling the incoming payments is easier and quicker. Most of them just need to be redirected to the proper account, often it is obvious

what they refer to, and investigations are usually not needed. Those few that are difficult, though, can take time before they are solved. They still do not require much time spent on working with them, in contrast to the negative balances handling, which is usually a very time consuming task, involving many complicated investigations about the outstanding claims.

A ratio analysis shows that the total PQC of SEK 2 371 000 per period compared to the total cost of approximately SEK 4 640 000 per period for the non-production material part of the process (period 8-10) is 51%. This is very high and not quite a correct comparison, since the overdue interest payments are not part of the total costs for the non-production material part of the process. A better comparison would be to look at the PQC without such payments since that figure represents PQC in the activities carried out at VBS. The PQC for this is SEK 1 167 000. Then the ratio is 25%, which is within the range discussed in the theory as common (see section 5.6.1). That one fourth of the costs are the result of poor quality is obviously not good. This shows how urgent it is to address the issue of poor quality. A study such as this shows clearly where there is room for improvements.

Many of the shortcomings and PQC identified in this study are problems that are caused by several root causes, but which are also causing other shortcomings themselves. One such example is the incomplete invoices. They are a shortcoming in themselves, and a fairly large one too, but they are also partly causing many of the other shortcomings identified, primarily payment reminders and interest invoices. This is because the natural consequence of incomplete invoices is that the invoice processing takes much longer time, and often the payment ends up being late. Much would be gained, timewise for administrators at VBS and for persons in the customer and supplier companies, as well as easier work with less irritation, if all invoices could be correct from the beginning.

As seen in the result chapter, this problem is a cause for many shortcomings. There are at least two different types of unnecessary work caused by this. One is to take care of the special pile of incomplete invoices that exist for some customer companies, and the

other is handling the incomplete invoices that reach each invoice handler, who must then do this themselves. From the autumn 2000, VBS is trying to solve this problem by being careful and send back incomplete invoices to the suppliers. They are also charging the customers for all returned invoices, hoping that both customers and suppliers will be better at making sure all information needed is correct, and on the invoice from the beginning. In the long run a solution to this problem can lead to savings, as well as less work for everyone involved.

If each root cause for problems could be identified, and the value of the consequences throughout the process could be calculated, one would perhaps find other shortcomings and PQC. We have tried to do such a calculation of the effects throughout the process from the problems with invoices that are parked, and waiting to be coded, approved, or matched. Invoices being parked is a problem that exists in many of the customer companies, and approximately 14% of the payment reminders are caused by this. Reminding the agents, pushing for the tasks to be completed, takes much time. There are many reasons for the invoices to remain unprocessed, and that the consequences of this can be serious is seen when interest invoices are investigated.

Approximately 70% of all interest invoices, both in number of invoices and amount of overdue interest paid, are caused by delays with coding and approving in the customer companies. If this problem is seen as a shortcoming in itself, the PQC for handling payment reminders and interest invoices caused by this, and the amount of interest being paid, would amount to approximately SEK 1 090 000 per period. This includes the cost for handling parked invoices (49 000), plus 70% of the cost for handling interest invoices (193 000), plus the interest costs paid caused by delays with coding and approving (850 000). Even without including the interest payments made, the cost would be SEK 242 000 per period, which is a large amount, and comparable to the highest PQC identified in this study.

Another problem with the invoices that are waiting a long time to be coded and/or approved is that they are the cause of much irritation, both within VBS, within purchasing organisations, and between VBS

and the customer and supplier. Administrators at VBS are the ones taking calls from suppliers waiting for their payments, and they have to take the responsibility, or blame, for someone else not having carried out his or her task properly. Often this puts the administrator in the position of having to find out what has happened, where the invoice is, and then push for the coding, or approving agent to finish their task, and release the invoice for payment. Also, many purchasers feel that this is a task, and a burden, they do not want, and it takes valuable time from their 'real' work with purchasing and negotiating etc. Depending on how many in a department that are authorised to code, and approve, the burden can be heavy for some. They can get irritated over having to do this, giving it low priority, and this irritation can go out over the relationship with VBS, since VBS are the ones 'chasing' the agents to get the job done.

One important reason that we have found for the above problem is that purchasers, or coding and approving agents, are not always sure of what their job with invoices includes, or they do not know exactly how the Workflow system works, so they do not know how to do the task. This, as well as the problem with incomplete invoices, where information is missing or incorrect on the invoice, can be because the purchasing organisations in the customer companies are not working perfectly. Some organisations are unstructured and have unclear routines, without clear guidelines for who may place orders and what must be done when they do this. If people without knowledge about the purchasing procedure, or without authority to purchase, go ahead and make orders, there is a risk that they miss giving the supplier all the necessary information, that they are unclear towards the supplier concerning references (who is making the purchase, and who will pay for it), that they simply do not know the correct information to give, or that it takes a long time before they do their coding, and approving tasks.

There are of course customer companies with well functioning purchasing organisations as well. Here the problem with not providing correct information can occur when people or departments need something in a hurry, and feel that it takes too long to go through the proper purchasing channels, which can lead to the same errors being

made. It is however the responsibility of both coding and approving agent to make sure that the invoices they receive from administrators at VBS are correct before they approve an invoice.

As we see it, the root cause for problems with purchasing organisations, leading to both incomplete invoices and invoices waiting a long time to be coded and/or approved, is a lack of understanding between customers and VBS, or at least between the personnel in both places. Persons in the two companies are not always sure what the tasks entails that are carried out by someone in the other company, and therefore do not know how their own work affects the other person. Many purchasers, and others involved in placing orders in the customer companies, feel that administrative services should not be part of their task, but a function somewhere in the background, hopefully without them having to be involved.

The fact that there is a problem with movements and changes in the staff, and rotation of tasks, lies in the nature of VBS itself, being a shared services centre. The idea with shared services centres is to implement processes where all activities are organised to follow a component, product, or service, horizontally along its way through the company. The goal is to be able to make all tasks involved uniform, and to be able to rationalise them. This leads to tasks becoming simpler, and more monotonous. Other factors influencing the turnover is that VBS was started in 1998 and has not reached full stability concerning the work situation, and the number of employees needed in this process. VBS is also affected by the fact that the workload being moved from the customer companies to VBS was much larger than expected, and therefore the personnel is not dimensioned for this volume. This leads to that after almost three years, the workload is still heavy, and many people feel that they are stressed and that their time is not enough, and VBS has not yet been able to cut back on personnel.

As a consequence of the uncertainty about volume and workload, and when rationalisations can be made, VBS has quite a few employees that are hired from staffing companies such as Manpower. This can increase the employee turnover, with people hired for short periods. The activities and tasks in the A/P process are becoming more

specialised and less varied, and there are still changes being made to the organisation of the activities within the process, leading to tasks being changed, or rotated, between the employees. Together with the fact that there has been quite many reorganisations within the A/P process, these factors lie behind the employee turnover that exists in VBS.

A risk with specialised and monotonous tasks is that people become bored, and feel little responsibility for their work, and for having good co-operation with other teams and employees. There has been a feeling of lack of responsibility in the A/P process in VBS, leading to employees not being happy with their work situation and feeling a lack of commitment, possibly causing part of the employee turnover as well. We believe the situation may be improved with the new team structure put in place in the beginning of this autumn. A factor that can have a positive effect here is that they are trying to make sure that the members in each team are sitting close together. Thus they can work better together, improve the routines for the activity, learn from each other, and more easily back up for each other if someone is away. If it is allowed to be fully implemented, and worked with until it is working satisfactory, and then used for a longer time before new changes are being made, the new team structure can work out well.

The stress and lack of time, is a root cause for many of the problems discussed so far. It can hinder commitment to the work, the task, the team etc, as well as hindering persons and teams from working with improvements in the daily work. Noticeable is that it leads to persons making errors, e.g. when registering, or not doing all tasks properly or as carefully as possible. Not doing the task properly often means that you do not follow the routines, and two routines that are often not followed is the preparation routine, and the routine stating that all incomplete invoices should be sent back to the supplier right away. In the end all this leads to poor quality in the service being provided. This can become a vicious circle, where stress leads to problems, and problems lead to time being spent on unnecessary things, giving even less time to do the real task. To make sure that VBS does not end up in this vicious circle, they need to improve the work situation and try to decrease the workload, thereby reducing the stress.

This study at VBS has shown similar results to these predicted in theory, with a few exceptions (see e.g. Harrington, 1988; Sandholm, 1997; Sörqvist, 1998; Campanella 1999). The major exception concerns whether the identified PQC are external or internal failure costs (see section 5.6.3). Often the timing for the cost and the problem is the same, but there are times when a PQC could be classified differently depending on whether one goes by the problem or the costs. In the definition by for example Sandholm (1997), the line between external and internal failure costs is drawn looking at whether *problems* are discovered before or after delivery of the product or service. Using this definition has turned out to be difficult in this case, since it is difficult to draw such strict lines between internal and external failures in a service providing company. This is because services are often produced by the service company together with the customers, in this case study this is that the invoices are initiated, coded and approved in the customer companies. It is also difficult to pinpoint exactly when the service has been delivered, thus saying when the problem was found. In the case of VBS some problems are found before delivery, i.e. before the invoice has been paid, but the problem originates in either the supplier or the customer company and can cause costs for both VBS and external parties later on.

But if the definition given by Campanella (1999) is used instead, what is interesting is whether the *costs* occur before or after delivery of the product or service (see section 5.6.3). It can be easier to see when the cost occurs, instead of knowing when a problem was discovered. Costs that are easy to classify as external failure costs, i.e. are found after delivery, are the PQC for payment reminders, interest invoices and payments, negative balances, and incoming payments. Out of these five, four are large, which is logical since they occur at a very late stage and are the result of several problems occurring during the A/P process, both at VBS and the customers. Most of the other PQC identified can be both internal and external failure costs, in the sense that the problems can be found during the process and taken care of before delivery, e.g. returning incomplete invoices to suppliers. This causes a cost for the extra time spent on the task. But the incomplete invoices can at the same time cause costs that occur after delivery of the service. If they lead to the whole payment being late they result in

costs for dealing with payment reminders, and possible interest invoices. However, there is one PQC that is internal according to both definitions, and that is the cost for correcting payment proposals. The problem is discovered before the invoice is paid, and the cost for taking care of it occurs before payment as well.

Another example of a shortcoming that is difficult to classify is the internal audits performed at VBS. They can be seen as either a preventive activity, i.e. an investment to make sure there is good quality in the business, or be seen as an appraisal activity, i.e. checking that quality is delivered at all stages. The appraisal costs are seen as PQC, but not the prevention costs (see section 5.6.3). As long as the activity is carried out to ensure quality in the first place, a way to keep the quality work alive, and a way to have a good control over the business in general it can be called a prevention activity. Also, if it is done because it perhaps is requested by auditing companies or in order to be able to receive an ISO certificate, it can be a prevention activity. But, if the activity is performed regularly to make sure and control that the services provided are of good quality, it is an appraisal activity that would not be needed if one knew from the beginning that the process was perfect.

In VBS, the internal audits are used to try to improve processes and routines continually. One cannot stop evaluate processes and routines and think that there is one best solution, everything can always be improved and made more efficient. From this point of view the costs for internal audits are prevention costs, thus not a PQC. However, with VBS still being fairly new and there not having been that much time so far to look at improvements and make processes more efficient, the audits have also been much concerned with making sure that routines are followed, or that they actually describe the work being done. Considering this aspect, the cost could also be seen as an appraisal cost, and a PQC. As the processes become more efficient and tasks are more clearly defined, the quality of the work being done will most likely be better and the audits might be able to be more concerned with smaller adjustments and refinements leading to even better quality. As the situation in VBS is now, the internal audits are partly prevention activities, and partly appraisal activities, being partly a PQC.

This shows how difficult it can be to define what PQC are, and what is to be included.

One classification of PQC that is easy to do in VBS and that corresponds with theory is the one looking at whether PQC are traditional or 'hidden' (see section 5.6.4). There is one traditional PQC of the ones we found at VBS and that is the cost for interest payments, since it can easily be found in the ordinary accounting and reporting system. The others are 'hidden', which means that even if they might be known, they are not measured and reported as individual costs, but the cost must be found under other cost items. One way of working with PQC can be to make sure that they are measured and reported individually in the future. That most PQC identified in this study are 'hidden', is consistent with VBS being a service company. Most reporting and accounting systems are set up for production, and costs that can arise around that. When these systems are adjusted to service companies, more of the PQC will be visible as traditional costs. It is easier to reduce the traditional PQC since they are measured, and the effect on costs of steps taken can be seen right away. To turn more 'hidden' PQC into traditional will then make it easier for VBS to see their problems, and the following costs. This could be done by continuing to improve the time reporting system, to show the time spent on more of those tasks that are known problems.

The third way to look at PQC is to see whether the shortcomings are sporadic or chronic (see section 5.5). The sporadic shortcomings are those problems that arise and can be corrected in the daily work, such as a broken machine, and the corrections take the work back to a normal or accepted quality level. Underneath the sporadic problems are often chronic problems that are not known, or seen as problems. In VBS it has been difficult to classify the PQC as either sporadic or chronic as described in theory. Many problems are known and arise on a day-to-day basis, i.e. they are sporadic. VBS and the customer companies are working with solutions for many of these problems, but when solutions are needed for both parties it can take a long time to correct the problem. Meanwhile, people have learned to live with them and are not trying to correct them in their daily work, or do not even see them as problems, i.e. in this sense they are chronic. An example of

this is inefficient routines. Even if solutions for these problems are found, some who do not see them as problems might not change the way they work, and thus the problem remains, and can cause poor quality.

In a study such as this, where the aim is to get a rough assessment of the PQC, and the method used is a deviation analysis, it is likely that there are chronic problems that we have not discovered. The chronic PQC are those inefficiencies that people do not see as problems and the identified PQC in our study are based on information about problems we have received from the employees. In our own observations and information gathering we have not found any chronic problems that could be identified as shortcomings. However, another method that would probably be better at finding chronic PQC is to make a best practice analysis, where one looks at an optimal way of performing the tasks and then compares that to the actual process being performed. This would be a very time-consuming study where one needs to look at how others perform such a process, and then there has to be a thorough analysis of the present process. This could be an interesting method for a further study of PQC.

One factor that makes this study somewhat different to those we have looked at in our theoretical background review and in other theses studied, is the fact that VBS is a service company. They furnish a service, not a product, and hence the ordinary known problems in manufacturing companies do not exist here. The problems in a service company are more difficult to see, or to establish. They are intangible, such as inefficient routines, and thus it is also more difficult to decide whether the service delivered is defect in any way.

To sum up, there are certain general conditions existing in VBS that in some way are responsible for the possibility of poor quality to arise. The first is that the company is young, barely three years old, and therefore there are many things that there has not been time to work with yet. One example is that routines and work methods are still not uniform. The working environment, or situation, is a problem, as the place where especially the A/P process staff is working is too small, making it crowded, loud, and with many desks, shelves and other

spaces being untidy. There is also a problem with co-operation in general. There is a lack of understanding between many customer companies and VBS as a result of too little co-operation, and many would want to have a closer relationship with the other part. Another problem is that there is sometimes a lack of co-operation and understanding between processes in VBS, and between some teams. That persons do not understand how their work is connected to other persons' work can result in that they do not do their job properly, or that things either are done twice, or not at all, or result in the process being inefficient.

One way of making all the reasons and causes for shortcomings clearer is to show them in an Ishikawa diagram, which shows causes and effects (see figure 8.2). The diagram groups the causes in a different way, using new dimensions, compared to the analysis so far. The ultimate effect in this diagram is the poor quality that exists in VBS. The causes are grouped under seven headings that can be seen as the main causes for the poor quality. Some reasons can occur under more than one heading, as they are connected to more than one dimension. Under management are the reasons that can be seen to be the responsibility of the management at VBS, and some of the conditions that are general to VBS. Man refers to the employees in the A/P process and in the customer companies, and things that they are responsible for. Method concerns how the work is done, the routines and the tasks. Measurements take into account those measures that might affect how the work is performed in the A/P process. Reasons under machine have to do with the tools used in the business. Material includes problematic input causing shortcomings. Finally, milieu refers to the general working situation/environment in the A/P process.

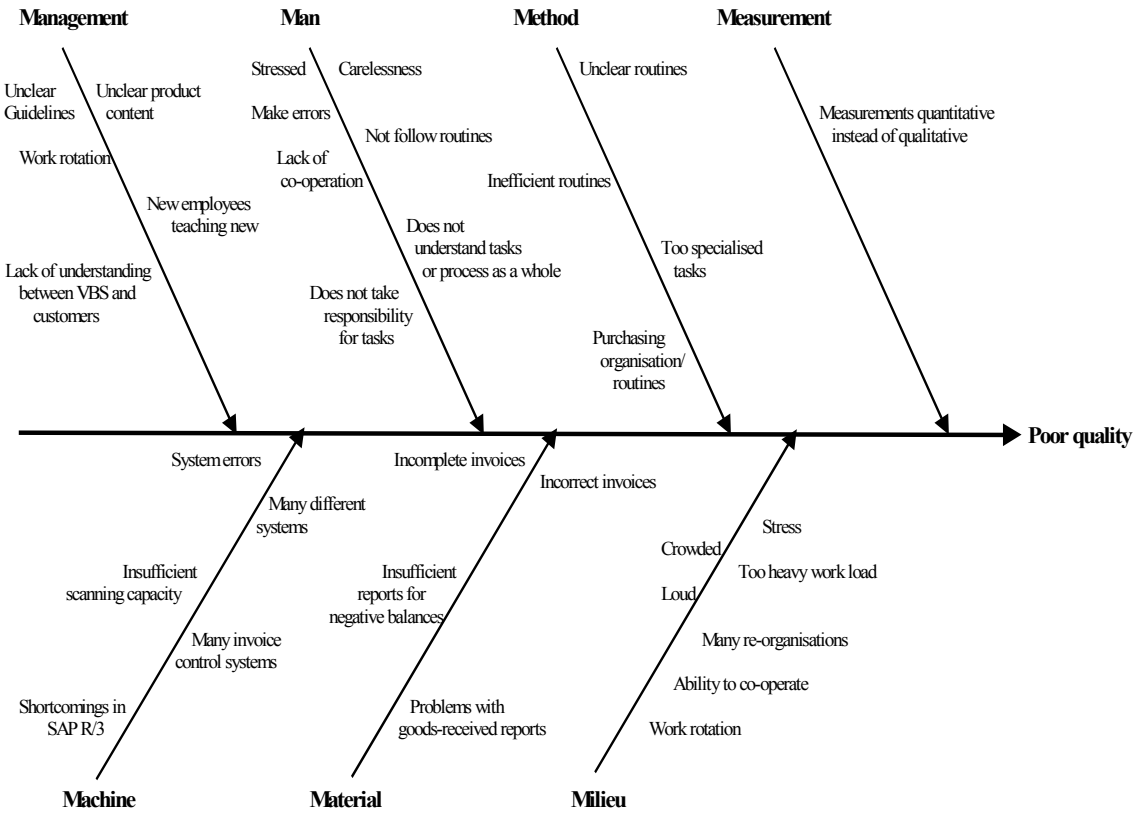


Figure 8.2 Ishikawa diagram over causes for poor quality.

The different PQC that exist in a company can be more or less easy, or difficult, to put a value on. The easiest one to value in this study was the overdue interest payments, since they were reported. After that follows the activities that can be seen as PQC in their entirety. It is more difficult to put a value on the problems that occur early in the process and that can cause several PQC later on in the process, depending on the consequences. For example, an incomplete invoice that is sent back is perhaps returned with correct information quickly and does not delay the further processing, but it can also take a long time and result in quite other consequences. Those problems whose consequences can be measured in extra time spent can also be valued relatively easy, but there is of course a risk that all consequences are not known. The general shortcomings that we identified are such that are very difficult to see the extent of the problem and its consequences, and hence cannot be given a PQC. Another way to put a value on all the PQC in a company is to perform a best practice analysis, where the total PQC is the difference between the present situation, or process, and an optimal situation. However, in that case it can be difficult to value each individual PQC.

| | PQC per period (SEK) | | |
|---|---|---|---|
| **Shortcoming** | **If less than estimated** | **Current estimation** | **If more than estimated** |
| Returned invoices | 50 000 | 62 500 | 75 000 |
| Incomplete invoices | 116 000 | 145 000 | 174 000 |
| Deviating invoices | 39 300 | 49 000 | 60 000 |
| Lack of goods-<br>Received reports | 70 000 | 88 000 | 105 000 |
| Corrections of<br>Payment proposals | 22 100 | 27 500 | 33 200 |
| Negative balances | 148 000 | 164 000 | 181 000 |
| Incoming payments | 69 000 | 77 000 | 84 500 |
| Payment reminders | 249 000 | 277 000 | 305 000 |
| (Interest invoices)<br>incl. interest payments | (249 000)<br>1 453 000 | (277 000)<br>1 481 000 | (305 000)<br>1 509 000 |
| Total excl. interest payments<br>Total | 1 012 400<br>2 216 400 | 1 167 000<br>2 371 000 | 1 322 700<br>2 526 700 |

Table 8.2 Sensitivity analysis for all shortcomings

In our analysis, the estimated time is a risk factor. According to the sensitivity analysis we made, based on that estimates on time spent can be 10% or 20% too high or too low, we can see that the total PQC identified can vary between SEK 2 216 400 and SEK 2 526 700 per period, including the overdue interest payments. If those overdue interest payments are left out, the total PQC for activities carried out at VBS can vary between approximately SEK 1 012 400 and SEK 1 322 700 per period. This shows that small changes leading to small reductions in time spent on shortcomings can result in quite large savings!

# 9 CONCLUSIONS

In this case study, carried out at Volvo Business Services AB (VBS) during the autumn 2000, we have tried to identify poor quality costs (PQC) and their causes. The process is divided into two main parts, the production material part and the non-production material part, and this study has focused on the latter. The process furnishes a service, which is to correctly pay the customer's invoices. The handling of invoices is a process that is set up of a number of activities that follow each other. The study has looked at each activity and identified PQC in each.

The result shows that the total PQC identified is SEK 2 371 000 per accounting period (4.3 weeks). This amount includes overdue interest payments made as a result of payments being made late, and this is by far the largest PQC identified. The rest is made up of PQC in the activities carried out at VBS as a result of errors, defects, inefficiencies etc that all lead to poor quality in the process and the service. A ratio analysis where the PQC for the activities carried out in VBS are compared to the total cost for the non-production material part of the A/P process shows a ratio of 25%, which is in accordance with theoretical discussions, and experience from earlier studies.

A Pareto analysis shows that the two largest PQC, after overdue interest payments, are for handling interest invoices and payments reminders, where the entire activities are shortcomings. This is logical, since they are the end result of something going wrong leading to a payment being delayed. They are often caused by errors or problems that in themselves are shortcomings with identified PQC. Examples of this are incomplete or incorrect invoices, lack of goods-received reports that make matching invoice to order impossible, or invoices that are returned to the invoice handler after registration because something was not correct. The later problems are discovered, the more expensive they are to handle. It can be especially expensive if they are discovered by the customer.

Many of the shortcomings have several causes in common. One major problem discovered in the study, as a root cause for other problems and

shortcomings, is the relationship and co-operation between VBS and the customers, which is to some extent characterised by a lack of understanding between the employees in VBS and in the customer companies. This shows itself in that administrators at VBS and purchasers, and coding and approving agents in the customer companies do not always have a clear picture of how their tasks are affecting the work of the others. Thus they do not understand the consequences of not carrying out their tasks properly and in time. A result of this can be that the coding and approving agents do not take care of the invoices they receive in time, and thus the whole invoice processing becomes delayed, with problems for administrators at VBS, and ultimately payment reminders and interest invoices as consequences.

Related to this is that some purchasing organisations have problems with their order and purchase routines, leading to that some persons who are not authorised to order products or services do it anyway. When this happens there are often problems with the invoice later on because not all, or not correct, information is given to the supplier and the invoice is incomplete when it arrives at VBS. Hence, the lack of understanding and co-operation between the two parties is found to be a root cause for shortcomings in VBS.

Another root cause is the work environment in VBS. The situation in the A/P process is stressful, both because of a heavy workload and because the premises are too small and become overcrowded and noisy. It therefore becomes difficult to concentrate on the work. This can lead to errors being made when invoices are registered, ending up in e.g. returned invoices, incorrect payments, or incorrect payment proposals. The work environment, together with specialised tasks, is one reason for the employee turnover and rotation in the A/P process. In turn, this leads to a turbulent situation, with knowledge being lost and constantly new employees trying to learn the routines and tasks.

The results of this study have been fairly much as expected considering the theory being studied. We have found problems in the activities and in the service being provided, resulting in unnecessary use of resources and poor quality and thus leading to PQC to exist. The total PQC for

activities in the studied part of the accounts payable process is about 25% of the total costs for this part, which was around the figure expected according to theory. However, the classification of PQC according to what has been stated in theory has been difficult to do. This is mainly because earlier studies have often concerned manufacturing processes, whereas VBS is a service providing company. The problems in a service company are more difficult to see, or to establish. They are intangible, such as inefficient routines, and thus it is also more difficult to decide whether the service delivered is defect in any way.

The point with a study like this is to find problems and turn them into opportunities for improvements. The large costs here that could be a good starting point is the handling of interest invoices and payment reminders. However it is not the handling in itself that is problematic but rather the fact that these exist. So to make improvements here VBS must go to the root causes, and try to make sure that these are reduced or eliminated. Dealing with root causes such as VBS/customer relationship and stress will reduce several of the PQC, among them the large ones. Especially important with improving root causes is that the sooner an error can be discovered (or best not occur at all), the less time will be spent later on costly and time consuming investigations, such as for negative balances.

Given that it is difficult to precisely define quality and poor quality, and thus PQC, it is important to remember, after reading our results and conclusions, that this study is based on one way of looking at poor quality and PQC. There are also other ways of defining poor quality and PQC, which would lead to a different result. This study has taken a somewhat extreme view on poor quality that assumes that there is a perfect, or ideal, situation where no PQC exist at all. This study identifies costs for everything leading to unnecessary work, and hence we can end up with identifying entire activities as shortcomings, such as handling payment reminders or negative balances. Primarily this is done to show how large costs these shortcomings actually cause.

However, we are aware that the entire activities, and costs, can obviously not be removed since the perfect situation can never be

reached. Some problems and errors will always exist, and there will always be a need to perform these activities to some extent. But there must be a starting point from which one can make improvements, and later look back to for comparisons. Also, we cannot say how much of the costs can be seen to be realistic to have in the normal operations, and therefore we cannot give another PQC than the total cost of the activity.

Moreover, the entire PQC for most of the shortcomings cannot be affected by VBS alone since the customer companies are involved in the invoice processing to a certain extent. This circumstance is natural for shared services centres, since their customers always supply the inputs that are the basis for the services being provided to those customers. Another consequence of VBS being a shared services centre, and having the customers performing part of the service, is that it is at times unclear which responsibilities each part has and who will perform what tasks, and perhaps what those tasks should include.

After this time at VBS we have some general recommendations on things that would be good for VBS to think about and consider, in order to reduce PQC. Some recommendations lead to higher costs for a period of time, in order to be able to have better quality and lower PQC in the long run.

- Improve the relationship between customer companies and VBS, since customers are active co-producers of the service. More meetings between administrators in the A/P process and purchasers and other involved personnel in the customer companies can lead to better understanding of each others tasks, and opportunities to work together to find solutions for problems. It is important that every one knows the consequences of their work, and how the tasks are related to each other in the invoice process.

- It is important that the suppliers see VBS and Volvo as one, where they always know what to expect because the way they are treated is consistent at all times. Irrespective of who the supplier comes in contact with, the information, answers, and attitude must be consistent at all times. Hence, the contents of the services provided

must be clarified, so that both customers and VBS are well aware of what is the responsibility of each part in regard to the service, and so that personnel in both parts know what they can expect from the other part. This is important so that each customer receives the same service (product), and know what they can expect in every situation.

- It is important for VBS to try to decrease the workload and remove the stress. If the workforce was increased for a period it would solve some of the problems. With a smaller workload the employees would be less stressed and thus be able to be more careful when carrying out their tasks, e.g. follow routines properly and make sure errors are not made. More importantly, they would also have a chance to work with improvements, going over their tasks and see where there is room for improvements that in the end could make tasks easier and more efficient, thus reducing the workload. A strengthening of the workforce especially for handling the ordinary invoice flow would most likely improve the work carried out in the beginning of the process, i.e. everything is correct right away, and thus less resources are needed in later parts of the process for activities such as incoming payments. To some extent resources for handling payment reminders, interest invoices, and negative balances could be reduced, even if they are also dependent on the customer companies. In the end, the total workload will be reduced and the personnel can be reduced as well. When rationalising the process so that the workforce can be reduced it is essential to make sure that the tasks do not become too specialised and monotonous. When the work becomes boring and without challenges the employees feel less committed and take less responsibility for their work, leading to mistakes, errors, and poorer quality in general.

- Continue to improve the time reporting system so that the time spent can be reported in more detail, especially the unnecessary work so that problems become more visible. Thus VBS can also separate the work that should be charged to the customer as it has origins in the work performed, or not performed, by the customers. To be able to show customers the costs for them not having

performed their work perfectly, is a way of influencing their attitudes and motivate them to work together with VBS to improve the entire process.

- Another way of making customers more aware of consequences of not doing the work correctly right away would be to make sure overdue interest costs are charged to each individual department, rather than to the customer company centrally. If their employees would see all the overdue interest costs and have to stand for them themselves, they would probably understand how important it is that they perform the tasks connected to the invoice process correctly.

All the above points are important to work with in order to improve the quality of the non-production material part of the A/P process, and to reduce the poor quality costs.

## 9.1 FURTHER RESEARCH

It has been very interesting to look at poor quality costs in VBS, and many ideas about what one can look at as well has come up during the study. First of all, the fact that this study was a first, rough assessment obviously leads to that not all PQC were captured, so another study could try to look more at hidden and chronic PQC. Perhaps looking at how a PQC measuring system could be implemented will be a way to find more PQC. Other interesting aspects which could be the basis for further studies is to look at VBS from the shared services perspective, as well as the process-orientation, and try to find out how these factors might influence the existence, or extent, of PQC in VBS. Are these important reasons, either for causing PQC, or for having led to fewer PQC?

The next step after our study is to use our results as a starting point for choosing a few areas and look at how they can be improved, in order to reduce the PQC. Here it could be interesting to try to focus on the VBS – customer relationship, and see how one can work with the customers to help them improve their part of the process as well.

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# Interview list

| | | |
|---|---|---|
| 000829 | Dennis Kraft | Process owner – Quality process |
| 000912 | Roger Andersson | Process owner - Human Resource |
| 000914 | Eva Kantola | Administrator in A/P process |
| 000915 | Kjell Claesson | Customer contact person |
| 000919 | Birgitta Björneson | Process owner – Accounts payable |
| 000920 | Nils Rune, Tomas Lindh | Group managers A/P, tutors |
| 000926 | Ulla-Stina Olsson | Employee in General ledger and closing of accounts |
| 000926 | Brainstorming 8 st | Administrators in A/P |
| 001002 | Graciela Valldal, Madeleine Ljung | Administrators in A/P, matching |
| 001002 | Anne-Charlotte Stendahl | Administrator in A/P, negative balances and incoming payments |
| 001003 | Birgitta Strömberg | Administrator in A/P, interest invoices |
| 001004 | Hanna Linder | Administrator in A/P, payment reminders |
| 001004 | Eva Kantola | Administrator in A/P, Group invoices |
| 001005 | Lena Lindblom | Administrator in A/P, regular invoices |
| 001005 | Stefan Bech | Administrator in A/P, payment proposals |
| 001006 | Ewy Augustsson | Administrator in A/P, regular invoices |
| 001011 | Mats Johannesson | Purchaser, Volvo Penta |
| 001017 | Nils Edvardsson | Purchaser, Volvo IT |
| 001018 | Sara Lönn | Administrator in A/P, Group invoices |
| 001018 | Christina Qvil | Administrator in A/P, regular invoices |
| 001024 | Hasse Spetz | Purchaser, Celero |
| 001031 | Birgitta Strömberg, Helene Rinaldo | Administrators in A/P, interest invoices |
| 001031 | Mary-Anne Nilsson | Administrator in A/P, payment proposals |
| 001101 | Anne-Charlotte Stendahl, Ola Wignell | Administrators in A/P, negative balances and incoming payments |
| 001101 | Lena Lindblom, Frank Cuba | Administrators in A/P, regular invoices |
| 001102 | Eva Kantola, Gunilla Cronholm | Administrators in A/P, Group invoices |
| 001102 | Karin Karlsson, Hanna Linder | Administrators in A/P, payment reminders |
| 001103 | Per Isaksson | Employee in process development |
| 001116 | Anneli Berntsson | Member of executive team for process development and quality |

# Interview guide for first round interviews with administrators in VBS

1. **Your background**
    a) How long have you worked at VBS?
    b) What have you worked with earlier?
    c) What is your education?
    d) What kind training have you received at Volvo/VBS?

2. **Your task?**
    a) What tasks do you have today?
    b) What were your tasks before the new team organisation?
    c) What material do you work with?
    d) Who are you 'suppliers'? (i.e. where does the material come from)
    e) How is the quality of the material you receive?
    f) What are you passing on?
    g) Who are your 'customers'? (i.e. who are you leaving material to)

3. **Time**
    a) How much time do you spend on your different tasks during one day?
    b) How much time do you spend on unnecessary work?
    c) Do you feel any stress or shortness of time in your work? (what)
    d) If so, how does it affect your work?

4. **The team's work**
    a) What are the tasks of the team?
    b) Are the tasks in the team similar or different? (how)
    c) How many persons are in the team?
    d) What were the members of the team doing before the new team organization?
    e) How is the co-operation in the team?
    f) Are the members of the team sitting close together?
    g) Does that affect the work?
    h) Is there any stress or shortness of time in the work performed by the team?
    i) If so, how does that affect the work?

5. **Co-operation**
    a) How is the co-operation with the other teams? (communication/information)
    b) How is the co-operation with the other processes?

6. **Measurements**
    a) What measurements are there for the team?
    b) How is the team's work affected by these measurements?
    c) Do you think that these are the correct measurements?
    d) Do you think the team has enough measurements?
    e) Do you know why these measurements exist/are used for?

**7. Work routines**

a) Do the work routines agree with how you actually work?
b) If no, how do they differ?

**8. The customer**

a) How is the co-operation with the customers?
b) Do you work differently depending on who the customer is?
c) What problems do you experience with the customer, or in the customer's work?
d) Can you estimate how many, or how often, or the time spent on such problems?

**9. Problems or shortcomings**

a) What problems or shortcomings do you experience in the team's tasks?
b) Can you estimate how many, or how often, or the time spent on such problems?
c) What problems or shortcomings do you experience in the non-production material part of the A/P process?
d) Can you estimate how many, or how often, or the time spent on such problems?
e) Do you accept to do tasks you should not do? (part of the service?)
f) Are there typical errors or problems in the material you work with
g) Can you think of any reasons for that?
h) Where are the largest 'bottle-necks' in the non-production part of the process?

**10. Commitment**

a) How committed are you to your work?
b) How committed are you to the result of the team?

## Interview guide for purchasers

1. **Position/area**
    a) What is your position?
    b) In which area do you work?

2. **Tasks**
    a) What are your tasks?
    b) What are your responsibilities and authorities?

3. **The ordering procedure**
    a) How is your purchasing organisation organised?
    b) Who may make orders?
    c) How is an order made?
    d) What information are you giving to the supplier?
    e) What information about price are you giving?
    f) Who is coding the invoices?
    g) Who is approving the invoices?
    h) How do you find out who will code, and who will approve?
    i) Is there any reference given, if so, what does it regard?
    j) How do you experience your work routines for ordering? (good, clear, difficult)

4. **VBS**
    a) What information or demands come from VBS regarding information on invoices?
    b) Do you know what VBS is doing?
    c) Do you know how your work with orders affects the work at VBS?
    d) How is the relation to VBS?
    e) Do you feel there is any difference in working with ordering since VBS was formed?

5. **Suppliers**
    a) How is the co-operation with the suppliers?

6. **Problems and shortcomings in the ordering procedure**
    a) What problems and shortcomings do your experience in your purchasing organization?
    b) What problems and shortcomings do your experience with those who make orders?
    c) What problems and shortcomings do your experience in your relation to VBS, or in the work performed by VBS?
    d) What problems and shortcomings do your experience in your relation to the suppliers, or in their work?
    e) Is there any difference with problems compared to before VBS was formed?

## Categories of poor quality costs according to Campanella

### PREVENTION COSTS

Marketing/Customer/User
Marketing Research
Customer/User Perception
Surveys/Clinics
Contract/Document Review
Product/Service/Design
Development
Design Quality Progress Reviews
Design Support Activities
Product Design Qualification Test
Service Design – Qualification
Field Trials
Purchasing Prevention Costs
Supplier Reviews
Supplier Rating
Purchase Order Tech Data Reviews
Supplier Quality Planning
Operations (Manufacturing or Service) Prevention Costs
Operations Process Validation
Operations Quality Planning
Design and Development of Quality Measurement and Control Equipment
Operations Support Quality Planning
Operator Quality Education
Operator SPC/Process Control
Quality Administration
Administrative Salaries
Administrative Expenses
Quality Program Planning
Quality Performance Reporting
Quality Education
Quality Improvement
Quality System Audits
Other Prevention Costs

### APPRAISAL COSTS

Purchasing Appraisal Costs
Receiving or Incoming Inspections and Tests
Measurement Equipment
Qualification of Supplier Product
Source Inspection and Control Programs
Operations (Manufacturing or Service) Appraisal Costs
Planned Operations Inspections, Tests, Audits
Checking Labor
Product or Service Quality Audits
Inspection and Test Materials
Set-Up Inspections and Tests
Special Tests (Manufacturing)
Process Control Measurements
Laboratory Support
Measurement (Inspection and Test) Equipment
Depreciation Allowances
Measurement Equipment Expenses
Maintenance and Calibration Labor
Outside Endorsements and Certifications
External Appraisal Costs
Field Performance Evaluation

Special Product Evaluations
Evaluation of Field Stock and Spare Parts
Review of Test and Inspection Data
Miscellaneous Quality Evaluations

## Categories of poor quality costs according to Campanella

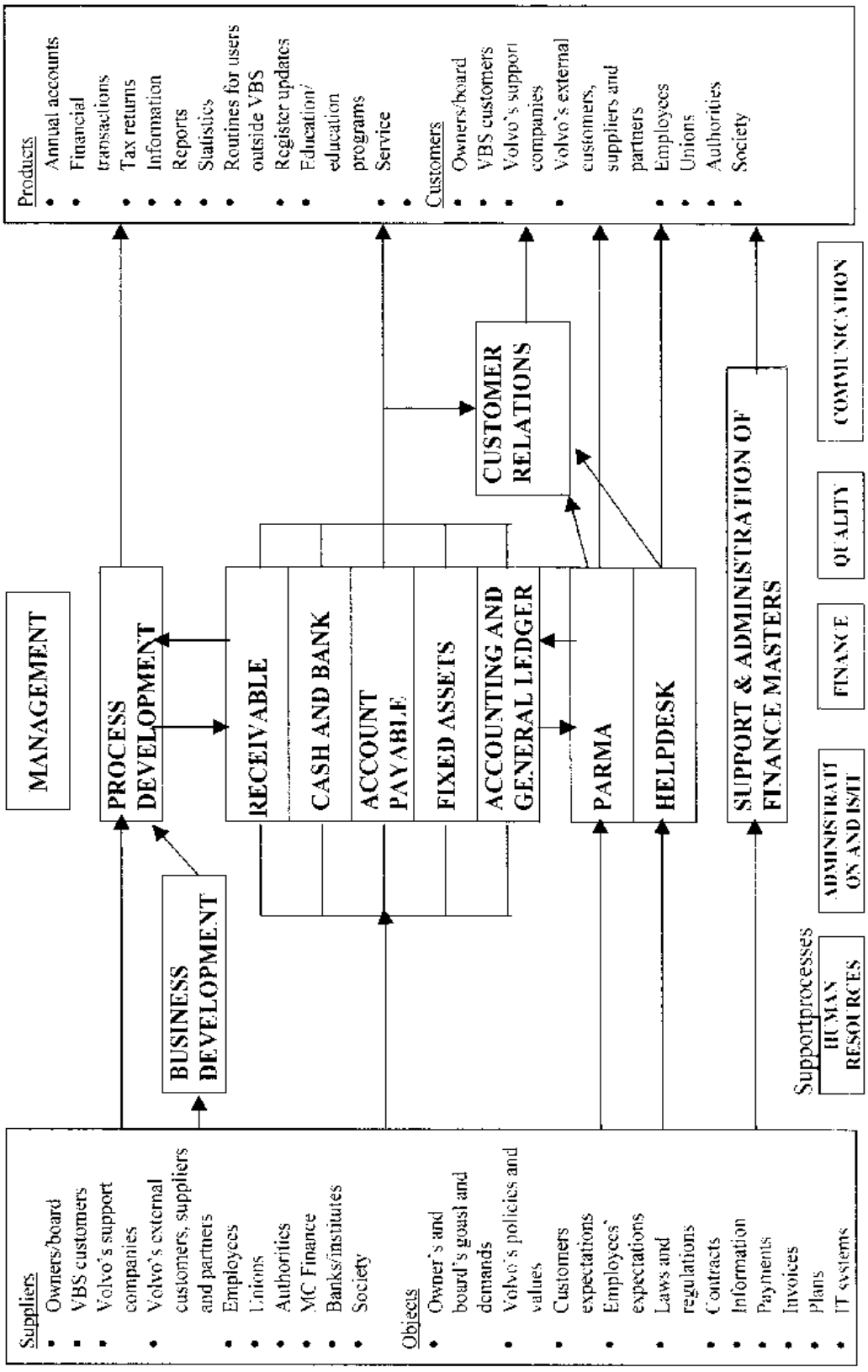
### INTERNAL FAILURE COSTS

Product/Service Design Failure Costs (Internal)
Design Corrective Action
Rework Due to Design Changes
Scrap Due to Design Changes
Production Liaison Costs
Purchasing Failure Costs
Purchased Material Reject Disposition Costs
Purchased Material Replacement Costs
Supplier Corrective Action
Rework of Supplier Rejects
Uncontrolled Material Losses
Operations (Product or Service) Failure Costs
Material Review and Corrective Action Costs
Disposition Costs
Troubleshooting or Failure Analysis Costs (Operations)
Investigation Support Costs
Operations Corrective Action
Operations Rework and Repair Costs
Rework
Repair
Reinspection/Retest Costs
Extra Operations
Scrap Costs (Operations)
Downgraded End Product or Service
Internal Failure Labor losses
Other Internal Failure Costs

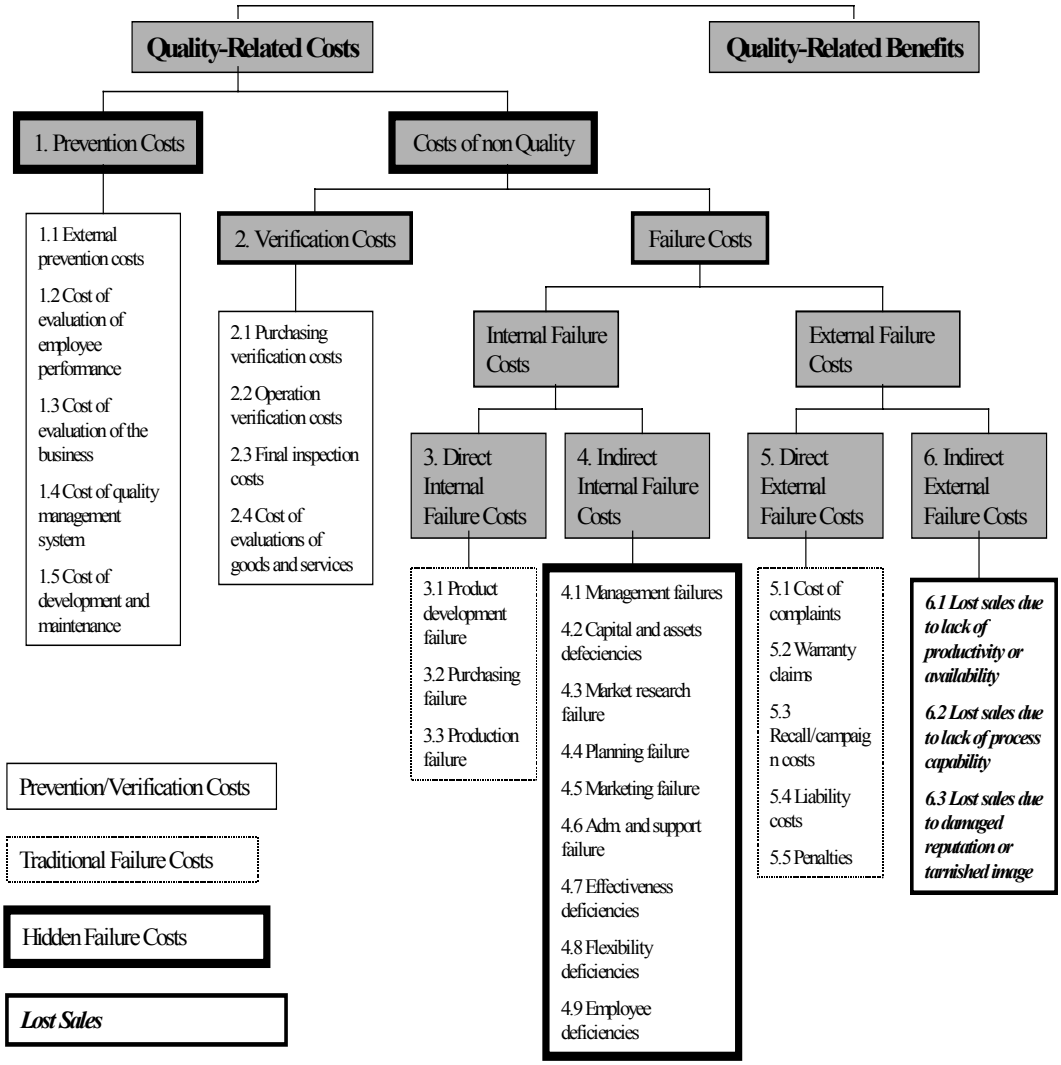
### EXTERNAL FAILURE COSTS

Complaint Investigations/Customer or User Service
Returned Goods
Retrofit Costs
Recall Costs
Warranty Claims
Liability Costs
Penalties
Customer/User Goodwill
Lost Sales
Other External Failure Costs

## Process structure of VBS



# Volvo Quality-Related Cost Model



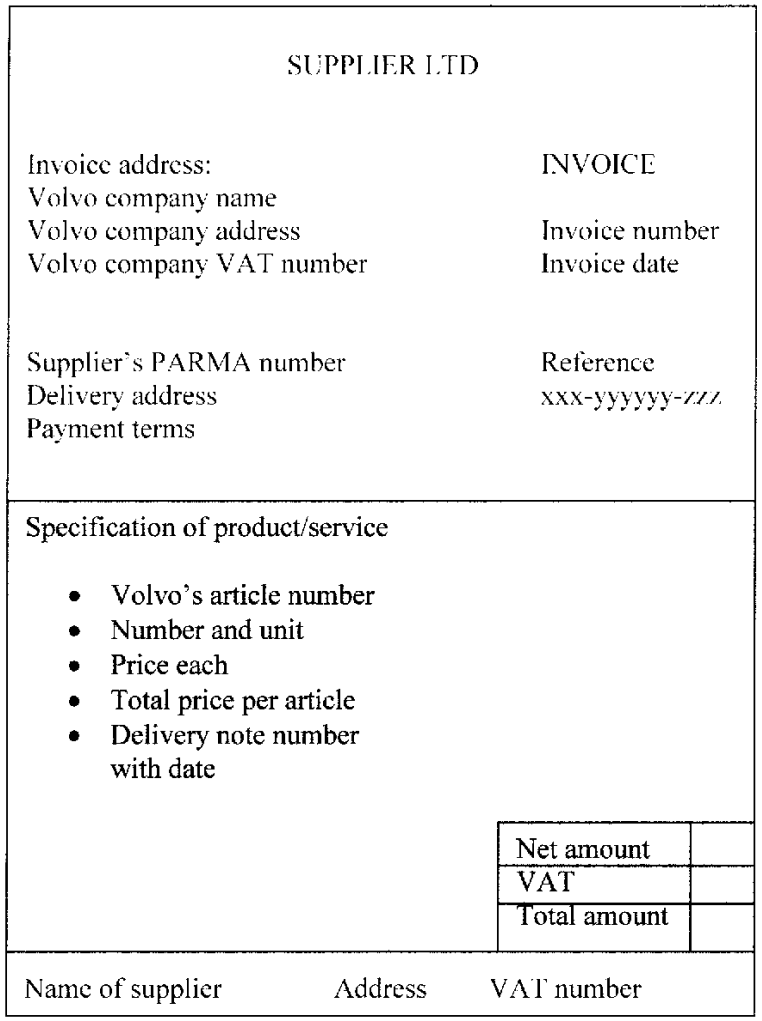
## Recommended invoice format

**To ensure an efficient handling, all invoices to Volvo should contain:**

- Invoice date
- Invoice number
- Invoice address
- The supplier's PARMA number
- Order number or reference (identification to person placing order)
- Supplier's address
- Delivery address (address of receiver)
- Payment terms
- Bank connection (bankgiro)
- Our VAT number
- Supplier's VAT number
- Specification of delivered goods
- VAT amount
- Currency
- Invoice's total amount

Invoices that for some reason miss any of the above items will be returned to supplier for completion. Missing information often lead to delayed payments, with payment reminders, and interest invoices.

Some of the information on the invoice must be included for legal reasons, e.g.The VAT number and the invoice address. Other information is needed for us To be able to process the invoice and send it to the correct invoice administrator.



SUPPLIER LTD

Invoice address:
Volvo company name
Volvo company address
Volvo company VAT number

INVOICE

Invoice number
Invoice date

Supplier's PARMA number
Delivery address
Payment terms

Reference
xxx-yyyyyy-zzz

Specification of product/service

- Volvo's article number
- Number and unit
- Price each
- Total price per article
- Delivery note number with date

| | |
|---|---|
| Net amount | |
| VAT | |
| Total amount | |

Name of supplier Address VAT number