Held & Francke

Cost calculation for a building project and the role of cost calculation in achieving competitive advantage

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It has been an exciting and interesting journey to write our thesis. First, we would like to thank Peter Lammerhuber, Albert Kufner and Christian Hieble at Held & Francke for taking the time to answer our questions. Without their help this thesis would not be possible. We would also like to thank our instructor, Fredrik Karlsson, for his valuable advice and support through this journey, and Rolf G Larsson for encouraging us to take on this subject.

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Summary

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Title: Held & Francke - Cost calculation for a building project and the role of cost calculation in achieving competitive advantage

Background: In the construction industry a company might be able to attain competitive advantages if it can develop an overall cost leadership and still maintain quality and service. In addition, the construction industry is characterized by a system that is much differentiated, fragmented and loosely. The short-term natures of construction projects also make integration difficult; additionally each construction project is unique. Hence, it becomes very hard to standardize the product or the working scheme in order to become even more cost and time efficient.

Purpose: The purpose is to gain a better understanding in how a construction company like Held & Francke calculate the price of an offer for a building project and what role cost calculation, in relation to quality and time, plays in achieving competitive advantage.

Method: Since the method of cost calculation only was investigated at one company we found it suitable for us to use a holistic single case study as the research strategy. The method used in this study is a qualitative research method since our empirical data, to a large extent, is based on interviews. Further, because our study is of a qualitative nature, we have chosen to perform semi-structured interviews.

Conclusions: After examining Held & Francke we found that they manage very well to use some of the theoretical methods for cost calculations. Their main method of calculation is ABC, where the project is broken down into smaller work steps. Cost calculation plays a large role as a competitive advantage for Held & Francke. Cost is the sole aspect where Held & Francke has full control and providing competitive project prices therefore becomes imperative in order to generate sales. With the focus on costs the cost calculation becomes an important role in achieving a competitive advantage.

Suggestions for future research: It would be interesting to study another construction company but in a different region, to see how they calculate cost and what role cost calculation plays in strategic decision process. It could also be interesting to choose an entire other industry to study the same problem. A last suggestion would be to further this research by studying Held & Francke in ten years or so, to see if their cost calculation methods and strategic decision process has changed.
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1. Introduction

In this chapter an introductory background to the topic of the thesis, discussion of the problem, as well as the research question is presented. It also includes aims and delimitations of the subject.

1.1 Background

In recent years consumers have become more and more demanding, wanting to pay as little as possible for the highest possible quality (Fawcett et al., 2000). In the construction industry customer satisfaction has become a vital issue (Forsythe, 2006). Thus, it is essential that the firms develop a competitive strategy in consideration of other firms in the same industry. A firm might be able to attain a competitive advantage if it can develop an overall cost leadership and still maintain quality and service (Beheshtii, 2004). According to Kaplan and Cooper (1998) cost reduction alone may not be enough to satisfy customers. Apart from lower prices customers also want higher value quality, responsiveness, and timeliness (Kaplan & Cooper, 1998). In the construction industry quality is directly connected to time and cost, and vice-versa. A project that is poorly quality managed can be the cause of the firm having to spend more time and money, and likewise, a poor time and cost controlled project can affect the quality (Abdul-Rahman, 1997). In the construction industry, time, quality and cost have been identified as the three vital factors for success (Shen & Walker, 2001). It is therefore essential for project managers to understand what the client requires when it comes to these three factors (Abdul-Rahman, 1997).

For many years criticism has been directed towards the construction industry for its slow adoption of new technology and new management methods (McGeorge & Palmer, 2002). In terms of the tools and methods to support the management of quality, these have not been so highly exposed in the construction industry as they have been in the manufacturing industry, where they have been successfully applied (Abdul-Rahman, 1997).

1.2 Problem Discussion

The construction industry is characterized by a system that is much differentiated, fragmented and loosely. The short-term natures of construction projects also make
integration difficult (Low & Peh, 1996). In addition, each construction project is unique (Kaka et al., 2003). Since every single project is unique it becomes very hard to standardize the product or the working scheme in order to become even more cost and time efficient. Unlike in the manufacturing industry where there are often repeated processes and products in large batches, the output from the construction industry are usually in single batches such as one building and one bridge etc. Although, there are some processes that are repeated from project to project, such as concreting and plastering, the specifics of application are never the same (Low & Peh, 1996). Moreover, construction projects are also often of high value and vital for the long-term success for both clients and for the construction firm (Ireland, 2004).

In most countries the construction industry represents one of the most significant parts of the economy (Toakley & Marosszeky, 2003). This makes it very interesting to see how a company in a construction industry works with their strategic cost management because cost information can play an important role in the formulation and communication of strategies, as well as the implementation of them. Furthermore, it can also support the development and implementation of controls to monitor the success of the implementation levels and thereby the success in achieving the strategic objectives (Govindarajan & Shank, 1992). Performance measurement gives the company direction on where they are going as well as where they are. It guides the company towards determined goals and helps discover problems. With measurement data obtained from different projects and through analysis a company can minimize the overall cost of quality to gain a competitive advantage (Willis & Willis, 1995). As an example cost information can help managers in the early stage of a construction project with preliminary or pre-design estimates because decision-making are based on such estimates. Reports have shown that the error of cost estimation at the early design stage may be as much as 20-40 per cent of the final cost (Li & Shen, 2005). According to Willis & Willis (1996) increasing costs are quite common in the construction industry, especially in regards of capital-intensive facilities like chemical processing plants.

In order to help management make decisions founded on vital and solid information it becomes crucial that the cost calculation system used within the company, from where the manager will receive much of his or her base for a decision, also is capable of gathering and translating the wishes and specifications of the client. Further, in order for firms to survive and grow it is also essential to achieve a decent profit and using
costing methods that achieve the best result (Esculier, 1997). With better costing comes a better managerial decision, as the awareness of the true costs increases. Therefore, managers can make wiser decisions regarding the limited resources (Snyder and Davenport, 1997).

The complex nature of the construction industry and the uniqueness of every project, which makes it hard to standardize work processes and products, is the reason for our fascination and the choice of writing this thesis within this subject area. In order to gain a deeper understanding about how the cost calculation of projects are done in a construction company and how complex this process really is in practice we have contacted a construction company, Held & Francke, who work and operate in Linz, Austria. Held & Francke is one of the core companies in the HABAU group. In Austria, the construction company HABAU is one of the largest companies in the construction industry (Eichelberg, 2005). The HABAU group is currently represented in 12 different countries in Europe (Company Profile). Throughout the whole HABAU Group, quality is a high priority. This has been documented by a number of certifications, awards and marks of quality. The main objectives are owner- or customer satisfaction, first-rate consultation from the beginning to the end and the perfect production of the construction elements when it comes to technical and quality terms (Eichelberg, 2005).

The background and the problem discussion lead us to the following research question:

*How does Held & Francke calculate the cost of an offer for a building project and what role does cost calculation play, in relation to quality and time, in achieving competitive advantage?*

**1.3 Purpose**

The purpose is to gain a better understanding in how a construction company like Held & Francke use the current method for calculating the price of an offer for a building project and what role it plays in achieving competitive advantage in relation to quality and time.
2. Method

In this part the methods underlying the empirical studies, as well as the choice of research approach and the process of data acquisition is presented. Further, interview approach, objectivity, validity and reliability of the thesis are discussed.

2.1 Introduction

Method is an instrument used to solve a problem and to raise new understanding within the subject (Holme & Solvang, 1997). The chosen method is a significant tool to answer the problem and to fulfil the purpose of the thesis (Patel & Tebelius, 1987).

2.2 The case study

Since we only intend to investigate the method of cost calculation at one company, Held & Francke, we find it suitable to use a case study as the research strategy. The purpose with our study is not to generalize the findings but to achieve a better understanding. Therefore, we believe the case study would be the best approach. By clearly stating that this is a case study, critics to this method will therefore also know that the findings in this study must not necessarily be applicable to other construction companies in Austria.

Given that the case study is appropriate as a research method when the purpose is to achieve a better understanding of a phenomenon it is a suitable method to use for this thesis. The context of a case study is to put focus on gaining insight, discovering and interpreting rather than testing hypotheses. In a case study the variables are usually many as opposed to surveys where few variables have been selected beforehand (Merriam, 1994).

Like other scientific method approaches, the case study has both advantages and disadvantages. The advantage lies in its ability to study complex phenomena in its many variables and thereby present a holistic view of the phenomenon (Merriam, 1994).

2.2.1 Case study design

For our case study we have chosen to undertake a holistic single case study. The study will only take place at Held & Francke in Linz. Since this company is not of a
large size we see no point in dividing the company into different areas of study and undertake an embedded case study. Further, we also believe that our choice of case, Held & Francke, is regarding their method of calculation, a typical representative of a construction firm in Austria. This also further emphasize that a single case study is the best approach.

2.2.1.1 Single and Multiple case studies

The single case study is appropriate to use when the study represents a critical case in order to test a theory. Further, a single case study is suitable when the case is extreme or unique but also if the case is the exact contrast, namely a representative or typical case. A multiple case study is often seen as a better source of evidence than the single case study. This has to do with the replication process that takes place during a multiple case study. Each hypothesis or area of investigation will be replicated a number of times in different cases, which will lead to a stronger basis for the findings (Yin, 2003).

![Diagram of Basic types of designs for case studies.](Yin, 2003, pp. 40.)

2.2.1.2 Holistic and embedded case studies

Regardless if performing a single or a multiple case study the study may contain several units of analyse. The investigator can for example choose to involve sub-units in the isolated field of study, thus making the study into an embedded case study. By examining the global nature of an organization or of a program the investigator performs a so-called holistic design. Both the embedded and the holistic case study can be in the form of single or multiple case studies (Yin, 2003).
2.3 Qualitative and Quantitative

The method that we will be using in this study is a qualitative research method since our empirical data, to a large extent, will be based on interviews. The interviews are based on questions prepared in advance. In addition, the interview subject will be given the opportunity to talk freely about topics not directly related to the specific questions. A free and open interview will also allow us to gather additional information that will supply a deeper understanding about the company of our choice and the way that they work.

When writing a thesis there are two options for how the information is measured and analysed: qualitative and quantitative research methods (Patel & Davidsson, 2003). Qualitative research method opposed to quantitative research method focuses on soft data. Soft data can be obtained through for example interviews (Backman, 1998). In the quantitative research approach statistical analysing methods are used. Information gathered in a quantitative research must be able to be quantified and statistics are often used as a tool for this method (Holme & Solvang, 1997).

There are four principles that describe the qualitative research method. First, it is distinguish by closeness to the subject being studied. Second, that the thesis gives a true and real picture of what occurred. Third, the thesis should consist of descriptions that are important for the understanding of what was studied. Fourth, the thesis ought to include direct quotes that demonstrate the individuals’ own way of expressing themselves (Holme & Solvang, 1997).

2.4 Research approach

For our thesis we have chosen to have an inductive approach. The choices of theories, the analysis and finally the conclusion will all be a result on the information found and gathered in the empirical part of this paper.

There are two approaches how to perform a research; an inductive model and a deductive model. The approaches describe different customs to transmit theory to empirical findings. When using an inductive model conclusions are made on basis of empirical data and theories are created based on knowledge from reality. The researcher starts with a number of separate cases and concludes if any apparent relation between the cases can be made. The deductive research approach centres on more rational conclu-
sions formed from existing theories. The deductive approach starts with a generally accepted rule and investigates if this general rule is valid within the cases that are examined (Alvesson, 1994).

2.5 Data collection

2.5.1 Secondary and primary data

Both primary and secondary data will be used for this study. Secondary data will be collected through the company’s website and through articles. Primary data will be collected through open questions in interviews with the personnel.

The data for this study can be divided into primary and secondary data. Secondary data are information that are already available and have been collected by others. Books, journal articles, online data sources, companies’ annual reports and governments are example of secondary data. Primary data are original data gathered for the purpose of the research. There are different ways to collect primary data such as observation, experiments, surveys (questionnaires) and interviews (Ghauri and Grønhaug, 2005).

2.5.2 Interviews

Since our study is of a qualitative nature we have chosen to perform semi-structured interviews. This allows us to set the topics we want to discuss beforehand but also allow the respondent not only to give us the answers needed to answer our research question but also to provide additional information of underlying causes relevant to the actual research question. If we already had all vital underlying information to the research question, structured interviews would be preferable.

As interview subjects we have chosen three key individuals within Held & Francke: Peter Lammerhuber, who is Head of Constructive Engineering, Albert Kufner, Project Calculator and Christian Hiebl, Construction Manager. The initial contact was made with Peter Lammerhuber who then recommended contacting Albert Kufner. Christian Hiebl was contacted on own initiative in order to give an additional perspective to cost calculation and project problems that may affect the cost calculations.
Interviews are often considered as the best method to collect data. There are different types of interviews. Structured interviews refer to the usage of a standard format with an emphasis on fixed response categories. In the unstructured interview, the respondent has more liberty to discuss reactions, opinions and behaviour of a certain issue. The interviewer’s job is merely to present lead questions and to record the information given in order to later understand ‘how’ and ‘why’. In unstructured interviews the questions and answers are not systematically coded beforehand (Ghauri and Grønhaug, 2005).

An exploratory research is more suited to use unstructured interviews, whereas in a descriptive research structured interviews are used more frequently (Saunders et al. 2007). In qualitative research the approach of interviewing tends to be less structured because in this form of research there is a stronger focus on interviewees’ own perspectives. The difference between qualitative interviewing and quantitative interviewing is that the interview reflects the researcher’s concerns in quantitative interviewing, whereas in qualitative interviewing the emphasis is on the interest of the interviewee’s point of view. Qualitative interviewing allows the interviewers to depart from the guide or schedule made beforehand. It allows them to ask follow-up questions to the interviewees’ answers and also the possibility to vary the order of questions and the wording of questions (Bryman & Bell, 2003). Thus, a qualitative interview has its advantage of letting the respondents in a higher degree control the course of the conversation (Holme & Solvang, 1997).

However, according to Jacobsen (2002) the qualitative interview should not be completely unstructured. There should be some form of interview guidance where the topics to be discussed should be set in advance (Ghauri and Grønhaug, 2005). This type of interview is referred to as a semi-structured interview. In the semi-structured interview the questions asked may not necessary follow the order in the interview guide. It also gives the interviewer the possibility to ask questions that are not included in the interview guide as the interview goes on and the interviewer picks up on things said by the interviewees (Bryman & Bell, 2003).

Moreover, in qualitative research it is often not important to have a statistical representative sampling but to achieve great degree of variation. The number of interviewees in qualitative research depends much on time, money and the research question.
According to Trost the number of interviewees should not be too high, possibly four, five or maybe eight. He argues that it is preferable with a small number of interviewees because of difficulties may arise in handling a high amount of data when conduction many interviews (Trost, 2005).

2.6 Sources of error

There are three criteria that designate how valuable the paper is and if the conclusions are trustworthy: reliability, validity and objectivity (Svenning, 2000).

2.6.1 Validity

_In order to reach a high level of validity we aim to allow the interview subjects to speak as freely as possible and we will also try not to ask questions that might influence the answer of the respondent. Giving the respondent the opportunity to speak freely will allow us to gather additional information of the surrounding causes relevant to our study that will lead to a high internal validity. Since we do not intend to replicate this study over time or on other similar companies it will be hard to determine the actual external validity of this case study. This still does not imply that the findings done in this case study are irrelevant for other similar studies. The findings may very well still have an importance as comparison material to future studies._

The connection between the theoretical framework and the empirical studies is the validity (Svenning, 2000). Validity concerns how well it measures what it aims to measure. When there is a lack of reliability there is also a lack of validity. However, a high degree of reliability does not necessarily result in a high validity. An investigation may lead to the same result during different periods but it may fail to investigate what it aimed to investigate (Bell, 2000).

2.6.1.1 Internal validity

Internal validity is only of interest when the investigator is conducting a causal or explanatory case study. For internal validity to be high it is imperative that the investigator examines all possibilities connected to the choice of object and see to it that nothing that influences the object is overseen (Yin, 2003).

As the authors of this study we have great freedom of action when it comes to the shape and the contents of the study. Further, as the interviewer we also have the
chance to influence the answers. The critics of the method used in this study means that the sensibility and integrity of the author could reduce the liability and the quality of the study research (Merriam, 1994).

2.6.1.2 External validity

External validity concerns whether the findings of a specific case study research can be used and applicable on other cases or situations. In other words, do the findings in one case study make it possible to draw conclusions on other similar situations? In order to know if the findings have an external validity the case study must be replicated a number of times on other cases (Yin, 2003). There are also other factors that have an effect on the external validity. Time validity is if results of the study at a point in time can be comprehensive to other periods of time. Population validity is if there are limitations on how accessible the object it (Ryan et al., 2002).

2.6.2 Reliability

To make sure that the reliability in this thesis is kept at a high standard we intend to thoroughly document when the interviews took place and who were interviewed, in order to allow for later research to interview the same subjects and reanalyse our investigation as systematically as possible. Further, since the interviews are conducted in a language where the interviewers are non-native the interview subjects will be given a chance to read through the empirical data in order to avoid misunderstandings and misinterpretations.

Reliability concerns on what level the research is free from accidental errors (Ryan et al., 2002). The reliability is high if an investigation leads to the same result under different periods of time but under the same circumstances (Bell, 2000). However, the findings from the conduction of non-standardized interviews may not be indented to be repeatable because they reflect reality at the moment they were collected, in a situation that may change over time. The strength from conducting non-standardized interviews derives from the flexibility to explore the complexity of an issue. Therefore it is not realistic or feasible to make the qualitative, non-standardized research replicable without undermining the value of this form of research. Although, when using this approach, it is essential to retain and make notes in relation to the research design, the reasons behind the choice of strategy and methods, and the collected data. This will enable other researchers to understand the method that was used and the findings
derived from them where appropriate, in order to reanalyse the data (Saunders et al., 2007).

2.6.3 Objectivity

In this thesis the authors has attempted to be as objective as possible. In order to secure objectivity when collecting information we have used a number of different sources. In the interviews, the questions asked were formulated so that personal values and guiding of answers were avoided. By being three people with different personal values writing this thesis, we also believe it is easier for us to stay objective.

Personal principles, standards and morals will affect us as authors of the research procedure. Each person is to some degree subjective and consequently it is not achievable to be completely objective. It is important that we attempt to reach a limited objectivity which can be achieved with keeping the problem significant, likelihood in the conclusions and by staying neutral in the analysis (Ryan, 2002).

2.6.4 Criticism of the Sources

For this thesis we have used both primary and secondary sources. To attain a high credibility it is vital to identify when the information was published and for what reason (Patel & Davidsson, 2003). The primary source of information in this thesis is represented by our own interviews. The secondary sources used were mainly articles that are scholarly, reliable and independent. All the sources used in this study are considered related to the subject. The authors attempted to refer to the sources in a rightful way. The results and the analysis will by all means be influenced by the knowledge of the authors.
3. Theory

In this chapter the theoretical framework will be outlined. Theories including cost management and quality performance management system will be discussed.

3.1 Cost management

The purpose of a cost management system is to support a firm in maximizing its profit, both in the present and for the future. Cost management is not a well-defined term. On one hand it is based on both cost accounting and management accounting, on the other hand it goes beyond them both (Agrawal & Mehra, 1998). Brinker (1996) defines cost management as “a set of techniques and methods for controlling and improving a company’s activities and processes, its products and services” (cited in Agrawal & Mehra, 1998, pp. 60).

The construction industry is mainly focused on one-off projects, which makes it difficult for effective management control. However, despite the irregular nature of construction projects, it is still necessary to monitor and control production costs if the planned level of profit is to be realized (Harris et al., 2006).

According to Harris et al. cost control is an obvious objective of most managers, although it is essential to keep in mind that no amount of paperwork achieves this control, they only provide information on what actions should be taken. It is the decisions that the manager makes based on that something can be improved, and the implementation of that decision, that achieves control (Harris et al., 2006).

3.1.1 Target costing

The idea of target costing was invented 1965 by Toyota (Gagne & Discenza, 1995). Target costing differs from other costing systems like absorption costing, marginal costing and activity-based costing (Everaert et al., 2006). According to Ansari & Bell (1997) a target cost is “the allowable amount of cost that can be incurred on a product and still earn the required profit from that product.” (Ansari & Bell, 1997, pp. 2). Target costing is a costing system that is market-driven, costs targets are calculated by the consideration of customer requirements and competitive offerings (Ansari & Bell, 1997). Target costing is more dynamic than traditional cost management methods,
continuously pushing for improvement (Gagne et al., 1995). Cost targets are attained by a focus on both product and process design and by continuously improving the support processes (Ansari & Bell, 1997). With target costing companies can prevent costs during the design stage instead of reducing costs after they have occurred. It also force managers to determine on the features, quality and time issues on an early stage and to balance cost and features against what customers are willing to pay for them (Everaert et al., 2006).

The main steps in implementing target costing are shown in figure 2. The first two steps in implementing target costing are to establish a target profit for the product and then determine the target cost. This is done by estimating total sales revenue and then by subtracting the desired profit from the total sales revenue. The following step is to perform functional cost analysis, which is strongly linked to value engineering. Functional analysis is a type of cost management system that looks more deeply into the functions of each product. These functions then become the set of cost objectives that the costing system is based upon. The next step is to determine the cost estimate. This is when the actual manufacturing cost is compared to the target cost of each product’s functions. If they are the same, the next step is to make the final decision. However, if the cost estimate exceed the target cost, functional cost analysis has to be performed again.
to bring the estimated cost to its target cost. Once the cost estimate equals the target cost, the final decision is made, based on manufacturing feasibility, market needs and consumer acceptability, whether to introduce the product or not. If the answer is yes, manufacturing can proceed with production (Gagne et al., 1995).

### 3.1.2 Activity-based costing

In the early 1980s, scholars began to challenge the traditional costing way of using information and the way it was calculated. As a consequence, new approaches to cost information were developed and the concept *Activity-Based Costing*, or *ABC* was born (Hicks, 1999).

Activity-based costing can be defined as the gathering of financial and operational performance information of the activities in the business. It is a concept based on the idea that costs are created through an organization’s activities. In the activity-based costing, allocation of costs is based on the activities that drive costs (Lockamy III, 2003; Kaplan & Cooper, 1998). The purpose of activity-based costing is to provide usable cost information that in an accurate way shows the cause-and-effect relationships between costs, activities, and product or services. Moreover, with activity-based costing, a firm can acquire accurate and relevant cost information to support the decision-making (Hicks, 1999). Kaplan & Cooper describe activity-based cost systems as systems that “establish priorities for process improvement activities and help managers make strategic decisions” (Kaplan & Cooper, 1998, pp.19).

According to Hicks (1999) there are five critical points that must be understood if activity-based costing is to have “business utility”. The first point is that activity-based costing is a concept. The basis of this concept is that firm’s outputs create a need for operating, management, and administrative activities, and that they in turn, makes it necessary for costs to occur in providing these activities (Hicks, 1999).

The second point is that activity-based costing forms the basis for an economic model. Models are simplifications of a more complex reality. Although, the purpose of the models are to illustrate a real-life phenomenon it is necessary with some degree of simplification in order for the model to be easily understood and used. Economic models reflecting a firm’s cost behaviour are simplified versions of what will occur under the firm’s real-life conditions (Hicks, 1999). It is according to Hicks (1999)
highly important to understand that models can be formed in many different ways and that what will work for one firm might be completely unsuitable for another.

The third point is the necessity of accurate cost information. The cost information provided by activity-based costing must be accurate. Accurate here means that cost information reflect reality so closely that it will not lead the management into making a bad decision. Accurate cost information means that the information is free from error or mistake. However, a firm should not strive for perfection in cost information because the nature of cost measurement and behaviour makes it impossible (Hicks, 1999).

The forth point is the necessity of relevance of cost information. It is not enough with accurate cost information; the information must also be relevant. Different types of cost information are needed for different purposes. It is vital that costs are identified, defined, and calculated in relation to its purpose. Depending on what type of information the decision maker needs, it is sometimes more appropriate to use absorbed costs and sometimes incremental costs. Some decisions should also be based on historical accounting while others are better to be based on future accounting or cash costs (Hicks, 1999).

The fifth and last point refers to the necessity of cost information supporting all types of management decisions. Numerous firms focus their costing efforts too much on calculating the “fully absorbed” unit costs of their output (such as product and services). Although this type of cost information is important, other decisions might require different types of cost information, and should not be overlooked (Hicks, 1999).

In comparison to traditional costing systems, activity-based costing has the advantage of embedding the need of managing an increasing variety of products, services, and customers on an internationally expanding scale and also serving as a way to control costs combined with function as a tool for the decision-making (Beheshti, 2004). Moreover, activity-based costing provides insight that help dissolving the traditional boundaries existing within the organization. When aggregating cost information across departments, it presents decision makers with a wider picture of how resources are allocated and thereby allows for a deeper understanding of how resources are leveraged producing certain outcomes (Driver, 2001).
The popularity of activity-based costing derives from the failure of traditional costing systems to provide the right type of information to support a company in making the necessary decisions to be competitive. In activity-based costing costs are directly connected to activities. To be able to control the costs the activities must also be controlled. These cost activities are referred to as cost drivers. Activity-based costing is commonly referred to as activity-based management because of its ability to provide managers with the understanding of how changes in cost drivers effects overall costs and thereby make it possible for managers to maintain better control of the costs. The advantage of allowing managers to analyse cost more precisely has made other non-manufacturing functions adopt activity-based costing as well (Willis & Willis, 1995).

The combination of activity-based costing and activity-based management has been identified as activity-based cost management. According to Beheshti (2004), activity-based cost management can help the firm in increasing value to the firm’s core activities and thereby increase the firms’ competitive advantage. The system allows managers to gain a strategic view of the activities that are important to the competitive nature of the firm (Beheshti, 2004).

According to Beheshti (2004) one way to gain competitive advantage is by developing an overall cost leadership without neglecting quality and service. However, in order to develop a cost leadership it is essential for the firm to examine their internal processes and to have accurate cost information. Since the focus of activity-based cost management lies in eliminating and reducing low value-adding costs, finding the root cause of a problem and fixing it, and introducing effectiveness as well as efficiency, can help a firm in obtaining cost leadership, thus also achieving a competitive advantage (Beheshti, 2004).

Nevertheless, activity-based costing is also seen as a powerful tool for total quality management (Willis & Willis, 1995). The main concept with activity-based cost management is that costs are caused by activities, therefore managers must first understand the activities involved in a process before they can understand the reasons that costs are generated. The activity-based cost management system enables the identification of the cause and effect relationships between the elements of the system. When activity-based cost management is linked to quality improvement efforts, the costs of
quality in the firm can be measured and performance indicators can be developed. Quality improvements are of high value since it is crucial with continuously improvement in order to maintain competitive advantage (Beheshti, 2004).

3.2 Quality performance management system

As stated in the background, quality has been identified as one of three vital factors for success in the construction industry (Shen & Walker, 2001) and is directly connected to time and cost. A project that is poorly quality managed can be the cause of the firm having to spend more time and money, and likewise, a poor time and cost controlled project can affect the quality (Abdul-Rahman, 1997). In the construction industry, QPMS (quality performance management system) is used as a version of activity-based cost-of-quality report. QPMS was developed by the Construction Industry Institute (CII) and introduced in 1990. It was later modified to its current form in 1993. The purpose of a quality management system is to achieve objectives such as meeting or exceeding customer expectations while minimizing costs. In addition to help minimizing costs, QPMS also brings an awareness and understanding of the whole quality process. It provides long-term benefits such as the awareness of how to use prevention and appraisal activities that will improve the quality efforts of the entire project. With QPMS the management can identify and control quality activities. Furthermore, QPMS help identifying the causes of the deviation corrections and thus help reducing them on future projects. Another benefit is providing the necessary information to evaluate performance against competitors (Willis & Willis, 1995).

3.2.1 Definition of quality

Quality can be defined in several ways. Manufacturing-based definition of quality is the ability to meet requirements or specification. This measure is objective because it focuses completely on the ability of the product or service to conform to predefined specification or standard. An example of this type of measure is the percentage of construction projects completed on time. The problem with these forms of measures is that they do not indicate if what is measured is in fact what the customers wants and is willing to pay for (McGeorge & Palmer, 2002).

Other definitions of quality are product-based definitions. These are also objective since they are based on measures of specific attributes of a product such as durability, maintenance etc. A product could for example be considered to have better quality
compared to another because it lasts longer and need less maintenance (McGeorge & Palmer, 2002).

Third forms of definition of quality are user-based definitions. In contrary to the other two definitions of quality, these definitions are subjective. They evaluate quality on the basis of to which extent a product satisfies the user (McGeorge & Palmer, 2002).

Finally, definitions of quality can also be value-based. These definitions often include one of the measures of quality mentioned above but in the context of cost. As example, a product might be considered to have better quality because of longer durability but have a higher cost than those products with shorter durability (McGeorge & Palmer, 2002). The ‘best buy’ approach to quality is according to McGeorge & Palmer (2002) the one frequently used by consumer magazines.

In a construction organization all of the above specified definitions have a role to play. McGeorge & Palmer states this as: “a good construction project will conform to specification and satisfy the user with given levels of quality of the attributes required at the desired price.” (McGeorge & Palmer, 2002, pp.161).

### 3.2.2 Quality costs

Quality costs can be grouped into three major categories: prevention costs, appraisal costs and failure costs. Prevention costs include all the costs of the activities connected to the controlling and planning of a quality assurance program and system. The aim is to prevent defects from occurring by making sure that organizational quality or standards and customer satisfaction are met. Different types of prevention costs are costs related to quality control engineering, employer training, supplier system evaluations and equipment maintenance (Willis & Willis, 1995).

Appraisal costs are costs associated with the activities that are necessary to set the actual level of quality achieved in relation to the levels of organizational standards and customer satisfaction desired. These types of costs include inspection, testing and supplier surveillance. In the construction industry, appraisal and prevention costs are all the actions are taken in order to make sure that requirements are met (Willis & Willis, 1995).
Failure costs are costs that occur when the company has to correct products or services that have failed to meet customer expectation or quality specifications of the company. There is usually a distinction made between internal and external failure costs. Internal failure costs are costs that are directly connected to and a result of unsatisfactory quality that is discovered before the actual delivery to the customer has been made. These internal failure costs are scrap rework, retesting, and the time spent on deciding on the right and appropriate action. External failure costs on the other hand, are costs that occur when poor quality is found after the delivery already had been made to the customer. Such costs could come from material returns and repair, field activity costs and warranty replacement (Willis & Willis, 1995).

These three groups of quality costs can help quantifying the management viewpoint on quality. It is essential to understand how the management views the costs of quality and how quality is defined, because the management’s strategy on quality depends on this. Managers who regard costs imposed on the customer as costs to the firm will make different decisions on quality management than those who does not (Balachandran & Srinidhi, 1996).

Moreover, it is claimed that quality costs can constitute from 8-15 percent of the total construction costs. Various studies have also shown that more than 25 percent of the costs can be reduced from a lot of constructed facilities by using a good quality program. Knowing where and how quality costs occur is therefore important in order for actions to be taken to prevent them from being repeated and hence reducing the construction costs. This will benefit contractors as well as clients and end-users. A study in Australia of construction projects showed that through spending 1 percent more in prevention costs, it could bring down the failure costs from 10 percent of construction costs to 2 percent (Low & Yeo, 1998).

According to Hagan (1986) it is important to know the quality costs and he states that: “The inter-relationship of quality, schedule and cost, without attention to the contrary, is likely to be unbalanced in favour of schedule and costs – and often unwittingly at the expense of quality. This imbalance will continue to exist as long as the real cost of quality remains hidden among total costs. In fact, such a condition can easily set the stage for even greater imbalances. True cost of quality, when remaining hidden, can
grow to a magnitude of such an extent that it can significantly affect a company’s competitive position.” (cited in Low & Yeo, 1998, pp.332).

Moreover, Low & Yeo (1998) states that there is an inter-relationship between quality, cost and schedule as shown in the figure below.

![Figure 3. Inter-relationship between cost, quality and schedule. (Low & Yeo, 1998, pp. 332).](image)

The need to measure quality costs lies in its ability to help reveal quirks and abnormality in cost allocation and standard which may not be detected by the more frequently used production/operation and labour-based analyses. The benefits from using quality cost information have been discussed by many authors. Some benefits are that it can alert managers of the possible impact of poor quality on a firm’s financial performance, and help managers to determine the activities that are more strongly focused on reducing quality costs and prioritizing quality improvement activities. Another potential benefit is that it can help promote the concept that quality is everyone’s responsibility. Quality costs bring out the awareness of the importance of product and service quality to the firm’s well being and thereby help affect the employee’s behaviour and attitude towards total quality management and continuous improvements. In addition, quality cost information allows activities related to quality to be formulated in the language of management, i.e. monetary terms (Low & Yeo, 1998).

Quality cost information need to be collected in order to be useful. The main purpose of using a quality cost system is that traditional accounting practices fail to measure quality costs directly. Although traditional accounting system has the ability to meas-
ure all construction costs, it does not separate quality costs from the accounts for assessment. It has been stated that many costs related to quality have not been so palpable on normal financial reports. The main reason for this is that most accounting systems are not built to identify those (Low & Yeo, 1998).

### 3.3 TQM in construction projects

In the manufacturing industry the concept of total quality management (TQM) is not something new, it is widely known that the industry has well-instituted quality systems. In the construction industry however, the tools to implement TQM can be difficult to apply because of the complex nature of customers’ requirements and uncertain expectations. Additionally, construction work is usually undertaken in single batches or projects, unlike in the manufacturing industry where repeated processes with products mainly produced in large batches are more common. Within the construction industry there are various different specialists such as surveyors, contractors and engineers, who all have their special technical skills and their own special way of doing things. This may also affect the building process either individually or collectively (Low & Peh, 1996).

Quality in construction projects involves a process in which a key aspect to success is continuous improvement. A major challenge is the implementation of improved quality processes into the subcontractors work. Subcontractors and their workers have an important role in the quality process initiated by the main contractor. The subcontractors are the ones who actually perform the on-site work. By making subcontractors understand the importance of TQM and that it is for their own best interest as well as for the main contractor’s, it is possible for them both to achieve cost savings in the construction project and thereby increase profits (Low & Peh, 1996).

The TQM concept focuses on processes rather than on results because the results are likely follow if the processes are performed correctly. TQM can help an organization to become more competitive. It improves the quality by getting managers and employees involved in identifying and solving work problems. Moreover, it has a prevention-based approach that heightens organizational strength as well as improving morale and productivity. The entire construction industry is project oriented; therefore improved quality performance must also be project-oriented and involve the whole project team. All the key people involved with the project – the main contractor, sub-
contractors, suppliers, designers, project managers and the clients, must be a part in the process (Low & Peh, 1996).

A tool used in the development of TQM is a cause and effect diagram, which functions as a way of identifying the potential causes of problems. The following figure present a simple example of a cause and effect diagram for material-related delays (Harris et al., 2006).

![Cause and Effect Diagram](image)

Figure 4. A cause and effect diagram for managing materials-related quality. (Harris et al., 2006 pp.21)

### 3.4 JIT in construction projects

The Just-In-Time (JIT) concept has its origin in the manufacturing industry (Low & Chuan, 2001). Both JIT and TQM have been recognized by organizations around the world as useful strategies in improving competitiveness (Vuppalapati et al., 1995) JIT helps improving the production process by handling materials more efficiently, i.e. by delivering the right materials, in the right quantities and quality, exactly when it is needed in the production. The manufacturing sector differs a great deal from the construction industry. Repeated production of standardized products and the extensive use of automation and mechanization are typical for the manufacturing setting, whereas the greater part of construction work is done on site. Labour and processes are subject to changes in weather, and the environment where the construction work takes place makes mechanization difficult. Hence, the different conditions between the manufacturing and construction industry demand modifications to some of the JIT principles in order to suit the construction setting (Low & Chuan, 2001).
Nevertheless, a report in Denmark has shown that productivity increased with 10 per cent in the first phase of a social housing project that practiced JIT principles in building logistics and an average 7 per cent in the second phase of the project. Additionally, construction time was reduced by 10-15 per cent and the amounts of errors were less frequent (Low & Chuan, 2001).

One of the key principles to JIT is the focus on a pull system, i.e. the materials are pulled by the demand side. Moreover, it also focuses on the elimination of waste. If something does not add value it should be eliminated. An example of this is reducing the inventory because it does not add any value; instead it takes up space, binds capital and creates storage costs. Another example is the waste of time spent on waiting, inspecting and correcting defects. Therefore, according to the JIT concept, it is important to do things right the first time. It is also essential within this concept that the delivered material, good or product is of high quality. Poor quality and materials that has to be rejected due to defects disrupt the entire production workflow and schedule, diminishing any savings and productivity gains made (Low & Chuan, 2001).

### 3.5 Earned value management

Earned Value Management connects schedule, scope and cost into one measure. Schedule, scope and cost are the three key areas to focus performance on in order to be able to evaluate the success of a construction project. Earned Value Management help provide managers with answers on questions such as if they are overspending despite being on schedule, if they are accomplishing enough of the scope even when being under budget, how much more the project will cost than what was originally estimated, and how much they at present expect the total project to cost (Alvarado et al., 2004). The author argues that Earned Value Management is an effective tool for the management of a single construction project or a group of projects, because it embeds scope, schedule and budget (Alvarado et al., 2004).

According to Alvarado et al. (2004) traditional project cost analysis may be misleading. Planned value and actual cost are according to the authors not enough to evaluate performance, as is shown in the figure below. Planned value refers to the planned amount of work or project scope that was to be accomplished as a function of time. The planned value curve should be determined before the project begins. Actual cost is defined as the amount of effort or funding that actually has been spent so far in the project. As shown in the figure, planned value is higher than the actual cost at time $t^*$,
which may lead managers to think that the project is doing well, when in reality the project is behind schedule. Although the project is spending its funding it does not automatically mean that the objectives are attained (Alvarado et al., 2004).

Figure 5. Earned value management analysis. (Alvarado et al., 2004, pp.96.)

By adding a new parameter, such as earned value or how much of project scope that has been performed to date, it is possible to determine how well the project is performing without ambiguity. As seen in the figure, the earned value curve shows that the project is running behind schedule – at time $t^*$ earned value is still less than planned value, meaning that what was originally planned has not yet been accomplished. The ideal situation would be when the earned value curve lies above both the actual cost and planned value curves. From the discussion it becomes obvious that earned value is an important part of project performance management (Alvarado et al., 2004).

### 3.6 Summary and linkage between the different theories

As stated earlier there is an inter-relationship between quality, cost and schedule (Low & Yeo, 1998). The way a company works with their cost management is therefore linked to the quality and time aspect. As an example a costing method such as activity-based costing is seen as a powerful tool for TQM (Willis & Willis, 1995). Moreover, when activity-based cost management is linked to quality improvement efforts, the costs of quality can be measured and performance indicators can be developed (Beheshti, 2004). In target costing managers are forced to determine quality and time
issues on an early stage and to balance cost and features against what customers are willing to pay (Everaert et al., 2006).

An additional system that has a strong focus on costs and quality is QPMS. QPMS helps reducing costs and provides long-term benefits such as the awareness of how to use prevention and appraisal activities in order to improve the quality efforts of the entire project (Willis & Willis, 1995). Both quality and cost are vital factors for success in the construction industry (Shen & Walker, 2001) and can support the company in gaining a competitive advantage. The competitive advantage can, according to Beheshti (2004), be obtained when a company develops an overall cost leadership without neglecting quality and service.

Moreover, Beheshti (2004) argues that activity-based cost management can provide a company with the means to obtain cost leadership because of its focus on eliminating and reducing low value-adding costs. This is highly compatible with one of the main ideas of JIT: to eliminate everything that does not add any value (Low & Chuan, 2001). Furthermore, JIT is also connected to the quality aspect. According to Low & Chuan (2001) it is important within this concept to do things right the first time and that what is being delivered have an enough good quality for use. Poor quality disrupts the entire production workflow and schedule, diminishing any savings and productivity gains made (Low & Chuan, 2001).

Another concept focusing on time and cost is earned value management. It connects schedule, scope and cost into one measure. According to Alvarado et al. (2004) schedule, scope and cost are the three key areas to focus performance in for evaluating the success of a construction project.
4. Empirical studies

In this chapter the empirical findings from the case study of Held & Francke will be presented. The empirical data was gathered through interviews between February and May of 2007.

4.1 Introduction to Held & Francke
Held & Francke was founded in 1961 and operated as an independent company until it was acquired by HABAU in 2001. The HABAU group is currently represented in 12 different countries in Europe. Together all branch offices employed 2797 people, and had a turnover of 295.224.000 € in 2005 (Company Profile). HABAU pursues a common goal across Europe: “To offer the best available quality in building, civil, pipeline and prefabricated construction sectors at competitive prices” (http://www.habau.at/international/unternehmensgruppe/index.html).

Held & Francke is HABAU:s main representative in Austria and employed 950 people and had a turnover of 155 Million euros in 2006 (Interview 2007-04-24, Hiebl). Of this turnover five major customers; ÖBB, a railway company controlling the majority of the rail related traffic of people and goods in Austria, ASFINAC, a company in charge of the construction and maintenance of the Austrian fast traffic net, the City Administration Linz, the Government and different Local Communities make up for 80 to 90 percent of the total annual turnover of Held & Francke (Interview 2007-03-09, Lammerhuber).

Held & Francke is divided into four different construction areas;

- Hochbau, “High construction” i.e. structures constructed above earth surface.
- Tiefbau, “Deep construction” i.e. structures constructed below earth surface.
- Fertigteilbau, “Pre fabricated building parts“, Walls, Clinker roofs etc.
- Pipelinebau, “Pipeline construction”, Pipelines, Pump stations, Irrigation systems etc. (http://www.h-f.at/leistungsspektrum/index.html)
4.2 Cost and cost calculation

In Austria the organisation that is responsible for creating and updating the guidelines and instructions for street and traffic construction is the FSV - Forschungsgemeinschaft Straße und Verkehr - "Austrian Society for the Research on Road - Rail - Transport" (www.fsv.at).

The three main objectives of the FSV are:

- The creation and publication of guidelines, instructions and explanations
- The execution of lectures, seminars and congresses
- Information exchange on national and international level (www.fsv.at).

In the process of setting norms, creating guidelines and instructions for the planning, construction and execution of building projects in Austria, the FSV compiles this information into something called the RVS (Richtlinien und Vorschriften für den Straßenbau), translation “Guidelines and instructions for road construction”. The RVS includes street and traffic planning, street equipment, tunnel constructions, legal regulations from initiation to finish of a project and also technical contract requirements. A part of the technical contract requirements also includes how the financial planning of a project is to be carried out. These guidelines have lead to a standard for cost calculation (www.fsv.at). The creation of this standard has shaped the way that the construction industry in Austria operates. Many of the customers and construction companies use this standard. This is also the case with the five major customers of Held & Francke (see Introduction to the Held & Francke). Since Held & Frackes largest customers use this standard, the company has little choice when it comes to planning and cost calculation and is therefore forced to perform their cost calculation and project planning according to the FSV (Interview 2007-03-09, Kufner). How Held and Francke perform a cost calculation using the RSV in an actual construction project will be illustrated in an example given below (2006-01-12 Project Umfahrung Lasberg).
<table>
<thead>
<tr>
<th>Position Number</th>
<th>Entry / Operations name</th>
<th>Calculation</th>
<th>Volume</th>
<th>Price / Unit</th>
<th>Salary (EUR)</th>
<th>Other (EUR)</th>
<th>Standard Price</th>
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<td>1 087,56</td>
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<td>623,916</td>
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<td>1,99</td>
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</tr>
<tr>
<td>20410100</td>
<td>Horizontal C &amp; S Support Price per m3</td>
<td>0,9136 h</td>
<td>45,32</td>
<td>90,65</td>
<td>86,42</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50,0 m3</td>
<td>75,0 h</td>
<td>2 265,75</td>
<td>4 532,49</td>
<td>6 798,24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>207231</td>
<td>Road / Surface Work</td>
<td>204,00</td>
<td>m2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN01E</td>
<td>Worker Payment</td>
<td>23,0 EUR</td>
<td>1,06</td>
<td>24,38</td>
<td>24,38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN03E</td>
<td>Other</td>
<td>22,0 EUR</td>
<td>1,06</td>
<td>23,32</td>
<td>23,32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20410100</td>
<td>Road / Surface work Price per m2</td>
<td>24,38</td>
<td>23,32</td>
<td>47,70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>204,0 m3</td>
<td>4 973,52</td>
<td>4 757,28</td>
<td>9 730,80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>210222</td>
<td>Steel Railings with Anchorage</td>
<td>170,00</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LP33E</td>
<td>Specialist worker payment</td>
<td>181,6 EUR</td>
<td>1,06</td>
<td>192,50</td>
<td>192,50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LP34E</td>
<td>Railings, other</td>
<td>166,3 EUR</td>
<td>1,06</td>
<td>176,28</td>
<td>176,28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>210222</td>
<td>Steel Railings with Anchorage Fix price / m</td>
<td>192,50</td>
<td>176,28</td>
<td>368,77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>170,0 m3</td>
<td>32 724,3</td>
<td>35 960,7</td>
<td>68 685,03</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1 Example of cost calculation based on Project Umfahrung Lasberg
After a first overview of this example it becomes clear that the system builds on activity-based costing. If we examine “206120 Horizontal Concrete and Steel Support” a bit closer it reveals that this isolated part of the project requires several different objects in order to be executed (2006-01-12 Project Umfahrung Lasberg).

### Table 2 Horizontal Concrete and Steel Support calculation based on Project Umfahrung Lasberg

<table>
<thead>
<tr>
<th>206120</th>
<th>Horizontal Concrete and Steel Support</th>
<th>50,00</th>
<th>m3</th>
<th>45,32</th>
</tr>
</thead>
<tbody>
<tr>
<td>L28</td>
<td>Bridge workers payment</td>
<td>1,5 h</td>
<td>30,21</td>
<td></td>
</tr>
<tr>
<td>M62001</td>
<td>Formwork carrier H 20 P</td>
<td>0,013333 m</td>
<td>8,76</td>
<td>0,12</td>
</tr>
<tr>
<td>M61101</td>
<td>Formwork plate 27 mm</td>
<td>0,2 m2</td>
<td>17,15</td>
<td>3,43</td>
</tr>
<tr>
<td>M62999E</td>
<td>Formwork general</td>
<td>0,75 EUR</td>
<td>1,06</td>
<td>0,80</td>
</tr>
<tr>
<td>M09074230301030</td>
<td>Concrete</td>
<td>1,0 m3</td>
<td>86,42</td>
<td>86,42</td>
</tr>
<tr>
<td>20410100</td>
<td>Horizontal C &amp; S Support</td>
<td>Price per m3</td>
<td>1,5 h</td>
<td>45,32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50,0 m3</td>
<td>75,0 h</td>
<td>2,265,75</td>
</tr>
</tbody>
</table>

All the costs of the different objects, such as bridge workers, formwork carrier, plates and general and the concrete are defined by an amount of a required unit for each object. In this case the units are hours, meters, square meters, euros and cubic meters (2006-01-12 Project Umfahrung Lasberg).

Attached to each specific unit a price can be found which through a simple calculation (required amount of unit x price) leads to a total cost of the specific object. For example, a bridge worker requires 1,5 hours to finish this part of the project and costs 30,21 € / hour. The total cost for the bridge workers will therefore be 1,5 x 30,21 = 45,32 €. Adding the costs of all specific objects together gives a total cost for the isolated part of the project (2006-01-12 Project Umfahrung Lasberg).

### 4.2.1 The Project Plan and ABC

It has been shown in chapter 4.2 that activity-based costing is the major cost calculating system used by Held & Francke. The reason for Held & Francke using this type of cost calculation system for building projects has to do with the demands and specification of their clients. Below a more detailed discussion to this reasoning is given (Interview 2007-03-09, Kufner).

Generally the building projects from a client can come in three different forms regarding the level of detail and specifications (Interview 2007-03-09, Kufner);

- **Case 1.** A highly detailed project plan with blueprints and a suggested cost for every step and detail of the project (Interview 2007-03-09, Kufner).
• **Case 2.** A less detailed project plan with blueprints, with or without suggested cost per step and detail of the project but with a set price for the project as a whole (Interview 2007-03-09, Kufner).

• **Case 3.** A rough plan or an idea of a project where Held & Francke will project and execute the project from start to finish. In these projects the client generally has a set maximum cost for the project as a whole (Interview 2007-03-09, Kufner).

A highly detailed project plan means for Held & Francke that they only have to fill in their costs for material, machines and work at the already calculated cost positions within the project and give a total price suggestion. These types of project plans normally follow a regulated standard or norm by the FSV, which gives little or no room for changes. The client in these cases is generally one of the five larger customers (see “Introduction to the company”) who make out 80 – 90 % of the total revenue of Held & Francke (Interview 2007-03-09, Kufner).

A less detailed plan will either follow one of the regulated standards or norms, or will be the creation of the client himself. In most cases it follows a regulated standard or norm but may very well be in the form of activity-based costing or even as a written specification of what the customer would like to have and which type of requirements the projects is to uphold (Interview 2007-03-09, Kufner).

The last and final form of a building project is the rough plan or idea. In these cases the client is most often a private person and the project only makes up for a very small part of the total revenue per year for the company. Such projects may be to plaster a driveway, to build a garage or construct a house. There may or may not exist a blueprint and in most cases no cost calculation is made in advance (Interview 2007-03-09, Kufner).

Regardless of how pre-planned and pre-calculated the project is by the client, Held & Francke will still in the end calculate it with help of activity-based costing. In case 1 and 2 it is in most of the cases regulated and Held and Francke will therefore follow this regulation or norm already made by the client. When the project plan is either
case 2 or 3 with written specifications without prior cost calculations Held & Francke will do the cost calculation for the project by themselves. Also in these cases activity-based costing is used and most times the existing rules and norms used in case 1 are followed since the employees in the company are so used to working in this type of manner (Interview 2007-03-09, Kufner).

4.2.2 Lowering Project Costs using Target Costing
Although almost every cost calculation made by Held & Francke is made in the form of activity-based costing the cost calculation method target costing is also used as a supplement to activity-based costing. It is important to emphasize that no cost calculation made by Held & Francke is a pure target costing calculation, nevertheless, it is still a valuable supplement. Since the construction industry is a highly competitive industry the firm who makes the lowest offer for a project will receive it. Therefore it is essential to keep the costs as low as possible. Target costing is therefore used in a way that can be described as indirect or direct (Interview 2007-03-09, Kufner).

The indirect way is when the company has made a cost calculation using the activity-based costing model and goes over the figures one or more times in order to cut costs and make cost adjustments. This is done every time to make sure that the offer given to the client is a competitive one and to ensure that the chances of receiving the offer is high (Interview 2007-03-09, Kufner).

The direct way on the other hand is when the client approaches Held & Francke with a building plan or an idea of a project that the client would like to have built but without a direct cost calculation. In the majority of these cases, although the client does not have a pre-made cost calculation, the client has a firm idea of the maximum amount that he or she would like to pay for the project. This price that the client is willing to offer will then serve as the target cost. The costs will be calculated as usual with the help of activity-based costing but the target price will always be present. If the first calculation does not meet the target cost the calculation will be reviewed and possibilities to cut costs will be examined. After a number of reviews and the target are reached the project will be undertaken. If the target cannot be reached it will either be dismissed or it will be executed despite the fact that it contains a loss. It is only in rare cases and under certain circumstances that the company will take a project that means a direct loss. Such circumstances would include if the project meant special
PR, if there is a lot of free capacity at the time or if it is a strategic investment, for example into a new market etc (Interview 2007-03-09, Kufner).

One problem with the cost calculation process that often leads to the cost calculation not being on target with the final cost of the project is that labour time is often based on the calculator's experience with similar projects. As stated before, each construction project is unique and therefore the actual time it takes to perform the tasks can differ from the actual time schedule. Delays of material, the actual topography of the construction site, the influence of infrastructure such as trains that only allows work to be carried out at certain times are a few reasons for project delays. All employees involved in calculating the cost of a project visit the construction site in order to perform investigations on topography and actual conditions for the future construction work. The possibility to do further inquiries on site allows for the calculator to do more exact calculations that are more likely to correspond with the actual end cost of the project. However it may still not be enough to discover all possible problems that may occur during the actual construction phase. (Interview 2007-04-24, Hiebl). A further problem that occurs in the calculation phase has to do with the fact that the costs of the materials are already fixed and new negotiations of price are not possible. Therefore the only possibility of cutting cost and thereby providing a more competitive price for the project is by lowering the costs for labour, i.e. estimating that less labour or hours of labour is needed for certain tasks. This can lead to the time calculated for steps in the project may not allow for any things to go wrong (Interview 2007-04-24, Hiebl). The problematic of calculated cost and actual cost will be further discussed in chapter 4.4 Time.

4.2.3 The influence of Material and Labour on Cost
The main benefits of being part of a larger group of companies, as Held & Francke now is after being purchased by HABAU in 2001, is the opportunity to purchase material in larger batches through internal purchase collaborations. Unfortunately this opportunity is not used in a larger extent and Held & Francke would like to see a larger collaboration between parent and affiliated company. This could lead to better leverage in price negotiations. Leverage advantages of these kinds can already be seen today when Held & Francke works as a part of a joint venture. In these joint ventures all material for the whole project is purchased at once allowing for Held & Francke to buy their material at favourable prices (Interview 2007-04-27, Lammerhuber).
Inventories at Held & Francke are kept as low as possible. Materials for larger projects, which make up for 95% of the total material consumption per year, are purchased directly. A small inventory is kept in order to cover the material requirements for smaller projects, which are responsible for 5% of the total annual material consumption. The reason for not holding large inventories is on the one hand to minimize inventory costs by the JIT principle, but also because some materials such as concrete cannot be stored and must be delivered fresh to the construction site (Interview 2007-04-24, Hiebl).

For Held & Francke the largest cost carriers in the projects are material and labour. Materials make up for 45% of the total project as costs in average for the whole company over the year. Labour cost also stands for an equally large part of the annual costs, namely 45%. The remaining 10% is administrative and overhead costs. But as stated this is the average for the whole company. In some departments, such as deep construction, the material is responsible for 75% of the costs in a project and the labour only 15%. So when trying to lower total costs of projects it is essential that each department investigates thoroughly whether it is the labour or material that is the largest carrier of cost in order to take appropriate measures (Interview 2007-04-24, Hiebl).

**4.3 Quality**

The specifications for quality are given to Held & Francke by the client in writing as well as the necessary blueprints for the project to be executed. The quality specifications given by the client are very detailed and as can be seen in the table below there is a position number for each material in the left column.

<table>
<thead>
<tr>
<th>Position</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Horizontal Concrete and Steel Support</td>
<td>50.00 m³</td>
<td></td>
<td>m³</td>
</tr>
<tr>
<td></td>
<td>Bridge workers payment</td>
<td>1.5 h</td>
<td></td>
<td>30.21</td>
</tr>
<tr>
<td></td>
<td>Formwork carrier H 20 P</td>
<td>0.013333 m³</td>
<td>8.76</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Formwork plate 27 mm</td>
<td>0.2 m²</td>
<td></td>
<td>17.15</td>
</tr>
<tr>
<td></td>
<td>Formwork general</td>
<td>0.75 EUR</td>
<td>1.06</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Concrete</td>
<td>1.0 m³</td>
<td></td>
<td>86.42</td>
</tr>
<tr>
<td></td>
<td>Horizontal C &amp; S Support</td>
<td>1.5 h</td>
<td></td>
<td>45.32</td>
</tr>
<tr>
<td></td>
<td>Price per m³</td>
<td>1.0 m³</td>
<td></td>
<td>90.65</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0 m³</td>
<td></td>
<td>2265.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75.0 h</td>
<td></td>
<td>4532.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6798.24</td>
</tr>
</tbody>
</table>

Table 3 Horizontal Concrete and Steel Support calculation based on Project Umfahrung Lasberg

Each position number is connected to a certain standard and is specific for each object. For example M09074230301030 Concrete refers to a specific type of concrete with a certain texture, grain size etc. (Interview 2007-02-19, Lammerhuber). As a re-
sult of the detailed specifications there is rarely a problem with the functional quality of the final product and due to this system the client maintains a large control when it comes to specifying what types of materials and degree of quality of the materials that is to be used in the project. At times errors may incur in the blueprint but these are in the majority of the cases detected and a dialogue with the customer and commissioner of the building project is held in order to correct these errors. The project managers of Held & Francke are trained to make suggestion to the client and the commissioner of the building project regarding changes and alternate materials during the project. This leads to increased revenues for Held & Francke and is a form of sales technique. In up to 90% of all projects, such changes are made and these changes make up a vital boost of revenues for the company (Interview 2007-04-24, Hiebl). Due to the fact that the client maintains a large control throughout the whole project and is constantly contacted when there is a suggestion for change, the client is in a large majority of the project satisfied with the final product of the project (Interview 2007-04-27, Lammerhuber).

The downside of the client performing the major part of the work when it comes to drawing blueprints and writing detailed project plans is that the cost of the project becomes the most priority. “The blueprints and cost suggestions that we receive from the clients are generally very simple structures designed to cost as little as possible. This leaves little room for designers to use their creativity. In fact, design in the construction industry has stood still since the mid eighties” (Interview 2007-04-27, Lammerhuber).

Quality defects can be caused both by the employees of Held & Francke as much as the commissioner of the building project can cause it. Since the commissioner of the building project is the representative of the client and works on their behalf it is imperative that this person tries his best to foresee eventual problems that might occur during the construction. A current example of this was at the construction of a tunnel where the complex nature of the project was underestimated which lead to water leaking into the tunnel. This cost Held & Francke a lot of time and money in order to correct the errors and at the same time completing their part of the project in time (Interview 2007-04-27, Lammerhuber).
Sometimes human error can be the source of actual quality defects. An example of one human error was when a specific type of concrete was ordered and another received. The degree of hardness of concrete cannot be tested before it has been given time to fully set. Therefore this quality defect was not detected before the project was close to finish. Although functional quality errors occur the major cause for disagreements with a client regarding quality is almost always of an esthetical nature (Interview 2007-04-24, Hiebl).

The quality aspect of projects has increased in importance over the last year. The client now a day exercises control of quality more than before. When for example a road has been build, the unevenness i.e. small bumps in the road are measured and penalized with cash fines. This has nothing to do with measurements instruments being more accurate and available today than before, rather it is a result of higher quality awareness of the customer (Interview 2007-04-24, Hiebl). In order to amend this particular problem in road construction Held & Francke has created a task force whose job is to prevent quality defects from occurring. This is done both by measurements in order to avoid defects and by supervising the actual work being done on the site. But although quality has become a more and more important factor for the customer, Held & Francke does not keep statistics on the reasons for delays, quality defects, additional costs and the causes that lead to the prior stated delays, defects etc (Interview 2007-04-27, Lammerhuber).

4.4 Time
The customer and the commissioner of the building project specify the time span for a building project in the contract stage, in other words, before the actual construction has commenced. When a contract is given to Held & Francke the necessary preparations in order to execute the project can start. These preparations include cost calculation, investigations of the construction site and planning the actual execution of the project. This whole process generally takes three to four days for smaller projects, which have a time span of two weeks up to a year (Interview 2007-04-24, Hiebl). Large-scale projects with duration of over a year may require a planning and calculating time of two to four weeks (Interview 2007-04-27, Lammerhuber). The more time spent on calculating, investigating and execution planning the more accurate the cost calculation versus outturn will be. A current problem is that not enough time is spent in the preparation work for projects. “There is nothing wrong with the actual cost cal-
calculation and the program used to perform these tasks; the problem lies in the employees not taking the time to investigate and think the entire project through” (Interview 2007-04-27, Lammerhuber). But the problem with investigating and thinking the whole project through applies as much to employees at Held & Francke as it does to the client and their commissioner of the building project. Vital time aspects in the construction phase such as concrete that need two weeks to harden may be overseen. Another problem may as well be the weather, since the construction may not be able to progress in times of heavy rain. Although it is hard to foresee when it is going to rain, statistic regarding how many days of rainfall occurs per year is available and is likely to come after a longer period of good weather and is therefore to some extent possible to incorporate in the time calculation of every project (Interview 2007-04-27, Lammerhuber). But the seasonal nature of the construction industry does not always allow for the time needed to calculate, plan etc. to be spent. The construction season starts in the spring and ends in the fall. For the first projects in the spring, time for planning, calculation, and investigation is available, but as time goes on and fall comes closer, less time is available to make the vital preparations for a project (Interview 2007-04-24, Hiebl).

Depending on the size of the actual project, the project can be divided into several construction steps where different contractors are responsible for a specific task and with a specified deadline. The necessity of each contractor finishing its step in time is highly important since the delay of one contractor makes it impossible for the next contractor to start with their step in the project. If the contractor creates a significant delay the contractor must pay a cash fine. The actual size of the fine depends on the project and range between cost insignificant to highly cost significant. But the actual cause of delay is often hard to determine. As stated earlier at some times the contractor can be the cause, but it may as well be the commissioner of the building project who by failing to make decisions, supplying material etc. Often the reason for delays is a combination of errors from both the contractor and the commissioner of the building project in which case both acknowledges their error and no fine are paid. Held & Francke, as a part of their strategy, tries to avoid delays of projects at any cost. This has to do with maintaining a good reputation, which could, in case of being known as a company who fails in completing their work on time, lead to problems in receiving future contracts. Therefore, if the project is behind schedule and a delay is probable, additional staffs are put into the project and Saturdays and Sundays are also used in
order to finish on time. Needless to say such measurements cause additional costs and may even lead to negative revenue for the project, but from Held & Franckes point of view it is a necessary measurement in order to uphold a good reputation (Interview 2007-04-24, Hiebl).

In order for the project manager to maintain control and stay updated on the progress of the project a IS – SHOULD report is given at set intervals. The IS – SHOULD report is a simple measure of the actual progress of the project related to planned progress in a specified timeframe. This update of the current progress allows for measures, such as additional labour to be added to the project, to be taken in order to secure the projects completion in time. These IS – SHOULD reports are used in about 50% of all projects. When the IS – SHOULD reports are not used, briefing meetings with the commissioner of the building are held every two weeks in order to maintain control over project process (Interview 2007-04-27, Lammerhuber).

![IS - SHOULD Diagram](image)

Figure 6. Example IS – SHOULD Diagram (Interview 2007-04-27, Lammerhuber)

A third and alternative way of knowing whether all projects within a specific timeframe, such as a month, are making good progress is to review the monthly report. If total sales are close to total costs the time of completion of the projects can not be far away (Interview 2007-04-27, Lammerhuber).
5. Analysis

In this chapter the analysis will be conducted on basis of the information from the theoretical framework and the empirical studies.

5.1 Part I - The Cost Calculation Process
In this first part of the analysis the cost calculation process in Held & Francke will be illustrated by an analytical model. The purpose of this model is to supply information regarding the cost calculation process in order for the reader to understand the course of events that occur in Held & Francke between receiving the project plan from the client to completion of the cost calculation. This model is based on the empirical data found in chapter 4.2 to 4.2.2.

Figure 7. Cost Calculation Process at Held & Francke
5.1.1 Degree of Detail in the Project Plan

The degree of detail in the project plan determines how Held & Francke will calculate the cost of a project. A very detailed project plan (Case 1) already has a pre made cost calculation structure that must be followed by all companies who wants to make an offer. If the level of detail is low (Case 3), the companies are free to calculate the cost in any way they see fit. Since the largest clients of Held & Francke all use the FSV the company has adapted to this method of calculating costs, and uses in for all project calculations (Interview 2007-03-09, Kufner).

5.1.2 Calculating the project cost

In order to provide a competitive price for the client, Held & Francke lets the cost calculation undergo a step much similar to target costing (Interview 2007-03-09, Kufner). Target costing is a costing system that is market-driven, where costs targets are calculated by the consideration of customer requirements and competitive offerings (Ansari & Bell, 1997).

If the client has specified a maximum spending amount for the project, Held & Francke will use this amount as their target cost, i.e. direct target costing. Direct target costing sets the specified sum of the client as target and the cost calculations are done over and over until the cost is the same or lower as the target (Interview 2007-03-09, Kufner).

If the client does not specify any maximum spending amount the indirect target costing approach will be used. The indirect way is when the company has made a cost calculation using the ABC model and goes over the figures several times in order to cut costs and make cost adjustments. This is done to reach a cost that is competitive on the market. If the cost calculation turns out to be higher than the direct or indirect target cost, the figures will be recalculated several times to either reach the target cost or a competitive market cost (Interview 2007-03-09, Kufner).

Unlike the theoretical approach on target costing where a target profit is established for the product and then the target cost is determined (Gagne et al., 1995) Held & Francke does not specify any profit in their calculation process. The profit for a direct target cost will be the amount between what the client is willing to offer and the cal-
culated cost. For an indirect target cost approach, the profit is the mark up added after the lowest possible cost is calculated.

Regardless if an indirect or a direct target costing approach is used in the cost calculation process, the framework for calculating costs is always ABC (Interview 2007-03-09, Kufner). In the activity-based costing, allocation of costs is based on the activities that drive costs (Lockamy III, 2003). In the same way Held & Francke allocates the cost in a project by breaking down the project into work steps. Within each work step all costs are further allocated to the tasks and materials that are used. Each task and material has a certain cost attached to them that is distributed by an amount of a unit, such as time, metres, tonnes etc (2006-01-12 Project Umfahrung Lasberg). The purpose of activity-based costing is to provide usable cost information that in an accurate way shows the cause-and-effect relationships between costs, activities, and product or services. Moreover, with activity-based costing, a firm can acquire accurate and relevant cost information to support the decision-making (Hicks, 1999). The finished cost calculation performed in Held & Francke will in the end be the one of the most influential information provider in the decision process. Further, it will also serve as a vital part in the price suggestion for the project to the client.

**5.2 Part II - The role of Cost Calculation in relation to Quality and Time**

In this second part of the analysis the role of cost calculation process in relation to quality and time in Held & Francke will be illustrated by an analytical model. The purpose of this model is to show the reader how important cost calculation is to Held & Francke as a method of creating a competitive advantage. This model, used in this second part of the analysis, is based on the empirical data found in chapter 4.2.3 to 4.4.
5.2.1 Degree of Detail in the Project Plan
As in the cost calculation process the degree of detail in the project plan also determines the possibility for Held & Francke to influence the three vital factors cost, quality and time in order to gain a competitive advantage over their competitors. As a general rule it can be said that the higher the level of detail in the project plan the lower is the possibility for Held & Francke to influence cost, quality and time. Important to say is that the five largest clients of Held & Francke who together make up for 80% of the total annual revenue all, through the use of FSV, give highly detailed project plans (Interview 2007-03-09, Lammerhuber).

5.2.2 Quality
The ability for Held & Francke to influence what materials to be used in projects is very small for the highly and the less detailed project plans. It is only when the project has a low level of detail that Held & Francke can decide freely which materials that they are going to use. In the design aspect the possibilities to influence is even lower (Interview 2007-04-27, Lammerhuber). Highly detailed project plans give no room for changes or suggestions unless there is an actual error in the blueprints (Interview...
For less and roughly detailed project plans, only little degree of involvement in the design process is possible. The reason for Held & Francke not being able to take part in the design process and influence the choice of materials lies in the Austrian way of planning and undertaking construction projects. The guideline in the FSV and the fact that the client has already planned most of the project in detail leaves little room for discussion. Therefore the quality aspect in the Austrian construction market has very little possibility to become a competitive advantage to the construction companies. The only aspect, regarding quality, that is relevant for Held & Francke, is to ensure that the project runs smoothly and that the project planning has been made properly in order to avoid additional costs and delays.

The positive aspect, with the control being in the hands of the client, is that the client almost always receives exactly what he or she wants (Interview 2007-04-27, Lammerhuber). The downside is that by taking the major control of quality from the construction company, there is little insensitive for companies to work with quality related processes and improvements. For example according to Low & Peh (1996) implementing TQM can help an organization to become more competitive. Quality in construction projects involves a process in which a key aspect to success is continuous improvement, (Low & Peh, 1996) continuously improvement being a crucial factor for maintaining competitive advantage (Beheshti, 2004). Another example is quality management system where the purpose of the system is to achieve objectives such as meeting or exceeding customer expectations while minimizing costs (Willis & Willis, 1995). When the client remains in control and does not allow for any changes or alternative methods of working, Held & Francke can never surpass the expectations from the client. Though Held & Francke is currently taking measurements to improve their quality and avoid making errors, the company needs more control in order to use quality as a method of gaining a competitive advantage.

5.2.3 Time

The ability for Held & Francke to influence and timeframe a project in the project planning has to do with the level of detail. The higher the level of detail from the client is, the lower the possibility is for Held & Francke to influence the project planning. Deadlines are, due to the company strategy, never changeable. By always finishing projects on time the company maintains a good reputation that leads to a higher probability in receiving future contracts (Interview 2007-04-24, Hiebl).
Hagan (1986) states that “The inter-relationship of quality, schedule and cost, without attention to the contrary, is likely to be unbalanced in favour of schedule and costs – and often unwittingly at the expense of quality” (cited in Low & Yeo, 1998, pp.332). For Held & Francke, this statement does not entirely apply. It is rather so that for Held & Francke, schedule and quality are favoured at the expense of cost. The reason is that since the client has specified the material and blueprints in the project, the quality will in almost all cases be to their satisfaction. Through Held & Franckes strategy of always holding deadlines, projects finish on time (Interview 2007-04-24, Hiebl). Therefore, cost is the one that has to compensate for the other two.

The time aspect of a project is vital for Held & Francke in order to be competitive on the Austrian market. But since it is a known fact throughout the whole company that all projects are to be finished on time, even when it requires measures such as additional workforce or overtime, it is no longer a modifiable or changeable aspect of the project, rather a prerequisite of the project (Interview 2007-04-24, Hiebl). Hence, all project planning must allow for enough time to be available in order to perform each task. Therefore, as long as Held & Francke stays with their strategy of finishing all projects on time, the time aspect in the project planning and cost calculation must be calculated in such a way that the tasks can be performed without having to resort to pulling extra workforce into the project or demanding overtime.

### 5.2.4 Cost Calculation

Rough and less detailed plans offers a high possibility for Held & Francke to decide what materials to use and thereby also an opportunity to achieve a competitive advantage. But the more information the project contains, the more the client has already specified the material to be used and procedures that are to take place during the construction of the project (Interview 2007-03-09, Kufner). Detailed project plans make it impossible for Held & Francke to substitute any materials and therefore also make it hard to achieve any cost advantages towards competitive companies in this area.

The costs of labour is the only aspect, in the cost aspect as well as the quality and time aspects, where Held & Francke retains a high level of control regardless if the client has submitted a project plan with high or low detail level (Interview 2007-03-09, Kufner).
5.2.4.1 Focus - Cost Control

According to Harris et al. (2006) the construction industry is mainly focused on one-off projects and the nature of construction projects is quite irregular. Despite the irregularities in the construction industry, it is still necessary to monitor and control production costs if the planned level of profit is to be realized. The high level of control Held & Francke has on the cost aspect of the project makes it important for Held & Francke to focus on the cost aspect and keeping costs low in order to gain a competitive advantage.

Held & Francke has incorporated just-in-time aspects in their projects (Interview 2007-04-27, Lammerhuber). JIT helps improving the production process by handling materials more efficiently by delivering the right materials, in the right quantities and quality, exactly when it is needed for production. The more efficient material handling also helps companies reducing their inventory that leads to less bound capital and storage costs. (Low & Chuan, 2001). Much of the materials used in construction projects now arrive directly to the site without being stored. As a result of JIT Held and Francke, only a small inventory of 5% of the total annual material consumption is kept in order to cover the material requirements for smaller projects (Interview 2007-04-24, Hiebl).

5.2.4.2 Focus – Project Spending

The three ways currently used in Held & Francke for retrieving information regarding the progress of a project are only focusing on the project schedule. They state very little or nothing about project overspending. As a part of cost control it is imperative that Held & Francke also focuses their attention avoiding project overspending. Earned Value Management could be one way for management to receive early warnings of project overspending, or information about if they are accomplishing enough of the scope even when being under budget, how much more the project will cost than what was originally estimated, and how much they at present expect the total project to cost (Alvarado et al., 2004).

Abdul-Rahman (1997) states that poorly quality managed projects can be the cause of the firm having to spend more time and money. For Held & Francke this is also a known fact. According to Peter Lammerhuber, the problem with costs in a project exceeding the budget is mainly due to the employees not taking enough time in planning
and thinking projects through (Interview 2007-04-27, Lammerhuber). By spending more time on calculating, investigating and execution planning the more accurate the unnecessary errors and project overspending can be avoided.
6. Final discussion

In this chapter, we will present our own thoughts and reflections that will argue for the conclusion drawn in the following chapter.

As we have concluded earlier the quality and time aspect of a project are both something that Held & Francke has very little control over. We might even go as far as to say that quality and time, through the reasoning held earlier, are no longer vital aspects for Held & Francke to be competitive in the Austrian market. The clients, through the own planning and control over the project, always receive exactly what they want. The projects are always finished in time due to the fear of receiving a bad reputation. The only aspect of competitiveness remaining is cost. Hence, the main focus for Held & Francke must lie in providing as cost efficient offers as possible. Cost is the only competitive aspect where Held & Francke has full control over. We therefore conclude that by giving the projects the required attention regarding project planning and cost calculation is the most effective way to be competitive in the Austrian construction industry. The project planning and the cost calculation therefore become vital parts in order to create a cost efficient organization. Thorough planning enables the elimination of possible errors and delays that might occur during the actual construction. With proper planning, cost calculation can be calculated to include not all but many of the things that may go wrong during the construction phase and thereby take this into account. More ordinary work time can be planned in the cost calculation and thus raise the probability of budgeted and actual costs of a project being inline with each other. Consequently, the probability of projects making a loss, i.e. risk factor, will be lowered.
7. Conclusion

In this chapter, the conclusions will be drawn and ideas for future research will be given.

In a complex industry like the construction industry, where competition is hard and the profit margin is varying, it is important to keep the numbers under control. There are several theoretical methods for how to keep control of the numbers. Occasionally, it can be difficult, if not impossible, to implement the theoretical methods in reality, no matter how good they seem.

The question that we aimed to answer with our research was;

*How does Held & Francke calculate the cost of an offer for a building project and what role does cost calculation play, in relation to quality and time, in achieving competitive advantage?*

After examining Held & Francke we found that they have implemented some of the theoretical methods for cost calculations in a successful way. Their main method of calculation is ABC, where the project is broken down into smaller work steps. Within each work step the costs of materials and tasks performed are calculated. Further, Held & Francke use a modified version of target costing in order to lower the costs. This version differs from the theoretical type since profit is not included in the target.

The role of cost calculation as a competitive advantage for Held & Francke is very high. This is due to a number of reasons. First, the use of the norm FSV grants the client the control over the project planning and choice of materials. This eliminates the possibility for Held & Francke to surpass the clients’ wishes and thereby gain a competitive advantage in quality. Secondly, deadlines are due to the strategy and Austrian construction industry climate, not changeable and must be kept at all times. Therefore Held & Francke cannot use punctuality as a competitive advantage over other companies, since almost all companies in the construction industry strive to do the same. Punctuality has become a prerequisite for obtaining contracts and is no longer an instrument of being competitive. Consequently, the cost aspect becomes the vital factor in order to gain a competitive advantage in the market. Cost is the sole aspect where Held & Francke has full control and providing competitive project prices therefore becomes imperative in order to generate sales.
With the focus on costs the cost calculation becomes an important role in achieving a competitive advantage. Using a system such as ABC to see the cause and effect between the activities and the cost, and eliminate non-value creating processes, becomes the main basis for offering a competitive price to the client in order to get the contract. Further, since competition is hard there are little profit margins in the contracts, it is important that the cost calculation is thorough in order to avoid project overspending.

To make some suggestions for future research we think it would be interesting to study another construction company but in a different region, to see how they calculate cost and what role cost calculation play in strategic decision process. It could also be interesting to choose an entire other industry to study the same problem. A last suggestion would be to further this research by studying Held & Francke, for example, in ten years or so, to see if their cost calculation methods and strategic decision process has changed.
8. Criticism to our own work

In this final chapter, criticism to our own work will be presented.

In any academic work where students such as us examine a specific problem within a company under a limited period of time there is always a possibility that one or more aspects or pieces of information may get overlooked. Although our research was thorough, there is a chance that we failed to collect all information possible. Further, there is also the possibility that the respondents deliberately or in deliberately withheld information.

Unfortunately we have not been able to find any useful articles or books regarding the particular prerequisites and market competition conditions for construction companies in Austria. Such material would have been very valuable as a supplement in creating the theoretical framework for this thesis.

Finally, if we had conducted a multiple case study, i.e. interviewed one additional construction company or more, the conclusion drawn in this thesis would have been more substantiated. We therefore strongly advise that the reader takes this into consideration when reflecting over the findings in this academic thesis.
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**Other Material**

Authentic Project Cost Calculation
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