CHALMERS

Impact of Organizational Culture on Quality Management

A case study in a manufacturing unit

Master of Science Thesis in Quality and Operations Management

ELIN GRÖNDAHL
LOVISA MARTINSSON

Department of Technology Management and Economics
Division of Quality Sciences
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden, 2011
Report No. E2011:025

MASTER'S THESIS E2011:025

Impact of Organizational Culture on Quality Management

A case study in manufacturing

Master of Science Thesis

ELIN GRÖNDAHL
LOVISA MARTINSSON

Examiner:	Henrik Eriksson
Tutor, Chalmers:	Marcus Assarlind
Tutor, Hilti Group:	Pascal Jud

Department of Technology Management and Economics
Division of Quality Sciences
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden, 2011

Impact of Organizational Culture on Quality Management

Master of Science Thesis

ELIN GRÖNDAHL
LOVISA MARTINSSON

Master's Thesis E2011:025
Department of Technology Management and Economics
Division of Quality Sciences
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden

Abstract

This thesis aims to increase the understanding of the relation between quality management practices and organizational culture. This is done by an action research, participating in an improvement project in a production unit within the global corporation Hilti Group.

In order to define and to analyze organizational culture, the Competing Values Framework has been used as a model, and the unit under study has been evaluated according to the dimensions of this framework. Rational culture, which is characterized by its focus on productivity and goal achievement, has shown to have the strongest influence at the unit.

The thesis discusses different quality management practices and their potential in different organizational cultures. The rational culture is supporting several quality practices, which have been used to bring suggestions on how the unit can continue to develop their quality management. The research has shown that the practice in greatest need of more focus at the specific unit is the process management practice, which implies a shift from quality control towards preventive actions and work towards reduction of variation within production. In order to achieve a higher performance in the process management practice, it is important to increase the feeling of empowerment among employees and to involve the people closest to the process it the quality efforts at the unit. Finally, it can be concluded that the use of frameworks and models for evaluating organizational cultures has shown to be difficult, due to the complexity of the cultural concept.

Acknowledgements

We would like to express our gratitude towards our tutor Marcus Assarlind at the institution of Technology Management and Economics, who has guided us through this research and whose help has been of great value for this project. We also want to thank our tutor at Hilti Group, Pascal Jud, who has facilitated and supported our work at the unit. Finally, we would like to thank all employees and co-workers at Hilti for supporting our work and always being available for answering questions and participating in interviews.

Keywords: Action Research, Competing Values Framework, Organizational Culture, Process Management, Quality Management, Quality Management Practices.

Table of Content

1 Introduction

In this chapter, the background of the topic is described together with a short description of the organization. Further the purpose and research questions are stated. Finally an overview of the disposition of the report is given.

1.1 Background

In the competitive environment of today, it is crucial to stay ahead of competition and continuously satisfy customers. Quality management practices have been widely implemented, and while some organizations experience great success, other initiatives have failed (Jinhui Wu et al. 2011). Many studies have started questioning the universal application of quality management in all organizations, and they claim that some of the quality management practices are dependent on the organizational context, such as industry, firm size and country (Sousa & Voss 2001). Further, Prajogo and McDermott (2005) argue that among several factors, which all have been attributed as key determinants for quality management success, organizational culture is among those listed at the top. These studies indicate that the organizational context, and consequentially its culture, will have an impact on the outcome of implemented quality management practices.

There are different views on whether quality management practices are associated with, and therefore supported by only one single culture, or if quality management practices can be built on different cultural dimensions (Prajogo & McDermott 2005). Quality management could be treated as something that includes cultural elements such as a switch of mindset of the adapters, which indicates that there are only a single quality culture that is appropriate for philosophies such as TQM and Lean etc. Naor et al. (2008) state that quality management is more than tools and techniques and that it has a value system as an underlying foundation. The cultural setting of the organization will affect the outcome of the methods and also the performance of the organization (Naor et al. 2008). Further, quality management could also be seen as a pure constitution of practices and tools that would fit into different organizational cultures. The latter would imply that different cultural characteristics can be associated with different elements of quality management (Prajogo & McDermott 2005). This research will take the position that quality management is different from organizational culture, and that it is possible to adapt practices to suit the context of where they are being implemented (Sila 2007).

There are almost as many organizational types and cultures, as organizations as such. There have been numerous attempts to define and classify between different organizational cultures (Hofstede

1980; Quinn and Rohrbaugh 1983; March 1991). Each culture has its own set of resources and capabilities and it is difficult to generalize the appropriate quality methods and tools for different organizations. When an organization launch methods and tools it has to make sure that those are the most appropriate, but at the same time it has to make sure the organization has the right enablers for making the most out of a method or a tool.

This study will be based on an empirical case study in a manufacturing unit at Hilti Group (Hilti) situated in Liechtenstein. Hilti is a global supplier of tools for the construction industry. The production plant is an engineering driven organization with a highly developed technical understanding. The improvement initiatives are often carried out from an engineering point of view, focusing on the product and its properties. The empirical data for this project is gathered from an improvement project during four months at the unit. The study will constitute as a base for evaluation of the organizational culture at the plant, and create an understanding of the impact that the culture has on quality management.

1.2 Purpose

The purpose of this master thesis is to evaluate how the cultural setting of an organization impact quality management. In order to understand and determine the correlation between the two topics of organizational culture and quality management the culture at the unit needs to be studied and evaluated. This cultural assessment, in combination with theory, contributes to an understanding of the specific organization's cultural prerequisites as well as an understanding of how culture influences the choice of quality management practices. Further, the research aims at recommending the quality management practices best suited for the determined organizational culture at the unit under study. The research questions for this study are therefore stated as:

- What characterizes the current organizational culture at the unit within this study?
- How can the quality management be developed in order to be aligned with the resources of the existing organizational culture and the new initiative of Lean@Hilti?

1.3 Disposition

Following the introduction is the method chapter which gives the reader an insight and an explanation of how the research is conducted. It explains and motivates the research strategy and how data will be collected and analyzed. At last, it contains theory regarding the reliability of the research and its methodology.

The theory chapter covers the theoretical context of interest to perform this research and analysis. It begins with overall theory on the concept of organizational culture including a framework and four culture types. This is followed by a section of empowerment. Further, theory on quality management practices and a section on how to deal with corrective and preventive actions within process management are presented. Lastly, the theory chapter elaborates upon the connection between organizational culture and quality management practice.

The empirical study first explains the desired global Hilti culture and then goes deeper into the status quo at the unit. It clarifies the structure of the organization and especially the work structure regarding quality management. It also gives information on softer factors within the unit, such as relationships, participation and encouragement.

In the following analysis the empirical study along with the theoretical framework is analyzed, first in terms of what type of organizational culture the unit possess according to theoretical framework and thereafter an analysis on how they work with their quality management practices today and how it could change in the future in order to use the existing culture resource in a more efficient way.

The report is settled with a conclusion and discussion of the findings from the research.

2 Method

This chapter will describe the chosen research strategy and the use of action research as a method. Further it will elaborate on data collection methods and finally the chapter will deal with quality of the chosen data collection methods concerning the validity and reliability of the study.

2.1 Selection of Research Strategy

Grounded theory has been defined as theory that is "derived from data, systematically gathered and analyzed through the research process." (Strauss & Corbin 1998, p.12) In this method, data collection, analysis and eventually theory stand in close relationship to one another (Strauss & Corbin 1998). The grounded theory is an appropriate method for scientists who aim to investigate the interactions of people and the view of participants (Denscombe 1998). The method for this research is well correlated with the theories developed by Strauss and Corbin as the intention has been to systematically generate and analyze data throughout the project. The process can be described as an iterative study, which according to Bryman and Bell (2003) involves a weaving back and forth between data and theory. It allowed the researchers to keep an open mind to the problem at hand and to go back and forth between theory and practice in order to compare the results from data collection with theory, and to generate a thorough analysis that could be revised. Strauss and Corbin (1998) claim that grounded theories, because they are drawn from data, are likely to offer insight, enhance understanding and provide a meaningful guide to action.

The purpose of this study has been to evaluate organizational culture, which demands the researchers to take a hermeneutic approach in this research project. The hermeneutic approach refers to the intention to understand and examine the thoughts and feelings of people through interpretation and comprehension (Ödman 2003). During this study the researchers have had the advantage of spending most of the time on site. Therefore there was an opportunity to evaluate and understand the organization and its cultural context thoroughly. Ödman (2003) describes the learning process of the hermeneutic circle, where researchers develop their understanding through interpretation and then understanding of the objects under study in an iterative loop.

Hence, the research has been of a qualitative nature. This means that the epistemological emphasis will differ from the positivistic standpoint developed by natural scientific models and positivism, and that the study will describe ways in which individuals interpret their social world (Bryman & Bell 2003). This type of epistemological standpoint is referred to as interpretivism.

2.2 Action Research

This research has been developed together with the unit under study, and this phenomenon is sometimes referred to as action research. The development of action research has sprung from the idea that one needs to take into consideration the power relations that exist between researcher and the people that are the main subject under study (Bryman & Bell 2003). They state that action research plays a particular role in bridging the gap between researchers and participants, since the output of the research evolves through involvement with members in the organization under study. Action research enables the subjects under study to play a more active part in design and output of the study, and intend to contribute both to the academic theory as well as to the organization. During the last ten years, the phenomenon of action research has become an established way of understanding and developing organizations (Coghlan 2007). A practical quality improvement project has been executed at the unit, and learnings from this project have been of interest both from an operational viewpoint for the unit, but also for generation of new theory that can contribute to further understanding the correlations between quality and culture. Coghlan (2007) states that "issues of organizational concerns such as system improvements, organizational learning, and the management of change are suitable subjects for participant research since they provide opportunities for both effective action and learning". Since the intention of this research is to contribute both to theory and to the development of the unit under study, it has been important to work together and develop solutions with the employees.

Denscombe (1998) states that in action research it is of great importance, due to ethical implications, to point out that the work together with the organization will also include scientific elements which should neither be camouflaged nor hidden. As for this research, much of the data collected, such as observations, comes from the participation in an improvement project, which has been conducted together with representatives from the organization under study. However, the nature and purpose of the study has been made clear to the participants. Material that has been written about interviews and observations has been distributed to the organization for approval. Further, there have been elements of this study when data have been collected in a way where the distinction between researcher and participant has been clearer, such as performed interviews. In these situations, the relationship between researcher and object under study has been distinct and this has made it clear to participants that the project has a scientific outlook.

2.3 Data Collection Methods

There is no particular method that is unique for the grounded theory, as what distinguish the research method is the way the gathered information is analyzed (Denscombe 1998). The data collection methods that have been used for this research are participant observations and interviews, as they have made it possible for the researchers to be flexible in their search for information. The use of several diverse data collection methods is common in qualitative research, and the combination of interviews with participant observations will ensure credibility by triangulation of information (Bryman & Bell, 2003; Denscombe, 1998). By triangulation, it has been possible to validate information given in interviews with observations, which has increased the credibility of the outcome of this study.

2.3.1 Observations

The purpose of observations is to understand what people do, rather than what they say they do. A basic hermeneutic insight is that one will always have preconceptions before starting a research. These preconceptions will gradually be modified as one gain knowledge (Fangen 2005). It was therefore important to keep an open mind towards the subject under study.

Participant observation indicates that the researchers combine two types of roles, one is the participant who engages in the social interactions, and the other is the observer of people under study (Fangen 2005). This research has to great extent been based on the participative observations made by the researchers, which is also a consequence of the action research. By participating in an improvement project at the department, and by working in the plant environment, the researchers have been able to deepen their understanding of the organizational setting.

Further, two planned observations were conducted in the production, in order to get an understanding of how the operators worked on the shop floor. These observations were performed by both researchers to avoid problems with selective memory discussed by (Denscombe 1998), and the observations were documented directly after being performed. The observations were unstructured, and the researches sometimes interfered with questions, asking how and why different tasks were performed. One could argue that interaction with the subjects under study would interfere with the natural environment (Denscombe 1998). To thoroughly understand the production process was considered more valuable than avoidance of interaction. For example, the observant could explain different procedures and the purpose of doing different tasks – things that would not been understood without asking questions.

2.3.2 Interviews

Interviews can have many different purposes, as they can be used only to get information from the respondents, or they can serve as a way to thoroughly understand the opinions and beliefs of the interviewee (Bjerke 2003). Further Denscombe (1998) claims, that even though interviews are commonly used in research to gain information, the method is even more beneficial when they are used for more complex problems such as the need to attain knowledge of people's beliefs and attitudes. As this research aimed to analyze the organizational culture, in-depth interviews were considered important as an information source and were therefore chosen as an important input in addition to the observations.

Literature discusses three different ways of structuring an interview (Denscombe 1998). These are structured interviews, unstructured interviews and semi-structured interviews, which all serves different purposes. The semi-structured interview was chosen in order to keep the interviews flexible, as this type of interview gives the researchers enough structure to deepen their understanding in certain predetermined topics, but also it allows the researchers to be able to follow up with questions regarding new areas that are mentioned during the interview (Bryman & Bell 2003). Initially, two different interview guides were designed. The first one was structured in a way to understand the organizational culture at the department under study, Appendix B. The second interview guide was designed to answer questions regarding the topic of Lean and how the Lean implementation initiative was structured at the unit, Appendix C. Both of the interview guides were designed with fairly specific topics and areas of interest, but questions were sometimes added or removed depending on the respondents' answers.

Nine interviews were carried out concerning the organizational culture at the plant and one interview was carried with the person leading the Lean implementation at the plant. The intention of the selection of interviewees was to create a sample that could be generalized to the whole department (Denscombe 1998). However, even though the choice of interviewees was done with the aim to get representatives from all different levels within the plant, the interview sample was sometimes opportunistically chosen. It was preferred from the researcher's side that the interviewees were speaking English, even though two of the interviews were carried out in German. Since the interviews were not carried out in their native language, this might have reduced the possibility for the interviewees to express themselves unhampered. Further, the interview guide had to be translated to another language which implies a risk in change of meaning of words.

All of the interviews lasted for an hour each and as memory is an unreliable tool for collecting data in interviews, they were all tape recorded (Denscombe 1998). Both researchers were present at the interviews, and while one raised the initial questions, both researchers asked follow up questions. Bjerke (2003) discusses the possibility to observe the interviewee during the interview, and claims that there is much that can be interpreted from noting his or her behaviour. Since both researchers were present, there was the possibility to observe the interviewee's behaviour and to take notes.

2.4 Data Analysis Method

In qualitative research, theories and analysis are generated during the research process, which is the foundation of grounded theory (Denscombe 1998). Further, Denscombe (1998) argues that literature disagrees about the need for structure when analyzing qualitative data, however, most experts concur on the following general procedure.

- Preparation of data, which includes converting data to the same form.
- Conversance of data, which refers to the in-depth studies of the gathered data.
- Interpretation of data. The process of coding and categorizing of the data is critical, since in qualitative research, the data collection is broad and it can be hard to prioritize and to find relevant clusters of topics.
- Verification of data. To verify data is essential in research, which refers to the secure validity and objectivity of the data. This process will be described further in section 2.5.
- Presentation of data. This part of the process includes the generation of a trustworthy summary of the identified data.

All the collected data was first converted into written text (Denscombe 1998). From the planned observations, both observers had written down their thoughts, and the result was then compared. The reason for this was to make sure that there was an inter-observer-consistency between both researches, which refers to the ambition of a match between members of a research team (Bryman & Bell 2003). All recorded interviews were listened to repeatedly, and the answers were summarized and combined with the notes that had been taken. The additional notes regarding the interviewee's actions and behaviour during the interview were also taken into consideration when concluding the empirical study. Further, the data was combined into clusters that belong to the same topics. The empirical study was then offered for review to one unit representative to ensure that the researches had interpreted the information accurately. The analysis took the empirical study into consideration, highlighted the factors that affect quality management the most and then placed them in the four quadrants in the Competing Values Framework further described in the theoretical framework,

section 3.1.1. This was done according to the effectiveness criteria displayed in an extended version of the framework, see Appendix A.

2.5 Research Quality

It should be pointed out that the researchers and the unit under study are from different national cultures. As been stated by Hofstede (1980), national background does affect the underlying assumption and culture. Even though the attempt of this study was to have an open mind towards the research object, one cannot eliminate the possibility that the research is affected by differences in basic assumptions, due to national background.

Reliability and validity are important criteria in establishing and assessing the quality of a research. However, these concepts are generally recognized for quantitative research and there have been questions raised about the application of reliability and validity on qualitative research. The meaning of these concepts has to be adapted to the qualitative research (Bryman & Bell 2003).

External reliability in qualitative research refers to the degree of which a study can be replicable, and this is difficult to achieve in a qualitative research since it is impossible to freeze a setting (Bryman & Bell 2003). Fangen (2005) discusses that the important question to ask yourself is if another researcher would discover your theories as false, rather than if they would discover the same thing. Further, Fangen (2005) argue that it is important to thoroughly describe the method for interpretation and conclusion. The intention of this method chapter has therefore been to thoroughly describe the method and the social role that the researchers have used in this action research, so that other researchers could understand and agree upon the used method.

External validity refers to the extent that the research can be generalized across social settings (Denscombe 1998). However, organizational cultures differ from each other, and the studies on other social settings will generate different results. According to Bryman and Bell (2003) it is important for qualitative researchers to produce a *thick description* – that is, rich on detail of the culture being studied. This makes it easier for others to judge whether or not the research is transferrable to their case. It has been of great importance to thoroughly describe the background of the study and to include much information about the unit in the empirical chapter. This is done in order for the reader to get a clear picture of the organizational setting. However, the researchers of this study believe that every organizational culture is somewhat different, and that the transferability to another case is limited.

3 Theoretical Framework

The theoretical framework starts with an investigation of the definition of culture and describes a framework for evaluation of organizational cultures. Thereafter, it discusses the value of empowerment for successful quality management. This is followed by a section presenting different quality management practices and the importance of corrective and preventive actions in process management. The chapter concludes with theory regarding organizational culture's impact on quality management practices.

3.1 Organizational Culture

The literature on organizational culture stresses that many companies have failed with their quality initiatives and Naor et al. (2008) argue that one possible reason for failures is the lack of understanding of the role of organizational culture. It is of great importance to understand existing cultural values of the organization before any effective adaption or customization of quality practices is possible (Naor et al. 2008; Zu et al. 2010). Further, parallels have been drawn between organizational culture and operations management where Nahm et al. (2004) claim that people's beliefs indirectly influences existing practices and therefore also manufacturing performance.

It has been known for a long time that underlying value systems influence people's actions and behaviours (Jinhui Wu et al. 2011). There exist many explanations of what organizational culture is, but this research will use the definition of culture stated by Schein (1984) that has been widely cited in literature. He defines culture as "a pattern of underlying assumptions that the given group has developed in learning to cope with problems of external adaptation and internal integration. They have worked well enough to be valid, and therefore, they are taught to new members as the correct way to perceive, think and feel in relation to these problems." The underlying, basic assumptions are the things that we all take for granted and consider as the truth, since we cannot picture other ways of thinking (Schein 1984).

Schein (1984) describe that organizational culture can be analyzed at three levels, see Figure 1. On the highest level, there are the visual artifacts of the organization which includes the structural settings of an organization with its technology, office layout, audible behaviours etc. These are easily observable, but as an outsider you will only understand *how* organization behaves but you rarely can understand the underlying logic of *why* it behaves the way it does, and therefore it is hard to analyze an organizational culture only based on this level. On the second level of organizational culture, there are the cultural values of the organization. Values are communicative and people of an

organization are aware of these, such as company philosophy, norms and justifications. On the third level of organizational culture, one can find the basic assumptions. These assumptions are lying so deep that the involved people cannot imagine what the alternative would be. It can therefore be hard to observe and ask straight questions about these assumptions, since people might not even understand the question. Liker and Hoseus (2008) discuss that it is not necessary for people to think in exactly the same way, but it is important that there are shared core values and that everyone agrees about how to carry out work.

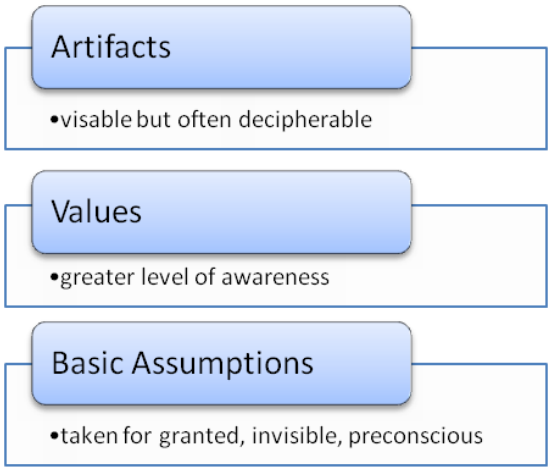

Figure 1. Model of organizational culture, developed by Schein (1984).

In general, one can say that culture is defined at different dimensions according to population as can be seen in Figure 2 (Liker & Hoseus 2008). Both the national and industry culture will influence the organizational culture. The national culture is influencing people's perception of the world, and it represents the cultural mental programming that nationals tend to have in common (Hofstede 1980). He has defined national culture in four aspects and these are power distance, uncertainty avoidance, individualism vs. collectivism, and masculinity vs. femininity. Further, Hofstede (1980) discuss the problematic situation of multinational organizations, since the organizational culture has to either adapt to local settings or try to change it.

Within the organization there will exist different subcultures. An organizational culture is the articulated culture for the whole company, and even though it is meant to be equal all over the business it most likely differs between different departments and units (Liker & Hoseus 2008). Schein (1984) argues that if an organization has a structure with functional, divisional or geographical subgroups, the organization will exist of multiple cultures. The occupational background can affect the culture and therefore an organization can have an engineering culture, a marketing culture and a labour culture existing within the same company.

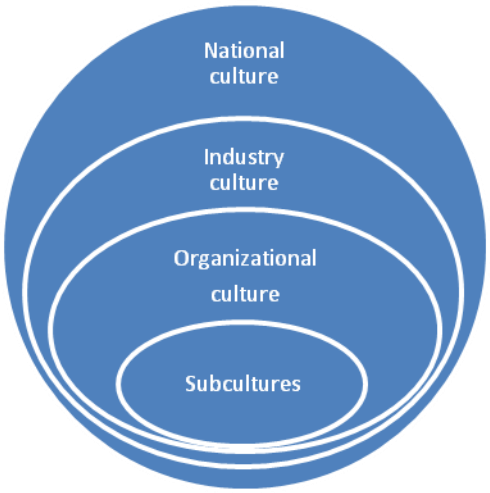

Figure 2. Different cultural populations and their impact on organizational culture, freely interpreted from Liker and Hoseus (2008).

3.1.1 Competing Values Framework

The assessment of organizational culture is widely discussed. Cameron and Quinn (1999) argue in their research that there have been numerous attempts to assign culture with dimensions and attributes, and they claim that one reason for this is the extremely wide scope that is included in the definition of organizational culture. It is almost impossible to include every relevant factor since there is always something more that could be argued to be of interest. Further, Denison and Spreitzer (1991) identifies a shortage of models assessing organizational culture while performing organizational development. The reason for this lack of integration could be firstly the difficulty of measuring the organizational culture and secondly the reluctance of dividing and sorting organizational cultures into clusters. However, Denison and Spreitzer (1991) claims that the Competing Values Framework, developed by Quinn and Rohrbaugh (1983) is a model that has shown promising for this purpose. It is a framework which serves as a tool to analyze organizational cultures. The Competing Values Framework has been proven to have validity, since it has been empirically derived, and it also integrates dimensions which have been proposed by various authors (Cameron & Quinn 1999). This framework has a number of purposes and among others it indicates what concepts that are most vital in construction of organizational effectiveness and describes two dimensions of organizational analysis and what values they consist of. The Competing Value Model was initially developed for research on indicators for effective organizations (Cameron & Quinn 1999). Denison and Spreitzer (1991) discuss 30 factors derived from research of effectiveness, carried out by Campbell (1977), as an area closely related to organizational analysis. They claim that those are counterparts of each other since when it comes to analysis of an organization it is more or less

measured in effectiveness. Further the research carried out by Quinn and Rohrbaugh (1983) conducted an empirical research where 15 out of the 30 effectiveness criteria were chosen. Those criteria were then analyzed and plotted on the graph in Figure 3. The graph with the supplemented 15 criteria can be found in Appendix A. Foremost, the framework developed by Quinn and Rohrbaugh (1983) offers an overarching framework for guidance when trying to assess organizational culture. Further, Denison and Spreitzer (1991) argues that the Competing Values Framework "focuses on the competing tensions and conflicts inherent in many human systems".

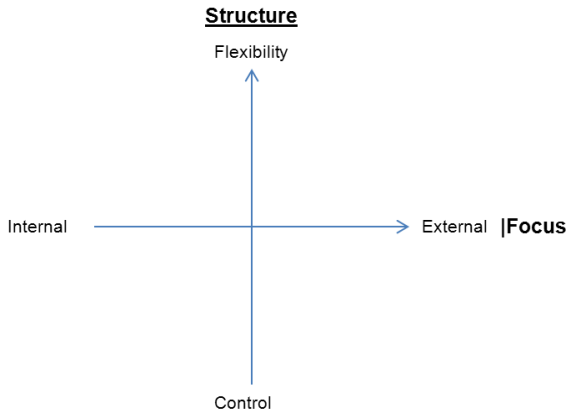

Figure 3. Competing Values Framework, freely interpreted from the model developed by Quinn and Rohrbaugh (1983).

The two dimensions which the framework is based on are structure (flexibility-control) and focus (internal-external), and they are arranged in a coordination system as can be seen in Figure 3. The horizontal x-axis reflects the different focus of organizations in terms of person orientation (to the left) or organizational orientation (to the right). When person oriented, an organization is viewed as a socio-technical system (STS) where the employees have their own feelings while the latter one see the organization more as logically designed tool with the purpose to perform its task and reach the set goals (Quinn & Rohrbaugh 1983). Further, Cameron and Quinn (1999) argue that some organizations seem to be effective if they have harmonious internal characteristics, and a consistent way of working. Other companies are seen to effective when they interact with the external environment. The vertical axis is concerned about the existing structure, whether the organization prefers stability and control or flexibility and change. For some companies, both the organizational structure and the product mix are rapidly changing, while others are seen as effective when they have a stable and predictable structure (Cameron & Quinn 1999). At a first glance on the coordination system it seems like it would not be possible to be on both sides of an axis since this would be contradictions. However, it is important to point out that even though an axis represents different concepts, which appear to be the opposites of each other, it is although not impossible for

an organization to contain a bit of both at the same time e.g. flexible yet stable (Denison & Spreitzer 1991). As an example, an organization can both focus on high performance by satisfying external customers while at the same time invest in development of the internal workforce.

3.1.2 Culture Types

For the Competing Values Framework to be of greater use in this research it would be desirable to structure it even further. Quinn and Kimberly (1984) offer a version of the framework that bring together the strategic, political, interpersonal and institutional aspects of organizational life. This is done by arranging the values and interpretations that defines an organization and the extended model facilitates the examination of organizational culture (Denison & Spreitzer 1991). Quinn and Kimberley (1984) combines the original framework with four types of major models in organizational theory; group culture, developmental culture, rational culture and hierarchical culture, see Figure 4. Those four cultures are discussed by Naor et al. (2008) and described as:

- The group culture emphasizes flexibility and focus on the internal organization. Organizations adopting the group culture focus on collectivism through teamwork.
- The developmental culture emphasize on growth, resource acquisition, creativity and adaptation to external environment.
- The rational culture has an external focus but is control oriented, meaning that it emphasizes on goal achievements, performance and productivity.
- The hierarchical culture focuses on the logic of the internal organization and its stability, and motivating factors are security, procedures and rules etc.

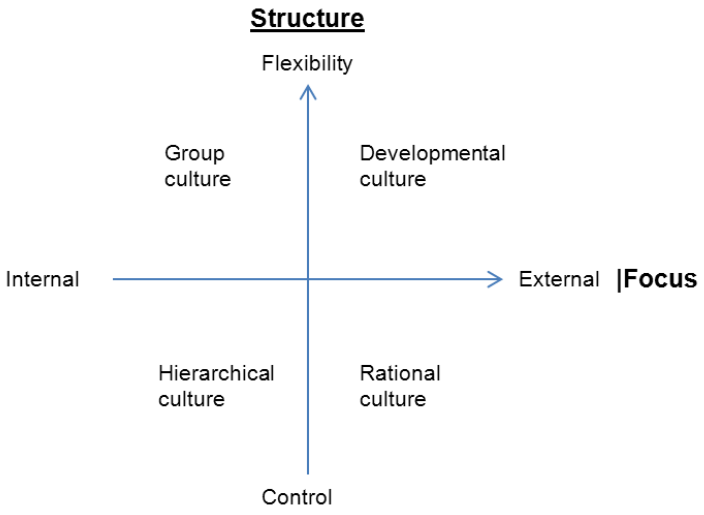

Figure 4. Extended and combined Competing Values Framework.

The group culture is characterized by empowerment, consensus, and participation. The leadership is supportive and it demonstrates a true concern for employees' ideas (Zu et al. 2010). In the group culture, the development of people and learning is important, and the culture emphasizes the long-term benefits of educating human resources (Denison & Spreitzer 1991). Further, Naor et al. (2008) state that teamwork activities and knowledge sharing are central aspects of the group culture and this creates a common language that breaks barriers between departments.

The developmental culture is a culture with a high flexibility focus that emphasizes on changes due the external environment. These organizations intend to delight their customers by offering innovative products and creative solutions to their customer's problems. Cameron and Quinn (1999) states that this type of organization encourages individual initiatives and courage from employees and the leaders are risk takers. According to quality management it is important to have a strong focus on satisfying customers, and Naor et al. (2008) state that companies need to possess a high level of flexibility to adapt to faster changing customer needs.

The rational culture also has an external focus but it emphasizes on stability and control. This type of organization is very result oriented and they try to achieve a competitive advantage by goal achievement and high productivity (Denison & Spreitzer 1991). The leaders of these organizations focus on competitiveness and winning market shares (Cameron & Quinn 1999).

The hierarchical culture has an internal focus and emphasizes control. In the hierarchical culture there is a formalized way of working (Cameron& Quinn 1999), and they have clear guidelines for how to perform work. In these types of organizations employees feel comfortable with following procedures and rules (Zu et al. 2010) and the underlying belief is that the key to effectiveness in the organization is to have formal structure and roles (Quinn & Kimberly 1984).

Distinguishing different organizational cultures can be done by using many different dimensions. An additional way of differentiate between cultures is to consider the relation between exploitation and exploration as suggested by March (1991). Exploration of new possibilities is about innovation, variation, discovery and experimentation whilst exploitation is more about exploiting old certainties such as refinement, efficiency and execution. Too much focus on exploration might lead to high costs without correspondent gains, while exploitation might lead to a suboptimal but stable state (March 1991). Those two different views of the competing values framework and exploration versus exploitation that origin from Quinn and Rohrbaugh (1983) and March (1991) respectively, could be related to each other where exploration is equal to a developmental culture while exploitation is more associated to a rational culture. A group culture is naturally connected to team work and every

employee's participation, while a hierarchical culture is in relation to the degree of empowerment among the people, the latter one is elaborated more on in the following section.

3.2 Empowerment

Due to tougher conditions and raised pressure from the environment, companies have to perform on their very edge which implies that the expectation on the managers goes up (Robinson & Schroeder 2004). The increasing competition forces many companies to operate in survival mode where not much time is available for thinking about the results beyond next month. Robinson and Schroeder (2004) argue that the solution to this problem is closer than realized – it is within the people who perform the actual work and can see problems and opportunities on a daily basis. The ideas and thoughts from employees are more valuable than managers think. Historically it has been, and still is, common to hear the comment that the operator should not think, they should do. According to Robinson and Schroeder (2004) the making of ideas should be part of everyone's work, no matter if the person is an operator, a middle manager or a senior leader. In order for this process to take place the people within the organization has to feel empowered.

Empowerment of employees is a popular concept in many organizations. Quinn and Spreitzer (1997) argue in their article that empowerment leads to effective, innovative and transformational people that is needed in an escalating, global market with rapid changes in technology. Conger and Kanungo (1988) compare the view of empowerment from management and psychology literature and claims that management theorists have seen empowerment as a set of techniques without sufficient attention to its nature or underlying processes. There is often an assumption that empowerment is the same as top down delegation power to subordinates and that no further action is needed (Quinn & Spreitzer 1997). This view is referred to as mechanistic by Quinn and Spreitzer (1997). Psychology literature on the other hand is considered to more often relate empowerment to beliefs that are internal to an individual where power and control are used as motivational factors (Conger & Kanungo 1988) and is called an organic approach by Quinn and Spreitzer (1997). According to Quinn and Spreitzer (1997) these concepts need to be integrated in order to create a successful implementation of empowerment in an organization.

In the mechanistic view, the process of empowerment starts from the top. Managers can empower their employees by sharing information, provide structure to the organization, train people, and advocate teamwork instead of hierarchy (Randolph 1995). Information sharing is important since it raises the level of trust from the employees. When employees understand the threats and opportunities facing the organization, it will create a sense of ownership. At the same time

information will enable them to take own initiatives (Randolph 1995). Further, Randolph (1995) argues that in the beginning of an empowerment process where the organization moves from a bureaucratic, hierarchical culture, there is a need for structure and strong leaders who can show the way. Goal setting, division of responsibilities and reward systems are structural elements that will facilitate the understanding of within which frames employees can be creative and take their own decisions. It is argued by Conger and Kanungo (1988) that reward systems which emphasize innovative and unusual performance foster a great sense of efficacy. Finally, teamwork is a great factor when it comes to empowerment of employees since it will reduce the hierarchical structures of the organization (Randolph 1995). Robinson and Schroeder (2004) also give their view on how it is possible to encourage employees by rewards. Their statements derive from the belief that most people have a natural drive to fix things and will not mind to offer their ideas, even for free. People are excited to be able to help and are glad when their ideas are recognized and can contribute to the improvement of the company, therefore a simple recognition is most often all that is needed. A common mistake for a company is to offer monetary rewards for ideas since it is hard to quantify the actual benefit of a single idea as well as it might lead to unethical behaviour where managers "steal" ideas to save money (Robinson & Schroeder 2004). It is better to spread the rewards to many people in order to create harmonious working relationships among employees.

According to Conger and Kanungo (1988), management literature regarding empowerment deals with participative management techniques such as quality circles and goal setting by subordinates as ways for sharing power. Employee participation is sometimes equated with empowerment but this is not guaranteed. A participation program is a formal system which empowers people by sharing of authorization and formal power. However, for the empowerment to be effective, employees must perceive an increased self-efficacy (Conger & Kanungo 1988).

Quinn and Spreitzer (1997) argue that these mechanistic practices are not enough for an organization to become empowered. They claim that empowerment is not something that managers do to their employees, but that it is something fundamental within people that relate to believes and personalities. Empowered people feel free to perform their task as they choose. They feel a sense of meaning in what they do, that they can impact decisions and that they are being listened to. Quinn and Spreitzer (1997) have identified three barriers in an organization that prevents people from feeling empowered. The first barrier is the bureaucratic culture, which refers to a multilayered, hierarchical organization that strives for maintaining the current state and status quo. The second barrier is the multi-levelled conflict that can appear when different department sub-optimize their performance. Third, it is the personal time constraints that counteracts with empowerment. People

who work under stressful conditions have difficulties to think about innovative ideas, or to initiate new concepts. In times of layoffs and cutting costs, one person can sometimes do the work of two, and this can be devastating to empowerment.

Consequentially, an organization needs to combine the mechanistic and organic view to create true empowerment among employees. There is a need to facilitate structures and practices within the organization, but the empowerment of people come from within themselves. Leaders can only create empowered employees by first feel empowered themselves (Quinn & Spreitzer, 1997). Therefore, top management needs to reflect upon their own behaviour and feeling of empowerment, in order for the change of mindset to take roots in an organization.

3.3 Quality Management Practices

Flynn et al. (1994) define quality management as an approach for achieving and sustaining high quality output. The quality management philosophy can be characterized by its principals, practices and techniques, Figure 5. Dean and Bowen (1994) conclude in their research that quality management is based on three major principles which are customer focus, continuous improvements, and teamwork.

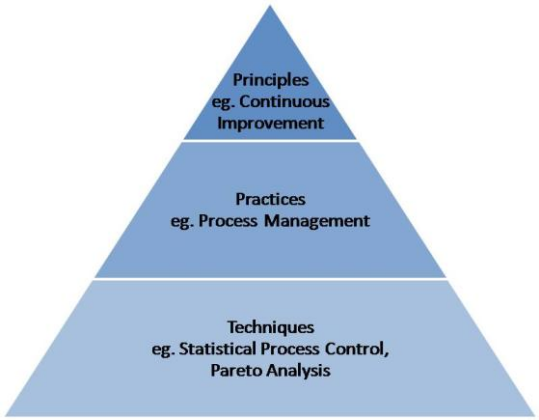

Figure 5. Figure demonstrating different levels of quality management, interpreted from Sousa and Voss (2001).

There have been many attempts to categorize practices of quality management and many frameworks have been documented (Kaynak 2003). For example, some authors use the Malcom Balridge National Quality Award as a framework (Samson and Terzioviski 1998). Even if many use different names for their practices, Kaynak (2003) has showed that there are similarities between them. This thesis will use the classification from Flynn et al. (1994), who organize quality management practices into seven dimensions, which have widely been used in quality management research. These dimensions are; top management support, customer relationship, supplier

relationship, workforce management, quality information, product/service design, and process management, Table 1. These practices have been divided into two further dimensions which are infrastructure and core quality management practices (Naor et al. 2008; Zu 2008). Core quality management practices are seen as hard and methodology oriented practices while the infrastructure quality practices are treated as soft, people- and culture oriented practices.

Table 1. Description of quality management practices, based on the division made by Flynn et al. (1994).

Infrastructure Quality Management Practices	**Description**
Top Management Support	Top management accepts quality responsibility; is evaluated on quality; participate in quality improvements efforts; makes strategies and goals for quality.
Customer Relationships	Measure customer needs and expectations; involve customers in quality improvement; determine customer satisfaction.
Supplier Relationship	Rely on a small number of suppliers; involve suppliers in product development; evaluate suppliers based on quality; provide training and technical assistance for suppliers.
Workforce management	Recognize employee performance on quality; encourage team work; provide training; involve employees in quality decisions.
Core Quality Management Practices	
Quality Information	Collect timely data on quality defects; quality data are available to managers and workers; quality data are used for quality improvements.
Product/Service Design	Thorough review before production; involve multiple departments; simplify design; design for manufacturability.
Process Management	Use SPC; design mistake proof processes; preventive maintenance; clean shop floor, meeting schedules.

Sousa and Voss (2001) argue that the practices level is best suited for empirical analysis, since principles can be too wide, and techniques can be too detailed. It is not feasible to compare different quality tools and techniques to each other, since many tools can be connected to the same type of quality practice. A company can be involved in Statistic Process Control (SPC) which is a technique that supports the process management practice, while another can use process data collection and have the same practice in mind. Practices are the observable targets of quality management that managers work with (Sousa & Voss 2001).

Many studies have tried to determine which of the practices that have most influence on quality performance. Jinhui Wu et al. (2011) point out a trend in resent research literature towards emphasizing the importance of infrastructure quality management practices and they state that the focus concerning quality management practices has made a shift from hard factors i.e. tools and techniques, towards softer factors such as culture and mindset. One example is Naor et al. (2008) who conclude in their study that the enhanced operational performance is directly affected by the organizational culture and infrastructure quality management practices but not by the core quality management practices. Also, Samson and Terzioviski (1998) support this argument by claiming that soft factors such as leadership, human resource management and customer focus were positively related to performance.

However, Zu (2008) discuss the importance of both types of quality management practices being present, and refers to the STS that view an organization as an open system consisting of two interacting subsystems: a technical subsystem and a social subsystem. The STS provides a useful explanation for why both types of quality management practices are necessary for a good quality performance, since core quality practices can be categorized in the technical subsystem, while the infrastructural quality practices belong to the social subsystem. Zu (2008) concludes that “from the perspective of the STS theory, the infrastructure quality management practices and the core quality management practices interact and both have to be established for successful quality improvement”. Dean and Bowen (1994) also discuss the importance of considering both social and technical aspects for organizational success. Especially, they argue about the importance of both aspects being present in the management of process quality. Kaynak (2003) is opposing Naor et al. (2008) in his view on infrastructure and core practices, and states that infrastructure quality management practices are supporting the core quality management and therefore indirectly affecting the operational performance. He claims that process management and product design are directly contributing to quality performance, while the other practices are supporting them. Moreover, the world wide known Lean approach is derived from Toyota’s production system and it also emphasizes the

importance of having a supportive culture in addition to tools and techniques (Liker, 2004). Further, Liker (2004) describes how the employees in successful plants in Japan make use of and work according to the tools, and at the same time it is clear that the work goes beyond only applying the tools and techniques of Lean Manufacturing. It is a system which encourages, supports and even demands employees' involvement. Liker (2004) describes the Toyota Production System, and therefore Lean, as a system designed to provide tools for employees to continuously improve their own work which implies that it consist of more than only the tools themselves.

3.3.1 Infrastructural Quality Practices and Quality Performance

Many authors discuss the importance of leadership commitment when implementing quality practices and Samson and Terzioviski (1998) even claim that this is the element which is considered to be the driver for quality development. Kaynak (2003) also finds that management support has a significant role in the implementation of other quality practices. By supporting quality management, managers establish an environment where quality performance is rewarded (Flynn et al. 1994).

Relationships with suppliers and customers outside of the own organization are considered to be important. Customer focus is one of the principals of quality management and it is necessary for high quality performance to emphasize customer relationships (Flynn et al. 1994). Naor et al. (2008) state that the involvement of customers influence the quality performance by improving initial design, determination of specifications and tolerances, and by simplifying the process of design of new features. Kaynak (2003) also emphasizes the importance of supplier relationships and state that this practice is positively influencing other quality management practices and therefore has an indirect impact on quality performance, but that is also directly correlated to inventory performance.

Further, Flynn et al. (1994) state that teamwork and group problem solving skills are both important parts of quality management, since it increase the efficiency in decision making by decentralization. Organizations that have developed their workforce management practice empower their employees and give them the confidence to attack problems themselves, rather than to turn to a supervisor (Naor et al. 2008).

3.3.2 Core Quality Practice and Quality Performance

The core quality practices are quality information, product design, and process management. Their influence on quality performance has been debated, but they are generally seen as important constructs for achieving high performance (Kaynak 2003). Quality information deals with bringing feedback to employees about the quality performance of the processes. Feedback is important for

people in order to reach set quality goals (Flynn et al. 1994). One example suggested by Naor et al. (2008) on how to increase the level of feedback in production is by using control charts on the shop floor as visual information to employees. Further, it is important that processes provide information about their state and give warnings of early breakdowns (Flynn et al. 1994). Kaynak (2003) claims that the use of quality reporting methods support other quality management practices, such as process management.

Further, the product design influences the quality performance (Kaynak 2003). As product design will influence the perception of quality of the customers, Flynn et al. (1994) state that product design is correlated with all critical dimensions of quality and the design weakness is often a source of product failure. Zu et al. (2010) argue that cooperation between departments is important for high quality product design. Flynn et al. (1994) mention many important components of product design quality, such as concurrent engineering, design for manufacturability and robust design.

Process management is concerned with managing and optimizing the manufacturing processes in order to perform as expected despite workforce variability (Flynn et al. 1994). Naor et al. (2008) state that by having a disciplined process management it is easier to detect flaws earlier in the process when they are easier to correct. Therefore, process quality will increase in terms of reduction of scrap, rework, and production costs (Zu et al. 2010). This argument aligns with the need for preventive actions combined with corrective actions, supported by Cheah et al. (2011) and Sirkin and Stalk (1990), see section 3.4. Process management also involves the definition and documentation of process procedures, including instructions for how to handle machine operations and to be available at each working station (Flynn et al. 1994). Further, Flynn et al. (1994) argue that keeping a clean workplace, such as applying 5S methods are part of good process management.

3.4 Corrective and Preventive Actions

Many, if not all, of the different set of quality management principles includes process improvement. In general, process improvements can be done either by corrective or preventive action (Motschman & Moore 1999). These actions involve identification as well as evaluation of a problem or a potential problem. It also includes actions to prevent future problems (Motschman & Moore 1999). Sirkin and Stalk (1990) explain a problem solving loop which includes both corrective and preventive action and which has proven to be a successful approach to manage and develop operations, Figure 6.

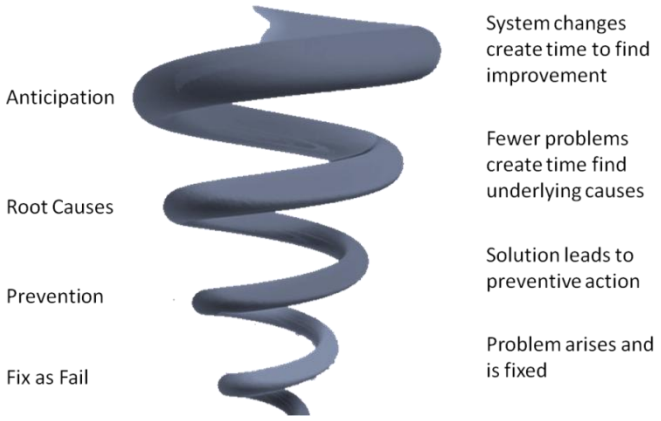

Figure 6. Problem solving loop freely interpreted from Sirkin and Stalk (1990).

The problem solving loop consists of four parts which are fix-as-fail, prevention, root causes and anticipation. Every company engage in the fix-as-fail loop, i.e. not sending defect products to customer, and it is considered the most basic type of problem solving (Sirkin & Stalk 1990). However Sirkin and Stalk (1990) also states that some companies get stuck in the fix-as-fail problem solving mode and will therefore perceive limited gain when it comes to productivity. In order for an organization to move on to the next part of the loop it has to develop processes for avoidance of the same problem arising again. This often implies investments in more resources. However, when an organization is able to reduce the scrap cost, the total productivity increases (Sirkin & Stalk 1990). Flynn et al. (1994) also states that it is of great importance to make sure that manufacturing processes run without breakdown and how preventive maintenance can make the process run smother. There is always a cost for quality, either as an internal/external failure cost or as a prevention cost (Cheah et al. 2011). Cheah et al. (2011) agree that when a company puts additional resources into preventive activities it will decrease their spending on failure costs. The third loop is about finding underlying causes for problems that has arisen in production. Sirkin and Stalk (1990) discuss the importance of finding root causes and how it can be favourable to let operators, not managers, perform this work. The fourth loop concerns the importance of anticipating problems before they arise and discuss how it can create competitive advantage and it request that the organization is much aware of their customer needs. Lengnick-Hall (1996) emphasizes the importance of involving the customer in the company's process in several ways in order to create a better product and therefore a more satisfied customer.

It is of great importance not to move too fast between the different loops and to make sure every employee follows and are involved and aware of each step. The progress takes time and the whole organization needs an understanding for example the prevention loop before moving to the loop of root causes (Sirkin & Stalk 1990).

3.5 Impact of Organizational Culture on Quality Management Practices

Much of the literature discussing the cultural impact on quality management practices is published fairly recently. Jinhui Wu et al. (2011) argue that quality management practices are dependent on their context and investigate how organizations can adapt quality practices to their existing cultures. Irani et al. (2004) agree that an appropriate culture is needed to support quality practices, with TQM as an example. Even though TQM alone is a whole concept, it has to be aligned with the existing cultural setting at the company where it is implemented (Irani et al. 2004).

In order to customize the appropriate quality practices it is necessary first to define the existing values and organizational context. It could be done in several ways, see section 3.1, and Jinhui Wu et al. (2011) adopt the thinking of exploration vs. exploitation developed by March (1991). Jinhui Wu et al. (2011) define different types and levels of quality culture maturity and suggest when to use more of an explorative or exploitative approach. The approach that makes a company perform best is dependent on whether or not it has an accepted quality culture which is interlaced with its organizational culture. In an organization where the quality culture is not fully developed, the quality exploitation is mostly used. This approach is highly related to performance outcome, as it relates to the development of existing procedures and processes. In an organization where the quality culture is strong, the focus rather lays on quality exploration which is related to operations performance and the development of new processes (Jinhui Wu et al. 2011). A company needs to control stable and familiar processes which are referred to as quality exploitation. But in the tough market today, companies need to improve their quality as well, that is done by innovation and exploration of the unknown. Jinhui Wu et al. (2011) further state that the quality management practices needs to be embedded in a supportive quality culture. When an organization would like to introduce TQM but lack an appropriate supportive culture the initiative will most likely fail. For instance, if employees do not feel empowered they might be afraid of stopping the production line right away when a defect product becomes visible.

Even though many studies have stated that organizational culture has an impact on quality management, few of them has made any further statement of the explicit relation in between the two topics. Naor et al. (2008) argue that group, development, and rational cultures are associated with higher level of quality infrastructure, which can be a useful insight for managers who can align their implementation of quality infrastructure practices to their existing cultural context. Further, Zu et al. (2010) systematically examined the relation between organizational culture and quality management and offer a conclusion where the four different cultures earlier mentioned are linked to

the practices of TQM and Six Sigma. The connections which were shown to be of importance are displayed without any weighing in Table 2, and thereafter discussed in the following section.

The cultures that prove to be of most important for successful implementation of quality management practices are the group culture and the rational culture which got seven and nine connections respectively. For overall implementation of quality practices the group culture with emphasis on commitment and cooperation act as an important supportive culture type. Zu et al. (2010) state that the group culture involves creating an environment in which participation, trust and concern for human development is promoted. This implies that people are more prone to participate in continuous improvement and should be rewarded for it, but also that in this kind of culture there is training and education in place. The rational culture on the other hand comprises productivity and goal achievement which correspond well to the Six Sigma way of working with clear structure for good orientation. The development culture also appears to have a connection even though it is only to one of the practices examined. It is claimed that the focus of individuality in the developmental culture supports Six Sigma's approach with different roles with specific training. The hierarchical culture did not show to have a significant link to the quality management systems tested. It is therefore considered as the one of these cultures which is of least importance when implementing quality initiatives. This lack of significance of hierarchical culture for organizational effectiveness is supported by previous studies (Cameron & Freeman, 1991). As mentioned, Zu et al. (2010) offer a concrete solution where the different culture types are related to the practice that is suitable. This is useful in the opposite way in this study where the culture at the unit under study will be determined in order to suggest appropriate quality practices.

Table 2. The connections between culture and TQM/Six Sigma practices derived from research of Zu et al (2010).

	Group culture	Developmental culture	Rational culture	Hierarchical culture
Top management support	X		X	
Customer relationship			X	
Supplier relationship	X			
Workforce management	X		X	
Quality information			X	
Product/service design	X		X	
Process management	X		X	
Six Sigma role structure		X	X	
Six Sigma structured improvement procedure	X		X	
Six Sigma focus on metrics	X		X	

The table above shows a relationship between rational culture and customer relationship since the value underlying a rational culture foremost is control which facilitates for control of quality conformance and set goals for the future. The group culture is meant to facilitate the supplier relationship because of the linkage between trust and commitment between the both. The workforce management practice implies that employees should be motivated and involved which is found to be supported by the group and rational culture since their values include training and education of people, participation and performance based incentives. As can be seen in the table the rational culture alone supports the TQM core practice of quality information while both a rational- and group culture together supports the practices of product/service design, process management,

Six Sigma structured improvement procedure and Six Sigma focus on metrics. According to Zu et al. (2010) this indicates the importance of a rational culture for the organization to make use of quality management tools and techniques. The group culture is simultaneously needed to support the cooperation and development of individuals. This conclusion is matched by the statement of the authors Shea and Howell (1998) who claim that "successful quality management implementation requires a company to provide employees with the freedom, autonomy, and range of skills to engage in creative and effective continuous improvement activities, while at the same time encouraging the usage of a systematic standardized problem-solving approach to use quality tools to control its system and processes"- a mix between control and flexibility. As pointed out before, different culture types open up possibilities for different quality management practices, an organization which has emphasis on a developmental culture might find it easier to establish the Six Sigma role structure. At the same time, an organization with more focus on goal achievement (rational culture) might have better conditions to use the core TQM and Six Sigma practices in order to ensure consistent and effective application of quality improvement with tools and techniques.

4 Empirical Study

The empirical study serves to give the reader an understanding of the current state at the unit of research. Along with the theoretical framework it will serve as a base for the analysis. At first, the company's global culture is explained in order to clarify what culture the unit strives for. Thereafter the work which is related to quality management will be described together with the understandings from the research on the unit's culture type.

Hilti is a global supplier of power tools to the construction industry. They have the reputation of having high quality products, which has made them the premium brand that they are today. People at Hilti are proud of their great culture, and they have won awards such as Best Workplace 2011 both for Switzerland and abroad, where the employees rank their employers. Hilti's headquarter is located in Schaan, Liechtenstein where they also have one of their production plants – Plant 1. Within Plant 1 (P1) there are many units and the study is carried out in one of these units. As the company is a global corporation it also has several production plants on other locations around the world, such as Germany, Mexico and one that recently has opened in China.

4.1 The Desired Hilti Culture

Many companies, including Hilti, have an articulated culture which is supposed to spread and impregnate to divisions all over the organization. At Hilti the defined corporate values are integrity, courage, teamwork and commitment. These values are described and elaborated upon in the Hilti Management Guide, and indicate that Hilti would like all their employees to act with integrity and be open and honest in what they do. They should also demonstrate courage, which refers to the need for every employee to break habits and think and act in new ways. Further, teamwork plays an important role in the Hilti culture where the employees should be able to have an open communication across the organization, where feedback between people are praised and everyone is treated with respect. The fourth value, commitment, refers to the aim for making employees feel responsible and accountable for their task. This emphasizes the importance of creating a sense of ownership and to give employees the empowerment to act self-dependent. As stated in the Hilti Management Guide, the company wishes to set the individual in the first room and put emphasis on that it is the people and their development that will drive the company's success. At Hilti there exists a plan on how to take care of and develop people and it is stated that the company expects high performance from its team members, who should of course be given the right incentives. The investment in people demands effort and resources. At Hilti they have developed what they call the Culture Journey where every employee is given time to study and be educated in the corporate

culture. Even though the company's culture is appreciated and can be noted through the company, there are deviations from the defined corporate Hilti culture at many of the departments within Hilti. This has been confirmed by several parties within as well as outside the unit.

4.2 Structure of the Unit and its Quality Management

The unit consists of 43 direct productive employees and 19 people working in the office. A simplified structure of the unit can be seen in Figure 7 below. There is a unit manager who is responsible for the unit's overall activities. The coaches are responsible for different production areas as well as for a team within this area consisting of both employees working administrative in the office as well as operators on shop floor. The engineering and development function is working with technical development of the production, e.g. machine and material improvement. The quality team focuses on quality control and makes sure that products that leave the plant meet set standards and expectations. There is quality control after each production step as well as an extensive application test on the finished product. The unit manager, coaches, quality team and the engineering and development department are referred to as "office employees" or "management team" in the following text, while the operators are sometimes referred to as "shop floor employees".

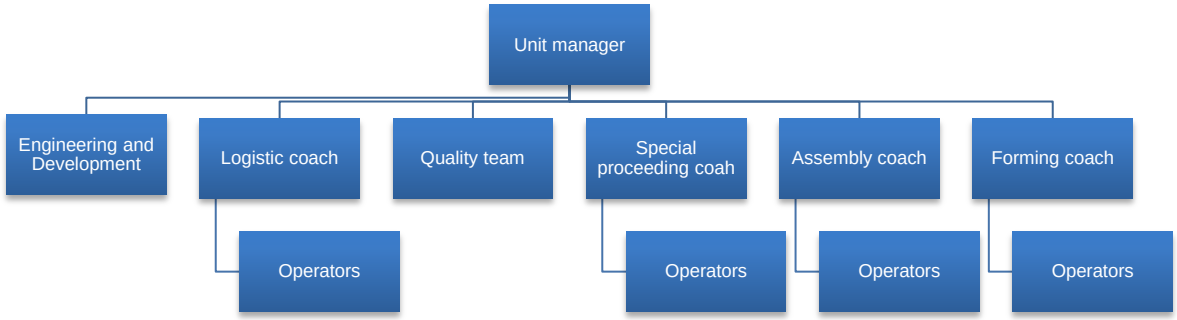

Figure 7. Simplified organizational structure for the unit under study.

Further, there is a general quality management function steering the overall quality work for all the units within the plant. The responsibility of this function is to be in charge of issues such as quality audits, but they also intend to launch Six Sigma as a way to work with larger quality projects in a more structured way. There are a number of Six Sigma projects running in the plant at the time, however, there are none at the unit under study, and the majority of the employees are not familiar with the methodology. There have been Six Sigma initiatives at the plant before, but they did not show the expected result, which according to one employee is partly explained by a lack of management commitment for these initiatives. There is no clear distinction of the division of responsibilities between the quality team at the unit level and at the plant level respectively.

However, according to the unit manager it is important to have a quality department close to the production unit, since there are quality topics that need to be discussed daily. Being located close to one another facilitates the direct communication between the unit management and the quality function. The quality team within the unit had a shortage of employees during the period of this study. This was denoted as a big burden on the existing employees who had to focus on carrying out the necessary tasks and corrective actions, instead of paying attention to process development with regard to quality. One employee explains the current work with quality as fire fighting, since the lack of resources makes it harder to work preventive with quality.

Management believes that it is impossible to produce only non-defect parts, but that it is important to make sure that only correct parts reach the customers. Therefore the quality philosophy at the unit is to constantly satisfy customers by ensuring that as few defect pieces as possible leave the plant. To ensure that the products meet specification, great amount of quality control is applied in the production. After the majority of the process steps there are numerous tests to ensure that the products meet the preset standards. Further, when the products are completely manufactured, many application and user tests are performed. The concept of failure prevention as a contrast to quality control is not a very familiar concept and it is not a common way of working within the unit.

During the last years, there has been a venture to implement Lean production at Hilti including the plant and unit under study. The initial projects were focused on logistical flow and the introduction of Kanban cards. Quality management was not considered within the scope of Lean at that time. A new course of action, which is called Lean@Hilti, has recently been initiated. It is controlled by a centralized business unit which works explicitly to develop the core values and strategy for implementation and execution. The practical implementation is however performed together with Lean experts at each plant. The four steps in this practical implementation are 1) disturbance-free, 2) flow, 3) rhythm and 4) pull, which can be seen in the Hilti Lean house displayed in Figure 8. The Lean expert in P1 is in charge of the actual Lean projects that are carried out at the plant and is the one who plan and lead the execution of the four steps. According to the Lean expert it is important to have stable processes when implementing Lean and therefore quality management can be seen as a tool of Lean. Therefore, he argues that in some matters it is important that the development and implementation of Lean is closely linked together to the plant's quality management. This link is clear also from the centralized business unit who has introduced the first step, disturbance-free production, in order to stabilize all processes. However, from interviews it can be derived that the employees at the unit seem to be rather unaware of a possible need for a link between the Lean and quality management.

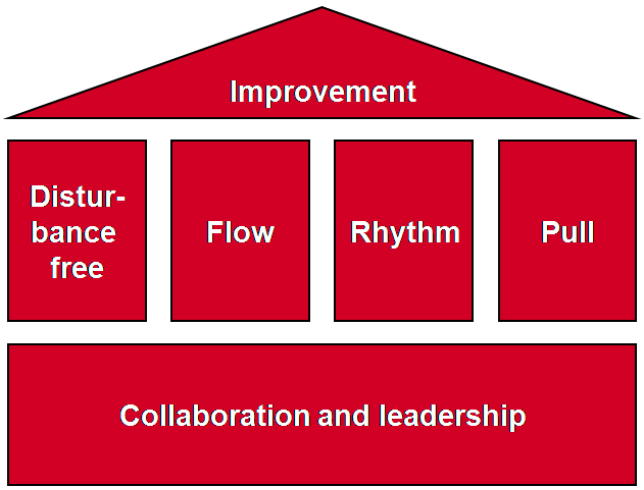

Figure 8. Hilti Lean house, Lean@Hilti.

One way of working with continuous improvement at the plant is by using so called CIP (Continuous Improvement Project), which is part of the Lean@Hilti initiative. They are used to gradually improve the work within the unit. There are different ways of performing a CIP, the one most widely used at the unit is the Speedy Quality Circle (SQC), see Figure 9. The CIPs let all employees be part of the development, and the scope of the projects are of various sizes. When a problem has been detected, an action group is formed, which then works together to solve the issue. The detected problems in the plant can be brought up by both operators and coaches. Since the CIP is part of the centralized Lean initiative, they are all arranged according to a Hilti standard, with defined project steps. Notice boards in the production show the status of these CIP's, illustrating the progress of the projects.

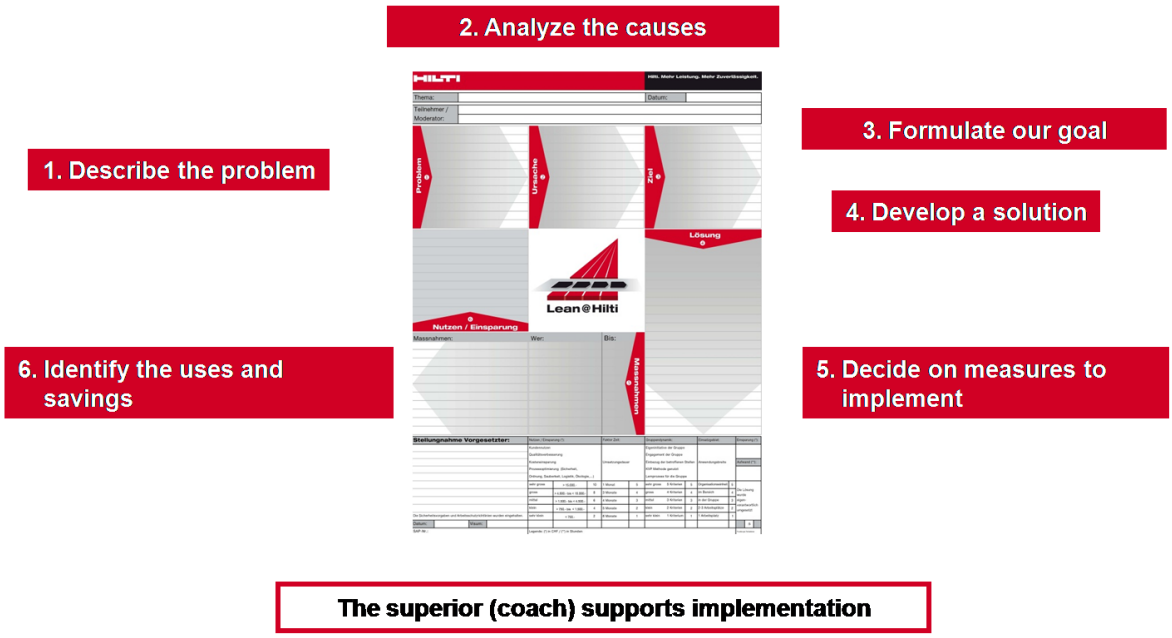

Figure 9. Speedy Quality Circle, most widely used CIP within the unit.

According to interviews, there is a shared understanding that all employees at the unit are responsible for delivering quality. It is seen as everyone's individual concern to perform their very best and in that way secure high quality. Many of the personal and group goals are connected to quality performance and this ensures that reaching high quality is a target for everyone. For example, it is stated as a goal for everyone to keep the processes in production within tolerances, which shows the high emphasis concerning quality in individual goals as well as group goals. Management agrees that it is important for the operators to gain know-how of the machines they run and therefore education is important. This is seen to decrease cost of tools and increase people's problem solving abilities. However, operators have raised their concern about lack of involvement on quality topics, and they feel the need for more and better tools to perform at their very best with regard to quality. The lack of appropriate tools could for example be old machines which are hard to control and operate in a sufficient way. During the period of this study, the production facilities have on many occasions been forced to shut down due to urgent maintenance.

People have worked at the unit for a long time, which has resulted in a great know-how of the processes, and the skills and experience of people are seen as valuable resources. However, this knowledge has led to that the tasks within the unit are often performed according to everyone's best judgment and not according to standardized processes. There are work descriptions for each process step, but they are rather general - not everything is included and some things could be interpreted in different ways. This inconsistency of work is, according to operators, due to that certain tasks are not at all stated in the work description and therefore every operator performs this task in a different manner. Other activities are defined in work descriptions, but they are not followed since they are not seen to be the right way to perform the task. Observations of the operators' work also indicate that many things are not standardized. There is a possibility that errors occurs because of unclear instructions.

4.3 Relations and Communication

The unit is described as an open environment which encourage an open communication, it is mentioned by several interviewees that "all doors are always open". One employee even states that the unit feels like a big family. The relationship between employee and supervisor is described as informal and there is a possibility for discussion. The common area for coffee breaks is situated in the middle of the plant's production which also indicates an open organization. People from the office are often seen out in production, engaging in different tasks, for example driving a forklift and inspecting the quality of pieces.

At the same time, the unit is considered to have a hierarchical structure. When a question regarding the relation between organizational levels is raised in interviews, the interviewees do not seem to understand the question at first. Some people even consider the question a bit strange which might derive from a feeling that a hierarchical structure of the organization is self-evident. One employee states that “at the end of the day, decisions have to be made, and then they are made top-down”. Since the department is based on technical knowledge, the hierarchical structure often is arranged after the engineering knowledge and the technical skills that the employees possess. It is also important for the management at the unit to have a stable and structured organization, where set plans and orders are followed. The management has a belief that too many changes and a shortage of employees will create loss of information within the unit.

There are many organized meetings at the unit, but informal meetings such as coffee breaks are also utilized. One organized meeting is the shop floor meeting that takes place every morning. In these meetings different topics are discussed every day of the week e.g. quality, logistics and Lean. However, the shop floor meetings generally include different people from the office but rarely people from the floor. Instead, these people get information from their coaches afterwards. One employee states that information that is shared within the unit has different purpose. When something is discussed horizontally there is a greater focus on knowledge sharing and understanding of the problem, while the communication vertically is more informative with a clear description of what has happened and what the consequences of this will be.

From the interviews and discussions about the focus of the unit it has been understood that there is a division between the view of the people in the office and the shop floor. This implies a difference in beliefs on how to act and behave towards a task. Operators find that the unit is more focused on rules and orders than people from the office, who feel that the unit emphasizes commitment and creativity. One employee states that creativity is mostly something expected from people in the office. However, he explains that also the operators have a chance to contribute with creativity in the CIPs.

4.4 Organizational Focus

The interviews that were held with employees within the unit were initiated with the ranking of the factors, see Appendix B. that are believed to be the most focused ones within the unit. The choice of factors and their ranking were then discussed and from those discussions it is clear that the unit puts great focus on productivity. It was also mentioned by several interviewees during the actual interview that the unit has gone from a focus on people towards a strong focus on productivity and

numbers. This is due to several reasons and foremost the tough environment which the unit operates within, i.e. the production site is located in a fairly cost intensive country. An additional factor is the fact that the company has grown rapidly during the last years which has increased the demand on production performance. The employees are much aware of the company's external environment and global position, and the high demand and focus on productivity, especially derived from the financial crisis, have forced the unit to perform better. Many employees see the current movement to low cost countries not only as a threat, but as a trigger to perform better, increase quality, and to stay on the leading edge of developing new technology. This has resulted in an environment where the focus of work is to produce. It is the researcher's interpretation that the unit, due to resource limitations, emanates from the current state and uses a fix-as-fail approach rather than looking into possibilities of improving the process. The change of focus towards productivity results in a time constraint and has the consequence that people are not allowed to be as creative in their task or spend as much time as needed on improving processes as earlier. As aforementioned, the existing improvement projects are carried out via CIP's in mixed teams. However, some people have the feeling the management style has changed slightly due to the more competitive external environment. It has gone from a management style with empowerment of the groups on the shop-floor, towards a more informative style where the manager provides clear directives. One employee states that "previously the boss was one in the group, but now the boss is more of a boss". However, it is recognized by the people at the shop floor that there has been a need for change to increase productivity, and that the change in behaviour is not due to a decision within the management team, but rather a decision from higher levels in the organization. The organization is flat and people, especially working in the office, are empowered to take own decisions in their area of authorization. This implies that the decision making within the unit is fast, while when you go outside the unit and interact with other departments, the decision making is slower.

As mentioned, the unit puts great focus on productivity and performance. It is aligned with Hilti's strategy of being innovative to stay on the leading edge of technology, and it has enforced the unit to develop products and manufacturing technologies especially developed by and for Hilti which are unique on the market. The department is considered willing to take risks, which is derived from the need of constantly being better than the competitors. As an example, the unit uses machines and manufacturing technologies that are unique on the market which implies great risk taking during the implementation and start-up phase. At the same time it is mentioned in interviews that risk taking should not be present in the operational every day work, but rather when it comes to certain projects, such as investments in new manufacturing technologies and machines.

4.5 Participation in Improvement Projects

In general there is a great amount of teamwork carried out within the unit and some people would argue that the people are highly empowered. Every employee is encouraged to participate in the CIPs and this is also very much appreciated by the employees. Some CIPs are constantly present at the unit even though the amount of projects at a time varies. This is a way to encourage people to take own initiatives and it also contributes to a sense of common involvement among the employees. There is a system with credits which is supposed to make sure that everyone is involved. When an employee participates in a CIP this is recognized and documented. However the participation level differs depending on factors such as your position in the organization, know-how and length of employment. The groups for the CIP consist of a mix of managers, engineers, coaches and operators. At times the operators are involved in the project a bit later than the rest of the group which suggests that they do not have the same amount of information and therefore not the same conditions for contributing to the group's decision. There is a shared point of view that everyone can bring opinions to the group but in the end everyone cannot be involved in the decision. However there is a split view between operators and managers whether or not the opinions from everyone are equally considered. An example of this is the work instructions for operating the machines in production. The operators can bring suggestions to the content of them but in the end it is something that is decided upon by the management team. Some people would argue there is a difference whether people would like to be creative and involved or just perform their task. The point of view whether there is room for personal development or not for the employees is torn apart, where some operators feel they have the possibility to grow on a personal level while some do not consider the environment as friendly for personal development.

4.6 Encouragement by Goal Setting

According to the company's global philosophy it is not the supervisor's responsibility to make sure that employees develop their professional and personal skills, it is up to each individual. However, the unit motivates people to develop themselves by encouraging training and education. The company has a strong culture and many employees seem to be driven and motivated by thorough commitment. There is a non monetary incentive in terms of an annual award for the best performed CIP at each plant. Once every year each employee has a meeting with his or her supervisor, where the business and personal goals for the following year are discussed and set together. There is a common understanding among each interviewee that the unit has a very strong focus on goal setting and goal achievement. It is considered as the main tool that helps them to perform better. The goals are closely related to monetary incentive in terms of bonuses, which is the prime factor for

motivation. A bonus can be given when the employee performs better than expected according to the set targets. There is also a spontaneous bonus system which will be given to a well performing employee at special occasions. The goals that are set each year consists of two parts. The first one serves to improve the employee's personal development and is also related to his or her goals for the future career. The latter part consists of business goals which should be somehow related to the unit's overall goals. The unit's overall goals are partly preset by higher instance. Apart from monetary incentives the goals also stimulates people to perform better, develop themselves and therefore increase the possibility to move forward and upwards in the organization. It seems to be a common understanding that the organization does encourage people to develop, but there seems to be no clear answer on how it is done in the operational work.

5 Analysis

In the analysis, the empirical study is evaluated based on the theoretical framework. This is done in order to draw conclusions on how future quality management should be directed. The first part of the analysis elaborates upon the unit culture compared to theory. This is followed by an analysis on the suitable quality practices for the existing culture and recommendations on how these can be further developed.

5.1 Cultural Prerequisites - Existing Culture

There is a strong need for companies to adapt their quality management strategy to their organizational culture in order to be successful (Naor et al. 2008; Zu et al. 2010). It is therefore considered to be of great importance to first understand the existing culture at the unit under study, which has been described in the empirical study. To get a better understanding of the culture it is analyzed according to the Competing Values Framework developed by Quinn and Rohrbaugh (1983).

5.1.1 Coherence between organizational culture and unit culture

As mentioned before, the Hilti culture is based on four articulated corporate values which are integrity, courage, teamwork and commitment. These values describe how the organization wants its employees to behave and act in certain situations and these values are communicated top-down to everyone inside the organization. Schein (1984) discusses the difficulty of reaching a single corporate culture since there will always exist subgroups within an organization. This implies that the existing culture at the specific unit under study deviates from the corporate culture which has also been noticed by the researchers during this study. The articulated culture has a stronger focus on empowerment of human resources and teamwork while the unit emphasize more on technical development and control. As for many larger companies, the quality management strategy is developed at a top level of the company and the directives are then communicated out to the units within the organization. One example of this is the Lean@Hilti initiative, which has been implemented at several production units within the company. Jinhui Wu et al. (2011) claim that it is important that the overall organizational management strategies support the units' context. Since the prerequisites might vary within a company it is important to align the practices within these initiatives for each unit.

There are differences in behaviour and beliefs between the employees from office and shop floor, which has been articulated in interviews as well as noted in observations. This is an indication of existing subgroups within the unit. The occupational background is a reason for differences in

cultural assumptions (Schein 1984). Employees are empowered based on their technical skill and this is due to the engineering focus of the unit. This is a possible reason for why the office employees perceive a stronger allowance for innovation and creativeness.

The closeness between the unit quality team and the unit management is appreciated by both parties and is seen to improve the communication and speed in quality. However, a lack of resources at the unit quality team has resulted in a need to prioritize between tasks, and this implies that only the most urgent matters are dealt with. Quinn and Spreitzer (1997) state that personal time constraints will affect the possibility for people to be empowered and come up with innovative ideas. The fire fighting, which is now used as the common method for selecting projects, will eventually create less empowerment at the unit. Lack of empowerment derives from the constraints on working in a creative way due to limited resources in time. Only the most urgent matters can be considered and this corrective behaviour is costly and not a sustainable approach to quality management (Cheah et al. 2011).

5.1.2 Culture type at the unit

In the theory chapter, section 3.1.1, the Competing Values Framework is described and discussed upon. Even though it consists of four quadrants with clearly defined axes it is, according to Denison and Spreitzer (1991), possible to be placed on both sides, representing contradictions. Often it is hard to evaluate a cultural setting and place it in one of the four quadrants only. There exist qualities which would place a culture in several of the quadrants, even though not all with the same strength. The analysis of the factors influencing the unit culture is displayed in the Competing Values Framework in Figure 10. The variance in strength of each quality is indicated in the figure by different sizes of the factors.

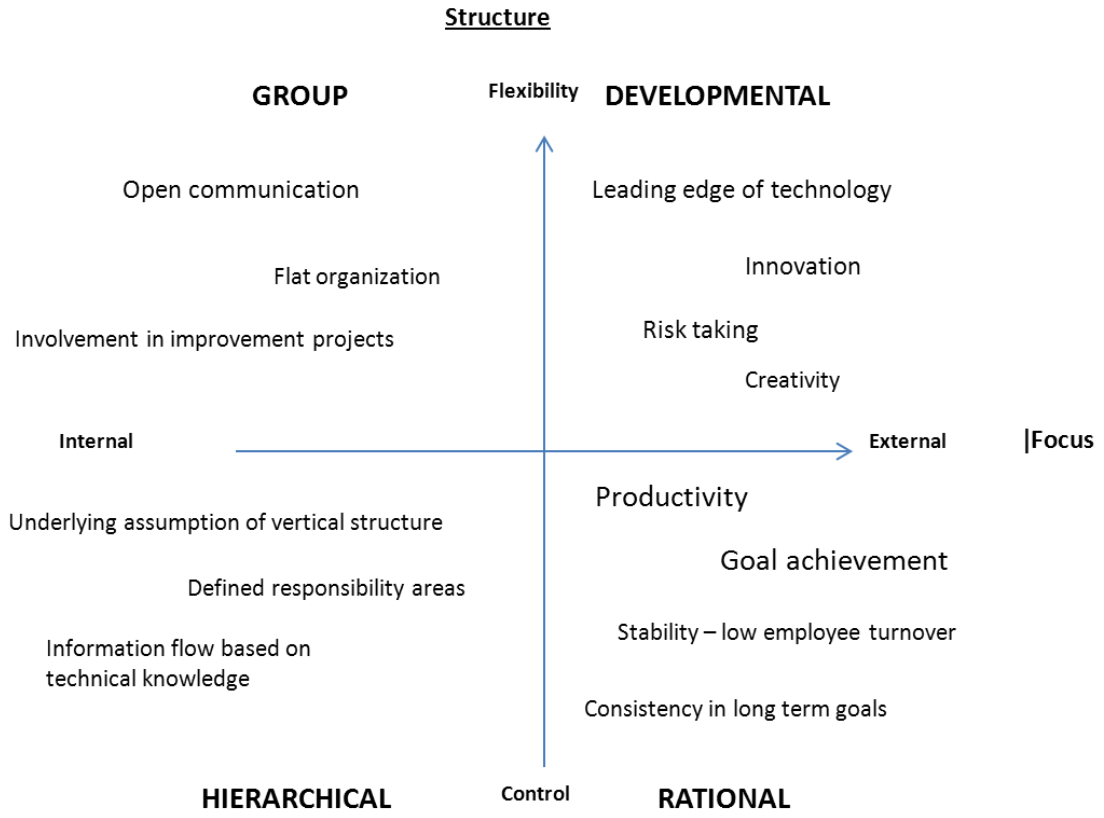

Figure 10. The unit under study placed in the Competing Values Framework.

Developmental Culture

Hilti has always focused on being on the leading edge of technology and to offer high class tools to the market. Innovation is an important part of their strategy and the unit has proven several times that they are willing to take risks by introducing unique manufacturing technologies. The unit has recently invested in an annealing facility using new manufacturing technology. This philosophy of being innovative and risk taking indicates a developmental culture as suggested by Quinn and Rohrbaugh (1983) which would also indicate a focus on exploration as suggested by March (1991). However, the unit identifies with the characteristics of an exploitative organization which are refinement, efficiency and execution (March 1991). From interviews it is clear that the employees in the office have the possibility to be creative and innovative in their task which is stated as drivers for a developmental culture (Naor et al. 2008). However, the shop floor employees do not have the same opportunity to be creative and are more focused on following rules. Robinson and Schroeder (2004) state that it is beneficial if all employees in an organization are being creative, since people can bring valuable ideas to the process.

Rational Culture

Lately, a change has been noticed where the pressure from the environment has forced the unit to put stronger focus on productivity. This is due to both an increased demand for the unit's products which requires an increased production performance as well as the fact that the unit is located in a cost intensive country which also implies higher demand on performance. The quest for realization of increased productivity is supported by the department's overall strong focus on goal setting and achievement. During the interviews and ongoing observations it has been clear that everyone is aware of and put great effort into working towards those goals. There is a clear structure in place where the goals are set from a discussion between employee and supervisor. There exist personal goals for each person as well as group and unit goals. This goal focus contributes to increased empowerment from a mechanistic perspective (Randolph 1995) since the goals let the employees understand what is being expected by them. It also provides the employees with a creative freedom of operating to reach these goals. According to Quinn and Rohrbaugh (1983) this strong focus on productivity and goals points toward a rational culture. Also, the units focus on effective production indicated a focus on exploitation (March 1991). The rational culture has a drive for goal achievement and a focus on winning market shares (Denison & Spreitzer 1991) and this is achieved through stability and control over the processes. In accordance with the rational mindset the management team for the unit agrees that stability in the organization is an important factor, meaning that both the external focus such as long term goals should be consistent, as well as the focus on low employee turnover, in order for the unit to build up knowledge over time.

Hierarchical Culture

Several people within the unit claim that decisions have to be made top down and that everyone cannot be involved. Further, horizontal communication is knowledge driven while the vertical is distinguished by only providing information, i.e. telling of what and how to do things. According to Randolph (1995) the mechanistic approach prescribe the importance of information sharing and it is also described that in order for the people to be truly empowered and perform their task, the information that is shared vertically has to facilitate peoples own initiatives rather than telling people what to do. Today the information flow is based on technical knowledge and there is an underlying ranking which tells what kind of information one passes on to another. This underlying assumption within the unit that an organization needs to be structured vertically shows a part of the organization which place itself in the hierarchical quadrant of the Competing Values Framework. There seems to be a basic assumption that a hierarchical structure is a natural way of organizing the unit, which implies that the employees cannot imagine a different organizational structure (Schein 1984).

Further, there are clear structures for what you are allowed to do. The development and revising of work descriptions is an example of something that indicates both on a placement in the hierarchical and group culture quadrant. Every employee is welcome to bring ideas on how to change the work description to the better and this open dialogue shows on a group culture where everyone is encouraged to participate. However, even though everyone can come up with suggestions it is still the supervisor or management team who take the final decision, which at the same time illustrate a hierarchical way of working, and a restriction of empowerment among employees.

Group Culture

The unit has an open communication between each other. This indicate a rather flat organization which is also supported by the fact that people help each other across organization levels, e.g. people from office are helping out in production at times which is a clear indication of a group culture. By a thorough work with Continuous Improvement Projects the unit manage to have a structured but yet involving way of working with improvement projects, where every employee is encouraged to participate despite organizational level. The credit system, which is related to participation in the CIPs, can be seen as a non-monetary incentive system which is supported by Robinson and Schroeder (2004) who emphasize the importance of non-monetary individual incentives. Further, the same authors argue how a reward should be given to a whole group rather than to an individual, which the credit system could work as a base for. Those CIPs encourages and facilitates teamwork and group dynamic within the unit. This effort to work in teams to bring forward a better solution places the unit within quadrant of group culture. According to Randolph (1995), teamwork facilitates empowerment of employees because of the reduction of hierarchical structure. In alignment with the global Hilti culture it is important that the sense of authorization that creates empowerment exists within each individual. This is explained in literature as organic empowerment (Quinn & Spreitzer, 1997). The CIPs naturally brings a certain amount of empowerment to every employee. However, involving people and delegating responsibility does not automatically guarantee the feeling of empowerment among employees (Conger & Kanungo 1988). As argued by Quinn and Spreitzer (1997) there has to be a combination of the mechanistic and organic approach in order to create true empowerment.

Due to the unit's existing way of working it possesses prerequisites which place it in all four quadrants which is not unusual (Denison & Spreitzer 1991). However, there are tendencies more towards one corner of the model and it can be concluded that the unit under study has a strong rational culture dimension. This is mostly due to its high focus on productivity and goal achievement.

5.2 Quality Management Practices Suitable for the Existing Culture

Literature agrees that organizational culture needs to be considered when developing quality management (Prajogo & McDermott 2005) and ignoring this is one of the reasons for failures of quality initiatives (Naor et al. 2008). Organizational culture can be seen as the foundation for developing quality management practices and consequentially the base for improvement of organizational performance, see Figure 11. Further, one can observe a disagreement in literature, about which of the dimensions of core and infrastructure quality management practices that are the most important for high quality performance. Zu (2008) argue that it is reasonable to believe that all quality practices are contributing to the operational success, as the infrastructure practices are prerequisites for the core practices and in that way the softer, human oriented practices are supporting the hard quality practices. In order to ensure process quality, product quality and quality information, the organization needs to develop an environment that promotes the softer infrastructure practices and supports for example top management involvement and workforce management.

Figure 11. Relation between organizational culture, quality and organizational performance.

Zu et. al (2010) argue that organizations can be viewed as Socio-Tehnical System where technical and human oriented values are combined. In order to reach high quality performance, both of these systems need to be developed. The unit under study has a high focus on technical development, and they are therefore stronger oriented towards the technical side of the STS. The empirical study shows that the focus of quality management is based on improvements of the technical process parameters and while the human impact on the process is not as emphasized. One example of this is the former attempt to implement Lean, where the attention has been on the techniques that are associated with Lean, such as Kanban systems and reduction of stock, while the underlying philosophy of Lean

and the social aspects of it have been less emphasized. Zu (2008) discuss the connection between core quality practices and the technical subsystem as well as the connection between the infrastructural quality practices and the social subsystem. As the unit's focus has been on the technical aspect it implies that core quality practices are the most influential to the unit. Liker (2004) reinforces this standpoint by underlining the importance of having a supportive culture in addition to the tools and techniques of Lean manufacturing. Since the unit under study has launched a new Lean@Hilti initiative this supports the broad and parallel focus on both core and infrastructure practices.

As aforementioned, the unit under study has a tendency towards a rational culture, due to their strong focus on productivity and goal achievement as defined by (Quinn & Kimberly 1984). As stated by Zu et al. (2010) the rational culture is supportive towards many quality practices, both infrastructure and core practices, and they argue that the strong focus on goal achievement contributes to reaching high quality goals. The unit puts most of its focus on the core practices even though Zu et al. (2010) claim that the rational culture also supports infrastructure quality practices and these could therefore be more emphasized at the unit. Further, the Six Sigma practices are also supported by the goal setting that is associated with the rational culture. It has been stated that Six Sigma projects are being launched by the plant quality department, which is something that the unit could benefit from since they have the right prerequisites in terms of organizational culture. It is recommended that the unit uses Six Sigma methodology for larger quality projects, as a part of their continuous improvement.

The rational culture supports all quality management practices developed by Flynn et al. (1994) except "supplier relationship" (Zu et al. 2010). Therefore the unit's way of working with the remaining quality management practices developed by (Flynn et al. 1994) is evaluated. Further, it is evolved upon how the unit can work in the future within each practice in order to match with their cultural setting.

Top Management Support

There is top management support in means of encouragement for participation in the unit's success and progress in work with relation to quality performance. The rational culture is positively associated with the level of top management support, since the management provides a clear vision and goals for quality. The ongoing Lean initiative at the company shows on a high level of top management support since the initiative is developed and steered from a central institution as well as having support from a Lean expert at plant level. Further, setting goals for quality, which is a

strong characteristic for the rational culture, works as a motivator for the employees to work with continuous improvement (Zu et al. 2010). Nevertheless, the support does not reach all the way to empower people to fully be creative, take own initiatives or more so, decisions. It is believed that the unit would benefit from giving full top management support by introducing a higher level of empowerment for all employees. This can only be accomplished by empowered management Quinn and Spreitzer (1997). Empowerment and a concern for people's ideas are rather characteristics of a group culture (Zu et al. 2010), and the unit should use their cultural tendencies in that quadrant to strengthen this practice. As an example, the use of the CIP structure could serve as a base for top management to support and empower employees. According to Conger and Kanungo (1988) it is important to ensure that people truly feel empowered in order to benefit the most from the resources within humans.

Customer Relationship

According to the framework developed by Flynn et al. (1994), the customer relationship quality practice means knowing the expectations from customers. Further, the importance of involving the customers in the quality improvement processes is stated by Lengnick-Hall (1996). In accordance with the rational culture, the unit puts focus on the structured way of understanding their customers. The feedback from customers reaches the unit as feedback forms, where all customer complaints are gathered. These are important to the unit management and the unit has a strong belief and understanding of that products being delivered to customers must have excellent quality. The goal is to deliver zero defect parts to the customer and therefore the unit has introduced much quality control along the process flow as well as testing of the finished product. It has been said that it is impossible to reach a level of zero defects in production, and the gap between the produced parts and the delivered parts will therefore be waste. The products which are produced but not sold would cause a failure cost (Cheah et al. 2011). The rational culture, with its focus on goal achievement, would be able to shift focus from zero defect parts to customer and, instead set the production goal to produce zero defect parts in order to eliminate the waste in between producing and delivering. This concept will further be discussed in the Process Management practice.

Workforce Management

According to the definition of workforce management it is important to involve people in the ongoing developmental work as well as recognize people when performing well (Flynn et al.1994). At the unit people are involved in CIPs where they can contribute to quality improvements. It has been expressed that operators does not have the space for creativity in their work and there is an

assumption that some of them are not interested in working with improvements of production. It would be desirable to increase the level of creativity for the people on the shop floor, since they are a valuable resource that sometimes is neglected by management (Robinson & Schroeder 2004). The unit should empower the shop floor workforce and make more use of their ideas since these could contribute to the unit's goal achievements. As the unit sees itself as a flat organization with open communication, which gives them tendencies in the group culture, there is a good chance that the CIPs could be more fruitful by nurturing these values of the unit. The open communication also should simplify the teamwork between different hierarchical levels.

The rational culture motivates employees using quality goals as incentives to increase the employee's participation in continuous improvement (Zu et al. 2010). The unit's strong focus on goal achievement facilitates for the recognition system. When an employee reaches his or her goal a bonus is given which serves as a recognition for a well performed task. However, according to Robinson and Schroeder (2004), monetary rewards, which are currently being used at the unit, are not always beneficial and another source of rewards should be considered as a complement. An example of how to deal with non monetary incentives at the unit is the annual award which is given for the best CIP within the plant. In order to link it with the strong focus on goal setting and goal achievement the rewards should be more related to group performance than individual performance (Robinson & Schroeder 2004). The employees can be recognized by gathering participation credits from the CIPs in groups rather than individually. The recognition should be based on participation level rather than the most efficient project in terms of goal achievement.

Since the organization is foremost rational and therefore has a strong focus on goal achievement it is important to provide a structure where the set goals are reachable. Within the unit, and at the shop floor especially, goals are sometimes hard to reach which could derive from a lack of organic empowerment. It would be desirably for the CIPs to be structured in a way to further facilitate the organic empowerment and therefore also the level of goal achievement and productivity. As an example, the unit has suffered from large variation within one of its production steps, and it is has therefore been stated in the group goals to keep the production parameters, such as pH value, within tolerances. However, there are no clear routines for how to control this, and therefore everyone is acting upon their own best judgement creating variations from day to day. Taken into consideration that the personal goals are sometimes hard to reach it should be considered to give the employees a better possibility to actually reach the set goals. This could be done by giving the individual better means to perform work in terms of installation of new tools and devices but also by standardization of work. The unit needs to assure that the set goals are reachable for everyone.

Quality Information

There are several foundations within the unit's ongoing work which facilitate sufficient quality information. The rational culture at the unit supports structured data collection and extensive quality data is gathered along the process. This is consistent with the arguments stated by Flynn et al. (1994) who claim that thorough information regarding the state of the process is important. Even though there are aged facilities within the unit, it is moving towards better process information with its upgrade of control software. Also, the unit has showed that it is willing to use innovative and new technology, as a part of their developmental culture tendencies, which make them open for new investments in control software and technologies. Further, the information and feedback to employees is well executed since the collected quality data is well used for quality improvements within the unit. This is facilitated for example by the shop floor management meeting conducted each morning where information on quality, among other topics, is discussed. However, the information about quality is not equal to everyone, and a way to further develop the quality information practice is to develop channels for quality information to reach out to everyone at the plant such as control charts mentioned by Naor et al. (2008). These are not present within the production steps at the moment and the introduction of these is recommended for further improvement of the quality information practice.

Product/Service Design

The characteristics for the quality management practice of product design imply simple design which is prepared thoroughly before production. This work should be carried out with involvement from several departments (Zu et al. 2010). The unit under study works in close collaboration with the research department with frequent meetings. The meetings include representatives from the unit's quality group, management team and research department, which facilitate good communication between departments. Further, as Hilti products are generally attributed with high perception of quality the product design is crucial (Flynn et al. 1994). The produced product is fairly simple but still it is designed to facilitate efficient manufacturing and the unit has developed several manufacturing technologies which are unique to the market.

Process Management

The process management practice is concerned with optimizing the processes with regards to enhanced quality (Zu et al. 2010). As all of the core quality practices, this practice is very focused on techniques, such as Just-in-Time etc. Even though the concept of Lean has been a recognized topic for a while it is only lately introduced as a concept which is systematically rolled out within the unit.

Along with the CIPs and the initiated work with Six Sigma, Lean@Hilti provides a structure for the process management. As the rational culture emphasizes structure, it is believed that the Lean tools that have been implemented at the unit have been beneficial. However, even though the CIPs and the Lean@Hilti program offer a structure for managing the processes, the understanding of a process perspective is not yet in place.

The literature on process management emphasise the importance of working with preventive actions and designing mistake proof processes in order to be productive (Motschman & Moore 1999; Cheah et al. 2011; Sirkin & Stalk 1990). Further, Naor et al. (2008) discuss the correlation between good process management and the ability to point out flaws earlier in the process. This relates to the suggestion of focus on zero defect parts produced rather than delivered. This is aligned with the Lean@Hilti initiative where focus is on doing things right from the beginning and eliminating waste. Focus should be on preventing bad quality rather than controlling and correcting it. This would increase the preventive quality costs but also increase the productivity in the long run (Cheah et al. 2011). In order to develop the work with preventive actions it is suggested to analyze the existing data on process performance and to find root causes for variation. To introduce a stronger awareness of process thinking, those root causes should consist of both hard and soft factors. It is important to take action before an urgent issue arises which is aligned with the spiral developed by Sirkin and Stalk (1990).

According to the Lean@Hilti philosophy it is essential to work with standardization of processes and development of work descriptions, to further decrease variation in production. This is supported by Flynn et al. (1994) who claim that it is important to thoroughly document process procedures. As has been noted there are sometimes unclear routines regarding work in production. Tasks are performed differently between operators since a best practice has not yet been documented. This implies spontaneous actions towards problems in the process which lead to a variation in performance. Since staying within tolerance is a goal for everyone within the unit the rational culture's strong focus on goal achievement will support the standardization of processes.

6 Conclusion

In this chapter, the conclusions for the study are presented. Firstly, it will concern the determination of the organizational culture for the particular unit. In addition it discusses the possibility for quality management development to be aligned with the existing unit culture.

As earlier stated, culture is something complex and multi-layered. Even though there are indications that the unit under study has tendencies in all four quadrants of Competing Values Framework, the most influential and prominent for this particular organization is the rational culture. The unit is characterized by its focus on goal-achievement, productivity and structure, which are all present in a rational culture. However, even though rational culture is the one of the four quadrants from the Competing Values Framework where the unit has its strongest emphasis, the organization also have shown to be present in the other quadrants. Examples of this are the unit's focus on innovativeness which belongs in the developmental culture, hierarchical way of sharing information, and finally its structure to encourage teamwork among employees which fits into the group culture.

As the rational culture is supportive to many of the quality management practices, the unit has a solid foundation for future quality initiatives. The practice with most need for development is the process management practice since the importance of looking at the unit as a whole process, considering all its aspects, is not yet in place. It is also the researchers' opinion that it is important to align the quality management practices not only with the current culture state, but also with where they are going. In this study Lean@Hilti has served as a base for understanding this. Since the first pillar and the first step in the house for Lean@Hilti is disturbance free processes, the increased focus on process stabilization and control is recommended. This is also a way of aligning the quality work within the unit with the ongoing cultural change. As stated in the empirical study, the unit has a great emphasis on quality control, while the work with failure prevention is considered complex by management. The work is more focused on exploitation of the known, such as refinement and making the process more efficient. It would be beneficial to also focus on exploration of what is considered to be complex, i.e. failure prevention. Further, the focus of the unit is to improve the technical aspects of the production, while they are neglecting the social aspect of the production as people making mistakes due to lack of work descriptions. Therefore there is a need to improve those social aspects of the production, which implies that processes affecting each production step need to be reviewed.

This research has shown that core practices, such as process management, are supported by the infrastructural quality management practices to reach high performance. Production is a combined

socio-technical system, and both of these subsystems need to be emphasized for the process management to reach its full capacity. It is believed that workforce management and top management support are the two infrastructure quality practices that are contributing the most to improved process management. In order to reach a mindset where the organization strives for constant improvement of processes there needs to be an acceptance and commitment from top management, where the finding of a potential improvement area is praised and appreciated. At the same time as top management needs to show more support for the process they also need to show more support and encourage the employees. It is especially the employees closest to the process that are considered most valuable, and with the most knowledge, when working with process management such as stabilization and standardization. As a base for those three practices lays the rational culture within the organization and it is believed that the existing culture along with improvements of these three practices will increase the overall performance, see Figure 12.

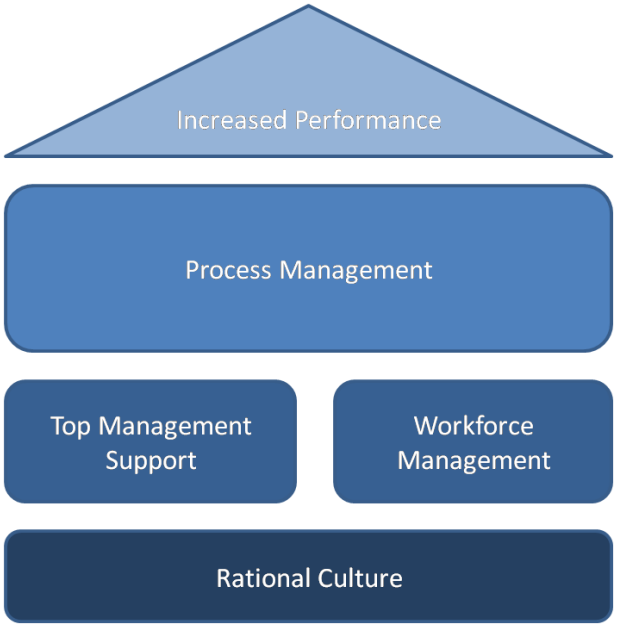

Figure 12. The correlation and support of infrastructural quality management practices on process management.

The workforce management practice is tightly related to empowerment of people and means that concerned employees themselves should participate more in improvement projects at the unit. The unit aims to have a stable organization where knowledge is built up over time. It would be beneficial for the unit to make use of this built up knowledge by involving and empowering the employees. One example is the development of work descriptions, which should be done by involving the people closest to the process. This will generate a feeling of increased responsibility and ownership towards the task which will also facilitate people acting according to the set descriptions. It can be hard to achieve a successful workforce management by only support from the rational culture. However, it is

considered a very important factor to reach increased performance and the organization should make use of its tendencies of a group culture to improve this quality practice. All employees need to feel empowered to improve the processes. The unit's workforce needs to feel as they can contribute to the improvements of production by providing ideas that are taken into consideration by management. As the unit is currently working in CIPs, these should positively be strongly emphasized with regards to improvements of production processes. Table 3 illustrate where the focus should be within each practice highlighted.

Table 3. Recommended focus for each suggested practice.

Recommended focus for each suggested practice	
Process Management	Standardization of processes and development of work descriptions.
	Focus on preventing bad quality rather than controlling and correcting.
Top Management Support	Take full responsibility for quality. Thorough top management support and responsibility to create high quality processes which supports reaching the set quality goals.
	Truly empower employees to not only be invited to participate but also to contribute.
Workforce Management	Use group incentives, such as annual honour reward rather than short term individual monetary incentives.
	Allow more creativity. Make use of ideas, involve people in standardization/improvement projects
	Listen to the people closest to the process.

7 Discussion

This chapter discusses the outcome of the thesis. It begins with a discussion about general complexities with performing research on organizational culture. Further, it elaborates on the connection between culture and quality management practices and how this can be used for further research.

7.1 Cultural Research

Organizations operate in a great diversity of fields and contexts, and the classification of cultures into four clusters has shown itself to be complicated. Many researchers have dealt with this issue as there are numerous frameworks and divisions for culture described in literature. One can say that there are no clear boundaries of what to include or exclude in research when culture is analyzed. Culture is subjective and it is constituted by people's basic assumptions. In this research, every interview has revealed new aspects of the unit and at times these views have somewhat been contradictory. As every person is unique in its thoughts and feelings, interviews and observations will all reflect different sides of a joint unit culture. It is believed that it is necessary to gather what is shared by the majority of the members of the group, to determine the unified organizational culture.

Further, the unit culture is influenced by both national and corporate culture. In this research, the corporate culture has been taken into consideration, while the national culture has been out of the scope for the study. As mentioned in the analysis, the articulated corporate culture has shown to differ from the actual state at the unit. This is believed to be due to causes such as academic background, leadership and people of the unit, which influences the environment and its culture. Units with different subcultures are not unusual, but something that is believed to be a common phenomenon in larger organizations.

7.2 Connection between Culture and Quality Management

The purpose of this study was to understand how quality management can be aligned with organizational culture. The supporting rational behind this assumption is that culture affects quality work. However this research has not investigated if, and how, quality work will affect the organizational culture. There is the possibility that well developed quality management is influencing the culture, possibly by creating stronger group culture characteristics.

Further, an assumption has also been that quality management can be supported by many different types of culture. However, there are cultural elements such as the hierarchical culture described in

the Competing Values Framework, which does not support quality management at all. It is believed that if the hierarchical elements are highly present in the organization, there is a need to change the cultural setting before implementing any quality initiatives.

There is strong support from both literature and from this research that it is important to take the organizational culture into consideration when developing quality management. It is believed that qualitative evaluation of unit culture is helpful when finding where to further develop an organization with regard to quality. As discussed in chapter 2.5 Research Quality, the external validity for this type of research could be limited, due to the complexity of the culture concept and the large variety of organizations. This study contributes to research by providing a framework for how to evaluate areas for improvements of the quality management in organizations. First, the culture needs to be evaluated, preferably by the Competing Values Framework which has shown to be a convenient approach. Second, the connection between the organizational culture and the choice of management practices needs to be understood in order to being able to find improvements areas to align this work with the existing culture. However, there is still a need for further research on the connection between quality management and culture, and several longitudinal studies should be conducted in order to establish the relationship. It would be of interest to see the implemented results of the quality management efforts by observing a unit during a longer period of time.

7.3 Authors' Reflections

This study suggests that there is a need for both social and technical factors to be in place in order to continuously increase quality. It has been obvious that quality is not only about the choice of process parameters and control, but something that is created together with the people behind the machines.

Further, the conducted study has contributed to an understanding on the connections between organizational culture and the choice of quality management practices within a production unit. As master thesis students, it has been a great learning to see how the models and theories are, and sometimes are not, used in an organization. When the understanding of quality and process thinking differs from the communicated and best-practice ways taught at university, it can be hard to act and respond. The change of working methods takes time, and behaviours are undeniably rooted in the organizational culture.

Finally, the differences in national culture, and the impact that it has on the daily work has been a great learning. To be able to work in different national environments, one needs to adapt and find ways of interacting on the same level. This understanding is thought to be of great importance for all organizations working in a globalized world.

8 References

Bjerke, Björn. "Successful Interviews." In *Kunskapande metoder*, by Bengt Gustavsson, 233-254. Lund: Studentlitteratur, 2003.

Bryman, Alan, and Emma Bell. *Business Research Methods.* Oxford: Oxford University Press, 2003.

Cameron, K S., and S J. Freeman. "Cultural congruence, strength and type: relationships to effectiveness." *Research in organizational change and development*, 1991: 23-58.

Cameron, K.S., and R.E. Quinn. *Diagnosing and Changing Organizationall Culture.* Addison-Wesley, Reading, MA, 1999.

Campbell, P J. "On the Nature of Organizational Effectiveness in P.S. Goodman and J.M. Pennings (eds.) New perspective on Organizational effectiveness." *Jossey-Bass*, 1977.

Cheah, Soo-Jin, Amirul Shah Md. Shahbudin, and Fauziah Md. Taib. “Tracking hidden quality costs in a manufacturing company: an action research.” *International Journal of Quality and Reliability Management*, 2011: 405-425.

Coghlan, David. "Insider Action Research: Opportunities and Challenges." *Mangement Research News*, 2007: 335-343.

Conger, Jay A., and Rabindra N. Kanungo. “The Empowerment Process: Integrating Theory and Practice.” *Academy of Managment Review*, 1988: 471-482.

Dean, J., and D. Bowen. "Managing theory and total quality: improving research and practices through theory development." *Academy of Management Review 19*, 1994: 392-418.

Denison, Daniel R, and Gretchen M. Spreitzer. "Organizational culture and organizational development: A competing values approach." *Research in Organizational Change and Development*, 1991: 1-21.

Denscombe, Martyn. *The Good Research Guide - for small-scale research projects.* Open University Press UK Limited, 1998.

Fangen, Katrine. *Participant Observation.* Malmö: Fagbokförlaget, 2005.

Flynn, Barbara B., Roger G. Schroeder, and Sadao Sakakibara. "A framework for quality management research and an assosiated measurement system." *Journal of Operations Management*, 1994: 339-366.

Hofstede, Geert. "Motivation, Leadership and Organization: Do American Theories Apply Abroad?" *Organization Dynamics*, 1980: 42-63.

Irani, Z., A. Beskese, and P.E.D. Love. "Total quality management and corporate culture: constructs of organisational excellence." *Technovation 24*, 2004: 643-650.

Jinhui Wu, Sarah, Dongli Zhang, and Roger G. Schroeder. "Customization of quality practices: The impact of quality culture." *International Journal of Quality and Reliability Management*, 2011: 263-279.

Kaynak, Hale. "The relationship between total quality management practices and their effects on firms performance." *Journal of Operations Management*, 2003: 405-435.

Lengnick-Hall, Cynthia A. "Customer contributions to quality: a different view of the customer-oriented firm." *Academy of management review*, 1996: 791-824.

Liker, Jeffrey K. *The Toyota Way 14 Management Principles From the World's Greatest Manufacturer.* McGraw-Hill, 2004.

Liker, Jeffrey K., and Michael Hoseus. *Toyota Culture - The Heart and Soul of the Toyota Way.* McGraw- Hills, 2008.

March, James G. "Exploration and Exploitation in organizational learning." *Organization Science*, 1991: 71-87.

Motschman, Tania L., and Breanndan S. Moore. “Corrective and Preventive Action.” *Tranfusion Science*, 1999: 163-178.

Nahm, Abraham Y., Mark A. Vonderembse, and Xenophon A. Koufteros. "The Impact of Organizational Culture on Time-Based Manufacturing and Performance." *Descision Science*, 2004: 579-607.

Naor, Michael, Susan M. Goldstein, Kevin W. Linderman, and Roger G. Schroeder. "The Role of Culture as a Driver of Quality Management and Performance: Infrastructure Versus Core Quality Practices." *Decision Sciences*, 2008: 671-702.

Prajogo, Daniel I., and Christopher M. McDermott. "The relationship between total quality management practices and organizational culture." *International Journal of Operations & Production Management*, 2005: 1101-1122.

Quinn, Robert E., and Gretchen M. Spreitzer. "The Road to Empowerment: Seven Questions Every Leader Should Consider." *Organizational Dynamic*, 1997: 37-49.

Quinn, Robert E., and J R. Kimberly. "Paradox, planning and preseverance." *In Denison R. Daniel and Spreitzer M. Gretchen (1991)*, 1984: 3-7.

Quinn, Robert E., and John Rohrbaugh. "A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis." *Management Science*, 1983: 363-377.

Randolph, Alan, W. "Navigating the Journey to Empowernment." *Organizational Dynamics*, 1995: 19-32.

Robinson, Alan G., and Dean M. Schroeder. *Ideas are free.* San Francisco: Berret-Koehler Publishers, Inc., 2004.

Samson, Danny, and Mile Terzioviski. "The relationship between total quality management practices and operational performance." *Journal of Operations Management*, 1998: 393-409.

Schein, Edgar H. "Coming to a New Awareness of Organizational Culture." *Sloan Management Review*, 1984: 3-16.

Shea, C., and J. Howell. "Organizational antecedents to the succesful implementation of total quality management." *Journal of quality Management 3*, 1998: 3-24.

Sila, Ismail. "Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: An empirical study." *Journal of Operations Management*, 2007: 83-109.

Sirkin, Harold, and George Jr. Stalk. “Fix the Process, Not the Problem.” *Harvard Business Review*, 1990: 26-33.

Sousa, Rui, and Christopher, A. Voss. "Quality management re-visited: a reflective review and agenda for future research." *Journal Operations Management*, 2001: 91-108.

Strauss, A., and J.M. Corbin. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory.* Thousand Oaks, California: Sage, 1998.

Zu, Xingxing. "Infrastructure and Core Quality Management Practices: How Do They Affect Quality?" *International Journal of Quality & Reliability Management*, 2008: 129-149.

Zu, Xingxing, L. Tina Robbins, and D. Lawrence Fredendall. "Mapping the critical links between organizational culture and TQM/Six Sigma practices." *Int. Production Economics 123*, 2010: 86-106.

Ödman, Per-Johan. "Hermeneutics and research practices." In *Kunskapande Metoder*, by Bengt Gustavsson, 71-93. Lund: Studentlitteratur, 2003.

9 Appendix

A - Competing Values Framework with Plotted Effectiveness Criteria

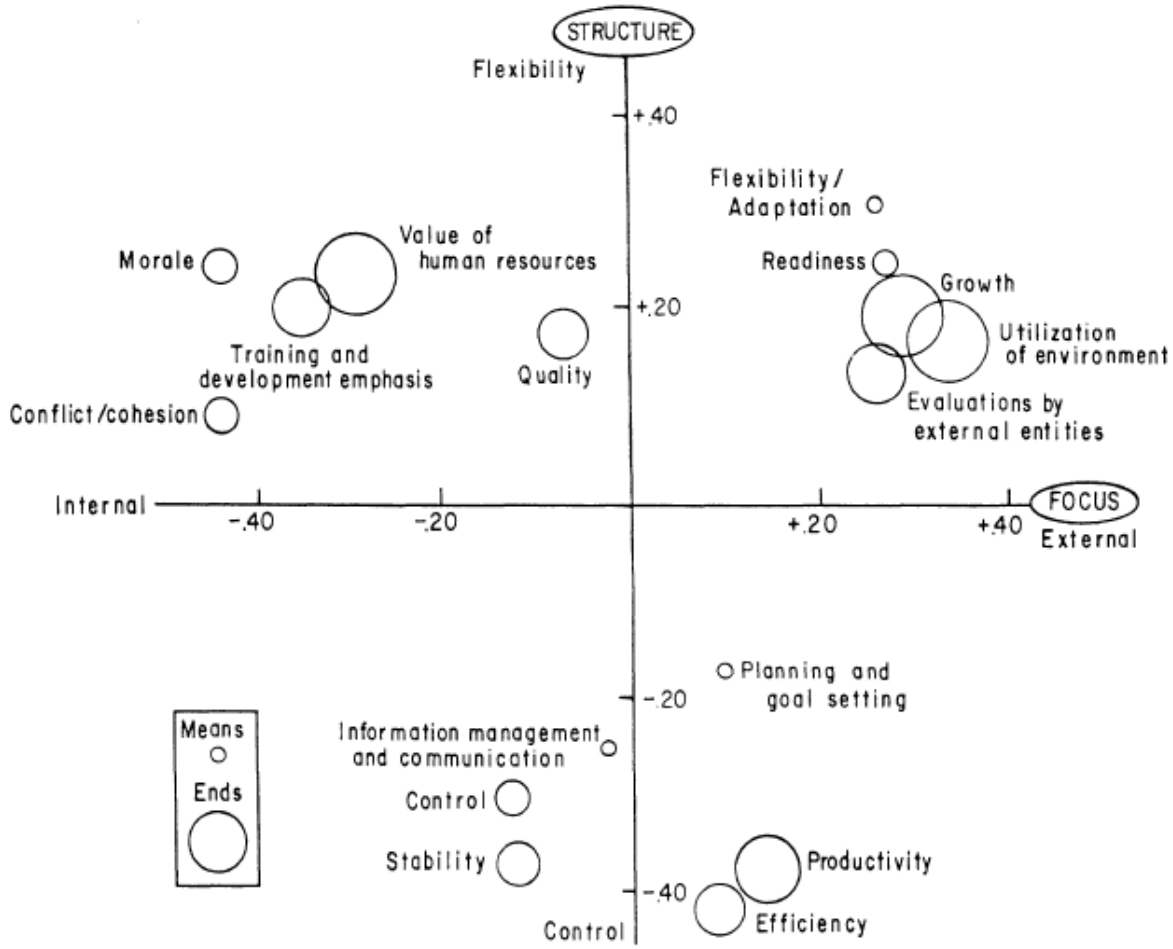

FIGURE 1

Figure 13. Plotted in the Competing Values Framework are the criteria that were selected out of 30 to represent effectiveness.

B – Interview Guide Cultural Settings

This interview is divided into three sections. The first section will investigate the current organizational culture at the unit under study according to the framework developed by Quinn and Rohrbaugh (1983). The second section investigates different cultural aspects connected to quality management and the third section investigates the use of quality management practices at the department.

1. Competing Values Framework

Ask the interviewee to rank the concepts, derived from Quinn & Rohrbaugh (1983) according to what he thinks reflects the work within the organization the most, 1-3 where 1 is the most important. Elaborate on the choices in order to create a base for further discussion and to make the interviewee start thinking about the organizational culture. There is a short explanation behind each factor to clarify its meaning.

Rank	***This unit believes it is important with/that..***	
	Factor	**Explanation**
	Creativity	..people are allowed to be creative in their tasks
	Commitment	..employees who feel committed to their job/group/the company
	Trust	..everyone trust your fellow workers ability to perform
	Competitiveness	..a competitive external environment encourage the unit to perform better
	Resource acquisition	..we make sure to gain the right resources for upcoming changes
	Belonging	..employees feel they are part of the team and the unit
	Growth	..we grow continuously
	Orders	..the given orders are followed
	Goal achievement	..we reach our previously set goals
	Performance	..we always perform at our very best
	Productivity	..we always produce as much as possible out of our resources (output-input)
	Adaption	..we can adapt quickly to changes in our external environment such as customer needs/supplier relations etc.
	Stability in organization	..a stable organization where set plans are followed
	Procedures	..documented procedures of how to perform work.
	Participation	..everyone is involved in decisions and ongoing projects
	Rules	..clear rules to manage the unit.

2. Organizational Culture

Information Sharing

The aim is to find out how the plant works with sharing of information, and if the employees get sufficient information in order to become empowered.

1. How is information shared at this unit? Horizontally? Vertically?

2. Do you feel that the given amount of information is sufficient for you to perform as desired at the plant?
    - Would you like to get more information about objectives/mission/performance of the plant?

3. How do you communicate with other departments? (eg. TechZ)

Goal Setting

It is important that in order to empower people, their personal goals should be specific and measurable, but in the same time be seen as "continuous improvement goals". Further, high focus on achieving goals is a characteristic of a rational culture.

4. Do you have your own personal work goals?

5. How are your personal goals connected to the overall objectives/goals of the plant?

6. What motivates you to meet the objectives of the plant? (examples)
    - If the answer is "monetary" - are there any others?

7. Do you feel as if you are encouraged by supervisors to develop new skills/ learn new things?

Degree of Empowerment

Aims to gather more information on the level of empowerment among the employees. An investigation on how much freedom they have got to make their own decisions, but also how the unit makes sure to truly empower people.

8. How would you explain your relationship with your supervisor/employees?

9. Which decisions are you authorizedto make on your own and which not? (examples of what activities that needs approval)

10. How do the organization encourage own initiatives?

11. Do you have power to influence decisions? /To what extent?

12. What happens if you make mistakes during work?

13. Are you allowed to take on own initiatives and be creative in your task?

14. Is it clear in what area you are allowed to take own initiatives?

15. To what extent do you believe that your organization is hierarchical?

PARTICIPATION/TEAMWORK

16. How often do you meet to discuss problems and opportunities in your groups?
    - Who attend those meetings?

17. To what extent does your supervisor encourage you to work as a team? /To what extent is it preferable that your employees work as a team?

18. To what extent do you feel that your opinion is valued?

19. Do you feel as if your ideas are considered when making changes?

20. Do you think that everyone's opinion is considered?

EXPLOITATION - EXPLORATION

Exploitation and exploration seems to be somewhat similar to rational and developmental culture respectively. In this section we would like to get an understanding on what attitude the unit has towards operating the process by improving or developing existing process.

21. How quick do you adapt to internal and external environmental changes (eg. customer demands, supplier changes, new board directives)

    - How do you make sure that you stay flexible to those changes.

22. What is your opinion of taking risks when implementing new ideas?
    - Do you think it's important to avoid risks or more important to take them?
    - Is there a risk management system that has to be followed?

23. What has been the most focused topics during the ongoing implementation of "Lean@Hilti"?

24. Do you make an effort to develop new manufacturing practices and technologies?/Do you often get new directives and technologies introduced in manufacturing?

25. To what extent do you find it important for P1E to stay on the leading edge of new technology? (give example)

3. QUALITY MANAGEMENT

4. What's your view on quality management?
    - How is it carried out at this plant?

5. What's the task/responsibility for the quality group within the unit

6. How is the work within the unit related to P1's overall quality management?

7. Is the qualiy management connected to "Lean@Hilti"

8. How do you make sure that the quality of your products meets the customer needs and expectations?
    - How do you control that they are ok?
    - How do you work with preventing quality issues?
    - How early in the process do you discover quality issues in the product?

9. Have you been involved in any quality management improvement projects? Explain.
    a. What was the approach to that project?/How was it carried out?

10. What is your perception of quality control and failure prevention?

C – Interview Guide Lean

This interview guide is designed as a semi-structured interview, with open questions that encourage elaboration and follow-up questions. The purpose of each section is to get an understanding of the topic, rather than to ask every formulated question.

1. Lean in General

General questions regarding Lean as a concept and the adaptation on Lean to the Hilti context. The purpose of these questions is to make the interviewee start thinking about the topic, and to share his view on Lean@Hilti. Let the respondent elaborate, and ask follow up questions if possible.

1. Briefly, what is your view on Lean?
2. Is there one Lean Culture?
3. How has Lean been adapted ("Lean@Hilti") to suit the organizational context at Hilti?
    a. How do the two concepts correlate / differ?
4. How is quality management related to Lean?
5. How can the existing way of working within the unit benefit from "Lean@Hilti"?

2. Hilti culture

The reason for this section is to understand the Hilti Culture that has been formulated as an existing concept at the company. We want to understand what this culture implies. Also, we want to understand if there are any differences between the pronounced Hilti culture and the reality at Plant 1. Please, let the respondent elaborate on the following questions, and ask follow up questions if possible.

3. What is meant by the "Hilti culture"?
4. Does the Lean Culture differ from Hilti Culture?
5. What is your perception of the existing culture at P1E, does it differ from the answer at previous question?
    a. To what extent is the culture at P1E hierarchical?
    b. Would you say that P1E work with a top-down/bottom-up approach? Why?
    c. How is teamwork encouraged at P1E?
    D. How are people within the organization empowered to take own initiatives?

3. IMPLEMENTATION OF LEAN

Further, questions concerning the implementation of Lean@Hilti, both global and within the unit under study. What factors ease the implementation of Lean? Are there any prerequisites in the organizational culture that needs to be in place to implement Lean? Is the implementation going as planned? Please, let the respondent elaborate on the following questions, and ask follow up questions if possible.

6. Are there any specific qualities of an organization that facilitates implementation of Lean?
    a. What are the resources and capabilities within P1E that would ease the implementation of “Lean@Hilti”?
    b. What are the enablers for successful implementation of “Lean@Hilti” within P1E?

7. How can the implementation of Lean@Hilti benefit from the existing culture?

8. What is your perception of
    c. the global current status quo of Lean@Hilti?
    d. P1E’s current status quo of Lean@Hilti? / Who is involved in the project from P1E?

9. Looking in the mirror, which, if any, obstacles have you experienced during the implementation of the initiative?