



JÖNKÖPING UNIVERSITY  
*School of Engineering*

# Quality Management in Offshore Construction Project

With focus on Southeast-Asian market

**PAPER WITHIN Production Systems**

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## **Abstract**

Companies have a need to internationalize and locate all over the world to gain advantages against competition. However, when companies internationalize, they face difficulties. One of the major difficulties is how they can reach the same high quality around the world in their business facilities. Over one third of all construction projects reporting major defects. The purpose of this thesis is to research how companies implement Quality Management in offshore construction projects, what are the common challenges related to the subject and how to overcome these challenges.

The theoretical framework for the study is gathered from academic literature. The thesis uses a qualitative research approach. The primary data is gathered through interviews and observations that are conducted on an offshore construction site.

The case study in this thesis researches how a multinational company handles Quality Management in an offshore construction project. The company's Quality Management guidelines and practices have been established in Europe, whereas the location and context of this study is in Southeast-Asia. The difference in business context and cultures causes additional challenges in implementing Quality Management in the project. After analyzing the data, the company's Quality Management practices are compared to suggested practices in the academic literature. These suggestions can be valid for other multinational companies that are expanding to different continents.

The results show that when companies do offshoring decisions, relationship quality with contractors and partnership credibility should be central attributes, even if it means doing business with higher priced companies. Many companies do not focus enough on the quality aspect in the contractor tendering phase. Instead they tend to base decisions solely on cost and speed even though bad quality work results in increased costs and delays in construction projects.

### **Keywords**

Quality Management, Project Management, Offshore Construction Project, Multinational Company Expansion, Construction Quality, Offshoring Challenges.

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## 1 Introduction

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*This chapter presents the introduction to the theoretical background and problem formulation of the study, followed by the purpose, research questions and delimitations. The structure of the thesis is explained at the end of the chapter.*

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### 1.1 Background

For companies to stay competitive in nowadays business environment, there is a need to internationalize and locate all over the world to gain advantages against competitors. In global competition, companies can enter each other's markets, produce in low cost countries and quickly transport their products to the market (Dicken 2007). However, when companies internationalize, they face more difficulties than when operating in their home-markets (Peh & Low 2013).

Reaching high efficiency in expansion construction projects is challenging for multinational companies and suboptimal satisfaction levels often exist between offshoring partners (Clampit et al. 2015). When the other company that is performing the task is located in a different country, outsourcing becomes offshoring (Paus 2007). Multinational companies need solutions on how they can reach the same high quality around the world in their business facilities. Typical offshore construction project challenges include lack of infrastructure, cultural differences, low educational levels and difficulties in contractor management (Ghemawat 2001; Peh & Low 2013).

Successful project is delivered on time, on budget and within the required quality (Raymond and Bergeron, 2008). Most construction projects focus on costs and scheduling but overlook quality (Hughes, Hillebrandt & Murdock, 2000). However, quality is a key issue in the construction industry, with over one third of all construction projects reporting major defects (Sullivan 2010). The reality on the construction site often differs to what is expected in the Quality Management plan. Time pressure, changes in costs, employee health issues and other problems on the site, force managers to do trade-offs and invent on the go. Many industries have used Quality Management programs to increase their performance and productivity, but construction industry has had problems to do the same (Lepatner 2007). Often the Quality Management in construction can be more reactive than proactive, even though preventing mistakes from happening is much cheaper alternative than the cost of correcting mistakes when they are revealed by inspection (Project Management Body of Knowledge Guide 2013).

Overall, quality is a major challenge in many offshoring construction sites, causing long delays and increased costs (Singh et al. 2005). This thesis aims to answer the issue that many multinational companies have: How to overcome the challenges related to Quality Management in Offshore Construction Project.

### 1.2 Problem definition and purpose

Many companies want to expand abroad to reach new markets. To do business abroad it is often required for the company to build new business facilities to fit their needs. Whereas a company is used to manage construction sites in its home country, the construction environment can be totally different on another continent (Peh & Low 2013). Especially companies in energy and retail industries often construct their own business facilities when moving abroad. It is common to subcontract the physical work on a foreign construction site to a local workforce (Ulubeyli, Manisali and Kazaz 2010). Foreign labor and construction site as whole bring its own challenges; quality related issues are common challenges in many offshoring construction sites, causing long delays and increased costs (Abdul-Rahman et al., 1996).

Multinational companies generally have a Quality Management plans to ensure that the characteristics of their operations are able to satisfy the company's business needs (Le-patner 2007). Research shows that quality of company's business operations reflects on its financial performance (Pignanelli & Csillag 2008). As an example, a luxurious fashion retailer must have well-built shop with polished details. Badly constructed shopping facility with obvious quality defects would hurt the retailer's image and possibly drive away customers. Another example, European company wants to offshore its business and build high-end paper factories in Southeast Asia but is worried that the manufacturing plant won't meet its quality standards in production. Moreover, if the quality is neglected during the construction phase of the factory, that can increase costs and cause delays later in the lifecycle of plant (Singh et al. 2005).

Internationally expanding companies can struggle with the following issue: How to overcome the challenges related to Quality Management in offshore construction project? Less quality issues in the project mean less wasted resources and faster project lead time, which then again results in higher efficiency and savings (Monden 2011).

Plenty of academic study can be found in the subjects of Quality Management, construction and offshoring. However, there isn't research where these aspects are combined. Globalization is one of the megatrends of the century according to Nadrag & Bala (2014). Therefore, companies that rely on functional business facilities need answers on how to manage quality at their construction sites abroad. To answer this problem, the aim of the thesis is set to:

*To explore the quality management implementation in construction project in an offshore location.*

### 1.3 Research questions

To fulfill the aim of the thesis, two research questions have been formulated.

*1. How does a multinational company manage quality in an offshore construction project?*

First, multinational companies' ways of managing quality in offshore construction projects are researched to gain an overview of the subject.

### *2. What are the challenges of Quality Management implementation in an offshore construction project and how to overcome these challenges?*

Secondly, the challenges related to the subject are identified. After, better ways of working are suggested to overcome these challenges related to Quality Management in offshore construction projects.

#### **1.4 Delimitations**

Construction sites are different everywhere in the world. This is due to laws, regulations, culture, education of the workers, building materials, environment and many other aspects. Therefore, some of the mentioned issues might not be relevant to other construction projects around the world. This research aims to speak on a general level about quality management issues that are common in offshoring construction projects.

#### **1.5 Outline**

**Chapter two** introduces the theoretical background in quality Management practices and guidelines. Best ways of working are covered based on research and industry standards.

**Chapter three** explores research design and methods to make the thesis more convincing. Also, the case study is explained and tied up to the research purpose of the thesis.

**Chapter four** presents the empirical findings of the case study. How Quality Management is done in the case company's project. Data is gathered during observations, interviews and from the company guidelines. Goal is to get an understanding on what are the normal ways of working and what are the challenges in the case offshore construction project.

**Chapter five** presents the analysis of the study where research questions are answered.

**Chapter six** is for the discussion and conclusion of the study. Findings and research methods are discussed. Chapter is closed with a conclusions and suggestion for future research in the related field of studies.

## 2 Theoretical background

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*The following chapter goes through the theoretical framework of the subject. In the beginning of the chapter, the theory of Quality Management is introduced, followed by Production Management in the construction industry and challenges in offshore construction projects.*

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### 2.1 Quality Management

#### 2.1.1 Origins of Quality Management

Quality Management started in the manufacturing sector of the economy (Orwig and Brennan 2000). The success of the Japanese mass production companies in managing quality has led the Western world to wake up to the importance of quality (Boje and Dennehy 2008). Quality is also a key issue in the construction industry, with over one third of all construction projects reporting major defects (Sullivan 2010). A construction defect claim is any claim for property damage that arises out of the construction of the project and occurs after the construction has been completed for that part (Rajendran, Clarke & Andrews 2012). Quality in construction projects has been defined by The American Society of Civil Engineers (2000) as the following: *'Quality in constructed project is achieved if the completed project conforms to the stated requirements of the principal participants (owner, design professionals, contractors) while conforming to applicable codes, safety requirements and regulations'*.

While manufacturing companies developed the theory behind Total Quality Management, many service companies began to implement some of these techniques (Orwig and Brennan 2000). Most of the academic literature concludes that it is challenging process to transpose and translate the principles, practices and techniques of Quality Management to construction projects (Formoso and Revelo 1999; Lahndt 1999; McCabe 1996; Soares and Anderson 1997). It must be noted, that development and implementation of proper Quality Management practices for use in the construction industry is a necessity and not an option (Ramsey 1984). How well quality management systems are implemented in individual companies is a matter of debate. However, these Quality Management practices, or systems must be directed and controlled with excellence so that high-quality buildings can be made (Conchúir 2011).

In recent years, the demand for better workmanship and quality has become more important. Increased competition in the national and global markets has forced companies to focus on the value of their product delivery systems. Different Quality Management programs such as TQM, lean production and Six Sigma have revolutionized the use of standardized systems and increased efficiency in various industries from manufacturing

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to commodity services such as IT-companies. These Quality Management programs have been adopted successfully by many organizations, however, significant affect has not been documented in the construction industry (Sullivan 2010).

### 2.1.2 Project Quality Management

Project Quality Management (PQM) includes processes and activities of the performing organization that determines quality policies, objectives, and responsibilities in a way that the project satisfies the needs for which it was undertaken. PQM uses policies and procedures to implement, the organization's Quality Management System and it also supports continuous process improvement activities as undertaken on behalf of the performing organization. Project Quality Management's goal is to ensure that the project requirements, including product requirements, are met (PMBOK guide 2013). Project Management itself oversees all three constraint components – time, cost and quality. Ultimately PQM's objective is to create a product that meets customer expectations (Wilson 2015).

For a project to be successful, three important elements are required. First there is effective schedule management plan. Second, accurate cost management plan, and the third important element in managing project to be successful is a fitting Quality Management Plan that will ensure that project deliverables are completed and meet customer expectations. Project Managers often focus on schedule and cost management and even develop warning systems in case these areas fall behind the schedule, but they do not invest the same time and resources in monitoring quality. For some Project Managers, quality is not an initial priority and is only addressed as needed while others might see quality as a priority but simply do not take the time to plan, monitor, or control it (Wilson 2015).

When analyzing the usage of three popular Quality Management Programs (TQM, Lean and Six Sigma), it is unclear if one of the programs has proven more beneficial to an organization than any other. However, research shows that successful implementation of any of these Quality Management programs has had direct correlation with substantial benefits on an organization (Shortell 1995). According to research by Krause (1998), Quality Management programs is usually in the implementation rather than in the validity of the programs. Reasons for this is for example, users not understanding the quality principles that are supposed to be applied, problems with change and lack of planning for sustainability (Krause 1998). It has also been proposed that the current Quality Management programs are not correctly translated into the construction industry and as a result, tools designed and proven to increase the quality, efficiency, and stability of a system have become ineffective (Sullivan 2011).

Management Body on Knowledge (PMBOK), categorizes Project Quality Management into three processes which include: quality planning, quality assurance and quality control.

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- **Plan Quality Management:** The process of identifying quality requirements and/or standards for the project and documenting how the project will follow these quality requirements. Every project should have a Quality Management Plan according to the International Organization for Standardization (ISO quality standard 2006).

- **Quality Assurance (QA):** The process of auditing the quality requirements and the results from Quality Control measurements to ensure that appropriate quality standards and operational definitions are used and met. To assure product quality, all departments must participate in Quality Control activities. The different departments will benefit from quality related functions throughout the company (Monden 2011).

- **Quality Control (QC):** The process of monitoring and recording results of executing the quality activities to assess performance and recommend needed changes (PMBOK guide 2013). Quality Control techniques might vary depending on what type of quality needs to be controlled at various points of work activities. Quality Controlling can be both proactive and reactive depending on the situation (Wilson 2015). Proper Quality Control during production phase decreases cost by reducing defects (Monden 2011).

Quality Control is the required internal system to achieve quality standards by meeting the set specifications, finishing objectives on the given time, staying within budget and maintaining a safe environment. Quality Assurance is a system to ensure that the QC processes are functioning properly. To ensure that the relationship between QC and QA works, a company can put strict requirements on the contractor to have a QC manager who is authorized and responsible of making sure that the approved QC system is working. The key to success in this area is that construction Quality Management requires a QC system to monitor construction and that a QA system to ensure that the control system works. When working properly, the system effectively pushes the responsibility for quality onto the contractor, while keeping the monitoring and tracking system at the entity that ordered the product (Smith 2014).

The mentioned quality processes are interlinked (Levin and Ginger 2013). Therefore, a systems perspective is recommended to generate more value with quality management (Conti and Tito 2010). Likewise, quality management is not an independent activity within the organization or a project. Quality management is not separable from the activities it refers to, and responsibility for quality belongs to the relevant operative managers (Conti and Tito 2010). However, to assure best possible product quality, all departments and all levels of management must be included in the quality activities. People in the organization are the driving force behind quality and where it all starts. Therefore, it is important to get everyone in the organization involved and think about quality. Things such as management commitment, training, leadership and empowerment have a crucial role in quality environment (Ho, 1999). Furthermore, the quality management activities of each department must be planned in a way that they are reinforced by other departments (Monden 2011).

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Leadership is the most important factor in creating organization working culture towards quality. Leaders must create feeling of comfort in the employees and that they can be proud of what they do. Leaders of the company must aim to improve self-esteem of the employees and make them feel appreciated. Employees will be committed to quality to the extent that management is. If there is not a decision to educate and train the employees, they will struggle to produce according to the customer requirements. It is essential that employees are able to participate and feel that they can affect decisions related their work. An employee that is provided the ability to a good job can contribute to improve quality. Leaders therefore must support and stimulate the development of employees that they are able to improve quality within the organization and products (Bergman & Klefsjö, 2007).

Modern Quality Management approaches seek to minimize variation and to create results that meet defined requirements. When a project manager has assessed the needed quality requirements, then it is easier to justify that higher costs for these resources and processes are necessary to get the product to the specified level of quality (Wilson 2015).

Quality Management is well established practice and used by all major companies, but many are still lacking in taking international and cultural aspects into consideration. Quality Management is often regarded as a concept that should be basically used in the same way in all projects regardless of the context (Lagrosen 2004). In previous research it has been found that there is a difference between countries on how Quality Management is conducted (Maheshwari and Xiande, 1994; Wacker and Sheu, 1994; Harrington, 1996; Dahlgard et al., 1998; Rao Korukonda, 1998; Solis et al., 2000). Since multinational companies conduct their operations in many different countries, it is reasonable to expect that their Quality Management practices need to be made to fit the specific project conditions in the countries in which they are executed (Lagrosen 2004). Several studies also address that quality problems in some countries are related to culture (de Macedo- Soares and Lucas, 1996; Ngowi, 2000; Mathews et al., 2001).

Lagrosen (2004) found that to reach high quality products, it is important to consider the educational factor of the employees within the organization. Quality efforts usually require a certain participation from the employees that can be difficult to achieve if the employee education levels are too low. On the upside, many quality practices have an educational effect in themselves. For example, one of the main aims in quality practices in Japan has been to educate employees in the use of statistical techniques (Ishikawa, 1985). This is also worth keeping in mind when handling problems with less developed sub-contractors. By trying to make them adopt quality management practices, their produced work standard can be raised (Lagrosen 2004).

### 2.1.3 Quality Management in Construction

In the context of construction, Quality Management can be defined as: “the performance of tasks, which ensure that construction is performed according to plans and specifications, on time, within a defined budget, and within a safe work environment” (USACE 2014).

In the late 1900’s, quality level of the construction industry’s performance was alarming, with around one third of all construction projects reporting major defects (Butt and Clinton 2005). Areola (1997), commented that the construction industry was in total chaos and suffering from major constraints regarding defects. This may be attributable to the fact that the industry was resistant to modern change and was structured “as if nothing had changes in the last fifty years” (Murray 1993). The quality of the construction industry has not improved significantly in the 21st century (“Shortages” 2005). Some sources are even reporting that the quality of the industry’s performance is in decline, with 72% of construction industry professionals witnessing increase in the number of change orders occurring in projects (Condon and Hartman 2004). As a result, the construction industry has become flooded with serious problems in quality standards and excessive costs from increased defect claims, counterclaims and lawsuits (Singh et al. 2005).

The need to increase efficiency in the construction industry has never been more important than in the beginning of the 21st century (Sullivan 2011). Many industries have used quality management programs to increase their performance and productivity, but construction industry has had problems to do so. During the past 40 years, the construction industry’s productivity per worker has decreased by almost 25%. This is alarming, especially when considering that in other industries average worker has increased in productivity by 125% (Lepatner 2007).

There are many different ways how to apply quality management to improve the overall quality in a project as well as factors to be considered in the application process (Low and Ong 2014). Most of the academic literature concludes that it is challenging process to transpose and translate the principles, practices and techniques of quality management to construction projects. (Formoso and Revelo 1999; Lahndt 1999; McCabe 1996; Soares and Anderson 1997).

### 2.1.4 Project Management in Construction

The main goal of Project Management is to meet stakeholders needs and expectations. Therefore, failure in Project Management causes dissatisfaction within the stakeholders and leads to extra time and costs. (Tam and Le, 2007). In addition, to be successful in Project Management, the projects must be delivered on time, budget, quality, while managing the risk (Raymond and Bergeron, 2008). Managing different risks in construction projects is recognized as highly important in order to achieve project goals. Project risk management in construction is an iterative process. This means that risk needs to be managed in a systematic manner throughout the construction project lifecycle.

cle from the planning stage to all the way to finish (Gupta & Sharma 2015). Also, implementation of continuous improvements in Project Management is critical for the success of international companies (Meredith & Mantel, 2003).

### 2.1.5 Contractors and project quality

A main contractor is a contractor hired by the client and is responsible for all work on a construction site including the engagement of subcontractors to complete part or all of the works involved in the project. A subcontractor refers to any person, organization that performs a specific task or work for another entity as part of a larger project. A supplier is a commercial organization which stocks, produces or delivers material, components or products for a construction project (Davies and Jokiniemi, 2012). Subcontractors can be considered as suppliers to the main contractor and both play an important part in affecting the workmanship quality of the construction project. It is essential that subcontractors also have their own quality programs to assure an acceptable level of quality of the final building product (Ghobadian and Gallear 1996).

Construction industry consists of numerous parties that play a role in ensuring the quality of the product. The poor performance of one party often affects the performance of the next party on the project. In addition, variety of changes to the details of the design of a project are typical throughout the construction process (Koehn and Regmi 1990). It is recognized that a successful contractor is one who understands the importance of quality to its activities, understands the need for a proactive way of working with quality and puts in place the processes to ensure that the quality management is undertaken systematically, diligently and continuously (Ng 2005). Overall, quality of the building and performance of the contractor are considered to be the most distinguished differentiating characteristics in the construction industry (Ng 2005).

The main parties in a construction project are the owner of the project, the general/main contractor, and the subcontractors where each party is bound to a different type of contract. The general and the subcontractors have a similar goal, which is to obtain profit through completion of the construction project. The outcome of the project is highly dependent on the level of management of both the main contractor and subcontractor. The relationship between these two parties is a critical success factor that decides the quality of the project results (Ulubeyli, Manisali and Kazaz 2010).

In recent years, the demand for better workmanship has become more important. Firstly, owners and developers of projects are better informed of good construction practices, and therefore are in a better position to bargain and demand for the right quality (Griffith 2011). Secondly, increase in reputable foreign contractors means a more competitive market, which puts pressure on the contractors to deliver good workmanship quality (Oswald and Burati 1992). Thirdly, when local contractors are reaching out for foreign market, the need to achieve good quality becomes compelling in order for the contractor to improve their business prospects abroad (Rommel 1996).

### 2.1.6 Subcontractors and Quality in Construction Projects

Many different operations are required in construction projects, and hundreds of work tasks can be subcontracted in most construction projects. Subcontracting is a common practice in the construction industry and provides an essential element of flexibility in the project (Luu and Sher, 2012). In normal international construction project conditions, many subcontractors are employed while there is only one main contractor. Therefore, how subcontractor coordination is executed by the main contractor has a large influence over the project success (Ulubeyli, Manisali and Kazaz 2010). Moreover, increasing number of subcontractors can result in trouble controlling the coordination process. When the project lacks control, the quality tends to suffer. Most importantly, main contractor companies not only use subcontractors in projects but also carry out activities using their in-house resources (Ulubeyli, Manisali and Kazaz 2010). Also, worth mentioning is that, contractors have a tendency to transfer risk and responsibility to the subcontractors to achieve their performance (Arditi and Chotibhongs, 2005; Choudhry, 2012). The right balance of project performance and partnership satisfaction between contractors has remained a controversial topic in academic literature (Lee, Han, Jang and Jung 2018).

Only a few main contractors these days undertake all the construction work involved in a contract on their own account (Brennan 2008). In construction industry's competitive business environment, subcontracting work is an important practice in the international construction projects. Subcontracting holds considerable importance in each area of projects because often using in-house resources is more expensive than outsourcing (Ulubeyli, Manisali and Kazaz 2010). Doing all work in-house would require that they maintain employees and equipment which would inevitably be under-utilized much of the time (Peurifoy et al. 2010). It is important to note, that subcontracting does not relieve the main contractor from any of its contractual obligations, including workmanship quality (Matthews et al. 1996). Majority of the production work is carried out by the subcontractors; therefore, main contractors should increase depth and strategic importance of their relationships with subcontractors (Eom et al. 2008).

Having numerous subcontractors on a project also makes it more difficult to control the quality of each subcontractor (Fewings 2005). Each of the subcontractors is only concerned with their own scope of works instead of looking at the big picture and tends to ignore the effects on the subsequent works of other contractors. If the first work was not properly completed, the workmanship quality of the next the subsequent trade will suffer. This can create major problems in achieving the wanted quality in the final product (Low and Ong 2014). It is recognized in the literature that maintaining a small number of subcontractors in the project will improve the built quality and productivity of the project (Ansari and Modarress 1990). Additionally, dealing with small number of subcontractors allows main contractors to pay closer attention to each subcontractor and therefore monitor the quality and ability to deliver the wanted product (Burt 1989).

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### 2.1.7 Choosing the contractors

In most cases, companies are aware that awarding a construction contract to the lowest bidder, without considering other factors, can result in serious problems in the project. However, still in many cases the contractor who offers to lowest price is chosen (Arditi and Chotibhongs, 2005). Putting too much emphasis on the price in the bidding phase can result in problems such as cost overruns, delays, and poor performance. Subcontractors in foreign projects are mostly chosen by a few top managers, whereas selection process done by the mixed group of technical and managerial personnel is low. Academic research done by Ulubeyli, Manisali and Kazaz (2010) shows that real decision makers should be the mixed group of technical and managerial personnel. In the end, the decisions are finalized by the approval of a company's top management. The percentage of firms using one-man decisions' is very low but the key-decision-makers 'usually' or 'sometimes' selected subcontractors based on their personal experience and judgment alone without using any methodological or numerical approach (Ulubeyli, Manisali and Kazaz 2010).

Main contractors usually select subcontractors in the period after the project's start. Many of the main contractors often work with the previously known subcontractors and don't use systematic processes or models to select the best subcontractor. Both main- and subcontractors tend to rely on personal relationships during the bidding process since the common assumption is that closer informal communication can reduce project related risks. However, this is not a professional approach to the bidding process, and it can negatively affect project success (Ulubeyli, Manisali and Kazaz 2010).

During the tendering stage, contractors and suppliers must be screened thoroughly to find out the ones who can deliver better quality. The main contractors should have approved list of subcontractors which can be used in construction projects. This list of approved subcontractors is constantly updated to integrate more partners to the company as they have demonstrated that they are able to deliver good workmanship quality. These subcontractors and suppliers who have shown good workmanship quality should be then documented for future projects, while those with poor quality performance should be avoided in the future. Other qualifications aside quality include their financial stability, details of the company's training programs as well as endorsement of their capability to deliver quality results (Barrier 1992).

Evaluating subcontractors assigned to the construction project can be as important as the initial contractor evaluation process (Levy 2009). The subcontractors that enjoy good reputation for high quality, usually go beyond the required quality spelled out in the contract documents. When the subcontractors achieve workmanship quality beyond the minimum, less rework is needed which results in more repeat business with the main contractor and client (Rommel 1996).

### 2.1.8 Communication in construction projects

Communication between the different parties is one of the fundamental requirements of a construction project. Thomas and Flynn (2011) suggested regular meetings

throughout the project life cycle to create strong lines of communication. In subcontractor bidding practices, a lack of communication may cause distrust between the parties (Hinze, 1994). According to Lin (2013), interface management between different parties in a construction project directly and indirectly affects costs, scheduling, and project quality, which are the three important elements for a project to be successful (Wilson 2015). Co-operation is one of the four most important factors considered by main contractors, where price was the most important, followed by technical knowledge and quality (Hartmann et al., 2009). Given the various participants in a construction project, effective management techniques are required at the interfaces between different participants for a successful project outcome (Weshah et al., 2014).

### 2.1.9 Schedule Management

The ideal schedule is not the schedule that is showing the project to be completed in the shortest time period. Instead, it is the schedule that is able to meet the quality requirements of the project based on the client's expectations. All expectations regarding quality, time and cost have to be realistic and must be met. Schedules serve as a communication tool among project participants to allow them to identify possible problems early before they happen as well as coordinate various activities with efficiency. When start, duration and completion date of each activity are established, the different stakeholders will know the schedule and whether it is possible that a work of a particular job can be accomplished in the context of the given schedule. Construction projects include many parties and activities, resulting in the overlapping of works. Therefore, coordination is crucial in order to ensure that work will be carried out smoothly (Low and Ong 2014).

### 2.1.10 Change requests

Company must have an efficient change management process in place to continuously improve their products (Jokinen, Vainio, & Pulkkinen 2017). The processing times for Engineering Change Requests can vary from anywhere between hours to years. The long processing times lead to unnecessary delays to requested fixes (Jokinen, Vainio, & Pulkkinen 2017).

## 2.2 Challenges in offshore Construction Projects

When companies internationalize, they face even harder and more difficulties than when operating in their home-markets (Peh & Low 2013). Ghemawat (2001) compared differences in business environments between countries and described how companies routinely overestimate the attractiveness of foreign markets while ignoring the costs and risks of doing business in those new markets. Ghemawat (2001) listed the differences in business environments as followed: religious, social norms, languages, trade arrangements, physical distances, size of market, access, geography, infrastructure and economic disparities between the markets. Also, it must be noted that having countries in different time zones make managing projects more challenging (Peh & Low 2013).

When the other company that is performing the task is located in a different country, outsourcing becomes offshoring (Paus 2007). A key challenge in offshoring is that a

## Theoretical background

business strategy that applies across all countries or a one size-fit-all organization design is highly unlikely to work effectively given the specific positional, multi-dimensional and varying conditions (Peh & Low (2013). Suboptimal satisfaction levels often exist between offshoring partners, according to research (Clampit et al. 2015). It is suggested that cultural differences play a role in low satisfaction levels between international offshoring partners and that cultural intelligence within a company can be valuable advantage that directly improves the changes of offshoring success (Ang & Inkpen, 2008). Moreover, in an industry survey nearly 70% of offshoring clients rated cultural differences as a “moderate” to “very important” factor that can harm performance (Lewin, Perm-Ajchariyawong, Sappenfield, & Aird, 2009). Even though cultural aspect is important to consider in offshoring, cost and capacity should still be considered as the key determinants of offshoring success (Clampit et al. 2015).

There are massive variety of different challenges in construction projects globally. Some challenges and problems are common around the world, whereas other problems are more apparent in specific countries (Long, Ogunluna & Lam 2004). When it comes to developing countries such as Southeast-Asia, major challenges are related to: problems imposed by the infrastructure, problems caused by clients and consultants and problems caused by contractor’s incompetence (Ogunlana, Promkuntong & Jearkjirm 1996). Moreover, a study on Asian cross-border construction done by Chua, Wang and Tan (2003), identified five groups of typical obstacles, which are: business environment risk, regulatory restrictions, contract arrangements, and differences in culture. The previous challenges need to be solved swiftly. Otherwise they can jeopardize the construction project’s success by reducing efficiency, causing delays, disputes and costs (Cheung et al. 2000). In conclusion, strong project performance and success are not common in offshore projects and especially in developing countries where many of the offshore construction projects are located (Long, Ogunluna & Lam 2004).

When doing offshoring decision making, relationship quality and partnership credibility should be central features, even if this means doing business with higher priced companies (Clampit et al. 2015). Overall, foreign companies should be cautious in contract biddings; in many countries, there are issues with open biddings. There is a risk that when you don’t understand the local construction market, an un-honest contractor puts a low bid price and makes money from making self-caused extra claims to compensate for the low price. (Chan & Yeong 1995)

Construction projects may or may not have limited durations, and quality is often not considered as important as compared to similar projects in developed countries where each and every aspect is checked, verified, tested and approved (Koehn and Jagushte 2005). Some building contractors in developing counties even avoid quality improvement processes because they believe that these processes would add only time and cost to the construction (Abdul-Rahman et al., 1996). However, construction industry is changing in some developing countries as larger contractors have begun using the latest equipment, techniques and trained laborers. These changes will increase productivity and quality and decrease accident rates at the worksites, thus making offshoring construction projects easier to manage. (Koehn and Jagushte 2005).

### 3 Method and implementation

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*This part of the thesis presents the research strategy for this study.*

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#### 3.1 Research strategy

There are two basic approaches to research, which are the quantitative approach and the qualitative approach. Quantitative research approach is based on the measurement of quantity or amount, meaning that the subject can be expressed in terms of quantity. Quantitative research involves quantitative analysis in a formal and rigid fashion. Qualitative research approach, on the other hand, is concerned with a qualitative phenomenon, which means that the researched phenomenon is involving quality or kind. Qualitative approach can be used when doing research with subjective assessment of attitudes, opinions and human behavior. Qualitative approach to research can generate results either in non-quantitative form or in a form that is not subjected to rigorous quantitative analysis (Kothari 2004). In this research, the goal is to understand the situation the case project is in, compared to qualitative research where the understanding is based on quantification of data from isolated properties (Hartman 2004).

The research topic has not been given much attention in current research. Quality management implementation in companies has been researched thoroughly, but not from the perspective of a European company that is offshoring its business functions. The expectations and requirements from the European company are that the quality of its operations and products should be same in every country that it operates in. The reality however, is that, the conditions where work is done within each country is different. This causes challenges for the offshore projects and operations as the requirements are same as in the home country, but the conditions are different. For this thesis, the aim is to study how quality management practices are handled within a European multinational company's offshore projects, and what are the recommended practices in the academic literature. Therefore, a case study is chosen as a research strategy. According to Yin (2007), research that focuses on the "why" in a current non-controlled environment is suitable to be done in a form of case study.

As seen from the table 1, the case study is the most suiting research strategy. The focus is on current events and aim to find out how quality management practices are handled within a European multinational company's offshore projects without eliminating other explanations.

## Method and implementation

*Table 1: Relevant situations for research strategies (Yin 2007)*

Strategy	Type of research question	Is control of behavior needed?	Focus on current events?
<b>Case study (Chosen strategy)</b>	<b>How, why?</b>	<b>No</b>	<b>Yes</b>
Experiment	How, why?	Yes	Yes
Survey	Whom what, was, how many, how much?	No	No
Analysis of sources	Whom what, was, how many, how much?	No	Yes/no
Historical study	How, why?	No	No

### 3.1.1 The case study

The case study is a very popular form of qualitative analysis and it involves a careful and complete observation of a social unit, that can be a person, a family, an institution, group or even the entire community (Kothari 2004). Case study is a method in depth rather than breath. The depth insights can be found because things are studied in detail opposed to a superficial study. This enables the study to reach a result that can explain complex research questions instead of focusing on a result of relations and processes (Yin 2007). Thus, case study method is essentially an intensive investigation of a particular unit under research. The object of the case study method is to find the factors that account for the behavior patterns of the given unit as an integrated totality (Kothari 2004).

Case study designs can be divided into three approaches: exploratory, explanatory and descriptive. In the exploratory case study approach, the data collection is done before defining the research questions and can be used to discover new theories. Explanatory case studies are useful when researching organizations or communities. Descriptive studies require a descriptive theory, for example the overall theoretical framework that is followed during the research. Descriptive approach is based on the research questions, which dictate the direction of the research (Berg, Lune & Lune 2009). The case in this thesis is descriptive by nature, because research questions formed the base for the case research.

## Method and implementation

The case study conducted as part of this thesis is not a situation that has been tempered with just for the purpose of research. It is challenging for a company to keep the same quality in its products and operations all over the world and there is a real need to find answers to these issues. The case study has been done in collaboration with improving a real company's Quality Management processes in its offshore construction projects in Asia. During the time of the thesis work, the European based case company had a large-scale offshore construction site, where the project managers wanted to invest more efforts into construction project's quality. The project is part of the company's wider expansion to Southeast-Asia and the wish of the managers was that this research would produce information that could be used in the upcoming offshore construction projects.

### 3.1.2 Background of the case

The case study research is related to Industrial Engineering, Project Management and Quality Management disciplines. The thesis work has been done in collaboration with improving a real company's Quality Management processes in its offshore construction projects in Asia. The company in this thesis is referred as the "case company", or as the "project customer".

The European based case company is building new large-scale facilities for its operations in Bangkok. The project is part of the company's wider expansion to Southeast-Asia. The case studies how Quality Management is carried out on the Bangkok's construction site where the new facilities are being built. The focus is put on the key factors that affect construction Quality Management. The company's Quality Management guidelines and practices have been established in Europe, whereas the location and context of this study is in Southeast-Asia and especially in Thailand.

The data for the study was collected based on constructed interviews and observations that the author has done on the construction site during 8-month period. After analyzing the data, the company's established ways of working are compared to suggested practices in the academic literature that is introduced in chapter 2. Based on the comparison, suggestions are made to improve the case company's Quality Management practices. These suggestions can be then used in the upcoming expansion projects to improve overall quality and save on costs and time.

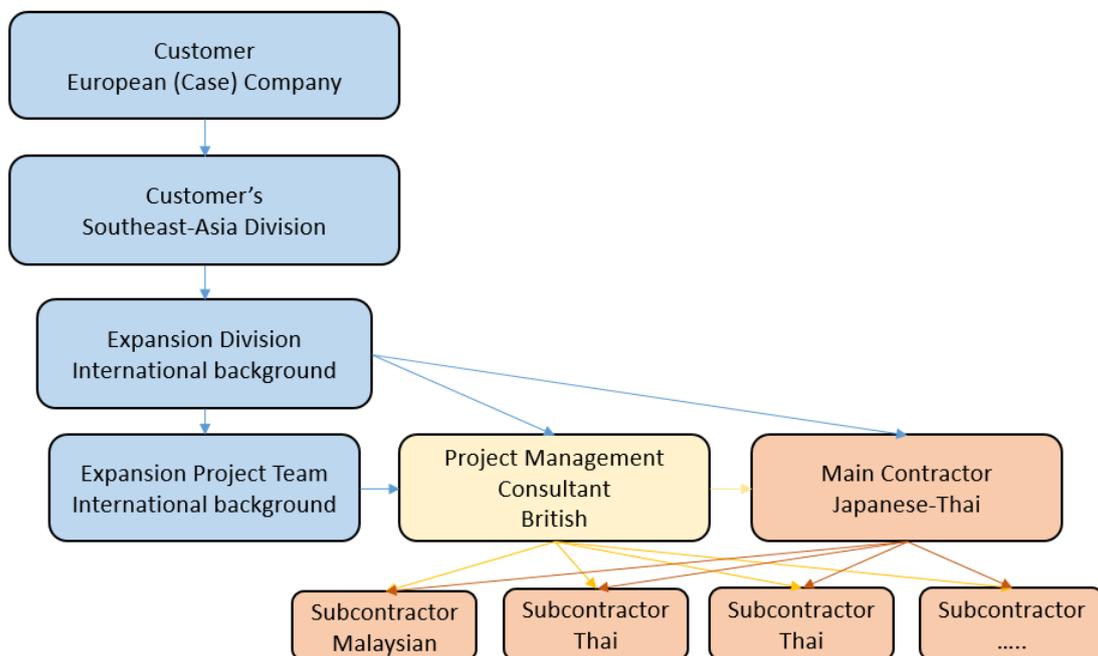
### 3.1.3 Organization structure in the case project study

The case company, which is the customer (blue in figure 1), ordered the construction project to be managed by the Project Management Consultant (yellow). The Japanese-Thai construction company was chosen to be the Main Contractor (red). The Main Contractor was responsible of the construction of the facilities. The Main contractor sub-contracted smaller parts of the construction site to different companies. However, completing the construction part of the project was always Main Contractor's responsibility. The Management Consultant (yellow) aided in the project management process and was responsible of the outcome of the project with the Main Contractor.

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The Subcontractors did not communicate directly to the Expansion Project Team. It was the Main Contractor's responsibility that the Subcontractors carry out their tasks. How well the work was executed and what was the end quality, depended on the Subcontractor. Expansion Project Team did not have any control over the Subcontractors and had to give the feedback through Project Management Consultant or the Main Contractor.

If there was a change request to the original plans by the European Case Company, the information would have to go through long chain of command. Expansion Project Team was at the interface between construction and the receiver of the finished project. Therefore, there was constant communication flow going back and forth.



*Figure 1 Organization chart in the project. Hierarchy is shown from top to down. The arrows represent chain of command and directions of the information flow.*

The customer sent its own Expansion Project Team (blue) to make sure that the final facilities can support its business functions correctly. The contractors know how to manage construction, but they don't know how to build operational facilities for the company. This was the Expansion Project Team's responsibility. To ensure that the parent company organization receives functional facilities to operate according to the concept given from the company headquarters. The contractors did not have previous experience of building such facilities. This caused additional challenges to the organization because things had to be done in the right way, right quality and in Thailand's context.

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### 3.1.4 Literature search

Literature reviews are common in all academic fields. The literature review is a research strategy or a method that is used to describe, review, and interpret what is already known about the subject and add new insights on the subject using secondary sources. Because literature reviews are secondary sources, they do not add new or original experimental content. (Jesson et al., 2011). Usually it is used as a data collection method that develops a theoretical background or a framework for a study. (Armitage & Keeble-Ramsay, 2009).

The data for the literature review chapter was gathered from two main sources, books and databases. The books were provided mainly by Kasetsart University library. The used databases were Jönköping University's database, ProQuest and Google Scholar. To find relevant literature several keywords were used in the search such as, quality management in construction, offshoring construction, multinational company quality management, offshoring challenges and project management quality. Keywords related to project management and quality gave most hits, whereas hits in offshoring construction were rather limited. Construction quality management literature was often country specific and hard to apply into other markets. Literature that was published on scientific journals was the main source for the literature search. The academic literature papers were compared with each other to gain understanding on how quality management papers are generally structured and what are the most used references. A framework of the subject was built around the academic literature in the theoretical background chapter. This framework was later used in conjunction with the observation and interviews data to gain better understanding of the subject.

### 3.1.5 Interviews

An interview is a purposeful conversation between at least two people in which the interviewer asks questions and the interviewee listens and responds to the questions (Saunders et al, 2012). Interviews can be a very productive method of data collection, because the interviewer has the opportunity to gather more information of specific issues of concern as they emerge. On the upside, interviews are suitable for obtaining detailed information and rich data can be gathered only with few participants. On the downside, interviews can be time consuming (Bryman & Bell, 2011).

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Interviews can be categorized as structured, unstructured or semi-structured (Williamson 2002). Structured interviews use pre-defines and often closed questions that makes them suitable for collection of quantitative data. Semi-structured and unstructured interviews are more flexible and rely mostly on open questions. They are commonly considered as qualitative research interviews that produce qualitative data. Semi-structured interviews have list of themes and key questions that are prepared prior to the interview, however, all of the questions do not need to be asked. Follow up questions and emerging questions that were not in the original list of questions are essential part of semi-structured interviews (Williamson, 2002; Saunders et al., 2012). The purpose of unstructured interviews is to serve as exploratory to gather in-depth information. There are no pre-defined set of questions in unstructured interviews. The purpose is to ask open-ended questions that are aimed at making participants to guide the conduct of the interview. (Saunders et al., 2012).

During the interviews, every effort needs to be made to create friendly atmosphere of trust and confidence, so respondents can feel at easy while answering to the questions and discussing with the interviewer. The interviewer must ask questions properly and record the responses in an accurate manner. The interviewer's approach must be friendly and unbiased. It is important that the interviewer does not show disapproval of respondent's answer and must make effort to keep the respondent on the track (Kothari 2004).

This thesis uses semi-structured interviews for data gathering. The prepared set of questions gave a structure for the interviews and follow up questions were asked to go more into depth to gather resourceful data (see appendix 1 for the interview questions). Seven interviews in total were conducted in English with employees who were the key-players within the area of Quality Management in the project. Three of the interviewed managers were from the project owner, mainly from top management of the construction project. The four other interviewed employees were from project consultants who were working with quality related issues. The respondents wanted often to add their own thoughts and follow up points to the questions, which gave many resourceful data. Five interviews were conducted in a face-to-face meeting, but two wanted to answer the questions via email due to tight time schedules. The respondents were promised to have anonymity in the research so that they could be honest in their answers. Interviews were conducted in a neutral, unbiased manner to ensure that the gathered data responds to the reality in the project's Quality Management practices. The answers were audio recorded and later written down for accurate data analysis.

### 3.1.6 Observation

Observation information gathering involves the systematic observation, description analysis and interpretation of people's behaviour in their natural setting (Saunders et al., 2012). The researcher is present at the physical setting of those that are being observed and at the same time listening what is said in conversations (Bryman & Bell, 2011; Saunders et al., 2012). The main advantage of this method that subjective bias

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can be eliminated, if the observation is done correctly. In addition, the information obtained through observation relates what is currently happening and is not complicated by either the past behaviour or future intentions of respondents (Kothari 2004). Observation can add richness to the research data when trying to get to the root of what is going on in the setting (Saunders et al., 2012). Usually observation research method is supplemented by interviews and with the collection of secondary sources such as documents (Bryman & Bell, 2011).

The observation data gathering for the case study was done on the European company's large-scale construction site in Bangkok. Most of the observations were done during quality inspections and construction handovers within 8-month period. The gathered qualitative data was written down for use in the empirical findings chapter. Also pictures and written data such as excel sheets were used to analyse quality management in the case offshore construction project.

## 4 Empirical Findings

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*This chapter provides information on the case company's Quality Management practices on the construction site in Bangkok. The information is gathered through observations and personal interviews.*

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### **Quality in the case project**

The finished construction quality in the project was commonly seen as "medium". Many viewed the project conditions as highly challenging, and therefore the final finishing quality was considered a success. A construction consultant mentioned that the construction quality in this project was very good in comparison to other similar projects in Thailand. How contractors work and what is their perception of quality has a massive effect on the final product quality. Communication by the management and construction consultant played a big role in the result of the project as well.

Quality was a serious concern for the project managers. Defects and rework due to bad quality of work on the construction site are expensive. A rework or defect can cause a bottleneck on the construction site, cause a domino effect and result on missing the project deadlines. Hence, improving quality in the projects would potentially improve the company's project success by a large margin.

In some areas the finished quality was considered poor and there were many complaints. For example, many designers and managers complained about how the floor surface looked. The look was not always consistent enough. It is very expensive to change the floor, because basically you would have to change the whole area at the same time. In the end, the floor was surface treated as well as possible to have a nice look. A leading designer gave his opinion on the floor quality: "In construction, the concrete floor, is one of the most difficult things to manage. To have a homogeneous appearance that has good quality level and not many cracks, that is where you see a difference in different countries. Here in Thailand, it is really hard to reach the wanted quality level when you don't have educated workers in the matter."

It was said that because the project was done in Thailand, it was more difficult to have certain expected quality in the final building in comparison for example the buildings that the company has opened for business in Europe. The construction managers said that the quality perception in construction business in Thailand is different in comparison to Europe. It's different, because you have to make certain compromises and quality is not that clearly defined in Thailand.

## Empirical Findings

The case company is trying constantly to improve how it operates its business. After each expansion project the case company has a follow-up phase where learnings are taken from the project. What went well, what went bad, what were the key success characteristics and what needs to be improved. This case study is part of that follow-up phase. Aim of the case study is to explore the company's Quality Management implementation in a construction project in an offshore location and come up with suggestions to improve the company's Quality Management practices.

### **Project Quality Management Plan**

A Quality Management Plan existed for the project. The plan included for example, Project Execution Plan, QA/QC Inspections, Manuals, Peer Reviews, Standards, how to do mock ups, Quality Approvals, Construction Monitoring and how to do Defects Follow Up. The Quality Management Plan was made by the European parent company. Multiple managers commented that that there were many guidelines and plans but the contractors had problems following these. For example, there were samples of the floor presented at an early stage to provide the expected quality – however this was not delivered. During the interview, a Design Manager was wondering how a concrete floor finish can go from light grey to in some instances black.

Even though a proper Quality Management Plan existed, a lot of improvising and “inventing on the go” was needed. This is seen as a natural part of Project Management, because there are always unforeseen circumstances and you need to look for solutions that fit the current situation that were not foreseen. For example, two lobbies required to be reworked to change the process flow. This was because it was hard to anticipate in advance how the flow will work in the new building. Therefore, layout changes had to be done. In addition, new unexpected things that needed extra attention were constantly popping up, which resulted in many change requests.

### **Quality Inspections**

The case company was the customer that ordered the project and that would receive the final building after its finished. The construction was outsourced to a Japanese-Thai main contractor, a company which then subcontracted various parts of the project to other companies. The case company that ordered the project, didn't have blue-collar workers on the construction site, and its employees focus more on managerial issues. Contractors knew how to build buildings, but most of them didn't know how to build a specific building that is used for the customer's business operations. This is the core responsibility of the case company's Project Management team: to ensure that the finished facilities can be used for the company's business operations, and after the project is finished, the unit is ready to operate on the level that is defined by the parent company in Europe.

The case company wants its business structure, including quality to be similar in different countries. By having consistency, the company can manage the business and brand on a global scale. To have the business operations working in Asia as they

## Empirical Findings

would be running in Europe means that the quality must be up to the bar. However, how quality is understood and managed in Northern-European and Asian cultures has differences (Kull & Wacker, 2010). For a multinational company, protecting the brand image is important. Therefore, the quality of the case company's facilities and products cannot differ much between the countries. The goal is to have the overall customer experience similar in each country, with small differences depending on the target country's culture and taste. This puts stress on executing Quality Management according to the expectations, because the quality expectations are from Europe, but the environment in which this must be achieved is different. The company is expanding to new countries and the Quality Management practices within the company are evolving constantly.

The brand decisions and operational decisions are made at the company headquarters in Europe. Therefore, brand experts are sent to visit the expansion site if the new facilities and quality meet the brand requirements. For the brand managers, it is of highest importance that the brand is portrayed in the right manner. Brand managers take part of some of the quality inspections on the facilities in the late stages of the construction project to ensure that the finished quality portrays the brand in a positive manner. Serious actions can take place if the construction quality could potentially hurt the brand. Such as postponing the opening date of the facilities until quality standards are met.

### **Contractors and Quality**

Existing case company's business facilities in Asia were shown to the main contractor to give an idea what the finished facilities should be like and what is the wanted quality. Purpose of the visit was to ensure that the parties "are on the same level" when it comes to understanding the job. The main contractor was considered to have a good reputation and references but didn't have experience of executing this kind of construction project. The different areas of the construction project were then subcontracted by the main contractor to smaller local contractors. Large margin of the subcontractors did not have experience of working in this kind of construction project. It was the main contractor's responsibility to control the subcontractors and ensure that they will execute their part of work on the wanted level. Others did, and some didn't.

At one point of the project it started to become clear to the case company's project managers that more quality control was needed to ensure that the building was up to the company's own standards that have been established in Europe. The case company's managers responsibility wasn't to supervise the work done on the "floor level" of the site. However, the Project Managers had to make sure that the finished facilities can be used for the company's business operations, and after the project is finished, the unit is ready to operate on the level that is defined by the parent company in Europe. Therefore, the case company's employees started to do construction site quality inspections to make sure that quality issues were known before the expected deadline.

### **Handovers**

The construction project was split into many smaller projects that were subcontracted to different contractors. Therefore, area handovers were needed. In a handover, all the stakeholders from different parties that are related to the specific area of the project come together to inspect the situation. Area is inspected by the stakeholders and everyone agrees that the work is done according to the specifications. Then the specific area of the project can be handed over to next owner. The owner is the customer that is going to operate the building. Before the area is handed over, the full liability of the area is in construction. Therefore, it is crucial for the outcome of the facilities that the receiver of the area can be sure that the handed area meets all the criteria. It was the Expansion Project Management team's responsibility to ensure that the area is up to the parent company's standards that are given in the concept plans.

During the late stages of the project there was always major pressure to get the area to be handed over on the exact planned date. The case company had to start preparing the area for its business operations right after the handover and did not want risk letting outsiders into the area. The case company started moving interior decorations and expensive equipment in, as soon as the area was received from construction. A permit to do construction work was required, if someone outside of the company's organization had to fix quality related issues after the area was handed over. The liability of the area is would be in the case company's hands and there is a risk involved of letting subcontractors in to the area. In case that something breaks, it would be complicated to find the person who is responsible of carrying the cost. Therefore, it was always better for the process flow to get the quality right on the first time. However, the time pressure affected all parties and increased the risk of cutting corners, hence affecting quality.

An example situation: Warehouse area is handed over from the main contractor to the owner of the building, which is the case company. The construction phase of the warehouse has been subcontracted to a different company. The main contractor that subcontracted the area is still responsible of the area. It is their responsibility to make sure that the area is ready and up to the standards. The subcontractor had not understood what the wanted quality was and the warehouse area requires a lot of rework. It was the main contractor's responsibility to educate their own subcontractor to understand what the expected quality is. There is also the Project Management Consultant company that is responsible of overseeing the overall project progression. From the customer's perspective it only matters that the area of the project is delivered as promised in the contract. In this situation, the handover from the contractor to the customer, which is the case company, would be postponed until the requirements in the contract are met. Postponing the handover and marking the area as finished costs the contractor's money because they must do rework and causes problems for the customer as the area is not ready to be received. Because the customer cannot receive the area, it is highly possible that in the future there will be delays as other contractors that are scheduled to continue work there cannot move in. The problem started with a bad communication between contrac-

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tors that led to bad quality work, which will then cause rework and delays in the schedule. The example situation is what can typically happen in a big construction project when quality expectations are not met.

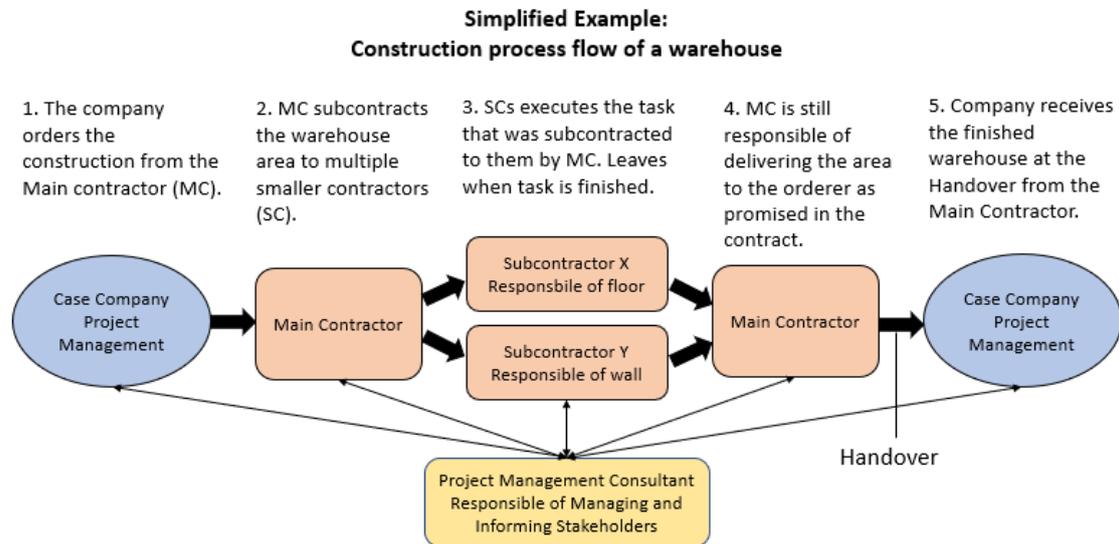


Figure 2: Example of handover process flow

An area could have major quality defects on the date it was supposed to be handed over to the next owner. All the stakeholders would gather together, some even fly in from other countries to make sure that everything is in place as stated in the contract. Early into the handover meeting, it would become clear that the area is not finished, and the handover must be postponed to another date. Postponing would cause major frustrations within the stakeholders as there would be delays in the other phases of the project and they would have to take the blame. A new handover date and meeting would have to be set. Meaning that all the stakeholders would need to gather for the second time to see if the job is done according to the contract and quality standards.

To tackle problematic handover meetings, the managers started to implement so called “pre-checks” to assure that the quality of the area is on the wanted level. This way many of the quality issues were proactively spotted before they became real problems and caused delays. Often these pre-checks would be done couple of weeks before the official handover date from the contractor. All the found quality issues would be marked down with the quality management team and pointed to the main contractor that then informs the subcontractors about the issues. Because there are many parties involved, it is important that communication and information flow is carried out in consistent, clear and good manner. Often the chain of communication could work like a broken phone. The worker that receives information on the construction site can easily get a different understanding of the problem than what the original message was trying to say.

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Specialized interior experts and contractors are flown all the way from Europe to do the final details. The special contractors time on the site is tightly scheduled. When the specialists arrive, everything in the previous phases must be finished before they are able to carry out their work. A specialist contractor could for example install the IT-systems. For the IT-specialists to be able to start the server rooms need to be finished, data-sockets installed, and the areas need to be clean. Multiple pre-checks were done especially for IT-rooms to ensure that everything is ready for the next phase of the project to start. In a worst-case scenario, the server rooms would be unfinished construction wise and there would not be much for the IT-specialist to do. He/she in most cases has a working visa for a limited amount of time. The job must be finished before that time window closes.

### Quality Management Documentation – Snag Lists

When an issue was spotted during the pre-checks, a picture was taken of the problem. The picture was added to the Excel file that listed all the quality related issues, including description (see figure 2). These files were called “snag lists” and one issue or a point was called a snag. Every snag has its area listed so it can be found and comment for description of the snag. Action is described for follow up, what must be done that the snag can be fixed and erased. Responsible entity is so everyone knows who is responsible of fixing the area and follow up. In the snag list file, the items are categorized to Defects, Deviation from the layout and to Change Requests (see figure 2). The follow up of the issues is easier with the contractors when every item is categorized. It is also important to know if the item is the contractors’ fault at all.

<b>HANDOVER Snaglist Goods Receiving - Inspection - Nov 28 Update 15/01/2018</b>									
Area	Comments	Action	Responsible	Construction Defects	Deviation from architectural drawings	Change Request	Photo	Completion Status	Sign Off
<b>Goods Receiving Area</b>	Light switch needs to be installed for loading box lights. Current is centralized control. Require CR. Who will issue?	Not an issue as its accepted that lights will be controlled from the central switch. This is due to safety, good to have all the lights on because the area is dark.	Construction			X		CR to be issued	
	Electricity sockets are not done according to the drawings. Need more sockets in the control room to follow the planning layout.	Contractor ask permission to work during the weekend. Define the needs.	Construction	X	X			Ongoing	
	Damage on concrete beams	To be repaired	Construction	X				Ongoing	
	Floor quality is not satisfying.	Check with construction manager and contractor. Discuss what can be done	Construction	X					
	Elevator (trolley) needs a big face-lift.	Do a touch up on the elevator	Establishment	X				Done	Await for sign off

*Figure 3: Snapshot of a Quality Inspection Checklist “Snag list” that lists Defects, Deviations from Architectural Drawings and Change Request.*

### **Change Requests**

Not all the issues on the site are defects or results of a bad quality. Change requests arise from the designers and managers. They are late changes that are added to the original plans during the construction phase. Adding change requests include extra costs to the ordered because they are not included in the original plans and contracts. In the design phase before construction, architects, designers and engineers try to gather as much input as possible from the people that are going to be working in the building. Change requests are needed, because all the aspects of the building cannot be foreseen when doing the design plans. When the construction project and building are close to finish, the experienced managers start to see issues in the building that need to be fixed before business can be operated. Issues can arise even though the contractors have done everything according to the plans and project contract. An example of a change request could be a wish that more light switches need to be added.

Designers come to check the construction site from the customer's headquarters, and they give their own input. These site visits are called "design reviews" and they are done between the case company's design and management. The design reviews are important to correct mistakes that were done while doing the original blueprints. Spotting these mistakes that are related to operational and brand issues require special expertise and long experience with the company. Common change request from the designers would be for example to change lighting in the building and how a brand logo is presented to the customers.

The input from the design reviews from the construction site are turned into change requests (CR) that are to be done on top of the original contract, with an extra payment of course. CR's could be done by employees in the project that saw potential improvements to the drawings. Generally, the CR were done by the company's managers that would receive the facilities. Change requests are given a priority. Some requests are more crucial, and the costs plays an important role. CR's competed with quality related issues as the most crucial items are handled first and there was somewhat limited amount of workforce in the project. Overall CR's are necessary to have a final building that satisfies the ordering company's stakeholders.

Many experts from all around the world come to visit the construction site during the final phases of construction. These experts know very well their own responsibility area that is part of the customer's business. The experts give their input that is often turned into change requests for construction. It is easier to see faults in the building when it's close to finish. The faults are not always related to construction but can also be related to for example how customers flow is expected to happen in the building or how the brand is shown to the customers. If the experts see room for improvements, then they suggest changes. Usually the experts join the design reviews, pre-checks. This way managers from construction can give immediate answers to some requests if they are possible to do and worth the cost. Often change requests are not worth the cost even if they would improve the facilities. Common reasons to decline change requests are the

## Empirical Findings

caused extra costs and that executing the CR would result in delays in other more crucial areas.

An example of a change request, that came up during the late construction was that there was too much visibility to the toilets from the hallway. In the design planning phase, it can be hard to perceive the how the visibility in the building is going to be when the construction is finished. The interior designers didn't like that people who were walking past the toilets could see partially inside. Therefore, change request was launched. The change request was quickly approved, and order was transferred to the Main Contractor to build an extra wall in front of the toilets to block the visibility. Workforce is required to complete the CR's on the construction site. In the toilet example, workers that were working on the project to finish the building as planned, had to move to build the additional wall. Moving the project's workforce to do additional but necessary tasks can but pressure on the project's schedule. Often in the project, time pressure to finish resulted in bad quality and "cutting corners", which then again caused rework.

### **Prioritizing Quality items**

Change requests and quality issues were ranked together by the project managers based on the importance. The most serious issues were called "show stoppers" that could postpone the opening of the business had to be fixed with highest priority. In most cases the quality and change request issues had to be considered together, because there was limited amount of time and resources to get everything done on the construction site. Most crucial ones were related to safety and security. Quality and change requests in safety related issues had to be fixed with highest priority before the building was to be opened. For example, additional emergency exit door was ordered to fulfill the safety regulations.

Second most important change requests and quality issues were related to operations. If an issue is so important that it would hinder the business operations of the company. These so-called operational issues had to be fixed before the opening date. An operational quality issue could be for example escalators that cannot be used, because the thresholds between the floor and escalator are not finished up to the quality standards of the customer company.

The quality importance group after operational issues could be called general because it concerns most of the change requests and quality related issues. The general quality issues weren't so called "show stoppers" that would jeopardize opening of the business but had to be dealt with. These problems were everything from wrong floor color to crack in the wall.

The least crucial but wanted quality and change improvements were marked to be done after the construction project was to be finished and when the facilities are already operational. They were marked to be done after all the crucial quality issues that could jeopardize business operations. Low priority quality issue could be for example a wall

that is badly painted but is not visible to the customers. The painting needs to be done well by the contractors at some point but is not important enough to focus resources from more crucial areas such as safety.

**How quality issues affected the Project Schedule**

The long list of quality and change issues on the snag lists caused frustrations in the project. The schedule was tight at the end and workers were on the construction site on every day of the week. More change requests and quality defect items meant increased pressure in the schedule. The snag lists i.e. documents that list quality issues and CR’s required proper tracking and constant updating. Management had to stay on top of progress on the construction site that they could allocate resources to necessary areas of the project.

A misjudgment on an issue could easily lead to number of other issues, causing so called domino effect. The streak of issues could be analyzed to find the root cause and avoid similar mistakes in the future. However, at the same time it is critical for the outcome of the project to allocate the resources to fix the problems before matters get worse. Simplified example of a domino effect caused by bad quality: if a floor has serious defects in it and needs to be redone in a building, then the decorators cannot move in to do their job. The decorators could be in the country only for 2 weeks with a limited working visa. If the job is postponed, the working visas need to be renewed, which adds extra cost. Or in the worst-case scenario, the professionals are not available anymore after the scheduled time window.

Area	Month	December				January		
	Week	49	50	51	52	1	2	3
Stacking	Plan		5%	10%	15%	25%	35%	45%
	Actual		0%	5%	13%	25%	50%	60%
Kitchen Installations	Plan	20%	40%	70%	90%	100%		
	Actual	15%	35%	60%	90%	90%	90%	95%
Bathroom Installations	Plan			20%	80%	90%	100%	
	Actual			0%	0%	40%	40%	95%
IT works	Plan					10%	20%	30%
	Actual					10%	40%	50%
Escalators	Plan				5%	10%	20%	30%
	Actual				3%	20%	40%	50%
Electrician & Carpentry	Plan	5%	10%	15%	30%	35%	40%	50%
	Actual	5%	8%	10%	15%	35%	40%	60%

Figure 4: Screen capture of a progress monitoring document that was used to follow and forecast the project processes. Monitoring helped with gaining the holistic view of the project and how parts of the project are interlinked. Quality issues would negatively affect the forecast. When issues are identified on time, they can be fixed before serious bottlenecks arise.

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It was critical for the outcome of the project that management forecasted possible bottlenecks and avoided pitfalls proactively. The forecasting of bottlenecks was done partly by learning from serious problems that were present in previous similar construction projects. Other method that was used to avoid forming bottlenecks was to do progress monitoring. Many different aspects affected the project's progress. Quality issues were one of them. As mentioned before, it was necessary for management to stay on top of quality issues and how they might postpone next phases in the project. To achieve the holistic view of the construction project's quality issues, the data regarding quality issues had to be collected from different areas of the site. The quality related data was then collected into previously mentioned snag lists and shared with the relevant stakeholders.

The employees who did the forecasting of the possible bottlenecks had to know the status on the pending quality issues. When there was a quality defect on the construction site, a project manager would ask the main contractor to fix the defect, so it would not bother progress in later stages of the project. In most situations the contractors agreed on the pointed issues to be defects and they promised to fix them. The time pressure started to increase when the project end-date was getting closer. The contractors had to keep on moving forward according to the original plans and often small quality issues would get forgotten. Because of this the quality managers would ask or give a specific timeline when the issue had to be fixed. Having a clear timeline improved progress monitoring and the overall project success. Instead of agreeing that a specific quality issue must be fixed, a clear timeline and definition of the execution was discussed agreed on. Sometimes the quality issues weren't fixed by the agreed date, but it was still better to have approximate timeline than no timeline.

### **Challenges**

The Managers think that the biggest challenges regarding quality in the project was to reach a common understanding between different parties. There were always issues with communication and coordinator inside the main contractor and the subcontractors. Partly because of this, it was challenging to bring all the different parties on the same level of understanding. Each party viewed quality differently, which caused rework and therefore it was challenging to reach the given timeline. The parent company's managers had to remind the local installation companies many times to reach the wanted quality. Common issues were in the painting, wall paper and having bubbles in the wall.

Communication was hard because there were many different contractors and over 2000 construction workers on the construction site. It was said that better communication is required between parties to reduce the amount of rework and lack of quality understanding. Quality Checks were done multiple times every week but often the information didn't reach the right parties.

The main construction company "main contractor" had not worked with the parent company before and neither had the project management company. This was a challenge

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for the Parent Company's Managers. The Managers had to improvise to get the contract partners on the right knowledge level and make them understand what the expected quality level is. The supplier for example has seen the Parent Company's facilities in Korea. Before the project started, the Parent Company, in this case the customer, showed the suppliers their facilities abroad that they know what the expectations are. Even though they (construction contractors/suppliers) have seen what is expected, they have not completely understood what they need to do to reach the right quality level. Therefore, we a guidance was needed every day to make them understand what wanted quality level is. A Project Manager said that if the same contractors and management consultant companies would be working on the next similar project, it would be definitely easier as you learn from project to project as some parties have now gained experience. Better quality control team was requested, and this can be achieved through experience.

Bureaucracy was also seen as a challenge. It made things difficult and heavily slowing down processes. The law's, guidelines and practices are generally different than in the Parent Company's home country and that made project execution tougher.

Much of the Project Management's work effort went to ensure that the right information had to be in the right place at the right time. There was a constant battle to keep all the different parties on the same level of understanding in the long chain of command. A common problem was that the information was transferred through multiple organization layers and the construction worker would not understand what the task is. Quality on the construction site seemed to be heavily matter of perception. The culture and how the communication was done played a major role in the project. In Thai culture, you are not supposed to confront people in a way that they can lose their face (Thanasankit, Corbitt 2002). A finished floor quality could be completely acceptable for an uneducated worker but totally non-acceptable for a manager that comes from a different culture. Not having a common understanding of the wanted quality caused a lot of frustration in all the project parties. This would worsen as information went through the long chain of command.

As mentioned, quality tended to be much of a matter of perception. This perception of the quality seemed to be heavily affected based on the culture where the person was from. The quality perception also depended if the person was responsible of doing the inspected area or if the person was receiving it. As a result, in many instances the contractor would did not understand or didn't want to understand what the issue is when the receiving party is complaining about quality. Both the receiver of the area and contractor often got frustrated in these situations. The outcome would often be that the contractor has rework the pointed area, such as painting, but the second time the quality has not improved. Then there would be a second quality complaint and the area would have to be reworked again. It was possible that the contractor and workers genuinely did not understand what was wrong with the quality or that they lacked the competence to execute on the expected level. When defects and rework piled up, contractors would rush through the tasks, causing more quality issues.

### **Culture and Quality perception**

The project had people from various countries and cultures: the client is a European based multinational company, the main contractor was Japanese-Thai joint venture, subcontractors were mainly Asian and blue-collar workers were mainly Thai and Burmese. At the peak, there were around 2500 people working on the project at the construction site. Because of varying backgrounds, people in the project had very different perception of what is acceptable quality.

Managers saw culture playing a very big part in the project. One of the major challenges was that the client company who ordered the project is from Europe, the project location was in Thailand and most of the workers were from all over the world but mainly from Thailand. The local Thai workers had a different overview of working in construction and about employee relationships. What was seen as acceptable workmanship Quality depended heavily on the workers cultural background. This made leadership and management more challenging. When the managers showed the workers Quality Defects, they either did not understand the problem or dodged the subject completely. The cultural aspect and understanding was seen important because labor is the final executor of the project. In Thai culture it is rude to criticize other people's work and therefore it is very difficult to challenge people to do better. One of the top managers in the project mentioned that there is a very big gap between the cultures. In Europe, the company is used to a way of working where plans are made and strictly followed, whereas in Asia there is no clear zone and "things just happen".

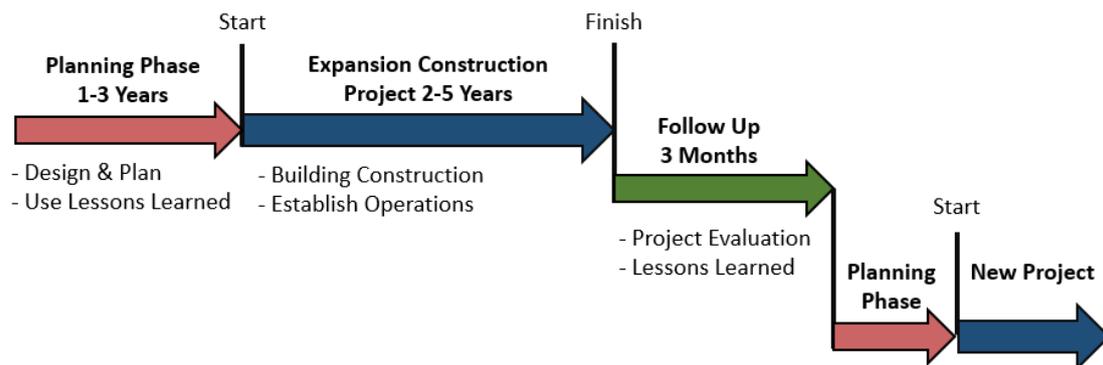
When a Project Managers was asked a question: "How big part did culture play in the possible challenges of the project?" He answered the following: "Culture played a very big part, people are not educated, not educated to understand what the customer's perception of quality is. Therefore, all the construction workers must be supervised by either a local or foreigner (this case Japanese), educated supervisor who will check the finished work quality of the local workers. Here in Thailand it doesn't exist that construction workers secure themselves that the finished quality is on the expected level."

### **Improving the processes**

The case company puts a lot of effort into learning from previous projects. The company has multiple similar expansion projects in the pipeline at the same time. Each project has many similarities but also distinctive challenges due to different geographical locations. The expansion speed of the company has accelerated during the past two decades. Expansion unit has its own managers and personnel that has experience from previous projects. Most of the managers that work in the expansion have experience of running the company's operations in Europe. These experts provide their knowledge in the expansion projects around the world.

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After each project, there is a follow up phase where learnings are discussed, taken down and then documented. In simplicity, the follow up documentation contains what went well in the project, what went wrong, what could be improved and why these things happened, and this is then used to develop better ways of working. Feedback for the follow up is taken from all over the expansion organization. When the follow-up is concluded, the learnings are then taken to the next project where the learnings are then applied to improve the processes. The lessons learned are also used for taking proactive actions in the next projects. Each single project can be seen as an iteration, where the expansion process is improved.



*Figure 5: Project timeline demonstration. Each project work as an iteration where the aim is to improve the previous established processes. Follow up and to improve the processes is mandatory for the project managers in the company.*

Every interviewed manager agreed that learnings are taken from pervious projects and used to improve the expansion process. How well these learnings are used in the future projects is a different story. There are room for improvements in how the follow up is done and knowledge applied in new projects. Sometimes lessons from previous projects are missed or not applied correctly. For example, in this project, some things had already happened in a similar previous project but were not expected to happen in this project. A comment from Expansion Project Specialist: "Every project has a different setup. Different people, contractors, different setups overall. There are hundreds of different tasks that need to be considered."

A Project Manager was asked in the interview the following question "Do you use lessons learnt from previous projects in new projects? If so, how?" The Project Manager answered: "Yes. For example, we have lessons learned from previous projects from Malaysia that we have used." Previous successful projects work as benchmarks and the next projects must be executed better every time. The Project Managers are required to do a follow up and take the learnings.

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During the interview process, the managers were working with the follow up for the next projects, where it is defined what needs to be improved and what issues require focus. It was said during the interviews that the quality perception is not mentioned enough in the follow up. The expected quality definition as such is not a separate part in the follow up. The three main components, cost, time and quality, less attention is put on the quality level. One manager saw much room for improvements within the quality component. He continued:” *From the time perspective we have shown in multiple projects that we can manage the time component. Cost we have been successful in many projects, but what about quality? That’s where we have not predefined a baseline.*” In comparison to cost example, there is clear black zero as the baseline that must be achieved. As for now, most stakeholders within the project are not aware of the quality expectations. In conclusion, there needs to be more defined baseline for quality.

During the interviews, the managers were asked what could be done with the contractors to improve the finished quality. The most common answer was that it is important to pick a reputable contractor that is right for the project. A lot of emphasis was also put on having skilled supervisors on the site that know how the job is supposed to be done. There are 3 things that require more focus when choosing contractors: education, experience and training. Many of the construction workers on the site came from the country side from different countries and they had never seen or worked in a complex construction project like this. It is very important to have skilled supervisors who know how the work is supposed to be done. Also, it is important the recruiting process is overseen by the contractors and made sure that the employees are able to meet the expectations given by the customer. To ensure that the finished quality is good enough, more monitoring is needed. Monitoring on a daily basis is the only way to ensure the quality level is high – ensuring poor quality is detected early and rectified.

During and after the project there have been many complaints that the contractors did not follow the given guidelines. Too much emphasis was put on the price level instead of quality. The price level of the contractors that execute the construction work is an important topic because the price will define what supplier will be selected. Project Manager gave a following example:” *More focus needs to be put on the quality level, instead of just defining the color paint number or the technical part. So, besides the execution of the technical things, we also need to clarify in a more detailed way, what kind of quality we expect.*”

## 5 Analysis

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*In this chapter, the research questions are answered. The chapter begins with answering how a multinational company manages quality in an offshore construction project, followed by the challenges in such project and how to overcome these challenges.*

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### **5.1 How does a multinational company manage quality in an offshore construction project?**

Research shows that the problem of Quality Management Programs is usually in the implementation in rather than the validity of the program (Krause 1998). The implementation issue was also apparent in the case study: the customer had defined quality requirements and a Quality Management Plan given by the parent company, but it was difficult to implement the plan in Thailand, because the project context is completely different.

According to the literature, quality needs to be planned, designed and built into the project instead of relying of inspections. Moreover, to successfully reach quality in a project, participation is required from all members of the organization, but management is responsible of providing the needed resources for employees (PMBOK guide 2013). Much of the Quality Management in the project relied on supervisors that followed the workers and inspected the produced quality. Often the results were not satisfying. In developing countries, many contractors don't think that quality is not important, and they might neglect internal quality inspections completely before handing the area over to customer (Abdul-Rahman et al., 1996). During the handover inspections quality issues were popping up constantly and the much of the management's effort went into putting off fires instead of focusing on driving the project forward.

Many of quality problems are related to uneducated workers Lagrosen (2004), which was also clear in the case study. Many workers were not motivated to put much effort into their work or lacked the necessary education. The quality checks had more of a reactive than proactive aspect in them, whereas the quality problems should be avoided before they even emerge (PMBOK guide 2013).

Communication between different parties in a construction project is a fundamental requirement (Thomas and Flynn 2011). Often the information would have to go through multiple parties before reaching the worker who did the productive work. Long information chains caused broken phone effect where the original message was interpreted in the wrong manner or not understood at all. Moreover, quality checks were done multiple times every week but often the information didn't reach the right parties. The managers of each party had constant meetings to keep the different parties in the information loop. According to Lin (2013), interface management between different parties in a construction project is mandatory project to be successful. A management consulting company was hired in the project to especially close the information gap between parties and ensure that the work was done at the right time and to ensure the quality on site.

Continuous improvement, the PDCA (plan-do-check-act) cycle is considered to be the basis for quality improvement as defined by W. Edwards Deming, the father of Quality Management (Project Management Body of Knowledge Guide 2013). The case company works with continues improvements and every project has its follow-up phase. After the follow-up is concluded, the learnings are then taken to the next project where the learnings are then applied to improve the processes. The fact that the case company has continuous improvement system implemented in the expansion organization can manifest itself in exceptionally positive returns in quality levels in the long run (Meredith & Mantel 2003). Moreover, valuable information can be gathered from these follow-ups in different countries to improve the current Quality Management Plan and make it to suit better a specific market.

### **5.2 What are the challenges of Quality Management implementation in an off-shore construction project and how to overcome these challenges?**

#### 5.2.1 General Quality Management Challenges

Quality is the key issue in the construction industry with more than third of all construction projects reporting major defects (Sullivan 2010). More focus needs to be put on the quality aspects on the project. One of the project's managers said that out from the three main components, cost, time and quality, least attention by far is put on the quality level. Quality issues tended to cause delays and postpone handovers in the project. Allocating more resources to Quality Control and Assurance could therefore improve the project's cost and time results as well.

It is challenging to implement good Quality Management system in construction (Formoso and Revelo 1999; Lahndt 1999; McCabe 1996; Soares and Anderson 1997). However, when a company has a good Quality Management system in place, high-quality buildings can be made (Conchúir 2011). The company could focus effort on implementing better Quality Management system to its expansion. The company's roots are in

Europe, where construction quality hasn't generally been an issue. To improve quality in the expansion projects, the company could buy external Quality Control services that do Quality Assurance on the local contractors and make sure that the workmanship is on the wanted quality level. Another possibility would be having internal professionals who support expansion projects regarding Quality Management.

The managers told in the interviews that the biggest challenges regarding quality in the project was to reach a common understanding between different parties. The customer's managers knew exactly what the wanted quality was, but it was difficult to communicate the message to the contractors. More time could be used in the beginning to make sure that all the different parties are on the same level of understanding. If the contractor's management personnel do not understand what wanted quality level is, how is it possible that the workers on the construction site know what is expected of them. Employees will be committed to quality to the extent that management is. If there is not a decision to educate and train the employees, they will struggle to produce quality work according to the customer requirements. Leadership is the most important factor in creating organization working culture towards quality (Bergman & Klefsjö, 2007). Therefore, managers from the different parties must be on the same level of understanding of the quality requirements. After that, quality practices can be started to be implement from top to down.

As for now the Quality Management in the expansion seems to be more reactive than proactive, meaning that quality issues are fixed after they pop up. Working proactively and preventing mistakes from happening is much cheaper alternative than the cost of correcting mistakes when they are revealed by inspection (Project Management Body of Knowledge Guide 2013).

Construction projects in Europe and Southeast-Asia have very different context to work in. Therefore, each market should have its own focused Quality Management Plan. Research done by Lagrosen (2004) puts the issue this way; Since multinational companies conduct their operations in many different countries, they need to make their Quality Management practices to fit the specific conditions in the countries in which they operate.

### 5.2.2 Contractor challenges

The outcome of the project is highly dependent on the level of management that the general- and subcontractors have as well as the relationship between these parties. If contractors only goal is to finish the project, that can result in "cutting corners" (Ulubeyli, Manisali and Kazaz 2010). Cutting corners can become a massive challenge for the success of the construction quality. Construction project customers need to be aware of who they hire; Some building contractors in developing counties even avoid quality improvement processes because they believe that these processes would add only time and cost to their responsibilities in construction (Abdul-Rahman et al., 1996). The customer could have incentives on place for the contractors to have high quality results. The incentives could be based on quantifiable values, for example amount of

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construction defects or how many handover deadlines were met on time. The customer wants the contractors to succeed and contractors want more money. By setting the right quality task incentives on contractors, a win-win situation could be achieved in the construction project.

Nowadays owners and developers of real estate are better informed of good construction practices. Therefore, owners can bargain and demand better quality (Griffith 2011). Construction industry is a global competitive market, which puts pressure on the contractors to deliver good workmanship quality (Oswald and Burati 1992). Therefore, the customer company can and should demand high quality work from the contractors. If the contractors don't deliver good quality, there is always more possible contractors in line for the next project. The contractors also benefit from delivering good quality results; the customers give positive references, which leads to more business opportunities.

Main contractors don't usually take all the construction work involved in the project in contract to their own account (Brennan 2008). In the case project, the main contractor subcontracted all the production work to subcontractors and focused on the design and managerial side. Important to note however, that subcontracting does not relieve the main contractor from any of its contractual obligations, including workmanship quality (Matthews et al. 1996). From the customer's perspective, it did not matter in the case project if the main contractor or subcontractors did the production work. What matters is the final quality. It was problematic however for the customer's project managers to interfere or give direct feedback on the subcontractors' workmanship quality; the customer did not have direct authority over the subcontractors because they were hired by the main contractor. As a result, the customer's managers had to give feedback through the main contractor and hope that the right message would go all the way to the right subcontractor. Research states that how subcontractor coordination is executed by the main contractor has a large influence over the project success (Ulubeyli, Manisali and Kazaz 2010).

Subcontractor coordination had a massive impact on quality and overall success in the case project. It was a challenge to make the subcontractors to understand how their role played a part in the big picture. Each subcontractor is only concerned with their own scope of works instead of looking at the big picture in the project and tends to ignore the effects on the subsequent works of other contractors (Low and Ong 2014). Because of the mentioned phenomena, some workers tend to avoid responsibility and cut corners, which causes defects. Quality issues were causing snowball effects that then caused delays and extra costs. It would be essential that subcontractors also have their own quality programs to assure an acceptable level of quality of the final building product (Ghobadian and Gallear 1996). The subcontractors in the project did not most likely have any form of quality program in place and completely depended on outside surveillance, which was partly due to the country's construction industry's culture.

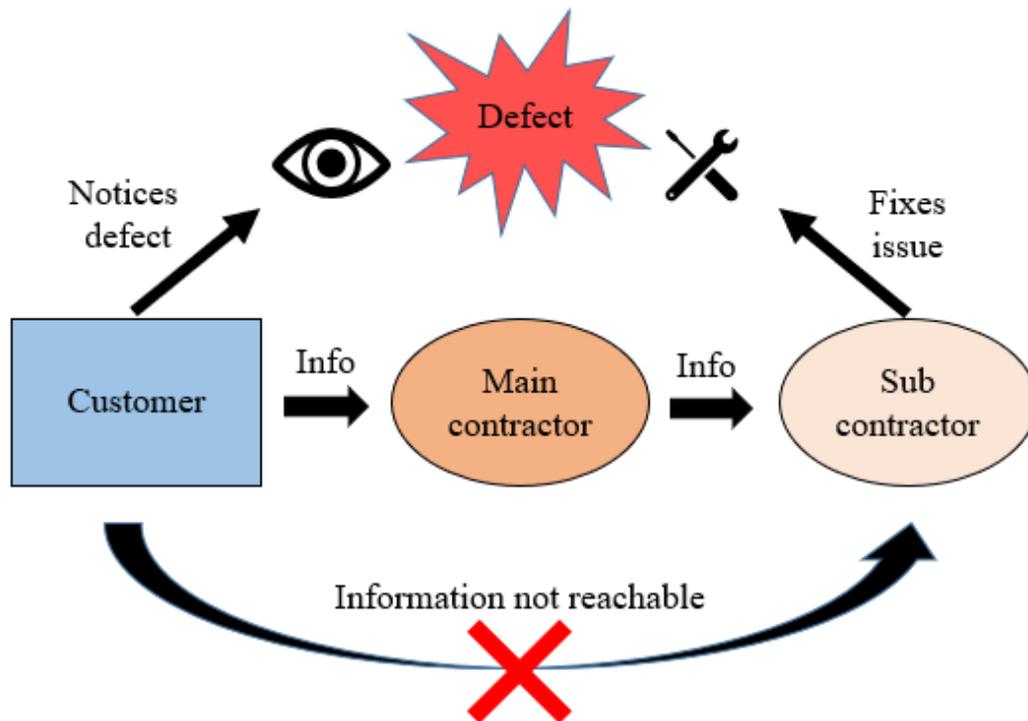


Figure 6: Example of the process how a Quality defect is handled. Customer notices defect on the site during inspection but cannot reach straight the entity who does the construction work. Information goes first through main contractor, interpretation might differ along the way of the information chain. Customer has no direct power over subcontractor.

### 5.2.3 Tendering challenges

During the tendering stage, contractors and suppliers must be screened thoroughly to find out the ones who can deliver high quality products. The contractors that have delivered good quality products, should be document and prioritized in future tendering processes, while with poor quality performance should be avoided in the future (Barrier 1992). Putting too much emphasis on price when choosing the contractor in the tendering phase can result in problems such as cost overruns, delays, and poor performance (Ulubeyli, Manisali and Kazaz 2010). In most projects the main contractors are aware that awarding a subcontract to the lowest bidder without consider other factors can result in lower quality in the project. Still in many projects the lowest price contractors are chosen (Arditi and Chotibhongs, 2005). One of the case's Project Managers was pointing out that too much focus is put on price while quality aspect is neglected. This causes problems later in the project. The case company should have tougher screening process on contractors to find out the ones who can deliver better quality. By having more strict screening process on the hired contractors, many quality related challenges can be avoided before they emerge.

### 5.2.4 Controlling challenges

Increasing number of subcontractors can result in trouble controlling the coordination process in a project (Ulubeyli, Manisali and Kazaz 2010). A conclusion can be drawn from this that with having fewer subcontractors, the main contractor can control them better and hence achieving higher quality through control. This conclusion is backed up by research (Fewings 2005). Academic literature states that contractors have a tendency to transfer risk and responsibility to the subcontractors to achieve their performance (Arditi and Chotibhongs, 2005; Choudhry, 2012). A possibility to improve quality in the project would be to screen the potential subcontractors with strict criteria. It can be put in the original contract with the main contractor that there is a limit on how many subcontractors are allowed and what kind of references are needed. The references should be included into the workforce as well. Only allow construction workers on the project that have proper education to execute the required work.

### 5.2.5 Information Sharing

Having the right information in the right place at the right time is one of the key success factors in projects. Importance of information sharing is apparent in the field's literature; communication between the different parties is one of the fundamental requirements for a successful construction project (Thomas & Flynn 2011). Sharing information effectively was especially hard in this project because the parties had multiple different languages and cultures. More effort could be put on the information sharing aspect in the next projects. Improvements could be done by for example establishing communication channels between different parties before the project initiation.

Communication with the contractors was a massive challenge in the case project. Even the main contractors highly value co-operation when choosing their subcontractors; co-operation is one of the four most important factors considered by main contractors, where cost was the most important, followed by technical knowledge and quality (Hartmann et al., 2009). Aiming for long term partnerships would most likely improve co-operation between the different parties as they try to keep each other satisfied with the results. Same applies with subcontractors, research suggests that main contractors should increase depth and strategic importance of their relationships with subcontractors to reach better results in projects (Eom et al. 2008). Moreover, by having good partnerships between the parties, a win-win strategy can be created together where everyone benefits (Lee, Han, Jang and Jung 2018).

### 5.2.6 Low education level challenges

Noticeable factor that Lagrosen (2004) brings up in his research is how crucial education levels are in reaching Quality Products. He states that Quality efforts usually require a certain participation from the employees that can be difficult to achieve if the employee education levels are too low. If there is not a decision to educate and train the

employees, they will struggle to produce according to the customer requirements (Bergman & Klefsjö, 2007). This was apparent on the construction site; low education level of the workers was one of the key factors that was affecting the quality. Overall it would be in the interest of the customer to focus on having long term partnerships with the same contractors and educate everyone in the project organization. When partnerships are long, the resources invested in educating the employees in the project organization doesn't go to waste and gives generates more value over time (Eom et al. 2008).

The main contractor subcontracted basically all the productive physical work to local workers, which were not educated to understand what the customer's perception of quality is. Therefore, all the construction workers were supervised by either a local or a foreigner, educated supervisor who checked the finished work quality of the local workers. To achieve high quality products, it is crucial to involve and educate everyone in the organization to think about quality (Ho, 1999). People in the project organization are the driving force behind quality and where it all starts. Moreover, things such as management commitment, training, leadership and empowerment have a crucial role in achieving quality environment (Ho, 1999).

### 5.2.7 Efficiency Challenges

The risks related to typical obstacles must be identified and managed, to improve overall project efficiency. According to Chua, Wang and Tan (2003), International Construction Projects tend to have five groups of typical obstacles: business environment risk, regulatory restrictions, contract arrangements, and differences in culture. These challenges must be controlled, otherwise they can jeopardize the construction project's success by reducing efficiency.

Efficiency and productivity of the workforce was rather low in the construction project. Reaching decent efficiency was a challenge because getting a specific job done would require more people and therefore more managers to supervise the quality. Bigger groups of people can result in trouble controlling the coordination process (Ulubeyli, Manisali and Kazaz 2010). Also, worth noting is that to achieve best possible product quality, all departments and all levels must be included in the quality activities (Monden 2011). Having more people on the site means that it is harder to include everyone in the quality activities. This is a common problem in the region; Developing countries in Asia tend to be highly populated and thus contractors generally use labor intensive methods for construction projects, thus reducing worker efficiency in the projects (Koehn and Regmi 1990). There is massive improvement potential in the project organization to involve everyone to work towards better quality. In reality this is challenging, because the subcontractors are changing all the time and there is a lot of inefficient workforce on the site.

Many areas of the construction site had to be reworked multiple times due to low quality work, hence lowering the efficiency even more. The case company could improve the project organization's efficiency by choosing the right contractor that can deliver high quality products, which would lead into series of positive outcomes and increased efficiency. The need to increase efficiency in the construction industry has never been more important than in the beginning in the 21st century (Sullivan 2011). By having contractors that deliver high workmanship quality, the project has fewer quality defects and therefore, the handovers are one time. Resources can be allocated in most efficient way, which results in saved time and less costs. When manpower, tools and time is freed from jobs that were previously caused by bad quality, they can be allocated to area which produced more value to the customer and therefore make the business more profitable. A solution to the low efficiency could be hiring workforce that is well educated and experienced in the field. Less people would be needed on the site, requiring less surveillance staff and it would be easier to include everyone in the quality improving activities and thus causing less quality defects.

### 5.2.8 Challenges with cultural clash in quality management

In previous research it has been found, that there is a difference between countries how quality management is conducted (Maheshwari and Xiande, 1994; Wacker and Sheu, 1994; Harrington, 1996; Dahlgaard et al., 1998; Rao Korukonda, 1998; Solis et al., 2000). Also, in the project it was clear the country of origin affected person's quality perception. A straight conclusion can be drawn that each cultural area requires a targeted Quality Management plan that fits the context of the business environment in the area. In other words, Quality Management practices that work in Europe, might not work that well in Asia. Local experts in the subject of Quality Control are needed to close the gaps to reach the wanted final product that is defined by the European customer

The interviewed managers saw that cultural challenges played a major role in the project's quality. The Thai culture is very different from the European one, and often there was not even a common language between people. Multiple studies also address that quality problems in some countries are related to culture (de Macedo- Soares and Lucas, 1996; Ngowi, 2000; Mathews et al., 2001). It is very important to understand Thai working practices, especially the importance of face. Without acknowledgement of Thai cultural practices, western business developers tend to create situations where employees can 'lose face' or respect because of direct negative confrontation, which can result in anger. The decision making in Thailand is very hierarchical. Most middle managers in Thailand don't want to make decisions themselves but instead ask their supervisors (Thanasankit, Corbitt 2002).

According to research, this is common in offshore business; suboptimal satisfaction levels often exist between offshoring partners (Clampit et al. 2015). Research also shows that suggests that cultural differences play a role in low satisfaction levels between international offshoring partners and that cultural intelligence within a company can be valuable advantage that directly improves the changes of offshoring success

(Ang & Inkpen, 2008). The satisfaction levels in the project varied between parties and changed over time.

### **5.3 Summary of the analysis**

The challenges related to Quality Management on the offshore construction site are mainly related to contractors and how well they were able to execute the final work. The root cause for this can be all the way in the contractor tendering, where contracts are given to subcontractors. The final workmanship quality might not be on the wanted level if too much emphasis is put on the price during contract tendering. Most quality related issues in offshore construction could be avoided by choosing contractors carefully and choose the ones who can provide high quality work.

Multinational companies that do offshoring have generally very well thought out Quality Management plans. The problems are usually in the implementation rather than in the validity of the Quality Management program. This was also apparent in the case study; the multinational company had very detailed quality instructions for construction but minor details on the surface level are hard to get right because the cultural working context is completely different.

To improve quality in the case study project, inspections on site were done more frequently. However, Quality Management is supposed to be more proactive than reactive. Preventing mistakes from happening is much cheaper alternative than the cost of correcting mistakes when they are revealed later by inspection.

## 6 Discussion and conclusion

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*This chapter presents discussion and conclusion of the study*

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### 6.1 Discussion of the findings

The starting point of this research has arisen from a common problem that globally expanding businesses have; how can Quality Management be improved in an offshore construction project and how to bring the quality levels on the same level as it is in the home country. During comprehensive literature review, it has been found that there is a difference between countries on how Quality Management is conducted (Madeshwari and Xiande, 1994; Wacker and Sheu, 1994; Harrington, 1996; Dahlgaard et al., 1998; Rao Korukonda, 1998; Solis et al., 2000), quality is a key issue in the construction industry, with over one third of all construction projects reporting major defects (Sullivan 2010) and that low satisfaction levels often exist between offshoring partners, according to research (Clampit et al. 2015).

To accomplish the goal of the study, two research questions have been formed:

***RQ 1:*** *How does a multinational company manage quality in an offshore construction project?*

***RQ 2:*** *What are the challenges of Quality Management implementation in an offshore construction project and how to overcome these challenges?*

The first research question was formed to get an understanding of how multinational companies generally manage quality in an offshore construction projects and what are the suggested ways of working in the academic literature. After the overview of the topic, the second research question was formed to analyse the typical challenges related to the projects and how these challenges could be solved. Potentially, the outcome of from this research question will have an impact on the case company's existing Quality Management Plan and therefore, improve the ways of working in the case company's future projects. Other companies in similar situation can also find value in the research and implement the suggested ways of working to their own Quality Management system.

The thesis was a research but also a consulting assignment for the case company and therefore many of the problems and the offered solutions in the analysis can be rather specific to the company. Nevertheless, many of the issues and challenges are most likely to be found in other offshoring construction projects. The goal of the thesis is not

only to help the case company to improve their Quality Management in offshore construction projects but also to contribute to the understanding of the subject.

The case company was aware of that they needed managers from the local culture to handle the local subcontractors and workers. Hiring local competent staff to ensure that things were done right on the site was one of the key aspects in managing quality on this offshore construction site project. It could be said that the company did succeed within the area of cultural intelligence to some degree. The project customer had support staff in Asia that helped with the local issues. The support staff generally helps all the expansion project within the area, and therefore has profound experience in handling common pitfalls. Management consultant company that had previous experience within the region was hired to help to manage the construction project. One specialist from that consulting company became remarkably valuable asset in the project. She had worked in similar challenging projects in Thailand before, and therefore knew how things work in that cultural environment. The local experts with strong references should be leveraged more in the future projects. Overall, projects in the Southeast-Asian region will become easier for the expansion organization to manage, after experience is gained from a few projects and lessons are learned from previous mistakes.

Contractors had massive effect on the overall project. Most Quality Management challenges were related to subcontractors and how to control their work quality. The construction project organization can only be good as the entities in it (Koehn and Regmi 1990). It can be said that the customer should want to be in the process of choosing the subcontractors. The customer chooses the main contractor; therefore, it should be taking part of choosing the subcontractors that execute most of the production work.

To sum up, the findings part of the thesis goes through how a multinational company manages Quality in an offshore construction project and identifies the common challenges that occur within these projects. After the challenges have been identified, the thesis suggests ways on how to overcome the challenges based on the information gathered from academic literature and Project Management professionals.

## **6.2 Discussion of method**

To reach high validity for the study, the author applied multiple data collection techniques that were supported by research literature. The results from interviews and observations have been analysed towards existing theory from the academic research in chapter two to provide new theories regarding the subject of the study. External validity is about knowing if the results from the research can be generalized outside of the conducted case study (Yin 2007). It could be said that many Quality Management aspects from the case study's offshore construction site can apply to other similar projects. Construction sites are different around the world but for example importance of subcontractor screening to assure quality is universal.

To achieve high reliability during this research, different data collection techniques were used, such as observations, interviews, tape recording etc. The answers to the questions from different employees were surprisingly similar to each other. Also, the information gathered from academic journals and professional books was critically and

thoroughly questioned and analysed. The data gathered from the case offshore construction site relates to the existing views in the academic literature.

Observation in the research included systematic observation, description, analysis, and interpretation of people's behaviour in their natural setting on the floor level on the construction site (Saunders et al., 2012). The observation produced qualitative data that can be seen in chapter 4. Observation as a research method was supplemented by interviews and collection of documents. Having multiple data collection methods added richness to the research data when attempted to get to the root cause of the challenges. Observation method is subjective in its nature and therefore can be questioned at points (Kothari 2004). However, the academic literature and data collected from interviews in the case clearly back-up the data collected through observations.

The interviews performed in this thesis were held as a semi-structured type. The author had prepared questions for each interview, but many of the questions were open-ended, so the interviews were carried out more as discussions. The purpose of performing the interviews in a semi-structure manner was to create an environment where the interviewees have the possibility to express their own thoughts and opinions on the subjects and the author could gain insights that might not be revealed otherwise. Employees were eager to give their input and views to the matter of Quality Management in the project. Many had strong feelings regarding how quality was in the project and what in their mind could be improved. Most managers would continue working on similar expansion projects in different locations. Therefore, the interviewees had incentives to help and answer to the questions because improvements in the company's Quality Management practices can help the project managers to succeed in the future projects.

The interviewees were promised full anonymity, so they could express their opinions freely without holding back information, which increases reliability. In the end, the answers were similar on a general level between the interviewees, with differences in the "free word" open question. This implies that the given answers can be considered reliable.

It must be noted, that construction sites and projects are always unique, and they the working context is different around the world. This is due to laws, regulations, culture, education of the workers, building materials, environment and many other aspects (Ghemawat 2001). Therefore, some of the mentioned issues in the case might not be relevant to other construction projects in the world.

### **6.3 Conclusions**

This thesis was a research but also a consulting assignment for a multinational company that had an offshore construction site. The aim was to give answers to challenges that were experienced on the case construction site but also to research Quality Management issues that are common in offshore construction projects. What was clear from the beginning of the research is that quality is a key issue in offshoring construction projects with most project reporting major defects. Results show that the biggest contribution by the study is made for international companies who struggle to reach wanted levels

of quality in their offshore construction projects. The analysis chapter provides guidelines and advice for offshore construction quality management, which are based on academic literature and practical learnings from a real case. The contribution made to academic literature by this study is that it aims to combine elements from Quality Management, offshore construction and project management. There is not much or any research where these elements are combined and therefore the thesis adds a new branch to the tree of knowledge

The most outstanding aspect of successful implementation of Quality Management in offshore construction project seems to be having good contractors that are able to deliver high quality work. Choosing the right contractors and suppliers in the beginning is the easiest way to avoid bad quality workmanship in the project. Long-term partnerships are recommended with contractors that deliver products on the expected level. Many customers don't take part in the subcontractor choosing because that is usually done by the main contractors. There should be a strict screening process for contractors in the customer's Quality Management Plan. During the tender phase it is important to avoid putting too much emphasis on cost and speed without considering quality. In the end, having a cheap main contractor can become costlier due to bad quality rework. The project customer must ensure that the main contractor has strict screening process on the subcontractors as well. The customer should regulate in the contract to have a veto power over the subcontractors and take part in the choosing phase.

Second important part in successful offshore construction Quality Management is understanding the working context and culture in the target location. This is a major challenge for many multinational companies that want to expand to new markets. What works in Europe might not work in Asia and vice versa. Cultural understanding plays a big role in offshoring project quality success. What a person perceives as a quality product can vary depending on person's cultural and educational background. Therefore, it is important that multinational company understands the target market's culture and that it hires people to the organization that has the necessary education to be able to deliver high quality products.

Future research in the subject could focus on understanding on how quality is perceived in different cultures, and if this understanding could be used to improve Quality Management in multination companies. Also, it would be interesting to do a similar study from a different angle, where Asian company expands its business operations to Europe or the United States.

## 7 References

- Abdul-Rahman, H., Thompson, P.A., Whyte, I.L., (1996). Capturing the cost of non-conformance on construction sites: an application of the quality cost matrix. *International Journal of Quality & Reliability Management* 13, 48–60.
- American Society of Civil Engineers. (2000). *Quality in the Constructed Project: A Guide for Owners, Designers, and Constructors*. ASCE Publications
- Andersen, H. (1990). *Vetenskapsteori och metodlära – en introduktion*. Studentlitteratur. Anderson,
- Ang, S., & Inkpen, A. C. (2008). Cultural intelligence and offshore outsourcing success: A framework of firm-level intercultural capability. *Decision Sciences*, 39(3): 337–358.
- Ansari, A., & Modarress, B. (1990). *Just-in-time purchasing*. New York: Free Press.
- Arditi, D., & Chotibhongs, R. (2005). Issues in Subcontracting Practice. *Journal of Construction Engineering and Management*, 131(8), 866-876.
- Areola, M. K. (1997). “A key sector suffering from funding constraints and irregularities.” *Pak. Gulf Econ.*, 97(15).
- Armitage, A., & Keeble-Ramsay, D. (2009). The Rapid Structured Literature Review as a Research Strategy. *Online Submission*, 6(4), 27-38.
- Barrier, Michael. (1992). Small firms put quality first. (includes related articles) (*Total Quality Management*) (Cover Story). *Nation's Business*, 80(5), 22.
- Berg, B. L., Lune, H., & Lune, H. (2004). *Qualitative research methods for the social sciences* (Vol. 5). Boston, MA: Pearson.
- Bergman, B, and Klefsjö, B. (2007). *Kvalitet: från behov till användning*, Studentlitteratur.
- Boje, D. M., & Dennehy, R. F. (2008). *Managing in the postmodern world: America’s revolution against exploitation* (2nd ed.). Information Age Pub Incorporated
- Brennan, D. S. (2008). *The construction contracts book: How to find common ground in negotiating the 2007 industry form contract documents*. American Bar Association.
- Bryman, A. & Bell, E. (2011). *Business Research Methods*. New York: Oxford
- budgets.” Release party held at the Instituto Cervantes in New York
- Burt, D. N. (1989). Managing product quality through strategic purchasing. *Sloan Management Review*, 30(3), 39–48.
- Butt, Thomas K., and Clinton, John S. E. (2005). “Limiting construction failure losses—A challenge for the insurance industry.”

## References

- Chan APC, Yeong CM. (1995) A comparison of strategies for reducing
- Cheung SO, Tam CM, Ndekugri I, Harris (2000). Factors affecting clients' project dispute resolution satisfaction in Hong Kong. *Construct Manage Econom*;18:281–94.
- Chua DKH, Wang Y, Tan WT (2003) Impacts of obstacles in East Asian cross-border construction. *J Construct Eng Manage, ASCE*;129(2):131–41.
- Clampit, J., Kedia, B., Fabian, F., & Gaffney, N. (2015). Offshoring satisfaction: The role of partnership credibility and cultural complementarity. *Journal Of World Business*, 50(1), 79-93.
- Conchúir, D. Ó. (2011). *Overview of the PMBOK® guide: Short cuts for PMP® certification*. Berlin: Springer.
- Condon, E., and Hartman, F. (2004). "Playing games." *AACE Int. Transactions*, PM141, Morgantown, WV.
- Conti, Tito. "Systems Thinking in Quality Management." *The TQM Journal* 22, no. 4 (2010): 352-68.
- Dahlgaard, J.J., Kristensen, K., Kanji, G.K., Juhl, H.J. and Sohal, A.S. (1998), "Quality management practices: a comparative study between East and West", *International Journal of Quality & Reliability Management*, Vol. 15 No. 8/9, pp. 812-26.
- Davies, N & Jokiniemi, E. (2012) . *Architect's Illustrated Pocket Dictionary*, Routledge
- Dicken, P. (2007). The multiplant business enterprise and geographical space: Some issues in the study of external control and regional development. *Regional Studies*, 41, S37-S48.
- Eom, C., Yun, S., & Paek, J. (2008). Subcontractor evaluation and management framework for strategic pacontiering. *Journal of Construction Engineering and Management*, 134(11), 842–851.
- Formoso, C. T., & Revelo, V. H. (1999). Improving the materials supply system in small-sized building firms. *Automation in construction*, 8(6), 663–670.
- Ghemawat P (2001) Distance still matters: the hard reality of global expansion. *Harvard Bus Rev* 2001:137–147
- Ghobadian, A., & Gallear, D. N. (1996). Total quality management in SMEs. *Omega*, 24(1), 83–106.
- Griffith, A. (2011). *Integrated management systems for construction: Quality, environment and safety*. Trans-Atlantic Publications.
- Gupta D, & Sharma M. (2015). Risk Management In Construction Projects Of Developing Countries. *International Journal of Engineering Research and Applications*, 5(11), 154-156.

## References

- Harrington, H.J. (1996), "National traits in TQM principles and practices", *The TQM Magazine*, Vol. 8 No. 4, pp. 49-54.
- Hartman J (2004) "Vetenskapligt tänkande. Från kunskapsteori till metodteori" Lund:
- Hartmann, A., Ling, F. Y. Y., and Tan, J. S. (2009). "Relative importance of subcontractor selection criteria: Evidence from Singapore." *Journal of Construction Engineering and Management*, Vol. 135, No. 9, pp. 826-832, DOI: 10.1061/(ASCE)0733-9364(2009)135:9 (826).
- Hinze, J. and Tracey, A. (1994). "The contractor-subcontractor relationship: The subcontractor's view." *Journal of Construction Engineering and Management*, Vol. 120, No. 2, pp. 274-287, DOI: 10.1061/(ASCE) 0733-9364(1994)120:2(274).
- Ho, Samuel K.M. (1999). *Operations and Quality Management*, International Thomson Business Press.
- Hofstede, G. (1984). *Culture's Consequences*. Sage, Newbury Park, CA: Abridged edition.
- Hofstede, G., and Hofstede G.J., (2005). *Cultures and organizations: software of the mind*. McGraw-Hill.
- Hoyle, David. *ISO 9000 Quality Systems Handbook: Using the Standards as a Framework for Business Improvement*. 6th ed. Amsterdam; Boston; London: Butterworth-Heinemann, (2009)
- Hughes, W., Hillebrandt, P., & Murdoch, J. (2000). The impact of contract duration on the cost of cash retention. *Construction Management and Economics*, 18(1), 11-14.
- Institute, P., & Project, M. (2013). *A guide to the project management body of knowledge (PMBOK guide)*. (5th ed.).
- Ishikawa, K. (1985), *What Is Total Quality Control? The Japanese Way*, Prentice-Hall, Englewood Cliffs, NJ.
- Jesson, J., Matheson, L., & Lacey, F. M. (2011). *Doing Your Literature Review: Traditional and Systematic Techniques*. Thousand Oaks: Sage Publications.
- Jokinen, Vainio, & Pulkkinen. (2017). Engineering Change Management Data Analysis from the Perspective of Information Quality. *Procedia Manufacturing*, 11, 1626-1633.
- Koehn, E. and D. C. Regmi (1990). Quality in Constructed Projects: International Firms and Developing Countries. *Journal of Professional Issues in Engineering* (1990): 388-396.
- Koehn, E., & Jagushte, S. (2005). Construction Productivity in Developing Global Regions. *AACE International Transactions*, IN31-IN35.

## References

- Koehn, E., & Regmi, D. (1990). Quality in constructed projects: International firms and developing countries. *Journal of Professional Issues in Engineering*, 116(4), 388–396. doi:10.1061/(ASCE)1052-3928(1990)116:4(388)
- Korpela, M., Soriyan, H. A., Olufokunbi, K. C. and Mursu, A. (1998). *Blueprint of an African Systems Development Methodology*
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- Krause, D. R., Handfield, R. B., and Scannell, T. V. (1998). “An empirical investigation of supplier development reactive and strategic processes.” *J. Oper. Manage.*, 17(1), 39–58.
- Kull, Thomas Wacker, John (2010): *Journal of Operations Management* Vol.28(3), pp.223-239.
- Lagrosen, S. (2004). Dealing with quality management in multinational firms, the framework is Quality management in global firms. *The TQM Magazine*, 16(6), 396-402.
- Lahndt, L. (1999). TQM tools for the construction industry. *EMJ Engineering Management Journal*, 11(2), 23–27.
- Lee, J., Han, K., Jang, S., & Jung, H. (2018). “Win-win strategy” for sustainable relationship between general contractors and subcontractors in international construction projects. *KSCE Journal of Civil Engineering*, 22(2), 428-439.
- Lepatner, B. B. (2007). “Keynote address: Broken buildings, busted
- Levin, Ginger. "Project Quality Management: Why, What and How, Second Edition." *Project Management Journal* 45, no. 5 (2014): E3.
- Levy, S. M. (2009). *Construction process planning and management: An owner's guide to successful projects*. Butterworth-Heinemann.
- Lewin, A. Y., Perm-Ajchariyawong, N., Sappenfield, D., & Aird, C. (2009). *Is the global outsourcing industry in for a no-holds-barred competition? ORN & PwC Service Provider Survey Report* Durham: Duke University.
- Lin, Y.-C. (2013). “Construction network-based interface management system.” *Automation in Construction*, Vol. 30, pp. 228-241, DOI: 10.1016/j.autcon.2012.11.025.
- Long, N., Ogunluna, S., & Lam, K. (2004). Large construction projects in developing countries: A case study from Vietnam. *International Journal of Project Management*, 22(7), 553-561.
- Low, S., & Ong, J. (2014). *Project Quality Management Critical Success Factors for Buildings*

## References

- Luu, D. & Sher, W. (2012). Construction tender subcontract selection using case-based reasoning. *Construction Economics and Building*, 6, 32-43.
- Macedo-Soares, T.D.L.v.A. and Lucas, D.C. (1996), "Key quality management practices of leading firms in Brazil: findings of a pilot-study", *The TQM Magazine*, Vol. 8 No. 4, pp. 55-70.
- Maheshwari, S.K. and Xiande, Z. (1994), "Benchmarking quality management practices in India", *Benchmarking for Quality Management & Technology*, Vol. 1 No. 2, pp. 5-23.
- Mathews, B.P., Ueno, A., Keka" le, T., Repka, M., Lopes Pereira, Z. and Silva, G. (2001), "European quality management practices: the impact of national culture", *International Journal of Quality & Reliability Management*, Vol. 18 No. 7, pp. 692-707.
- Matthews, J. D., Tyler, A., & Thorpe, T. (1996). *Subcontracting: the subcontractor's view. The organization and management of construction: shaping theory and practice* (Vol. 2, pp. 471– 480), London, UK: E & FN Spon.
- McCabe, S. (1996). Creating excellence in construction companies: UK contractors' experiences. *TQM Magazine*, 8(6), 14-19
- Meredith, J.R., Mantel, S.J., 2003. *Project management a managerial approach*. Wiley, New York.
- Monden. Y. *Toyota Production System: An Integrated Approach to Just-In-Time*, 4th Edition (2011)
- Moran, R., and Harris, P. (2001). European leadership in globalization, *European Business Re-view*, 96(2), 32-41.
- Murray, Myles (1993). "A construction contract for the year 2000." *Concr. Int.*, 15(6), 60–61.
- Nadrag, L., & Bala, M. (2014). A STUDY OF THE TERM GLOBALISATION. *Linguistic and Philosophical Investigations*, 13, 641-649
- Ng, S. T. (2005). Performance of engineering consultants in ISO 9000-based quality management systems implementation. *Engineering, Construction and Architectural Management*, 12(6), 519–532
- Ngowi, A.B. (2000), "Impact of culture on the application of TQM in the construction industry in Botswana", *International Journal of Quality & Reliability Management*, Vol. 17 No. 4/5, pp. 442-52.
- Noble (2006). I. S. O. "ISO 9000 quality systems handbook."
- Ogunlana SO, Promkuntong K, Jearkjirm V (1996) Construction delays in a fast-growing economy: comparing Thailand with other economies. *Int J Project Manage*;14(1):37–45.

## References

- Orwig, R. A., & Brennan, L. L. (2000). An integrated view of project and quality management for project-based organizations. *The International Journal of Quality & Reliability Management*
- Oswald, T. H., & Burati, J. L. (1992). Guidelines for implementing total quality management in the engineering and construction industry. Bureau of Engineering Research, University of Texas at Austin, Austin
- Paus, E. (2007). *Global Capitalism Unbound Winners and Losers from Offshore Outsourcing* (1st edition).
- Peh Lu, & Low Sui. (2013). *Organization Design for International Construction Business*.
- Pignanelli, A., & Csillag, J. (2008). The Impact of Quality Management on Profitability: An Empirical Study. *Journal of Operations and Supply Chain Management*, 1(1), 66.
- Rajendran, S., Clarke, B., & Andrews, R. (2012). Quality management in construction. *Professional Safety*, 57(11), 37-
- Rao Korukonda, A. (1998), "Measurement of quality vis-a` -vis quality of management in the Asia-Pacific region: a conceptual analysis", *International Journal of Quality & Reliability Management*, Vol. 15 No. 8/9, pp. 892-906.
- Raymond, L., Bergeron, F., 2008. Project management information systems: an empirical study of their impact on project managers and project success. *International Journal of Project Management* 26, 213–220 (26 (2008)).
- Rommel, G. (1996). *Quality pays*. New York: Macmillan Press
- Rose, K. (2013). A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition. *Project Management Journal*, 44(3), E1.
- Saunders, M, Lewis, P. & Thornhill, A. (2012). *Research Methods for Business Students* (6th ed.). Harlow: Pearson.
- Serdar Ulubeyli, Ekrem Manisali & Aynur Kazaz (2010) Subcontractor selection practices in international construction projects, *Journal of Civil Engineering and Management*, 16:1, 47-56, DOI
- Shortell, S. M., et al. (1995). "Assessing the impact of continuous quality improvement/total quality management: Concept versus implementation."
- Singh, D., Tiong, and Robert, L. K. (2005). "A fuzzy decision framework
- Smith, J. R. (2014). CONSTRUCTION QUALITY MANAGEMENT. *Engineer*, 44(2), 30-33.
- Soares, J., & Anderson, S. (1997). Modeling process management in construction. *Journal of Management in Engineering*, 13(5), 45–53.

## References

- Sullivan, K. (2010). Quality management programs in the construction industry: Best value compared with other methodologies. *Journal of Management in Engineering*, 27(4), 210–219.
- Tam, V.W.Y., Le, K.N., 2007. Quality improvement in construction by using a Vandermonde interpolation technique. *International Journal of Project Management* 25, 815–823.
- Thanasankit, T., & Corbitt, B. (2002). Understanding Thai culture and its impact on requirements engineering process management during information systems development. *Asian academy of management journal*, 7(1), 103-126.
- Thomas, H. R. and Flynn, C. J. (2011). “Fundamental principles of subcontractor management.” *Practice Periodical on Structural Design and Construction*, Vol. 16, No. 3, pp. 106-111, DOI: 10.1061/(ASCE)SC 1943-5576.0000087.
- Trompenaars, F., and Hampden-Turner-Turner, C. (1997). *Riding the waves of culture - Understanding cultural diversity in business* (2nd edition). Nicholas Brealy Publishing.
- USACE (2004). *Construction Quality management for Contractors , Student Study Guide*, USACE Professional Development Support Center, Control No. 784, Revised 2004.
- Vantage Partners. (2009). *Managing offshoring relationships: Governance in global deals*.
- Wacker, J.G. and Sheu, C. (1994), “The stages of quality management evolution in the Pacific Rim”, *International Journal of Quality & Reliability Management*, Vol. 11 No. 7, pp. 38-50.
- Weshah, N., El-Ghandour, W., Falls, L. C., and Jergeas, G. (2014). “Enhancing project performance by developing multiple regression analysis and risk analysis models for interface.” *Canadian Journal of Civil Engineering*, Vol. 41, No. 11, pp. 929-944, DOI: 10.1139/cjce-2013-0499.
- Williamson, K. (2002). *Research Methods for Students, Academics and Professionals: Information Management and Systems* (2nd ed.). Wagga Wagga: Centre for Information Studies.
- Wilson, R. (2015). *Mastering project time management, cost, control, and quality management: Proven methods for controlling the three elements that define project deliverables*
- Yin, R. (2007). *Fallstudier: design och genomförande*, Liber.

## 8 Appendices

### Appendix 1: Case Interview Questions

The questions prepared prior to the interview are the following:

1. Please state your name and position in the company, for the record.
2. What is your role in the project?
3. Have you worked on a similar project before?
4. If yes: How was the construction quality in comparison to the other projects? What was different between the projects?
5. Was there a plan about quality management that was followed?
6. What do you think were the biggest challenges regarding quality/quality plans/standards in the project?
7. Was there a lot of improvising and “inventing on the go”, regarding quality control?
8. Was communication or common understanding of quality an issue? How?
9. How big part did culture play in the possible challenges of the project?
10. Did the construction workers (Carpenters) etc. understand what wanted quality was?
11. What could be done with the contractors to improve the finished quality?
12. What went well with the construction quality control in the project?
13. What could be improved about quality control in the future in similar projects?
14. Where is all this quality information recorded within the company?
15. Do you use lessons learnt from previous projects in new ones? If so, how? Other comments / free word.