University of Stavanger

Faculty of Science and Technology

MASTER'S THESIS

Study program/ Specialization: Master's degree programme in Offshore technology/ Industrial Asset Management	Spring semester, 2015 Open / ~~Restricted access~~
Writer: Byungmu Ahn	…… (Writer's signature)
Faculty supervisor: Jayantha Prasanna Liyanage External supervisor(s):	
Thesis title: Managing the Efficiency of Foreign Engineering Contracts : A Study of a Norwegian and South Korean Project Interface	
Credits (ECTS): 30	
Key words: International project Norwegian operator South Korean shipyard EPC contract Communication and coordination	Pages: 93 + enclosure: Stavanger, 15.06/2015 Date/year

Managing the Efficiency of Foreign Engineering Contracts: A Study of a Norwegian and South Korean Project Interface

Abstract

Oil & gas exploration and production industry in North Sea has greatly been challenged over the last decade with increasing cost profiles. This condition, together with relatively low oil price has begun to squeeze the commercial margins of a large number of assets. Foreign engineering contracts have become a common trend in this context seeking significant cost advantage during the engineering phase of major offshore production assets. However, this popular strategy has been met with serious debates due to many critical issues experienced in complex engineering projects.

In last few years, many Norwegian offshore oil and gas field development projects were awarded to Asian contractors. Despite the important commercial need to ensure cost-effective projects, it has been revealed by reports and analyses that most of the projects have failed to deliver on time and budget during its execution phase. This makes economics of projects on NCS more vulnerable to recent oil market downturn. At the same time, it has raised concerns on the efficiency of coordination and communication management process of large-scale projects under the EPC contract regime.

This study investigated the key elements contributing to project coordination and communication challenges and thereby causing delay in schedule and cost overrun of the EPC projects awarded to shipyard in South Korea. In order to identify the key elements, principal data were gathered using in-depth, open-ended, guided interviews with Norwegian operators, sub-contractors, and authority, involving those who have long experience on EPC projects awarded to South Korean yards. The paper will define and discuss how the key elements regulate the efficiency of complex engineering projects involving Norwegian operators, South Korean EPC contractor, and sub-contractors from various countries. It will also suggest how to improve the current situation and enhance overall project performance.

Acknowledgements

I would like to express my gratitude to Siv Irene Skadsem for her interest and steady support for this study. You kindly took all the trouble to provide me with opportunities to have interviews with your colleagues in Norway and South Korea.

I would also like to acknowledge the help of Nina Marie Andresen, Tone Aanderaa Kiste, Young Mi Chu, Su Jin Hwang, Ola Bjelland, Stein Håland, Halvor Hodnefjell, Bjørn Terje Thorsen, and Stig Arne Witsø for arranging interviews and supporting this study.

I am very grateful to my supervisor, Professor Jayantha Prasanna Liyanage, for his support and guidance.

This study could not have happened without the support of all the nice people who participated in this study. I would like to thank each of you. Your perspectives were so valuable.

Table of Contents

List of Figures

List of Tables

1. Introduction

1.1. Background

The last decade with its strong oil market resulted in a significant increase in field development costs worldwide. Oil and gas field development costs almost quadrupled between 2001 and 2012, while production grew by only 2% (Statoil, 2014).

Norway, the 5th largest oil exporter in the world, has not been immune to the high cost in the oil and gas industry. The high compensation level in the manufacturing industry of Norway (TCB, 2014) put much pressure on the economic viability of new field development project.

In an attempt to tackle the high cost challenges, Norwegian operators has made various efforts to bring development cost down for each and every phase of offshore oil and gas field development projects.

For execution phase of project where intensive input of labor is required, notoriously high labor cost in Norway provided a strong incentive for Norwegian operators to eye East Asian contractors rather than Norwegian players. East Asian shipyards landed fabrication contracts from Norwegian operators in mid-late 1990s. As cost level in Norway kept escalating, Asian yards also appeared to be successful in securing more projects with higher budget and complexity, including multiple EPC (Engineering, Procurement, and Construction) projects, in late 2000s and early 2010s.

What was delivered for such high profile projects, however, was not something the Norwegians expected. Many of these projects suffered from huge cost overrun, significant delay in schedule, and low quality. In its report in 2013, NPD (Norwegian Petroleum Directorate) stated that Skarv FPSO (Floating Production Storage Offloading unit), built by South Korean and Singaporean contractors, was impacted by significant cost overrun of 32% in total (NPD, 2013). More recently, Goliat FPSO, delivered from South Korean yard, reportedly hit a 49% cost increase (Haugstad, 2015).

Bad experiences with East Asian shipyards, together with already expensive field development cost level in Norway, deepened Norwegian operators' concerns over the high risk potential of cost overruns for new projects in Norwegian Continental Shelf (NCS). Such concerns and the recent oil price drop pose serious challenges to the Norwegian oil and gas industry and resulted in a series of postponed execution of fresh field development projects late last year and early this year.

Given that the market consensus is that oil price will remain volatile for years to come, it is essential to make industry-wide effort to gain more control over cost development during project execution phase.

1.2. Statement of the Problem

Many of projects awarded to East Asian shipyards by Norwegian operators have been adversely impacted by significant time and cost overruns.

It is of critical importance for the whole Norwegian oil and gas industry to address this challenge, and much research has been conducted about how to do this. Most of the researchers working on this issue have adopted a broad view approach to cover the whole project life cycle or project development phases (see 4.1.1). This approach helps locate the activities that should be improved to prevent cost overrun from the wide perspective involving multiple of project phases.

Although the researchers were diligent in this respect, their findings have not been sufficient to provide practical implications to Norwegian companies that were actually involved in the projects at East Asian shipyards. When it comes to the project execution phase, the previous research findings have been limited, highlighting only the significance of Norwegian operators' responsibility and emphasizing the importance of the operators' obligation to carry all the burden. Although it is true that the operators should assume such responsibility, the research could have moved one step beyond this and touched upon the practical problems that arise at the East Asian shipyards and, thus, trouble Norwegian players.

1.3. Research Purpose

The purpose of this thesis is to provide the Norwegian oil and gas industry with insights into how to deal with difficulties arising during execution phase of Norwegian EPC projects at South Korean shipyards effectively. For the last few years, the majority of the projects have gone to South Korean contractors in a form of EPC contracts, and many of these projects are known to suffer from cost and schedule overrun. To achieve this aim, I investigated the practical problems occurring during the projects which are either recently completed or are currently under construction at the shipyards using a phenomenology approach to understand and describe such challenges. Primary research data were collected via in-depth, open-ended, semi-structured interviews, and secondary data was gathered through various resources.

In addition to this, I provide suggestions for the Norwegian players to be better prepared for the challenges.

1.4. Research Questions

This thesis aims to answer following research questions developed from statement of the problem:

- What are key factors that contribute to challenges arising from Norwegian EPC project at South Korean shipyards?
- How do such factors play out and create problems in practice?

1.5. Delimitations of the Study

Project management is a broad and complex subject where many different approaches can be taken for a research activity. Thus, some constraints are necessary for practical reasons. For this study, the constraints include the following:

- The research task is restricted to execution phase of Norwegian EPC project at South Korean shipyards. Hence, any potential contributors which originally emerge from preceding phases in the course of project development, (i.e., feasibility study, concept selection, FEED) are not of consideration in this study.
- This study investigated Norwegian EPC projects at South Korea where the project deliverables represent high technical complexity, such as topside or offshore units with new concepts. Thus, projects with relatively low complexity are not taken into consideration.
- EPC contract comes in many variants. The effect of such variants on the project is beyond the scope of this study. In this study “EPC contract” denotes EPC contract and all its variants.
- Compensation schemes of EPC contracts also come in many variants. The effect of such variants on the projects is also beyond the scope of this study.
- Another constraint is the focus of the study on two distinct features of Norwegian EPC project in South Korea: management of international project and the use of EPC contract format. Elements of the focus selected from the features serve as inputs to the study design, as discussed in section 3.

1.6. Thesis Structure

This thesis is presented in 8 chapters. Chapter 1 provides the context for the study, describes the task, and offers definition of terms used in the study. Chapter 2 presents a review of existing literature relevant to the thesis topic and identifies the focus area of the study. Chapter 3 contains the research methods along

with the study limitations. Chapter 4 provides an overview of Norwegian field development projects awarded to East Asian yards and an introduction to the South Korean shipbuilding industry. Chapter 5 presents the study findings, where the key influential factors are described and how they create challenges is illustrated. Chapter 6 contains recommendations for Norwegian companies to help them mitigate the challenges in EPC projects in South Korea. Chapter 7 discusses offers areas of potential future study and discusses challenges for this study. The thesis reaches conclusion at Chapter 8.

2. Literature Review

This chapter provides presentation of the two major feature of Norwegian EPC project in South Korea, that is, management of international project and use of EPC contract format.

2.1. International Project

2.1.1. Project management

Project and project management

According to Project Management Institution (2005), project can be defined as “It's a temporary endeavor undertaken to create a unique product, service or result.”

Gardiner (2005) points out three characteristics of project: unique, temporary, and progressive elaboration is required. Every project is unique and exists for a limited time only. As project progresses, required work is defined in a gradual manner with increasing degree of detail.

Project management is to conduct project activities utilizing knowledge, skill, and tools, to satisfy project requirement (PMI, 2015).

Project life cycle

According to Gardiner (2005), project life cycle comprises four phases: initiation and definition, planning, execution and control, and closure.

- Initiation and definition
  Project officially starts. Project scope is established and deliverables are determined. Feasibility and project assessment are conducted to justify the project and provide basis for go/no go decision.
- Planning and development
  Important documents which form basis of project control are produced. The plans created includes work plan and schedule, resource and budget plans, procurement plans and contract strategy, risk and quality management plans, document management plans, project control plans. Detailed plans for project management and organization are delivered. It is in this phase that task independence is established, critical path is determined, and schedule is developed.

- Execution and control

  Project deliverables are constructed. Thus most resource are used and control is critical in this phase. As project progresses better description of project end product is obtained. Changes requested should be properly managed to minimize their impact on critical success factors of the project.

- Closure

  Budget is closed and documentation is completed. Any conflicts and disputes among project stakeholders are settled. Official evaluation of the project as a whole can take place.

Life cycle of building and construction project is presented in Figure 2-1.

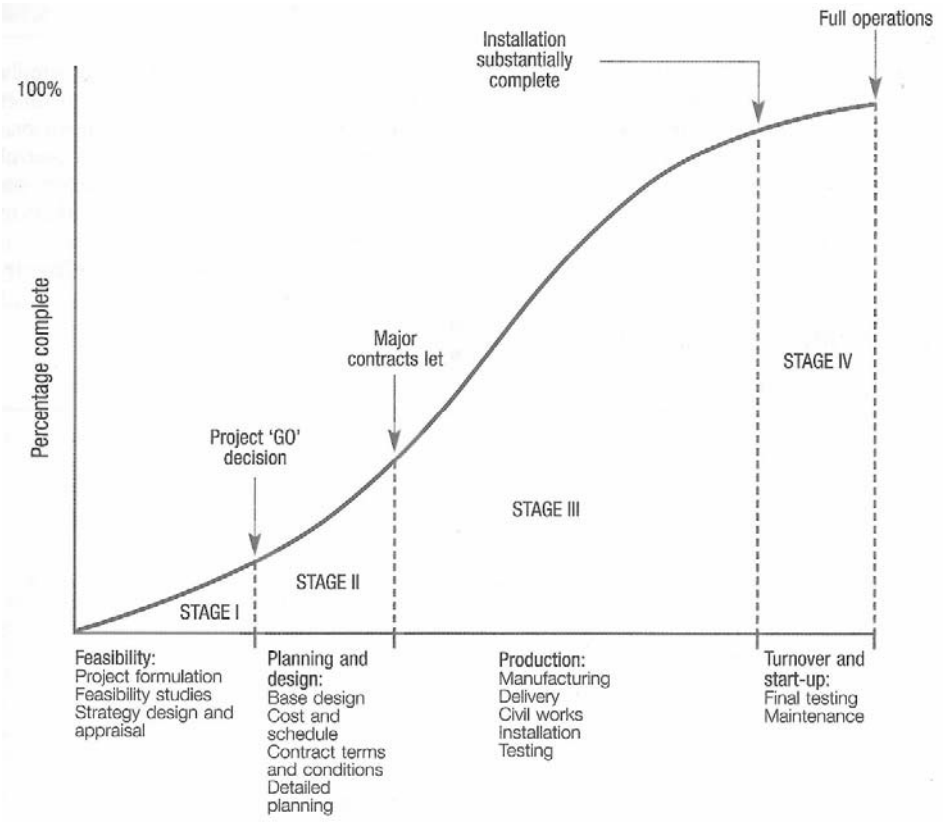

FIGURE 2-1 LIFE CYCLE OF BUILDING AND CONSTRUCTION PROJECT (MORRIS, 1988 CITED IN GARDINER, 2005)

2.1.2. International project problems

International project involves project stakeholders from two or more countries (Turner, 2009).

Cost of communication is a major challenge

In its nature, international project accompanies specific challenges. Among them, Turner (2009) underlines high cost of communication, in particular, as a major project challenge in the international context.

He identifies 5 problems which operate as boundary within international project team and increase communication cost.

Culture

Hofstede and Hofstede (2005) defines culture as "a collective programming of mind" which makes a group and its members distinct from others. Major challenges in international project arise from difference in the cultures. The programming governs how people behave and think. Thus, in international project, it is critical to understand culture of your project team member or counterpart in order to communicate efficiently.

Distance

Turner (2005) presents various dimensions of distance.

- Geographical distance: Different locations make communication less efficient.
- Time zone: overlapping working hours between two locations affects communication.
- Organizational behavior: The organization's structure and corporate culture is unique which new comer should learn to work efficiently.
- Profession: Distinct way of work or mindset of each person influence the degree of distance between people.

Organization, management, and communication

In international project, different organization structure is required to handle various issues: collaboration with partners, national interest, local contents requirement, local administrative regulation, and so on.

Productivity and logistics

The productivity of local employee can vary. Local practice, social security, and employment legislation should be taken into consideration.

Local legislation and regulation

International project should be in compliance with relevant law of a country.

2.1.3. Management of culture

Turner (2009) determines culture as the most important factors for international project as it has significant impact on cost of communication.

2.1.3.1. Cross-cultural analysis

Hofstede's five dimensions of culture

Many researchers have presented various theories of culture. Among them is Hofstede's five dimensions approach. It provides useful tools to compare different cultures.

Hofstede and Hofstede (2005) identifies five dimensions of culture as below:

- Power distance
  The extent to which power differential within organization is accepted by less powerful person.
- Individualism versus Collectivism
  The degree to which members of a society is interdependent with each other.
- Uncertainty avoidance
  The extent to which members of a society are tolerant to uncertainty of the future.
- Masculinity versus Femininity
  The extent to which two biological definitions of man and woman are used to assign different roles for each sex.
- Long term versus Short term orientation
  How a society associates itself with its own past while dealing with its present and future.

Hall's low context-high context approach

Another useful way to examine the difference in culture is Hall's low context-high context approach. In a low context society, the word spoken delivers explicitly and exactly the message of the speaker. In contrast, to interpret the speaker's message in high context society, listener should take into account the context where the conversation takes place as well as the work spoken (Griffin and Pustay, 2003).

2.1.3.2. Cultural fit of project management

Project management as discipline is not applicable universally.

Turner (2009) emphasizes the nature of project management as a social science which inevitably requires different approaches for its application in different culture. Svein-Arne Jessen studied the performance of

different countries at each stage of project life cycle based on the five dimensions theory of Hofstede (Turner, 2009). The result shows that project management as discipline is an approach which mainly fits western countries to solve problem (Jessen, 1993 cited in Turner, 2009).

Project management as discipline provides structural tools developed for planning, organizing, controlling, and executing project. According to Jessen's research (1993 cited in Turner, 2009), the tools appear to be a good match for most of European countries. In contrast, other countries in Asia including Japan, Thailand, Philippines, and Malaysia, seems not to fit well with the project management techniques (Jessen, 1993 cited in Turner, 2009).

This contradict with common belief that the project management discipline, which developed in Western world, is straightforward enough to lean and apply universally. Turner (2009) argues that this suggests the reason shy the project management model is often found to be not effective to deliver the international project involving different cultural cluster. Further he claims that Western country should see beyond the project scope to address challenges arising from the cultural difference.

2.2. EPC Contract Format

2.2.1. EPC contract

New build project for offshore platform topside or offshore mobile units of newly developed concept represents high degree of uncertainty and technical complexity.

EPC (Engineering, Procurement, and Construction) contract format has been normally used for offshore platform topside projects in NCS (INTSOK, 2014). Under the contract format, main EPC contractor is responsible for all the major functions for project. It is obligated to deliver the project for the agreed price, on guaranteed time, and with required level of quality (Schramm, Meißner and Weidinger, 2010).

Detailed design is produced during in engineering phase. Procurement activities follow to purchase equipment and materials, which will be used for construction of the structure or facilities. Conducting these major functions for each phase involves a number of different entities and thus require extensive interface management activities.

Under EPC contract format, EPC contractor serves as "a single point of responsibility, communication, and coordination" (Schramm, Meißner and Weidinger, 2010) for major project activities. Hence almost all risk is shifted from operator to EPC contractor.

Operator's task as project owner includes contract management concerning contractual relationship with EPC contractor and interface management across multiple entities (Schramm, Meißner and Weidinger, 2010).

Situated at the center of EPC contractual relationship, EPC contractor has to deal with operator and many sub-contractors. In particular, EPC contractor should ensure that its sub-contractors complies with all requirements form operator while carrying out their own tasks.

2.2.2. Characteristics

Schramm, Meißner and Weidinger (2010) indicates key characteristics of EPC contract format as below.

- EPC contractor acts as a single point of responsibility for work performance, communication, and coordination
- Full dependence on one contractor
- Guaranteed delivery date, performance
- Clear distinction between obligations and liabilities
- Relatively long tendering process and initial engineering phase negatively affect project schedule

2.2.3. Advantage and disadvantage

Advantages and disadvantages of EPC contract format in general are presented below (Baram, 2005; Johannsen, 2013).

Advantage

- Higher efficiency expected as one contractor responsible for both engineering and construction
- Earlier knowledge of full work scope, cost, and time of project
- Opportunity for innovation and fast tracking construction
- Customized approach for the project
- Less changes
- More flexibility to address changes
- Reduced conflict and dispute in general
- Improved risk management
- Reduced project supervision activities
- Streamlined contractor interface
- Transfer of cost risk to EPC contractor

- Transfer of schedule risk to EPC contractor (disadvantage for EPC contractor)
- Transfer of risk associated with owner supplied items (disadvantage for EPC contractor)
- Transfer of risk associated with Guarantee for performance (disadvantage for EPC contractor)
- Allow for innovation for value engineering and constructability by EPC contractor
- Streamlined procurement process by EPC contractor

Disadvantage

- Owner's less control and involvement in design
- Difficult to compare design alternatives
- Risk associated with usually shorter delivery period
- Transfer of cost risk to EPC contractor can lead to substantial risk premium
- EPC contractor is incentivized to apply minimum compliant standard in order to reduce cost
- Limited number of qualified EPC contractor
- Quality assurance and quality control largely managed by EPC contractors
- Disputes are likely to be larger and more complicated
- Often contract is awarded before project is fully defined

2.2.4. EPC contract type

Variants of EPC contract format

The main concept of EPC contract format can be extended and add more functions of project into its work scope. The variants of EPC contract format are (Odland, 2013):

- EPC : Engineering + Procurement + Construction
- EPCI : Engineering + Procurement + Construction + Installation
- EPCIC : Engineering + Procurement + Construction + Installation + Commissioning

EPCI is often referred to as EPCH with a focus on hook-up function of offshore construction project. EPCIC is normally used for new build project of mobile offshore drilling units, such as drillship, semi-submersible drilling rig, and jack-up rig (INTSOK, 2014).

Compensation scheme

The impact of compensation system on the project is not within the scope of the study so only brief introduction is presented in this section.

There exist various compensation systems applicable to EPC contract format. Most frequently used schemes includes lump sum price, target price, unit price, and cost reimbursable (Gloria, Siegfriedt and Carstens, 2011; Gardiner, 2005).

- Lump sum price
  Contractor offers a fixed price for fixed scope of work. Less owner's resources as compared to other compensation schemes. Owner has less control and changes can be expensive. High potential for dispute as contractor focus on reducing cost.
- Target price
  Functional and technical scopes are well defined but physical scope is not sufficiently defined for contractor to offer fixed price. Contractor is encouraged to save cost. Owner should be able to make good estimation of target price.
- Unit price
  Technical scope is established but quantity is not certain. Owner can have some control to decide quantity of work units but also take risk for total quantity.
- Cost reimbursable
  Owner compensates contractor for all work performed. Work scope is not well defined and many changes are expected. Owner can also choose this scheme to control contractors' performance. Owner can have influence of resource assigned by contractor.

2.2.5. Main features of EPC contract format

The main feature of EPC contract format is that EPC contractor serves as a single point of responsibilities for the project. The responsibilities can be broken down into 2 parts: responsibility for major functions and interface management.

For the former, EPC contractors take responsibility for major functions including engineering, procurement, construction, and project control. As one contractor rarely has all the functions required to be an EPC contractors, it sub-contracts some of the functions to other entities or forms consortium or joint venture. Still responsibility for performance of sub-contractors lies upon EPC contractor.

For the latter, EPC contractors serves as a single point of responsibility for management of interfaces between functions and among project stakeholders. EPC contractors address interface issues by recording and tracking interface information and opens communication channels among operator, EPC contractor and sub-contractors. To do this EPC contractor takes a leading role for communication and coordination activities across boundaries between functions and among sub-contractors.

In its nature, under EPC contract format it is critical for EPC contractor to have full capability take the two major responsibilities above.

3. Methodology

This chapter describes how the study was conducted including a discussion of the research methods and data collection and analysis. This discussion is followed by a review of the study's limitations.

3.1. Research Strategy

3.1.1. Iterative research strategy

In order to answer the research questions noted above, I used primarily inductive reasoning. This approach involves making observations, making inferences, finding their implications, and putting these into general perspective so as to develop a theoretical model. Bryman (2012) notes that deductive elements are also often required in the course of inductive reasoning sequence. Analysis of data collected through the inductive process can entail a need of gathering further data to test the theory. This "iterative strategy" (Bryman, 2012), where a researcher moves back and forth between data and theory, is used extensively throughout this study.

3.1.2. Qualitative research

As a general orientation to the present study, it is worth noting the difference between these two approaches. Table 3-1 contains a summary of their differences.

Item	Quantitative	Qualitative
Principal orientation to the role of theory in relation to research	Deductive; testing of theory	Inductive; generation of theory
Epistemological orientation	Natural science model, in particular positivism	Interpretivism
Ontological orientation	Objectivism	Constructionism

Table 3-1 Difference between Quantitative and Qualitative research (Bryman, 2012)

In a qualitative research such as the present study, the inductive reasoning sequence provides a principal method to generate theory, which tends to be the primary focus of the study. Though guided by informed methods and additional research, these theories arise from the researchers' interpretations of the data and the social phenomenon (Bryman, 2012).

3.2. Research Design

Within the domain of qualitative research, there are a number of approaches researchers may take such as narrative research, phenomenology, ethnography, grounded theory, case study, life history, and many more. The research approach determines how to structure study and collect and analyze data; thus, each approach has its own focused area and a type of problem which the approach is designed for (Creswell, 2007).

In his book, Creswell (2007) provides features of phenomenology approach. This approach puts emphasis on drawing from share experiences to describe core elements of a certain phenomenon. Phenomenology researchers analyze multiple of individual experiences to uncover a larger social phenomenon. Data in phenomenology approach is collected through interviews, for the most part, and is supplemented by relevant documents and observations.

The present study is conducted to describe the challenges in Norwegian EPC projects in South Korean shipyards, what factors create the challenges, and how these factors come into play. To do this, I adopt a phenomenological design to better understand the essence of the EPC projects (that is, the phenomenon as an objective of this study), using interviews with various project stakeholders to collect primary data. These data are combined with a review of the relevant literature and observations of the phenomenon.

3.3. Data Collection

3.3.1. Primary data

In-depth, open-ended, semi-structured interview

Qualitative data was collected by in-depth, open-ended, semi-structured interviews to describe and better understand the Norwegian EPC project at South Korean shipyard. The interviews asks the participants to provide their own experience and observations in their own words.

Interview participants

Forty-four individuals who have work experience in Norwegian EPC projects awarded to South Korean shipyards participated in the interviews. These participants were involved in six different EPC projects, each with its own variant: Goliat, Aasta Hansteen topside and substructure, CAT-J, Gina Krog, and Marina. The interviewees were from 13 companies covering 4 project stakeholder groups: Norwegian

operators (2), South Korean shipyards (3), Norwegian suppliers (5), and local service sub-contractors (3). Every interview participant had been previously involved in, or are currently working on, one of the EPC projects.

The interviewees had different positions in different disciplines within their organizations, from project director to discipline engineer.

Group	# of personnel	Manager level	Discipline level
Operator	26	21	5
Shipyard	9	4	5
Supplier	6	5	1
Local sub-contractor	3	-	3

TABLE 3-2 INTERVIEW PARTICIPANTS

Interview questionnaire

The interview questions were developed with a focus on main features of Norwegian EPC project at South Korean shipyard: management of international project and use of EPC contract format. Presentation of the two features in chapter 2 provides inputs for the interview questionnaire.

Turner (2009) identified communication cost as a major challenge for international project and highlights culture as the most important problem which contributes to the challenge.

The most distinctive characteristic of EPC contract format is that EPC contractor is responsible for performance of all functions (engineering, procurement, construction, and project controls) of the project and management of all interfaces between functions and among its sub-contractors. Thus EPC contractor is required to serve as a single point of responsibility. Schramm, Meißner and Weidinger (2010) indicates that communication and coordination issues cause interface problems.

The key elements of the two features are from the two features. Cultural difference and communication challenges are chosen from international project management perspective. Capability of an EPC contractor to perform project major functions and communication and coordination issues creating interface problems between functions and among project stakeholders are from EPC contract context.

As project owners, Norwegian operators are positioned to have an overview of project. Thus, the questionnaire for operator covered all the foregoing elements. The questionnaire designed for the operators is presented in Appendix A. The same general questions were used with other project stakeholders, though these stakeholders were not asked questions about aspects of the project that are not relevant to their work scope.

Interview administration

Interviews were conducted at the participants' work place in both Norway and South Korea according to pre-developed interview protocol (see Appendix A). Interviews were recorded when agreed to by the interviewee and when and the situation permitted. Out of the 44 interviews, 18 were recorded. Interviewees were informed that they would remain anonymous in the presentation of the study and that they could choose not to answer any questions.

I exercised the flexibility embedded in design of the semi-structured interview to ask additional relevant questions or skip those not suitable to the participant based on her or his position and experience.

3.3.2. Secondary data

Secondary data were also used for this study. These secondary data, which had been collected and produced by someone else, help to form the theoretical basis for the conclusion drawn from analysis of primary data. The data used for this study came from books, online databases, academic papers, as well as news articles. These materials were accessible either via the library at the University of Stavanger or online and were collected over the course of the study. The materials included both quantitative and qualitative data.

3.3.3. Reliability and Validity

Reliability

According to Bryman (2012), reliability refers to the degree to which the outcome of the study will be repeatable. Reliability also concerns consistency of the measures deployed in the study. These measures provide researchers with the tools to draw implication from data, develop theory, and establish a logical sequence in support of generalization of the theory. Thus, as Bryman (2012) notes, the stability of the measures is an issue in qualitative research.

Similarly, the reliability of the primary interview data is of concern. Interviewees' responses can be affected by their daily work situation, interest in the topic, and many other variables. In particular, when the interviewees are engaged in a troubled project, they might become more cautious in providing accounts and could deviate from discussing the full situation even when anonymity is offered. Thus, interviewers must be diligent and conscientious when asking questions, especially follow-up questions. Recording the interviews also helps to ensure reliability, e.g., by allowing for better subsequent transcripts.

Validity

Validity refers to whether the measures deployed to assess a concept accurately assess the specific concept they are supposed to and, for the purposes of a study, the concepts the study is designed to address (Bryman, 2012).

For this study, the overall validity of the primary data is high because all of the interview participants are or had been directly involved in the object phenomenon, i.e. Norwegian EPC projects in South Korea. Still, the fact that some of the interviewees had relatively short experience in the projects may weaken the validity. In particular, experience shorter than six months might have not been long enough for the participant to capture the big picture of the project.

In addition to differences in the personal experiences of the interviewees, there were differences in the actual projects themselves. This variability could also weaken the validity of the study. As noted previously, interview participant had been or are engaged in one of six different projects. Each of the project is unique by definition and involves a different operator, shipyard, supplier, and local sub-contractors. Furthermore, corporate culture of the South Korean shipyards seemingly demonstrates certain variance from company to company, and this variance has substantial influence over the project execution.

The positions that study participants held also affect validity. Manager level personnel can have a view over full scope of project but their account can contradict with observations from discipline level engineer who focuses on specific issues addressed in low level of the organization hierarchy.

3.4. Data Analysis

Creswell (2007) presents simplified procedure of data analysis in phenomenology approach:

- Organize the data and create files,
- Read the data thoroughly with notes on key elements,
- Describe the personal experience in full,
- Make a list of significant statements and arrange them into larger information units,
- Describe “what” the participant experienced and “how” the experience happened, and
- Construct the essence of the phenomenon by combining the description of “what” and “how”.

Data analysis in this study followed the procedure presented above in general. Due to time constraint of the study, however, more focus was on developing significant statements and the essence of the phenomenon while other processes received less attention.

4. Norwegian Field Development Projects in South Korea

4.1. Norwegian Offshore Field Development Projects

4.1.1. Project execution phase

Project development process

The development of offshore oil and gas resources requires massive capital investment and high technology to address the considerable risk involved. In order to successfully manage the field development project, operators have established project development models and strategies.

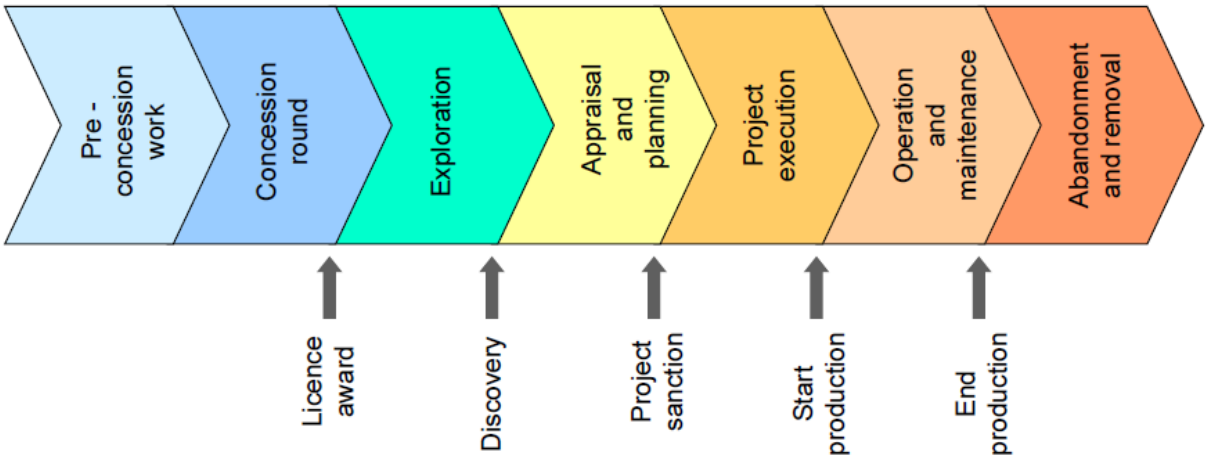

FIGURE 4-1 EXPLORATION & PRODUCTION PROJECT DEVELOPMENT MODEL (ODLAND, 2013)

Figure 4-1 illustrates entire exploration and production project development model used in Norway, which comprises comprehensive activities from evaluation of hydrocarbon potential to abandonment of facilities. In particular, among the seven project phases comprising the model, appraisal and development planning and project execution are jointly referred to as project development (Gudmestad, Zolotuchin and Jarlsby, 2010). This is where huge capital input is needed and, thus, robust risk management approach matters. Each phase of the project development comprises three sub-phases as shown Figure 4-2.

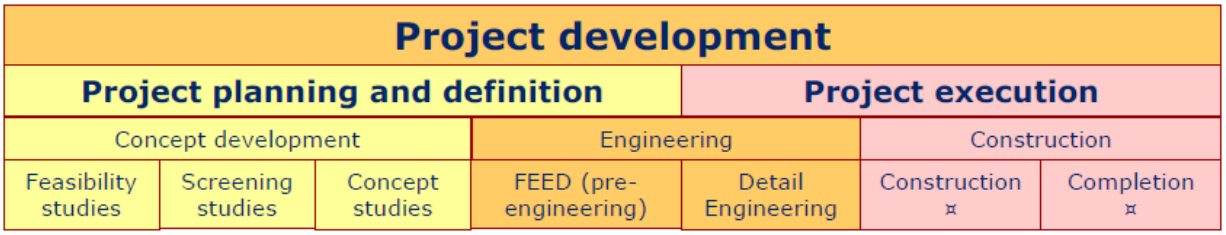

FIGURE 4-2 PROJECT DEVELOPMENT (ODLAND, 2013)

Appraisal and development planning phase

The appraisal and development planning phase consists of feasibility study, concept study, and pre-engineering.

Feasibility study provides technical and economic justification of development of discovery and identifies multiple feasible development concepts (INTSOK, 2014). One final concept is selected through evaluation of technical and commercial viability and the engineering design basis is produced in concept study. During pre-engineering, the project business case is defined and documented. FEED (front-end-engineering-design) is also developed and form a basis for project execution and tender process (INTSOK, 2014).

Project execution phase

The project execution phase comprises detail engineering, construction, and completion. During detail engineering, a detailed design is developed and the contract for procurement and construction is awarded. Procurement activities follows and the facility is constructed. Finally, the facility is installed and commissioned for production start.

Figure 4-3 illustrates that most of the project development cost incurred during detail engineering, construction, and completion phases of a project, which constitute the project execution phase. This suggests why project execution phase is prone to cost and schedule overrun and why the successful management of this stage is critical to robust economy of the whole field development project.

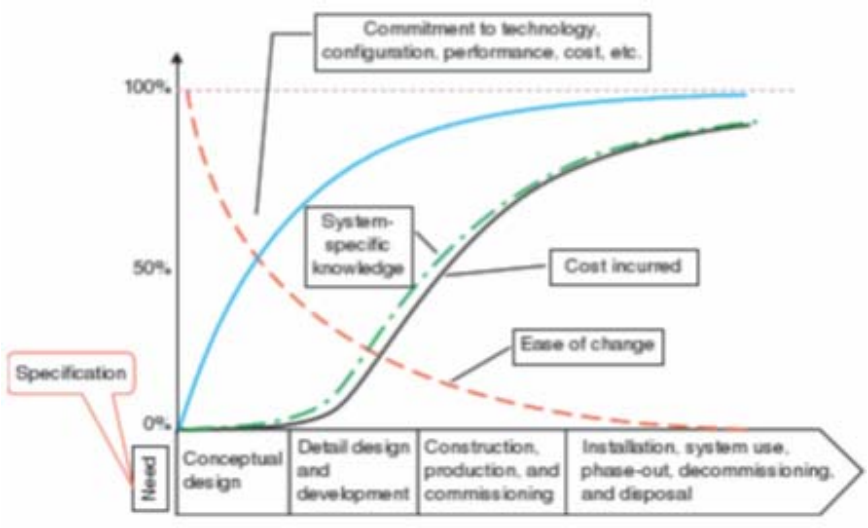

FIGURE 4-3 COMMITMENT TO COST AND TECHNICAL ISSUES (GUDMESTAD, ZOLOTUCHIN AND JARLSBY, 2010)

4.1.2. Project cost overrun in NCS

4.1.2.1. Renewed challenge

Project cost overrun is not a new topic in Norwegian offshore industry. It has been a hot-button issue for decades in NCS, and many studies of it have been carried out. Nevertheless, the magnitude of the overrun has grown drastically lately, and there is renewed market awareness of the issue.

Project awards to Asian contractor

In an attempt to tackle cost overruns in early 2000s in NCS, Norwegian operators made initiated many cost reduction approaches such as the development of low cost technology, standardization, etc. Among such efforts was to invite more Asian contractors to submit proposals and win contracts so that the Norwegian companies could take advantage of their cost competitiveness. Norwegian operators enjoyed the competitive international market to meet its target range of project budget.

Some of the NCS offshore project (new build project for production floating unit, platform topside, and new concept drilling units for NCS) awarded to East Asian contractors are shown in Table 4-1.

Year	Operator /Owner	Field/Project	Production Type	Contract	Shipyard	
1995	Exxonmobil	Balder	FPSO	Conversion	Keppel	Singapore
1995	Statoil	Norne	FPSO	Hull FC	Keppel	Singapore
1996	Saga Petroleum	Varg	FPSO	Hull FC	Keppel	Singapore
1998	Statoil	Åsgard A	FPSO	Hull FC	Hitachi	Japan
1998	Statoil	Åsgard B	Semisub	Hull FC	DSME	Korea
2002	Statoil	Kristin	Semisub	Hull FC	SHI	Korea
2007	BP Norge	Skarv	FPSO	Hull/Topside FC	SHI	Korea
2007	Statoil	Gjøa	Semisub	Hull FC	SHI	Korea
2010	Conocophillips	Ekofisk	Jacket	LQ FC	SMOE	Singapore
2010	ENI Norge	Goliat	FPSO	EPC	HHI	Korea
2011	Statoil	Valemon	Jacket	Topside EPC	SHI	Korea
2011	BG Norge	Knarr	FPSO	Hull/Topside FC	SHI	Korea
2011	Songa offshore	CAT-D	Semisub MODU	EPCI	DSME	Korea
2011	Statoil	Heidrun	FSU		DSME	Korea
2012	Total	Martin Linge	Jacket	Topside EPC	SHI	Korea
2013	Statoil	CAT-J	Jack-up MODU	EPCI	SHI	Korea
2013	Statoil	CAT-J	Jack-up MODU	EPCI	Sembcorp	Singapore
2013	Statoil	Aasta Hansteen	Spar	Topside and substructure EPC	HHI	Korea
2013	Statoil	Gina Krog	Jacket	Topside EPC	DSME	Korea
2013	Det Norske	Ivar Aasen	Jacket	Topside FC	SMOE	Singapore
2015	Statoil	Gina Krog	FSO	Conversion	Sembawang	Singapore

TABLE 4-1 NORWEGIAN PROJECT AWARDED TO EAST ASIAN SHIPYARD

Use of EPC contract

Another approach to bring project cost down is use of EPC contract format. NPD (2013) indicates that EPC contract type has been in dominant use among Norwegian operators to reduce time for project implementation since introduction of NORSOK process, which focuses on improving chance of less project execution time.

4.1.2.2. Cost overrun in NCS

The outcomes of such effort did contribute to enhanced project economy and gave some comfort to operators, but to a limited extent. Many NCS projects have still suffered from high cost increases. The trend of project cost overrun has become even more predominant and intensified in the industry recently.

According to NPD (2013), project with major cost and schedule overrun includes Skarv with 32% overrun as compared to cost estimate in PDO (plan for development and operation) / PIO (plan for installation and operation), Yme with 188%, and Valhall redevelopment with 86%. Knarr and Bryunhild project are also known to have experienced 36% and 58% increase in cost respectively (Torres, 2014). Goliat FPSO, of which construction is recently completed, reportedly suffered from almost 50% increase (Haugstad, 2015).

There are also growing concerns among the industry players about the possible significant cost overrun for ongoing projects. CAT-D project allegedly underwent considerable cost overrun; construction of the first drilling rig of the project is expected to completed June (Maslin, 2015). According to Løvås (2015), another three Norwegian projects (Gina Krog, Aasta Hansteen, and Martin Linge), which are on-going as of May 2015, are also reportedly behind schedule.

4.1.2.3. Major causes to cost overrun

Many studies have been conducted to reveal what causes project execution cost overrun in NCS. In its report in 2013, NPD found four key factors contributes to such cost overrun:

- Deficiency in early engineering work, including FEED, resulted in frequent changes in construction phase.
- Contractor prequalification process was not handled thoroughly by operator.
- The operator's contracting strategy failed to incorporate all the key risk elements. The strategy does not center on operator's direct follow-up activities to EPC contractor and meticulous prequalification of key equipment suppliers.
- Operator's follow-up was insufficient to address quality issues due to the oversea contractors' insufficient understanding of NORSOK and Norwegian standard.

In the industry, other cost increasing factors are being communicated:

- Overly commercially driven management decision leads to overly ambitious target and to too much emphasis on cost reduction without enough consideration of resulting detrimental impact on quality.

- Application of relatively new technology to flagship projects in harsher (farther, colder, and deeper) offshore environments, where no project has been developed before, creates unexpected technical challenges.
- Contractors/suppliers pursue high profit margin in a bid to take advantage of cost increase trend.

4.2. South Korean Shipbuilding Industry

4.2.1. Brief introduction

Since its entry into shipbuilding industry in 1970, South Korea has achieved dramatic success. South Korean shipbuilding industry secured a top position in the competitive shipbuilding market by value and second only to China by volume in 2014 (OECD, 2014).

By number of order intake, South Korea is ranked as the second in the world as of 2014 (Figure 4-4).

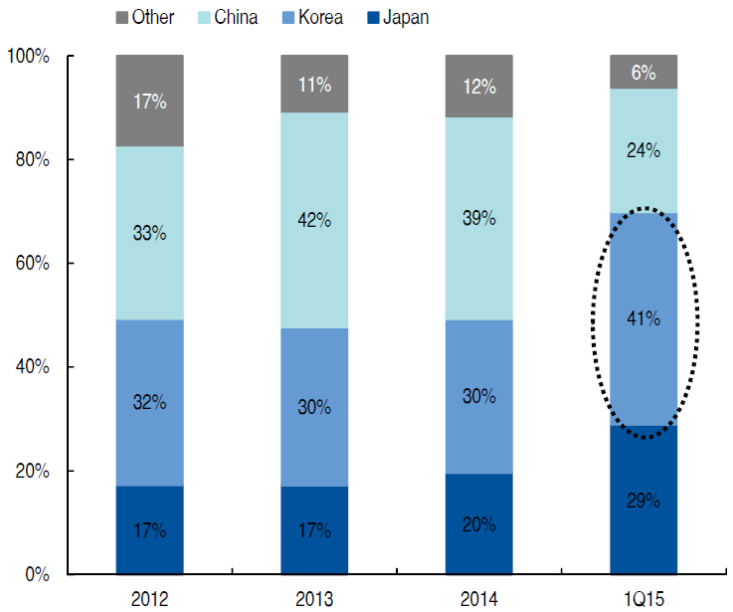

FIGURE 4-4 MARKET SHARE BY SHIPBUILDING ORDER INTAKE (SUNG AND LEE, 2015)

And in terms of value of ship delivered, South Korea has led the market for the last decade (Figure 4-5).

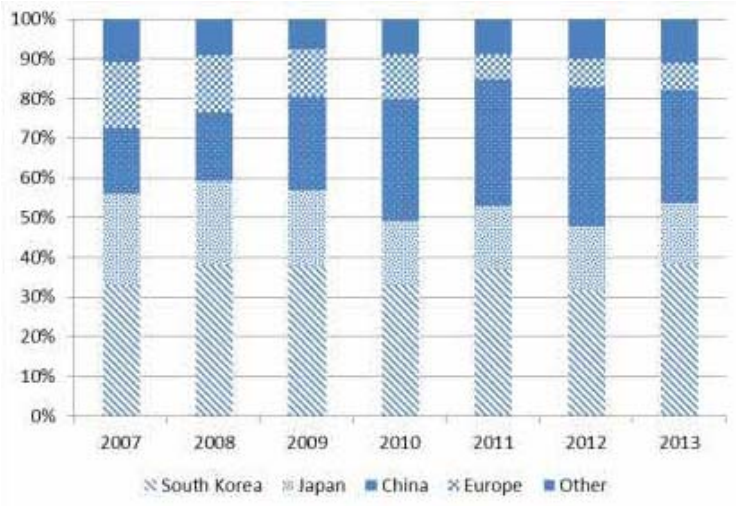

Figure 4-5 Total value of ship delivered (2007-2013) (OECD, 2014)

Figure 4-6 indicates that South Korean focuses on new building of high value ships, such as containership, LNG/LPG carrier, while China relies heavily on relatively low value ships, e.g. bulker carrier and tankers.

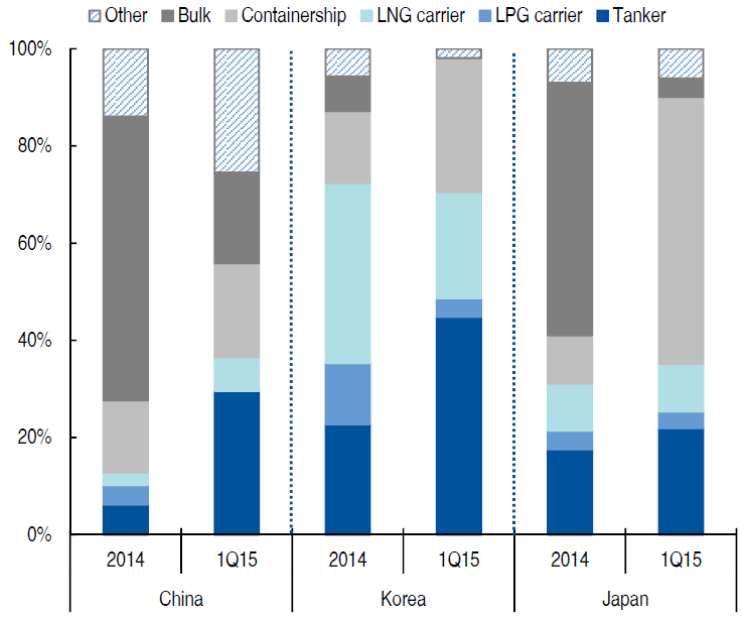

FIGURE 4-6 BREAK DOWN OF ORDER INTAKE BY SHIP TYPE (SUNG AND LEE, 2015)

4.2.2. Competitive edges

Bae, Lee and Park (2009) identify the core competencies of South Korean shipbuilding industry

- **Skilled work force**

  Abundant high quality labor force supports the industry. Sixteen academic institutions provide about 900 engineers per year and vocational secondary education provides 5,000 technicians.

- **Construction capability**

  South Korean shipyards demonstrate strong competitiveness in engineering, production, and production management. In particular, solid basic engineering capability and wielding skills helps accommodates customized design requests from clients.

- **Economies of scale**

  Total construction capacity of South Korean shipyard is two to seven times higher than its competitors as of 2007. South Korean shipbuilders with huge docks are positioned well to keep up with recent trend of increase in average size of the ships.

- **Productivity**

  High productivity has been achieved by continuous production process improvement and development of construction methods. Such as innovative methods include product-mix method, mega/giga/tera bock method, and the introduction of floating/T-type dock.

- **Product mix**

  South Korean shipyards have diversified their products with an emphasis on high value ship types by virtue of huge construction capacity and high productivity. While bulk carrier of relatively low value takes the major portion of new build order for Chinese and Japanese shipyards, containership and LNG/LPG tankers account for more than half of South Korean shipbuilders' jobs.

- **Shipbuilding cluster**

  Most of shipyards, equipment suppliers, engineering firms, and education institutions are located alongside the southeastern part of South Korea. Close relationship among academia and industry in the region supported reliable supply of high quality equipment and material and constant development of technology.

4.2.3. Tough times

Shipping market downturn

The shipbuilding industry is highly cyclical (Ecorys, 2009) and demonstrates strong positive correlation with shipping industry. When financial crisis hit the shipping market in 2008, the shipbuilding market also received big blow. The BDI (Baltic Dry Index), one of major shipping market indicator plunged to 663 (94% drop) after its earlier peak of 11,793 in May 2008 (Bloomberg, 2015).

Since then, the market has been in recession with little hope for recovery of high level of activities due to the huge supply-demand gap. The BDI stands at 610 as of June 6, 2015 (Bloomberg, 2015). Many shipyards went bankrupt across the world, and South Korea was no different. Nevertheless, global shipbuilding capacity still far outweighs new shipbuilding orders, and competition among shipbuilders is getting fierce.

Labor cost and quality

South Korean shipyards are losing their price competitiveness as labor costs in the country are continually increasing. Concerns over the quality of the work force also add to fresh challenges for South Korea. Many of the shipyards are heavily dependent on use of sub-contractors. While this can help increase labor flexibility in the industry, there are doubts about the adequacy of job training with sub-contractors (OECD, 2014).

Chinese shipyards

Backed by low labor cost and strong domestic demand, Chinese shipyards have boosted their shipbuilding capacity and caught up South Korean players in terms of number of new shipbuilding order. Chinese are also making significant technological development with a view to entering into high value ship market, thus making them a serious threat to South Korean shipbuilders.

4.2.4. Transition into offshore business

Big 3

There are currently 53 shipyards in South Korea as of 2013 (Koshipa, 2014). The biggest shipbuilders among them are HHI (Hyundai Heavy Industries), SHI (Samsung Heavy Industries), and DSME (Daewoo Shipbuilding and Marine Engineering), which are often referred to as the Big 3. Combined, the Big 3

account for more than half of total CGT (Compensated Gross Tonnage) of South Korean shipbuilding industry.

Entry to offshore business

South Korean shipbuilders have had many offshore project experiences but most of these experiences were limited to fabrication of relatively simple structures, such as steel jackets and hull of floating facilities.

After the financial crisis in 2008 hit the global economy, the Big 3 have ventured into large scale offshore new build project in earnest in an attempt to overcome the difficult time. They took aggressive marketing strategy for offshore business and managed to sweep offshore construction market.

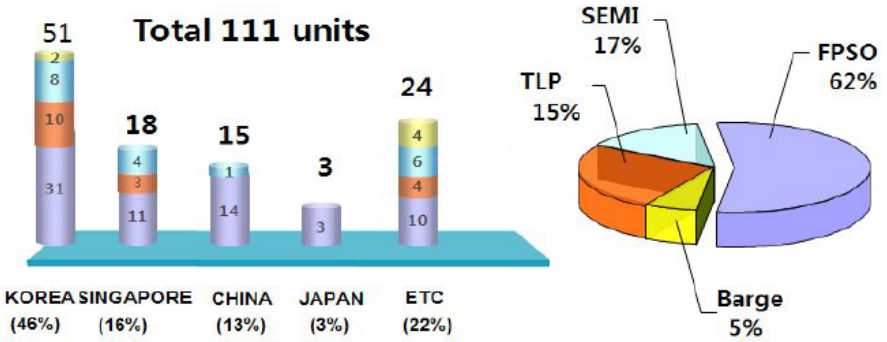

FIGURE 4-7 FLOATING PRODUCTION UNITS MARKET SHARE 2005-2009 (KOSHIPA, 2011)

Norwegian offshore experience

The details of NCS offshore projects (new build project for production unit and new concept drilling units for NCS) awarded to the Big 3 shipyards are shown in Table 4-2.

Shipyard	Operator /Owner	Field	Type	Contract	Price (Bil NOK)	Award	Delivery
SHI	Statoil	Kristin	Semi-Sub	Hull FC	0,48	2002	2004
	BP Norge	Skarv	FPSO	Hull/Topside FC	4,50	2007	2010
	Statoil	Gjøa	Semi-Sub	Hull FC	0,90	2007	2009
	Statoil	Valemon	Jacket	Topside EPC	2,30	2011	2014
	Teekay (BG Norge)	Knarr	FPSO	Hull/Topside FC	6,50	2011	2014
	Statoil	Heidrun	FSU		1,50	2011	2015
	Total Norge	Martin Linge	Jacket	Topside EPC	8,13	2012	2016
	Statoil	CAT-J	2 Jack-up Rig	EPCI	8,45	2013	2017

DSME	Statoil	Åsgard	Semi-Sub	Hull FC	0,55	1998	2000
	Songa (Statoil)	CAT-D	2 Semi-Sub rig	EPCI	7,35	2011	2014
	Songa (Statoil)	CAT-D	2 Semi-Sub rig	EPCI	7,15	2012	2015
	Statoil	Gina Krog	Jacket	Topside EPC	6,10	2013	2016
HHI	ENI Norge	Goliat	FPSO	EPC	6,90	2010	2015
	Statoil	Aasta Hansteen	Spar	Deck/LQ EPC	6,50	2013	2016
	Statoil	Aasta Hansteen	Spar	Spar Hull EPC	4,00	2013	2016

TABLE 4-2 NORWEGIAN OFFSHORE PROJECTS AWARDED TO BIG 3

(PRICE AT PROJECT AWARD, ASSUMING 6,5 NOK/USD)

5. Findings

While the challenges arising during Norwegian EPC project execution at South Korean shipyards are attributed to many different elements, it is important to review the experiences of the people involved in the projects and to consider the social phenomenon. Thus, the analysis of data from the interviews and follow-up literature review conducted for this study helps determine the key contributory factors that may not otherwise have been apparent. This chapter presents the key contributory factors and describes how they play out and create problems during project execution phase.

5.1. Key Contributory Factors

Each of the key contributory factors presented in this chapter does not come into play in isolation. They are closely interconnected to each other. It is essential to identify the relationship among the factors as well as to take a holistic view in order to understand how they make an impact on project performance.

5.1.1. Cultural Difference

5.1.1.1. How are they different?

Hofstede's five dimensions

The five dimensions of culture developed by Hofstede and Hofstede (2005) provides a useful tool to illustrate the cultural difference between countries in different cultural clusters. Scores of each dimension are graphically presented as Figure 5-1.

The comparison suggests some cultural contrasts between Norway and South Korea. On power distance dimension, Norway gets only 31 while South Korea has 60, which means that Norwegian society is less hierarchical than South Korean society. The score in the second dimension, individualism, reveals that Norway shows moderate individualism whereas South Korea exhibits very strong collectivism. Concerning cultural dimension of masculinity, Norway scores only 8, which makes it the second most feminist country after Sweden, suggesting that Norwegian people care more for life quality relative to other countries. South Korea also stays within range of femininity, but its society is more driven by competition as compared to Norway. Scores on uncertainty avoidance, the fourth dimension, suggest that Norway is neutral in this dimension while South Korea shows very uncertainty avoiding tendency,

suggesting that South Koreans feel acutely threatened by ambiguity or unknown situations. The most significant margin between the two countries, however, can be observed on the last dimension, i.e., long term orientation. Norwegian takes a normative approach, paying respect to tradition while seeking a quick result. In contrast, South Korean is extremely pragmatic, focusing on education to be prepared for change, thus putting more value on steady growth in longer term.

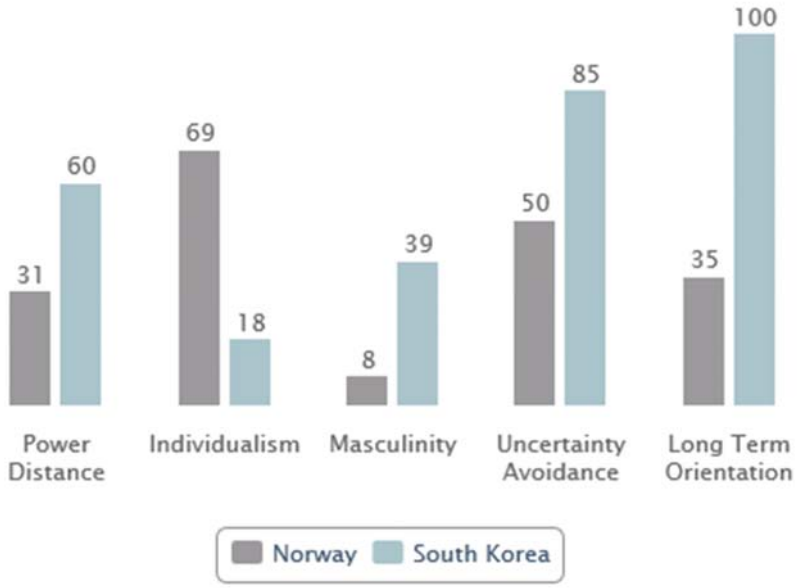

FIGURE 5-1 COMPARISON BETWEEN NORWAY AND SOUTH KOREA (HOFSTEDE AND HOFSTEDE, 2005)

Hall's low context – high context approach

Norwegian culture stands in a sharp contrast to that of South Korea from the perspective of Hall's low context-high context approach. Table 5-1 shows where countries are on the low context-high context scale.

The table shows that Norway has very low context culture while Korea, which is classified as East Asian country, belongs to extremely high context culture category.

Country	Low-Context	High-Context
German speaking Switzerland	****	
Germany	****	
Austria	***	
Norway	***	
Sweden	***	
Denmark	***	
Netherland	**	
USA	*	

France	*	*
United Kingdom		**
Italy / Spain		***
Russia		***
Middle East		****
Africa		****
South America		****
East Asia		****

TABLE 5-1 HALL'S LOW CONTEXT - HIGH CONTEXT APPROACH (ULVEN, 2004)

Impact on personal relationship and communication

Although Hofstede's cultural dimensions and Hall's low context – high context approach are useful for understanding the cultural differences between the countries, they are solely based on Western philosophical foundation and concentrate on highlighting the differences. Yum (1988) pointed out that there were increasing concerns over use of such approaches to explain interpersonal relationships and communication patterns in East Asia due to the frameworks' potential cultural biases. In order to identify communication characteristics in East Asia, it is of importance to go beyond such limitations of Western approaches to capture essence of the philosophy in the Asian region which has had significant influence over how Asian people interact (Yum, 1988).

5.1.1.2. Confucianism

Confucianism is a social and ethical philosophy concerning practical ethics in daily life (Chen and Chung, 1994) and as such is an important concept to understand when interpreting how people raised with this philosophy interact. The Confucian heritage is shared by many East Asian countries including China, South Korea, Japan, Taiwan, Hong Kong, Vietnam, and Singapore (Wiarda, 2013). The philosophy is based on the teaching of ancient Chinese philosopher, Confucius (BC 551-479), who aimed to achieve political stability and moral integrity of society by implementing order. According to Yum (1988), the focus of Confucianism is on human nature where right conduct arises and yields proper human relationships, which serves as a basis of social stability. Confucianism presents the four Confucian principles and certain aspects of human nature, which bring about the right conduct of people. These principles directly relate to development of social relationship, a distinct characteristic of interpersonal relationship patterns in East Asian Confucian societies in contrast to individualism in Western culture (Yum, 1988).

5.1.1.3. Confucian influence on interpersonal relationship

Yum (1988) describes five characteristics of interpersonal relationship as a result of Confucianism: particularism, asymmetrical and reciprocal obligations, clear distinctions between in-groups and out-groups, use of informal intermediaries, and the overlap of personal and official business relationships.

Particularistic

There is no universal rule governing human relationships in Confucian society. Confucian ethics take a relative and comparative approach rather than absolute one (Leonhard, 2009). In Confucian societies, people "differentially grade and regulate relationships according to the status of the persons involved and the particular context" (Yum, 1988). Such patterns resulted in development of sophisticated code of conduct that can be applied according to status of the person in a certain situation but not for someone whose status is not known.

Asymmetrical and reciprocally obligatory

Yum (1988) indicates that reciprocity is the core concept of Confucianism. People involved in a relationship have sense of asymmetrical mutual indebtedness. This asymmetry does not allow a give-and-take-equally approach to occur and calculations for such is deemed to be violation of Confucian principal (Yum, 1988). This complementary interpersonal characteristic helps the relationship last for long time.

Clear distinction between ingroup and outgroup

People involved in the reciprocally obligatory relationship become dependent on each other by fulfilling obligations assigned to each of them, which make long term relationship possible. Strong bonds among the group members arise by excluding other groups (Chen and Chung, 1994).

Use of informal intermediary

Clear distinctions between in-group and out-group members make the use of intermediary inevitable, and such intermediaries are effective for initiating new relationships or resolving disputes between groups. The intermediary belongs to the multiple of groups in question so that the groups can communicate through the intermediary.

Overlap of personal and official business relationships

Pure business transactions based on calculation of each other's interests is perceived as potential violation of Confucian principle of mutual faithfulness. The desire for mutual faithfulness has resulted in development of strong preference to develop a personal relationship during a pure business transaction

(Chen and Chung, 1994). People prefer small and personal meetings where they feel more comfortable as opposed to formal business meetings.

5.1.1.4. Confucian influence on communication

Yum (1988) states that communication patterns in Confucian societies are developed in a way that can help build and maintain interpersonal relationship. Yum identified four general patterns: process orientation, differentiated linguistic codes, emphasis on indirect communication, and an emphasis on the receiver and receiving.

Process orientation

In Confucian societies, communication focuses on developing social relationships. Communication is considered an on-going process to build and maintain such relationships, which are constantly changing and intended to persist for a long time (Yum, 1988).

Differentiated linguistic codes

In particularistic interpersonal relationships, the relationship is differentiated in a relative and comparative way according to social status, age, sex, title, and so on. This approach inevitably results in complex categorization system for the relationships. Each of the relationship is considered to be distinct, and people will take different communication approaches with one another based on the particular relationship. This leads to use of very complicated honorific language in East Asia.

Emphasis on indirect communication

A preoccupation with social relationships in Confucian societies leads to the extensive use of indirect communication. Indirect communication provides useful communication tools that can help save participants' face by helping avoid situation where loss of face can occur (Yum, 1988).

Emphasis on receiver and receiving

A process orientation of communication stresses the role of listeners or listening rather than that of the speaker or speaking (Yum, 1988). The on-going process of communication and constant changing relationships have the listener bear burden of correctly understanding and responding to what speakers say. Use of indirect communication puts even more emphasis on listener's capability to appreciate clearly what is said (Yum, 1988).

5.1.1.5. Confucian influence on organization

Using the insights of Yum (1988), we can better understand on how people in Confucian societies form relationships and communicate. These insights can be also used to interpret how Confucianism affects interpersonal relationships and communication within organizations.

Hierarchical structure

The nature of particularistic interpersonal relationships intensifies characteristics of linear relationships and serves as a basis for the hierarchical structure of organizations. It place great emphasis on differences in age, sex, length of service between different levels and assigns authority and responsibility based on the differences. Thus, the distinction between levels in organizations is clearer than in less particularistic societies. In hierarchical organizations, communication usually takes place in unilateral direction, i.e., top-down.

Explicit rule of communication

Because of the institutionalized differences and social distance between levels (e.g., management versus workers), there are explicit communication rules in Confucian societies and their organizations (Chen and Chung, 1994). Learning and practicing formal and specific code of conducts as well as differentiated linguistic code are important to avoid miscommunication.

Reciprocally obligatory relationship

Because of the complementary relationship in Confucian organizations, the superior takes paternal care of subordinates and provides knowledge and experience. Subordinates, in return, repay with loyalty and offer obedience to their superiors. Combined with hierarchical relationships and use of explicit rule of communication, reciprocally obligatory relationships restrains what subordinates are likely to say to their superiors.

Frequent contact among member

The overlap of personal and official business relationships leads to frequent contact among organization members. They seek opportunities to identify mutual interests, share personal information, and build trust so that they can expand common understanding and reach consensus (Chen and Chung, 1994). To this end, social activities and gathering after work hours are frequent.

Loyalty to organization

A clear distinction between in-group and out-group members promotes a strong sense of unity among members and inspires high commitment to the organization. Chen and Chung (1994) indicate that the strong sense of unity improves management-employee relationships and the organization's control system. On the other hand, the organization in Confucian society is often found to be difficult for out-group members because such loyalty is achieved by excluding others; thus, foreigners are rarely received as in-group members (Chen and Chung, 1994).

5.1.1.6. Influence on South Korean shipyard industry

In general, South Korean shipyards demonstrate most of the communication characteristics presented above. They have large, complex hierarchical organizations where very a formal code of conduct is used. Seniors receive much respect from juniors based on their age, experience, and knowledge. Employees of the shipyard have social gatherings frequently after work where they form consensus. It helps build strong sense of "we", which draws a clear line between their group and others.

How these Confucian influences affect the South Korean shipyard in particular will be further illustrated in 5.2.2.

5.1.1.7. Confucian influence on attitude towards law and contract

Confucianism has significantly affected the way contracts are understood and interpreted. As discussed in 5.1.1.2, the goal of Confucianism is to achieve stability through implementing order. Confucius stressed that, in order to build and maintain stability, people should remain in their social position, which is identified in a relative and comparative manner, and fulfill their obligation assigned in line with the position. This rigid social hierarchical structure leads to the development of a social relation concept that puts the group ahead of individual. Such social structure emphasizes harmony to keep the society stable and creates self-regulating environment to achieve this (Leonhard, 2009).

Negative view on law and contract

Emphasis on harmony and the individual's burden of fulfilling moral obligation discourages legal proceedings to pursue an individual's interests (Pattison and Herron, 2003). In the event of dispute, relying on interruption of legal system as stated in the written contract to settle the case is viewed as a failure to resolve dispute in respectful way based on trust. Such approach, hence, is considered to damage the harmony within the group (Tanner, 1996 cited in Leonhard, 2009, p.10). This Confucian approach leads to negative attitude towards law and contract (Leonhard, 2009).

Contract as an ongoing process of representing relationship

In Confucian societies, the written contract is not held in as high reverence as it is in Western societies. Rather, in the same context as the process orientation of Confucian communication (see 5.1.1.4), the contract is viewed as an on-going process of representing and describing, not regulating, the relationship. From this perspective, the signing of contract is viewed as an action of initiating a relationship between parties, not the critical process of concluding be-all-end-all document that should be upheld throughout the relationship as Western societies tend to view them (Pattison and Herron, 2003).

Many examples for this view of contracts are found in Confucian countries. Pattison and Herron (2003) indicate that in China a written contract is ignored frequently and considered nothing more than a mere formality. Further, the content of a signed contract is deemed to be subject to change and renegotiation as situations change because the contract is only a representation of existence of relationship (Pattison and Herron, 2003). Hall and Hall (1987) also observe that Japanese also often requests a meeting for changes after the contract is signed. While American businesses, for example, consider the signed contract a final, legally binding, and stable element, Japanese one expect change of the contract as situation develops and changes (Hall and Hall, 1987).

5.1.2. Shipbuilding Industry Practice in South Korea

5.1.2.1. Functional organization structure

Although South Korean shipyards embraced some elements of project-oriented organization, most of them have their organizational structure based on the functional organization principle. The organization is divided into sub-units by function and specialty. Authority is assigned according to level of position in the top-down hierarchical structure. Gardiner (2005) indicates characteristics of functional organization structure as follows.

Deep structure

The functional structure is characterized by deep structure with many levels and, thus, a clear line of authority. This reduces conflict of interest within the organization, and communication from top to down occurs very efficiently.

Focus on control of functional units

The manager of each function has complete power over the unit which enables flexible resource assignment. Thus, once decision is made, it is carried out promptly and effectively. Large resources of technical expertise make the organization competitive for complex project.

Rigid boundary between functions

Gardiner (2005) also indicates that communication and coordination across functions is not efficient and can be time consuming. Issues and concerns need to be brought up and carried through complex chains of command, going through multiple, different functions and levels to be resolved. The deep structure of the organization results in heavy politics among its members and makes it difficult for members to have a big picture of the overall business.

Concentration of authority

Delegation of authority is rare; thus, the functional manager is occupied with a heavy workload, leading to less work efficiency. Because its focus is on management and control of different functions, the functional organization does not provide point of contact for customer with substantial authority to address issues effectively.

Implication for South Korean shipyard

Although many of features of the functional structure described above can be observed in South Korean shipyards, the one with most significant influence over the organizations with respect to offshore project is the rigid boundary between functional units. This hinders lateral communication across functions and, thus, cooperation between them requires special effort. In this organizational setup, project management functions need more authority to be able to have substantial influence over other function in order to control resource and manage project. However, this rarely exists in South Korean shipyards due to the rigid boundary and the sheer size of the shipyards where 50 to 70 project are ongoing and competing each other. How these characteristics influence South Korean shipyards will be further illustrated in 5.2.2.

5.1.2.2. Lean production

High productivity has been known as one of success factors of South Korean shipbuilding industry. Such high productivity was attributed to implementation of the "Lean" concept.

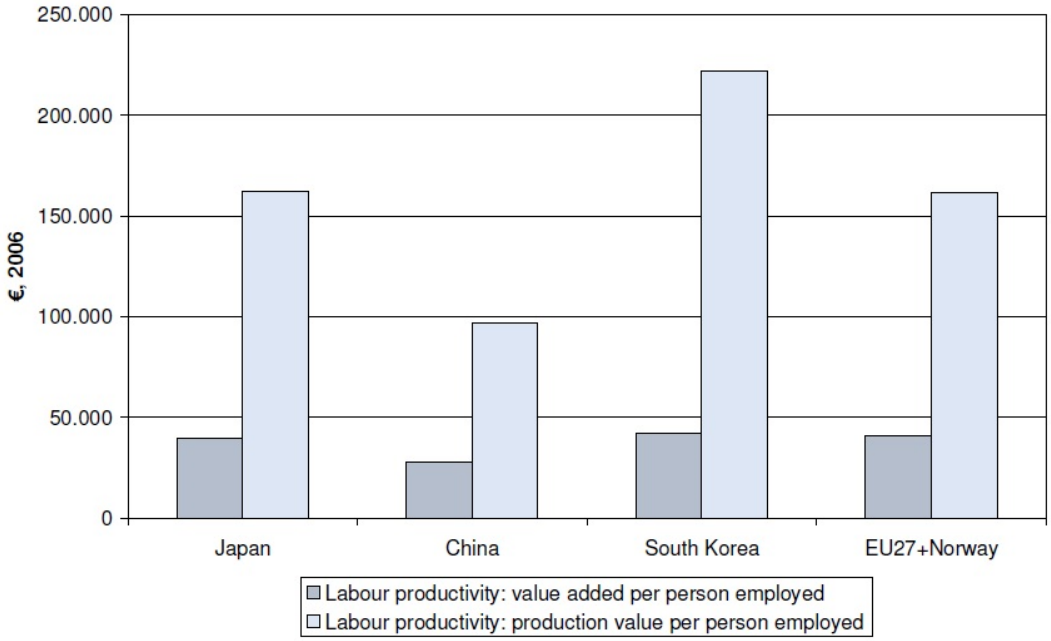

FIGURE 5-2 LABOR PRODUCTIVITY COMPARISON IN SHIPBUILDING INDUSTRY (ECORYS, 2009)

Lean concept

The "Lean" is a production concept that focuses on eliminating non-value-added inputs and processes from production operation (Yusuf and Adeleye, 2002). Inputs can be anything from time, to material, or to effort during the operation (Hassan and Kajiwara, 2013). For example, any activity or movement of equipment or people that does not create value, such as idle time of equipment or idle material, should be reduced. Principles of the Lean production includes standardization, one piece flow, flow smoothing, focus on eliminating waste, dedicated interim production line, and so forth (Liker and Lamb, 2000). Many tools to implement Lean principles have been developed, such as Just-In-Time, Total Quality Management, pull production, and group manufacturing (Yusuf and Adeleye, 2002).

Production process innovation

South Korean shipbuilders applied some of these principles into their production system. Moura and Botter (2011) indicate that the South Korean shipyards' strategies put emphasis on low cost, short build cycle, and high quality with technical innovations. According to Bae, Lee, and Park (2009), South Korean

shipyards have increased turnover rate of the core assets for shipbuilding industry, such as dry-dock, berths, and lifting equipment significantly, so as to reduce construction cycle through introduction of series of innovative production process: product-mix method, floating dock, mega/giga/tera bock method, T-type dock, and so on. These innovations contribute to reduction of waste, e.g., idle time of the main production facility and idle material.

Construction- led organization

Yusuf and Adeleye (2002) also indicate that Lean production is process-focused approach. As discussed above, South Korean shipyards have achieved high productivity through many innovative technical improvements in production process. Most of these improvements were initiated and led by construction management departments. These departments deal with practical production issues at work sites where new innovative ideas come out and communicate with other functions to put the ideas into practice.

Due to fierce international competition, the profit margin of South Korean shipbuilding industry remains relatively low even with such a huge scale (Bae, Lee, and Park, 2009). In light of that, for those shipyards which already possess full basic engineering capability for commercial ships in particular, increase of productivity is regarded as core competency which directly relates to higher profitability. This desire to increase productivity has resulted in a management focus on improvement of productivity that requires the construction management department to have substantial influence over the whole organization. The construction department investigates production issues and gives feedback to other functions. For example, the engineering function takes inputs from construction department into new design. During this process, the contraction department plays important role to assess chance of productivity improvement, come up with solutions, bring it to other functions to develop the ideas, and ensure that the information is brought into other functions in a correct manner.

Less flexibility

Lean production eventually leads to less flexibility, which favors productivity of South Korean shipyards for its shipbuilding business, but it does not help their offshore business.

The “built in quality”, one of lean production approaches, aims to build something right the first time. This approach helps reduce cost for inspection and correction during the production process while maintaining high quality. Thus, the “built in quality” approach improves reliability of production system with low defect rate and stable quality control.

In its nature, this approach results in more focus on how to prevent error or change and makes it challenging for the Lean production system to manage offshore projects, which entail many changes. Due

to its complexity and customized design, offshore projects inevitably come with a lot of change. Thus, such projects require an emphasis on how to efficiently deal with changes as opposed to “built in quality” approach of Lean production

Another characteristic of Lean production that affects flexibility is its emphasis on minimizing waste by smoothing the flow of goods. Production systems are organized such that the goods proceed continuously through the production processes without any waiting time. To this end, the production processes are streamlined and tightly coupled, which can translate into less flexibility. This suggests that the high productivity comes at the cost of flexibility.

In tightly coupled processes, a change in one process can influence the whole production system as the impact of the change is difficult to predict. A change in a local level can affect the entire production process flow and eventually bring serious consequence for the entire shipyard. Again, smoothing flow of goods in Lean production concept is another factor which can slow progress of offshore project in the shipyards.

5.1.2.3. Heavy reliance on local sub-contractor

Due to the labor intensive nature of the shipbuilding business, labor costs account for a substantial portion of production costs in the industry. In South Korea, wages make up 30% of total shipbuilding cost (Ecorys, 2009), and there has been increasing trend in the cost element. In order to retain its cost competitiveness and increase labor flexibility, South Korean shipyards contract out extensive construction work within the yard to local sub-contractors.

Dependency on local service provider

According to a report from the Korea Offshore and Shipbuilding Association (Koshipa, 2014), the number of technicians/craftsmen from service sub-contractors for construction work within the yard has been increasing, and this trend turns out to be very significant in offshore projects in particular.

As shown in Figure 5-3, total number of workers hired-in from sub-contractors for construction work at South Korean shipyards surged from 19,321 to 114,167 (by 491%) between 1998 and 2013, while total number of shipyard employees rose from 56,384 to 68,855 (by 22%) only during the same period.

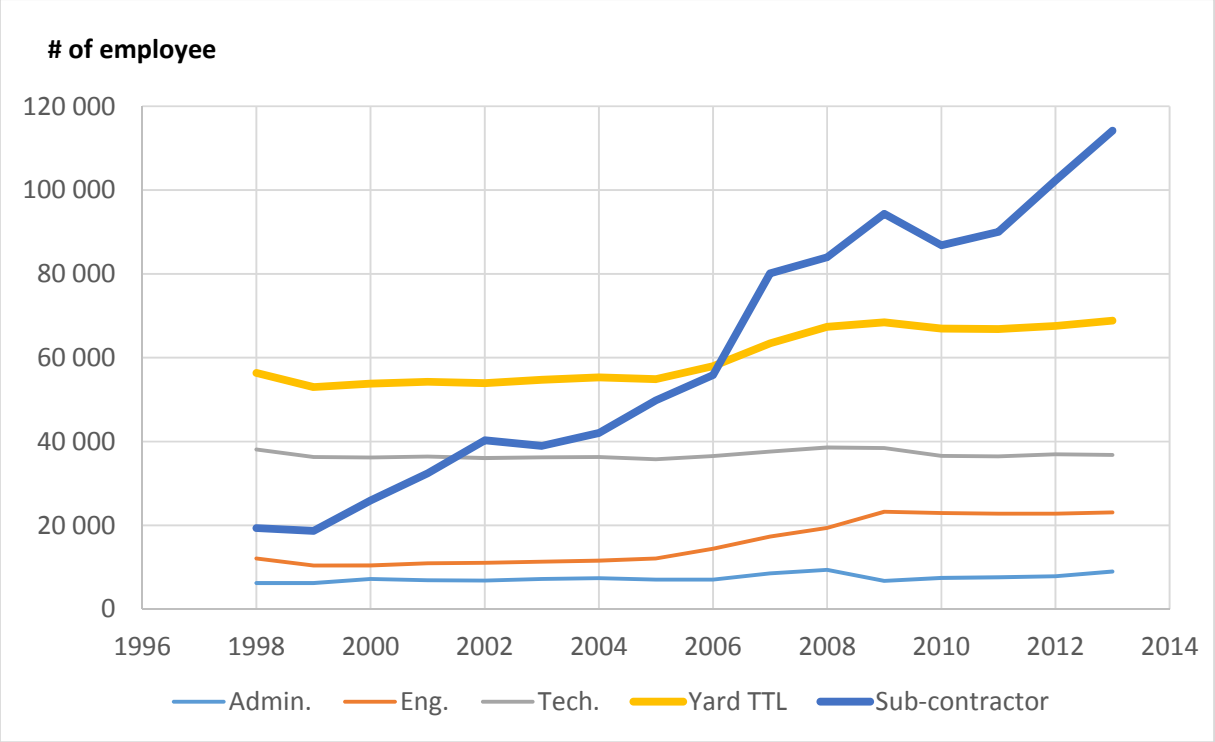

FIGURE 5-3 HEAD COUNT DEVELOPMENT OF SOUTH KOREAN SHIPBUILDING INDUSTRY (KOSHIPA, 2014)

This trend also appears distinct in headcount development of offshore segment. From 2007, when Koshipa begun data collection for offshore segment, to 2013, the number of hired-in workers from sub-contractors escalated from 12,442 to 35,576 (by 186%). In the same period, number of shipyard employee increased from 6,394 to 8,414 (by 32%) as shown in Figure 5-4.

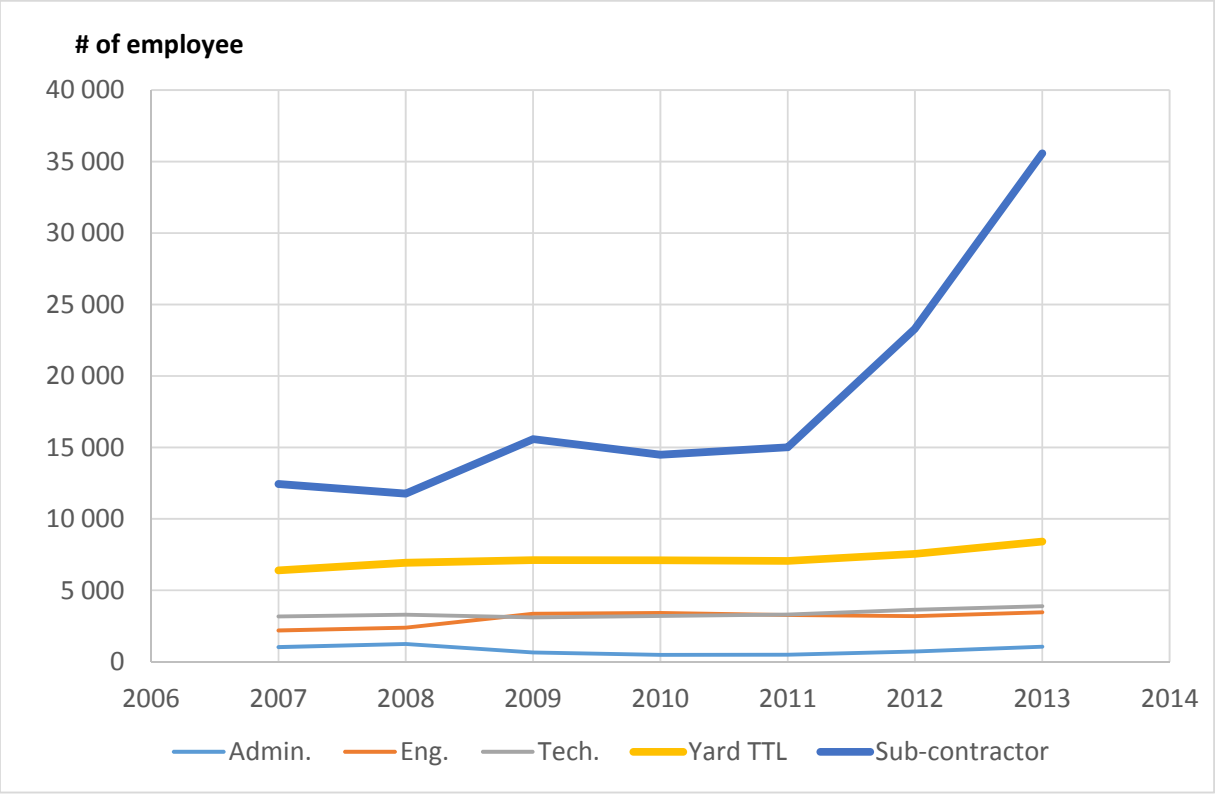

FIGURE 5-4 HEADCOUNT DEVELOPMENT (OFFSHORE SEGMENT) (KOSHIPA, 2014)

This significant disparity between the number of hired-in and a shipyard's own personnel poses challenges to control and quality of construction.

Control, quality, and experience transfer

Given that construction supervision is managed by shipyard engineer, the ratio of number of hired-in workers to number of shipyard engineers indicates meaningful implications for labor control and quality management.

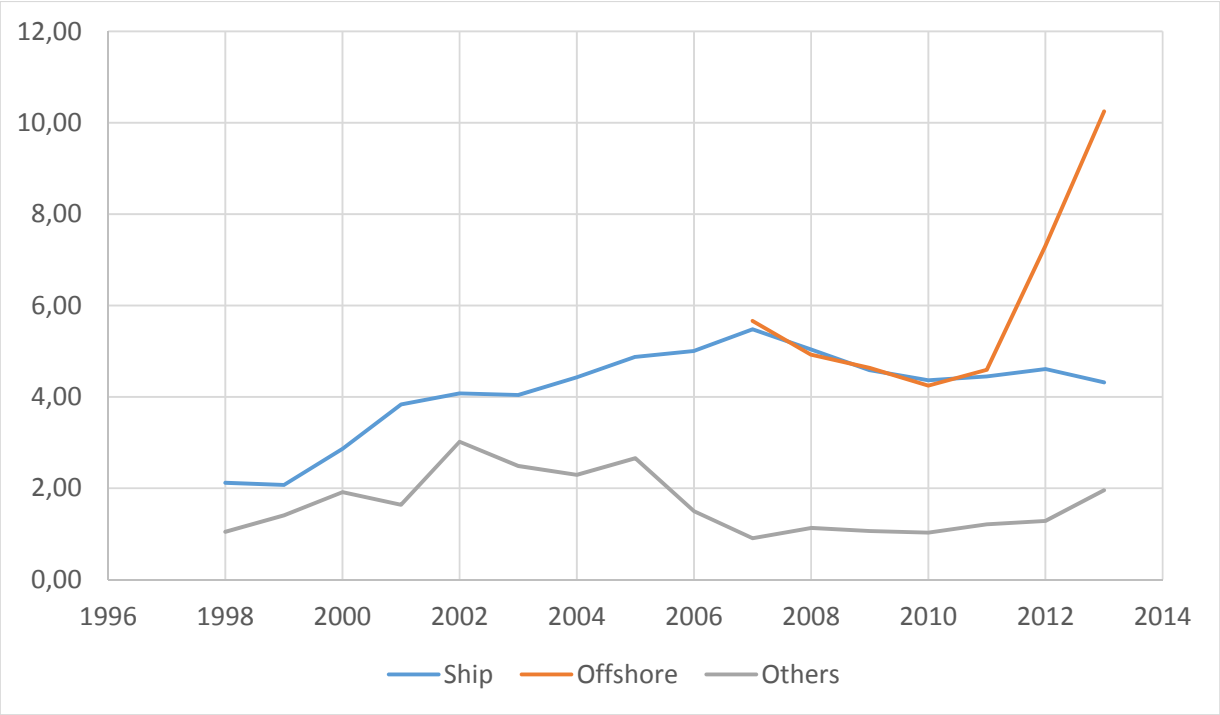

FIGURE 5-5 RATIO OF SUB-CONTRACTOR (TECH. & CRAFTS.) TO SHIPYARD ENGINEER (KOSHIPA, 2014)

Figure 5-5 demonstrates that the ratio in shipbuilding segment dropped by 21% from 5,48 to 4,32 between 2007 and 2013, while in offshore segment it rose to 10,25 from 5,66 by 81%. In particular, the ratio in offshore segment has spiked dramatically since 2011. These data indicate that the number of hired-in workers in offshore segment supervised by one shipyard employee is almost 2.37 times more than that of shipbuilding segment in 2013, assuming that field supervisor group accounts for same portion of total shipyard engineers in both shipbuilding and offshore segments. The rate at which the ratio had increased in offshore segment is also striking as compared with relatively modest increase in shipbuilding segment.

This trend is attributed to the upsurge in number of offshore projects awarded to South Korean shipyards since mid-late 2000s. The trend suggests that the shipbuilders have been addressing the abruptly increasing labor demand mostly by bringing in more sub-contractors rather than increasing its own employees. Consequences resulting from this trend seem obvious. Shipyards have tried to achieve its price competitiveness at cost of increased quality risk. Rapidly increasing number of workers inevitably affects effectiveness of supervision adversely. Many interviewees pointed out that the sub-contractors are not well controlled by the shipyard and that their waste of resources is considerable.

As the labor demand in the shipbuilding industry surges, it becomes more difficult to find skilled workers who are capable of understanding new requirements and performing up to the high standard of offshore industries. Thus concerns over the overall quality of construction work at the shipyards increase.

Another impact of the heavy reliance on sub-contractors is related to learning capability of the organization. Since most of the construction work is carried out by sub-contractors who are highly mobile, the stable members of the organization cannot fully capture the lessons learned through the experience and cannot, therefore, transfer that learning from project to project within shipyard in efficient manner.

5.1.2.4. Experienced negotiator

Over the course of navigating the tough and volatile shipbuilding market, South Korean shipyards have developed seasoned negotiation skills. The fluctuating market affects the market sentiments quickly, resulting in consistent changes of the balance of power between shipbuilders and ship owners. Shipyards are very sensitive to such changes and respond quickly as the resulting consequences can be immense. For example, in market down turns, ship owners often try to reject or delay the delivery of ships that are ready to sail, citing issues that are actually minor and not enough for “no-delivery.” Challenges of this kind come all at the same time, leading to long and difficult negotiations and legal proceedings. Thus, the market condition requires that the shipbuilder also be a skilled negotiator who knows when to be tough or nice. The ship owner and shipbuilder continuously change their positions according to the market development. At the same time, tough experience makes shipbuilding companies put a high value on a long-term relationship with reliable ship owners. However, after 2008 financial crises, when the dry bulk market index (BDI) plummeted by 94% in a matter of 6 months, South Korean shipyards learned that even very well-established ship owners can go out of business and that they may default on payment or refuse delivery. A number of lawsuits and much arbitration has made the shipbuilding companies cautious of their customers.

Since financial crisis, the overall shipping market has been slow and adversely affected the shipbuilding industry. Thus, South Korean shipyards come to take more cost-oriented approaches for new shipbuilding projects. At the same time, this has facilitated the companies’ transition into a relatively new business area, offshore oil and gas industry.

5.1.3. Engineering and Quality Management

5.1.3.1. Multi-disciplinary engineering

Characteristics of process industry

The processing facilities make up major portion of offshore production platform topside, main deliverables of many EPC projects in South Korean shipyards.

The function of the facility is characterized by use of hazardous chemical or biochemical reactions under harsh weather conditions, and this to a large focus in oil and gas industry on health, safety, and the environment (REE, 1981). Among other features of the facility is a continuous flow of the oil and gas processing work performed by groups of many complicated and sensitive pieces of equipment interconnected each other (REE, 1981).

Multi-disciplinary engineering function

Design, construction, and operation of such a complex processing system require expertise in a wide range of engineering disciplines including mechanical, hydraulic, pneumatic, electrical, and electronic domains. Components of the system are closely inter-connected and cannot be treated in isolation. The complexity of the facility has resulted in a need of engineers who can take a systems approach and a holistic view on the overall processing process and control. In order to develop such capabilities, engineers must understand a wide range of engineering disciplines, i.e., multi-disciplinary engineering capability, rather than exclusive knowledge in a certain discipline only. Rapid technological development in recent years calls for even more emphasis on such multi-disciplinary engineering. Engineers are asked to use newly developed technology to improve the process, while making the most out of proven technology. On such occasions, multi-disciplinary engineers are expected to ensure that operations of the system are not adversely affected by implementation of new technologies (REE, 1981). In all, the multi-disciplinary engineering capability becomes vital for design, construction, operation, and maintenance of complex processing facility.

Multi-disciplinary engineer

Special knowledge and experience in each of the single disciplines still plays a substantial role in dealing with ever increasing complexity of equipment and process used during processing. Specialists need to be guided and advised properly of when and how to address such issues so that their job would not hinder the processes of other components so that the performance of the whole system would not be affected. Multi-

disciplinary engineers are to take such role. They identify issues in the system and engage engineers from various disciplines to deal with them. The engineers coordinate communication among different disciples to ensure the issues are resolved while maintaining the integrity of the system.

The roles of multi-disciplinary engineer are elaborated by REE (1981):

- Deployment and training of process operation personnel,
- Employees' HSE (Health, Safety, Environment) issues
- Management of change during implementation of new or advanced technology, and
- Management of interface between process system and construction organization

3D modeling

The high complexity of processing systems demands the effective use of 3D modeling as well as cross-discipline cooperation coordinated by multi-disciplinary engineers. In a project of large scale, a number of discipline engineers work concurrently and unwittingly make local changes in a discipline level. Such changes invalidate connection between other disciples but are difficult to be located promptly before they cause the problem. 3D modeling programs collect technical inputs and present the data in an integrated 3D model that can used to check potential problems or any type of interface issues among different disciplines.

No multi-disciplinary engineering culture in the shipyards

South Korean shipyards do not have a tradition of developing multi-disciplinary engineering functions. In fact, there are rarely—if ever—positions for multi-disciplinary engineers in project management teams or in engineering departments.

Upon acknowledgement of technical problem, a project engineer who serves as a multi-disciplinary engineer in PMT (Project Management Team) can readily refer the issue to relevant discipline engineers or call for a meeting for cross discipline cooperation. Multi-disciplinary engineers also play an important role in the engineering department. They are able to have a holistic view on the engineering aspect of the project and prioritize the engineering tasks. Such engineers coordinate tasks between disciplines and get involved in the event of discipline clash so that facilitates the procedure and enhances quality of engineering work.

However, both the employee composition and organization structure of South Korean shipyards make such fluid communication less likely. Communication barriers arise from the hierarchical and functional organization structure of shipyards and may hinder discussion within a discipline and across them. High power distance between different levels dissuades low-level engineers from raisin their voices to note

problems or offer solutions. Rigid boundaries between engineering disciplines also obstruct efficient collaboration.

5.1.3.2. NORSOK standard

The NORSOK standard is a functional regulation that contrasts with prescriptive regulation. Functional, goal-oriented regulations describe what to be achieved while prescriptive, descriptive ones provide how to achieve the goal.

Prescriptive regulation

Before NORSOK was introduced in the 1990s, Norway used prescriptive regulations, which were a rather stiff system offering specific details to be followed by the industry. The rules appeared to inefficient at bringing technological development into practice while addressing risk associated with rapidly increasing complexity (Kringen, 2014). The limitation of the prescriptive rules leads to introduction of more flexible and systematic regulation.

Functional regulation

The functional standard emphasizes the ultimate objective to be accomplished. With adoption of these standards, the industry is given more flexibility to use its experience and knowledge and to exercise its discretion to determine how to reach the goal. The standards encourage creativity, enabling companies to further establish industry practice, develop new technologies, and cultivate continuous learning capabilities (Skotnes and Engen, 2015).Still, the introduction of the goal-oriented approach also brought issues with interpretation.

Increasing complexity of HSE regime

HSE is the area which underlines the feature of NORSOK standard as a functional rule. A coordinated effort made by the whole Norwegian petroleum industry to effectively address health, safety, and environmental issues contributed to establishment of the goal-oriented concept. According to a report by Engen, Hagen, and Kringen (2013), the functional approach of HSE movement also led to increasing complexity, which should be dealt by parties involved. The functional standards require considerable knowledge and technical skill. It is difficult for small or new players in the industry to fully utilize the flexibility given by the approach in order to identify and apply more advanced solutions. Skotnes and Engen (2015) also point out that functional standards pose application and interpretation challenges because they demand “comprehensive and systematic review on how the various provisions are to be understood and how the appropriate standards should be used to meet the requirements”.

Implication for Norwegian EPC projects in South Korea

In the shipbuilding industry, prescriptive standards prevail, not functional ones, and South Korean shipyards are no different. They have been developing their systems and knowledge based on approach of "command and control". Unlike functional standards, the prescriptive regulations do not require holistic approaches. The rules are clearly stated, so they is easily read and comfortably followed.

As the shipbuilders came into the offshore business and landed Norwegian projects, including topside construction projects, NORSOK standards became one of difficult issues for them. The Koreans were asked to take a systems approach which should be based on two critical elements.

First, in order to correctly interpret and apply the standard, shipyards need to understand how Norwegian companies see the problem and deal with it. Knowledge and experience in Norwegian offshore industry are very important in this regard. This view is evident from the case of HSE, the most critical domain in offshore industry. The development of HSE regulations in NORSOK is based on inputs from offshore operation experience. It has been difficult for shipbuilders to interpret the rules in consideration of such particulars. Many of interviewees pinpointed working environment and technical safety as the most challenging areas for Korean shipyards. This suggests how important it is for the industry to understand Norwegian offshore industry practice in order to efficiently and effectively use NORSOK standards.

The second element is a tool to analyze the problem and provide solutions. The NORSOK standards allow user to exercise discretion to come up with new solutions with creativity for many challenges from offshore project. Still, to fully utilize such flexibility provided by NORSOK, a tool to investigate issues from different perspectives is essential. Multi-disciplinary engineering is one of such tools, but it is not fully developed by the shipyards.

5.1.4. EPC contract

5.1.4.1. Responsibility of EPC contractor

EPC contractors provide a single point of responsibility to deliver on the project on time and in budget with required quality. EPC presumes that EPC contractors are experienced and knowledgeable enough to deal with almost all risk shifted from operator. Thus, EPC contractors must have a holistic view over the whole project covering all activities for core project functions: engineering, procurement, construction, and project controls. Such experience and knowledge should be fully utilized during project execution phase with the support of strong coordination and communication tools. As a lead interface manager of

project, the EPC contractor serves as a single hub connecting all relevant project participants where all information is exchanged and decisions are made (Kaasen, 2009).

Challenges for South Korean shipyards

Given the discussions presented in this chapter and their implications on functional expertise and interface management capability, it seems EPC asks a great deal from the shipbuilders to fully assume the responsibility as the main contractor. In particular, Norwegian EPC projects, characterized by their NORSOK standards and high commitment to HSE, are more difficult for South Korean shipyards to manage than other projects.

The core competitiveness of South Korean shipyards builds on their strong construction capability based on impressive productivity. Their capabilities in other functions, i.e. engineering and procurement, are not up to the level expected by Norwegian operators in general. Among areas for improvement regarding functional capability are multi-disciplinary engineering capability, understanding of Norwegian regulations, technical change process, and so on. The ability of the shipyards to take a holistic view over the whole work scope of project is restricted due to lack of such functional capacities.

Different communication and coordination tools which have been used by shipbuilders are found to be ineffective for Norwegian EPC projects. The differences in cultures (national level) and business practices (industrial level) make significant influence over the EPC contractor's interface management capability. The interface among operator, EPC contractor, and sub-contractors is not coordinated in a way to contribute to improvement of overall project performance. Rather, they disperse risk through the network of project participants. In particular, the interface between EPC contractors and Western vendors appears to be very challenging to manage. The combination of the Confucian framework and insufficient functional capability comes into play and adversely affects communication between the two parties (see 5.2.6).

Operator involvement issue

Because of the insufficient competences, many issues arise and become known to operator. Then the operator feels incentivized to increase its influence and take more control in effect over the project with a view to keeping the project risk in check. Baram (2005) indicates that even when a EPC contractor is given freedom and flexibility to manage project, it is still bounded by operator's requirements. The researcher lists various ways operator can affect the freedom and flexibility of EPC contractor (Baram, 2005):

- Operator's requirements,

- Variations vs changes,
- Design approvals,
- Schedule approvals,
- AVL (approved vendor list), and
- Operator provided items.

These items are often disputed to varying degrees between operators and contractors in EPC settings and should, thus, be closely and carefully watched. As the operator's involvement increases, the EPC contractor becomes more reactive and responsive rather than proactive and preventive. At some point, the EPC contractor comes to think that, as operator exerts more influence, the risk allocation the structure of EPC contract should also be re-organized. This approach seems to give a ground for EPC contractor to claim that operator should share some of the project risk with the main contractor.

.

5.1.4.2. Norsk Total Kontrakt (NTK) 07

Norwegian standard contract for offshore construction project

Norwegian operators extensively use Norwegian standard contract conditions with relevant amendments for the construction of offshore installations in NCS. A recent version of the standard contract documents include NF 07 (for fabrication contract), NTK 07 (for EPC contract), NTK 07 MOD (for modification contract), and NSC 05 (for subsea operation contract). These are results of long discussions between Norwegian operators and contractors operating in NCS and the federation of Norwegian industries. Thus, Norwegian standard contracts reflect comprehensive knowledge and experience of the Norwegian offshore oil and gas industry. One of main features of the standard contracts is the stringent formal rules, which are exemplified by variation order (VO) regime.

Variation order regime

By their nature, projects go through many changes and, in the case of EPC contracts, because of their broad scope, the number of changes become even much larger. The VO regime in NTK 07 is designed to deal with changes in an effective way and constitutes an essential part of the contract. The VO regime operates as a mechanism regulating relationships between changes in the contractor's obligations and the resulting impact on project schedule and cost (Kaasen, 2009).

Variation is an alteration to scope of work to be carried out by contractor as agreed to in the contract and, thus, demands adjustments on the project schedule or cost. Sources of variation include design change, variation from other contractors, new work scope, change in requirement, and so on.

Operators should issue a VO when they want to change an obligation of the contractor. The contractor then becomes obligated to perform the work as stated in the VO "without undue delay" (NTK art. 15.1) and informs the operator of an estimate of the work to be carried out for the variation. The obligation imposed on contractor side to carry out such work is dubbed as "Hoppeplikt" in Norwegian.

If the contractor considers that the operator requested variation without issuing a VO, the contractor shall issue variation order request (VOR) "without undue delay" (NTK 07 art. 16.1). If the contractor fails to meet the time constraints, it loses the right adjust the project cost and schedule.

Upon receipt of VOR, the operator can issue VO if he agrees on contractor's opinion. If the operator does not agree, it can issue a disputed variation order (DVO). The DVO has the same effect as a VO, and the contractor shall perform the work according to DVO.

The disagreement on whether the work instructed by operator requires VO or how much impact the VO has on project cost or schedule can be settled via expert decision, arbitration, or court proceeding. Still, if the contractor does not commence such dispute resolution actions against the operator within a specific time limit as stated in NTK 07, it will lose the right to the claim.

Formalism

The formal rules of procedure to handle VO described above represents strong formalism in Norwegian standard contracts. Preclusive time limits offer a good example: the contractor loses its claim if it fails to issue VOR within the time limit.

Kaasen (2009) notes the practical benefits of the stringent preclusive rules. The rules facilitate clarification of both parties' position so that the impact of any dispute between them over project will be lessened. The mechanism also helps the parties involved to renew the power balance between them if it is damaged in the course of project. However this formalism also often invites criticism. Critics question the fairness of the preclusive rule mechanism in the contract format (Kaasen, 2009). For example, as described above, the VO regime requires the contractor to perform the work instructed in the form of VO or DVO by the operator even though the dispute between them may not be settled. This "Hoppeplikt" rule begs the question of impartiality because it compels the contractor to relinquish its bargaining power. Another criticism concerns the preclusive rules that deteriorate the spirit of cooperation among parties involved: the stiff procedural rules make some parties of the agreement perceive the practice of such mechanism antagonistic and contentious (Kaasen, 2009).

Implication for Norwegian EPC projects in South Korea

The criticism of formalism raises interesting implications for Norwegian EPC projects at South Korean yards. and cultural difference play out considerably in this context. Negative attitudes towards contracts in Confucianism (see 5.1.1.7) have considerable influence over contract management activities. Emphasis on harmony lead South Koreans to perceive unfairness in the preclusive rules as violation of the Confucian principle. The negative view of contracts in Confucian cultures hampers invoking the formal contractual mechanism actively. The adverse impact resulting from the practice of the stringent formal procedure can, coupled with this Confucian characteristic, make the contractual relationships even more vulnerable.

Kaasen (2009) contends that the potential risks of the formalism presented above do not pose much challenge in consideration of practical situation where the Norwegian standard contracts are used. One of such situation assumes that both parties are exceptionally experienced and have good understandings of the mechanisms to use them efficiently (Kaasen, 2009). The assumption is valid for contracts involving Norwegian companies only but may not so for international contract with new players. Kaasen (2009) observes that it also takes time for Norwegian companies to get accustomed to the formalism of Norwegian standard contracts. As Norwegians become more familiar with the characteristic of Norwegian stander contract, the sentiment against the formality gradually abates This means that the formal preclusive rules require some time even for Norwegians to get used to, and, in this respect, it seems natural that it may take even more time for new player to well understand and practice the formalistic mechanism.

Change order in Shipbuilding contract

Offshore EPC and shipbuilding projects are of completely different in nature. Each of them has developed contractual terms and conditions customized to their own needs. Perhaps it is not proper to make a direct comparison between NTK 007 and commonly used shipbuilding contract forms (SAJ, AWES), as there are so many considerable differences. Still, it is worth noting how different they are, with respects to a specific issue at least, in order to understand how shipyard approaches the certain matter.

For the VO regime in in NTK 07, its counterpart in shipbuilding project is change order mechanism in shipbuilding contract. The most significant difference between the two is that the instructed change is not implemented before both parties agree on its impact on project schedule and cost. Thus, the shipyard is given substantial bargaining position.

This contrasts with the “Hoppeplikt” rule in NTK 07 and partly explains why shipyards are reluctant to and do not want to follow the “Hoppeplikt” as stated in the EPC contract. Rather, they try to reach settlement of the disagreement before performing the work according to VO/DVO.

Some other significant distinctions can be made between the NTK 07 and shipbuilding contract two forms. As it is beyond scope of this study to elaborate on such differences, only some of them are briefly described. For example, Norwegian law categorized as civil law family applies to NTK 07 while English common law governs shipbuilding contract. This results in huge differences concerning the interpretation and recognition of liquidated damage and the penalty clause of a contract, and it is considered one of the critical issues. The broad scope of work and associated high complexity in offshore oil and gas industry lead to the introduction of the “Knock for Knock” concept. The concept is not well known to the shipbuilding industry in general. The differences between the two contract formats, including many others which are not mentioned here, can serve as potential risk for the Norwegian EPC project at South Korean shipyard.

5.2. Communication and Coordination Challenges

The four key contributory factors come into play as a project progresses. How those factors play out in combination and challenges arise are illustrated here.

5.2.1. Communication between Norwegian and Korean

5.2.1.1. Language barrier

It is not easy to convey exactly what one thinks to others even when two people speak the same language. In international business, people with different first languages often communicate with each other in English, regardless of what their first language may be. Thus, there can be a substantial loss of understanding or information in the course of managing long-term projects involving countless meetings between parties with diverse linguistic backgrounds.

In general, employees of South Korean shipyards have basic competence in English. Personnel in a departments or teams that interact with customers frequently often use decent English well enough to handle complex detailed reasoning. Many in most technical disciplines or administration functions, however, are have less proficiency with English. Similarly, younger generations have relatively better English skills than older ones. So communication with South Korean local sub-contractors is even more difficult because they are less involved in direct interaction with foreign customers..

5.2.1.2. Cultural factors

Low context vs high context

From Hall's low context-high context culture perspective, the cultural difference between Norway and South Korea is significant (see 5.1.1.1). This poses a high potential risk for misunderstanding because Norwegians attend more to the actual words spoken while South Koreans attend to the context in which the conversation is taking place. There are many factors to be considered when interpreting conversations in the high-context culture of South Korea.

5.2.1.3. Business practice

Business practices in both countries also have huge influence over the communication. Some of the Norwegian business practices which South Korean recognizes are distinct are presented in (INTSOK, 2014).

Positive note	Negative note
• Technically advanced • Sincere and honest • Practical • HSE focused • Standardization • Equality • Do not abuse of unequal bargaining power	• Frequent and long vacations • Too direct and impolite • Too informal • Not clear/specific • Delay • Slow decision making process • Naive

TABLE 5-2 NORWEGIAN BUSINESS PRACTICES OBSERVED BY SOUTH KOREAN (INTSOK, 2014)

These practices, particularly the items on the negative side, have practical implications for daily communication at work. For example, South Koreans should plan ahead to obtain all the information they need to work from their Norwegian counterpart before the Norwegian takes a long vacation.

5.2.2. Within EPC contractor

South Korean shipyards demonstrate most of communication characteristics influenced by both their national culture, Confucianism, and the shipbuilding industry practice, as discussed in 5.1.1 and 5.1.2.

5.2.3.1. Confucianism

Among the Confucian influences over communication within organization of South Korean shipyards are hierarchical structure, reciprocally obligatory relationship, overlap of personal and official business transaction, and ingroup/outgroup distinction.

Hierarchical structure

In the hierarchical organization structure of South Korean shipyards, top-down communication occurs in a very efficient and effective manner. Authority is concentrated to higher position. Once a decision is made, it penetrates the whole organization instantly and is carried out instantly with the full support of the organization. On the other hand, communication from lower level personnel to higher personnel is less effective. Most of the shipbuilders have pre-established channels designed for bottom-up communication which in general appear to be not working sufficiently.

Reciprocally obligatory relationship

A superior is supposed to provide guidance and parental care for a subordinate, and the subordinate is loyal and pays respect to the superior. This helps smooth the transfer of experience and knowledge from the superior to the subordinate and strengthen the bond between the two levels. The power distance between levels is distinctive, stressing the difference in age, year of service, educational background, and so on. This means that if the superior is not necessarily more knowledgeable or experienced than subordinate, the reciprocally obligatory relationship principle cannot be sustained.

Overlap of personal and official business transaction

The shipyard employees interact with each other continuously and consistently so that they share many public and personal information. This helps enhance the relationship among the employees. Frequent contact often entails the sacrifice of one's personal life. Social gatherings after work hours take place more frequently in South Korea relative to Norway.

Ingroup/outgroup distinction

A clear distinction between shipyard employees and others helps strengthen ties among shipyard employees and encourages loyalty to the shipyard. This promotes sense of unity. However, the loyalty comes at cost of excluding others. This creates a huddle for the shipyard employees to build a cooperative relationship with other companies where open discussion is necessary, e.g., joint ventures or consortiums.

5.2.3.2. Shipbuilding industry features

Functional structure (see 5.1.2.1)

The shipyard benefits from strong support from big groups of functional expertise. The deep professional pool is a prerequisite for high productivity via innovating production processes. However, the rigid boundaries between functional units hamper lateral communication. Each function unit focuses on its own

tasks designated by the production system of the shipyard. Communication among functional units is not organized or supported by the system and is, thus, not efficient.

Lean production (see 5.1.2.2)

By implementing a lean production approach throughout its production process, the shipyard achieved high productivity and earned price competitive edge in international shipbuilding markets. Such productivity comes by limiting flexibility. Production processes are tightly interconnected; thus, it is difficult to estimate the impact of local changes on the whole system. The production system is not designed to be resilient to changes.

Improvements to productivity have led construction departments, which lead strong production processes toward improvement initiatives. The strong power given to construction departments enables the functional units to push the initiative through the organization. This results in an imbalance of power between construction and other functions. Other departments are more receptive and reactive as compared to construction departments.

Heavy reliance on local sub-contractor (see 5.1.2.3)

South Korean shipyards have been able to gain cost competitiveness by hiring in more sub-contractors. However, such an approach increases concerns over the control of labor and quality of performance as the number of sub-contractors supervised by shipyard employees has more than doubled since 2011.

5.2.3.3. Works for shipbuilding project

The communication characteristics observed within South Korean shipyard organization have been efficient and effective for shipbuilding business. With extensive experience in shipbuilding industry, employees in the organization fully understand what they should do, and how they do it. Strong leadership helps the organization move forward for the same target with a sense of unity. Within each functions, the employees have specialized knowledge for their specific job. Streamlined production line for shipbuilding process provides optimized tools for the task.

5.2.3.4. Challenges for offshore EPC project

Unlike shipbuilding projects, however, offshore EPC projects require a completely different approach, which does not favor the communication characteristics of South Korean shipyards.

Ineffective bottom-up / lateral communication

High power distances and rigid boundaries make it difficult to have effective communication in upward and lateral directions. To have support from other functions or share experience/information, the low level engineer should bring her/his voice, through barriers of many different levels, up to the higher position manager, who has authority over other functional units. If the manager with authority approves the low level engineer's idea, then the idea is, again, brought through multiple levels down to low level of other functions. This is too time-consuming and leads to wasting resources in offshore projects, which present high technical complexity and entail frequent changes. Such challenges in offshore project inevitably necessitate continuous discussions and cooperation across functional units to stimulate collective intelligence of the organization and come up with creative solutions. As Gardiner (2005) points out, project scheduling and control of offshore project are often haphazard in shipyards because the barrier among functions hinders prompt exchange of information.

Project management function without authority

In this functional set-up, the project management unit cannot fully perform its task as expected by the Norwegian operator. The PMT's voice is not strong enough to penetrate barriers between functions. Thus, the PMT operates more like a facilitator or coordinator among different functions rather than a project manager who actually leads the project with effective authority over resource and influence over other functions.

5.2.3. Interpretation of contractual relationship

5.2.3.5. Shipbuilding project

Application of Confucian framework

South Korean shipyards tend to construe contractual relationships between relevant parties through Confucian framework where Confucian elements observed in organization come into play (see 5.1.1.5).

In shipbuilding projects, such an approach proves to be effective. According to the Confucian framework, the project stakeholders form hierarchical relationships as shown in Figure 5-6, where the ship owner is positioned at the top, shipyard in the middle, and local vendors and sub-contractors the bottom.

In accordance with Confucian reciprocally obligatory relationship, shipyards (SY) pay respect to ship owners (SO) while ask submission from local vendors (LV) and service sub-contractors (LS).

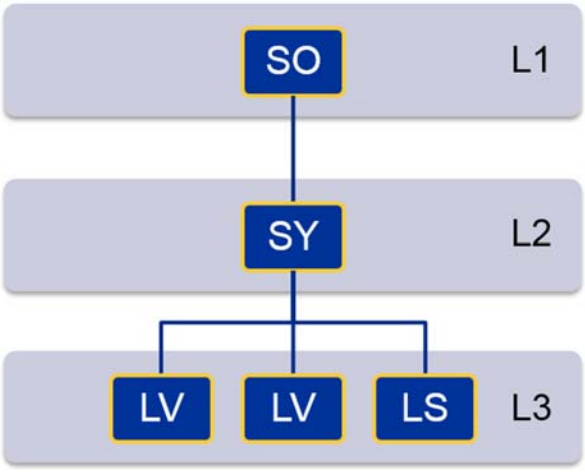

FIGURE 5-6 CONTRACTUAL RELATIONSHIP IN SHIPBUILDING PROJECT

Usually shipbuilding orders from a SO are placed repeatedly over a long period of time. This helps build long term relationships. Such relationships are also established with LV and LS, who can be regarded as a kind of big group comprised of many company members. The loyalty of the lowest levels (LVs and LSs) to the SY is strong, and in return the SY proves that it can fulfill its Confucian reciprocal obligation as superior by awarding more jobs and leading technology development initiative involving LV/LS. Thus, the notion of strong sense of in-group can be observed.

This framework works well. South Korean shipyards can satisfy any kind of request from ship owners because the shipyards have full capability within itself for engineering, procurement, and construction. The biggest three shipyards have large in-house groups of experienced discipline engineers. Ship is more standardized product as compared to offshore platform topside. This characteristic of the product has helped shipyards develop lean production systems where each of engineers can focuses only on his or her specialty. Similarly, 85% of all equipment and material for ship are procured from local players (Bae, Lee and Park, 2009). Thus, most of procurement activities take place within South Korea, where companies share Confucian culture. Lastly, shipyards have excellent construction capabilities, thus completing South Korean shipyards strong competitiveness in international shipbuilding market. And the same Confucian framework approach was taken for offshore EPC project, which turns out to be not the best solution.

5.2.3.6. Offshore EPC project

Application of Confucian framework

Figure 5-7

illustrates the contractual relationship of Norwegian offshore EPC projects under a Confucian framework. Application of this approach to overseas companies in offshore industry with different cultural

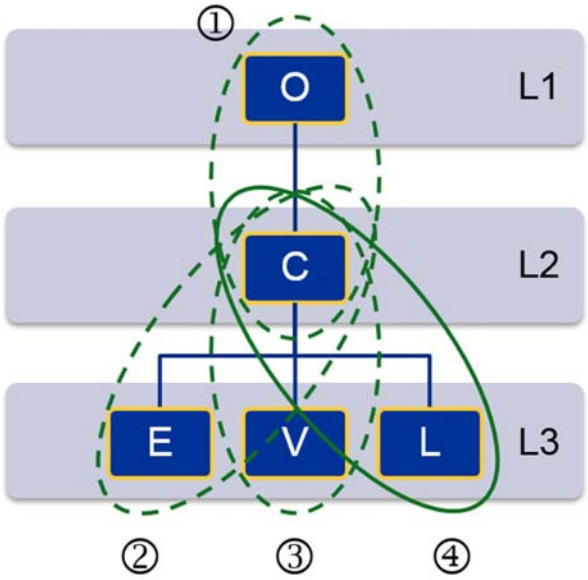

FIGURE 5-7 CONTRACTUAL RELATIONSHIP IN OFFSHORE EPC PROJECT

background gives rise to significant communication and coordination challenges.

Gray zone

In this setup, the South Korean shipyard, as South Korean EPC contractor (C), pays respect to the Norwegian operator (O). At the same time, C expect its sub-contractors (i.e. international engineering firms (E), oversea vendors (V), and local service sub-contractors) to look up to it as the local sub-contractors (L) in shipbuilding projects would. However, this does not happen. Instead, as C becomes demanding to sub-contractors, E and V, in most cases based on Western countries, are usually tough back to C.

Reciprocally obligatory relationship can be established only when both the superior and subordinate perform their own roles. In offshore projects, however, as project progresses, the key contributory factors to EPC project challenges are brought into play, and C cannot afford to fulfill such roles. According to Confucianism, C should be able to perform his task as EPC contractor in full without having to engage O. This makes it difficult for C to report any important issues to O upon recognition of the problems. C

makes attempts to solve the issue without notifying O in a timely manner. If C fails to find solution, usually it is too late to implement corrective actions in the most efficient and effective way (INTSOK, 2014).

Usually E and V are equipped with extensive experience and knowledge in offshore industry while C still has long way to go. Hence, it is practically impossible for C to provide guidance or advice as a superior to its sub-contractors except local sub-contractors (L), which are in small number. L in general does not possess offshore experience either. For FPSO, only 20% of total equipment and material are provided by local players (Koshipa, 2011). In addition to these difficulties, the in-group/out-group distinction is less clear in these projects than in shipbuilding ones, leading to more difficulties for C. For instane, the ethnic diversity makes it difficult to draw clear line between in-groups and out-groups. Nonetheless, C has a tendency to regard the hierarchical structure of contractual relationship as a group under Confucian thinking since it seems to them that the Confucian setup still binds all relevant parties together.

All the above issues creates a “gray zone” in cultural the context between O and C (①, see Figure 5-7), O and E (②), and O and V (③), where communication among parties gets difficult. Combined with insufficient functional and interface management capability (see 5.1.4.1), this cultural gray zone often results in undesirable outcomes: C demands E and V take responsibility towards O; direct communication between O and E take place excluding C.

5.2.4. Norwegian Operator

5.2.4.1. Confucian framework

Too much respect to the operator from the shipyard

According to a Confucian approach, the South Korean EPC contractor (C) pays respect to Norwegian operator (O), but the high respect paid to O often appears to hamper efficient communication between them. In general, C refrains itself from being assertive and speaking up particularly at the beginning of project. Issues arising as a project develops are not timely reported to and discussed with O. Thus, when problems are known to O, it is often too late to find an optimal solution, and what is left for O’s consideration usually includes more expensive and less effective alternatives.

5.2.4.2. Organization structure

Flat vs hierarchical

Norwegian companies are in general known to have a flat organization with low power distance, which is in stark contrast to South Korean companies. The Norwegian O expects C to have open discussions across levels, but this does not happen effectively. The top-down communication pattern of C hampers information flow from a bottom-up direction. For C, it is not clear who actually has authority to make a decision within O's project organization. South Korean shipyards have a big and deep organization structure. Thus, it is difficult for O to identify the person responsible for certain task.

Project-based vs functional

The project-based structure of O contrasts with functional structure of C. Within functional organizations, it is difficult to expect that a PMT has enough substantial influence over other functional units to hold a strong grip on the project.

Ineffective formal communication line

In principle, every correspondence between O and C should occur through C's PMT. However, combination of different organizational set-up and lack of authority of PMT at C makes the formal communication line ineffective. Thus, many of the official regular meetings are found to be not efficient and effective.

Frequent use of informal communication

The problematic formal communication naturally results in extensive use of informal communications. As O becomes aware of the communication problem, it tries to have direct interaction with C's personnel who actually have authority to get things done for O. Interview data supports that this informal approaches prove to be effective.

5.2.4.3. Tough contract management

The difference in approach to contracts between O and C is considerable, and the approaches of both are strengthened and supported by experience with each other, making the difference more distinctive.

Because of Confucianism, the general attitude towards contract is negative in South Korea (see 5.1.1.7), which is very different from the general attitude in Norway. As discussed in 5.1.4.2, stringent formality is one of major features of NTK 07 format, which encourages involved parties to actively utilize relevant clauses provided in the contract. Still, in the event of a dispute, the legal proceeding usually comes at

considerable cost which often does not justify such actions. And C, based on its experiences that their requests for compensation for any changes are common and well accepted in shipbuilding project, takes the same approach towards O, expecting that it is also workable for the Norwegian EPC projects. This creates much tension between the two parties.

5.2.5. Engineering sub-contractor

In general, the engineering service is sub-contracted to an international engineering company (E), which belongs to a different cultural cluster.

Collision between high context cultures

Communication between C and E become difficult when E has high-context culture. Exchanging ideas and information in a high-context culture requires more effort and time than in a low-context culture. In a high-context culture, the listener should be able to correctly interpret the contextual message conveyed in various ways in addition to the words and phrases spoken explicitly. Thus, if E has a high-context culture, communication between C and E appears comparatively more challenging than C and O, which has a low-context culture.

Confucian framework

Given this cultural gap, the Confucian approach can make the already difficult interaction between C and E even tougher. This can amount to serious interface management issues and disturb the smooth transition of engineering output to procurement and construction.

Direct communication with Norwegian operator

In many cases, the engineering service is awarded to the company which carried out the front-end-engineering-design, one of project development stages proceeding the project execution. Even if this is not the case, usually E has extensive international experience; thus, there is a high chance of E already having established communication channel with O. This gives E motivation to contact O directly while excluding C when relationship between C and E stumbles. Once this happens, it may persist, making C feel marginalized and causing C to pass more burdens to O.

Technical change process

In particular, when a technical change process is initiated, the stable and reliable correspondence between C and E is essential. Miscommunication between them can do serious damage to the integrity of the technical change management procedure and effectiveness of the complex feedback process involved.

Norwegian local engineering company

In many instances, E sub-contracts with local engineering firms in Norway for interpretation of NORSOK standards. This adds one more link to the communication chain. It also requires more attention to be paid to ensure smooth interaction among C and E and the Norwegian local engineering firm for efficient implementation of already challenging NORSOK standards.

5.2.6. Oversea vendors

Most of the major equipment in offshore EPC projects is supplied by oversea vendors (V) including many Norwegian companies.

Confucian framework

Cultural friction takes place in the relationship between EPC contractor (C) and V too. C takes a somewhat demanding position with V as it does with South Korean local sub-contractors. According to a report from INTSOK (2014), C can withhold the full contract amount if any dispute arises, and if there are serious issues between the two, V can be blacklisted by C, which means V cannot supply his products to C. Applying the same Confucian rules to the relationship between V and V's sub-contractors, C does not understand why V cannot take full control over V's subcontractors (INTSOK, 2014). Other common complaints from C include late responses from V in general, including late delivery of LCI (Life Cycle Information) of the equipment.

Lean production concept

As discussed in 5.1.2.2, the "customer driven" approach of the lean production concept results in master-servant relationship in the supply chain. This skewed power relationship, combined with Confucian approach, explains C's demanding attitude toward V.

NORSOK

Norwegian functional requirement is another important factor in this relationship. According to the Confucian approach, C should be able to provide guidance to V, but in reality it is not the case as V has better knowledge of and experience with NORSOK. This results in some occasions where C's procurement personnel make comments on V's equipment and service without sufficient understanding and knowledge about the relevant NORSOK requirement. V, thus, in many cases, finds such comments of little value or to be impractical.

The interviewees noted that procurement function of C is generally regarded as being in the commercial domain, and most of the related activities are handled by commercial personnel. However, it is not good enough to address many technical issues arising in the course of the procurement process. The equipment in offshore projects require high technical integrity and compliance with tough regulations, thereby demanding that engineers play more active roles in managing the procurement tasks rather than only providing support to the tasks. Still, in C's organization, procurement is within the territory of commercial discipline. Engineering department is to assist procurement personnel but that is not good enough to achieve smooth communication between C and V.

Interview also revealed that that often POs issued by C often miss out detailed technical specifications with relevant reference to NORSOK standards, which are essential for V to produce their equipment. Such POs lead to follow-up inquiries from V, which are followed by a great deal of correspondence between the two parties to supplement the insufficient technical input in the PO.

5.2.7. Local service sub-contractor

South Korean local sub-contractors (L), who in most cases provide construction service, have close relationships with C and exhibit strong loyalty to C in accordance with the Confucian framework.

Quality issue

Interviewees noted that by and large the overall quality of L's service is good enough but to varying degree across the South Korean shipyards. As discussed in 5.1.2.3, the number of L's personnel working at C's construction area for offshore project has been swelling since 2007, while the number of C's technicians remains more or less the same level. This implies that the number of L's personnel controlled by one supervisor of C has increased significantly, and this inevitably affects the quality of the service adversely.

In most cases, L has developed its own work procedure and practice through extensive experience in ship construction. L's adherence to its own procedure and practice makes it difficult for C and O to ensure that L follows the procedure required by Norwegian regulations. Further, because the South Korean shipyards are overloaded with so many projects nowadays, the communication within the hierarchical structure becomes ineffective at bring messages down to the lowest levels, i.e. workers of L.

All of above issues necessitate additional check and control activities to manage quality of L's service. In particular, when a project is delayed due to O's (including O's other contractors) negligence or failure of fulfilling its obligation, the project may become a low priority one to C. This can result in poor quality of

L’s service afterward, as the skilled personnel will be reassigned to another project with higher priority in line with C’s interest.

6. Recommendations

6.1. Alignment of Expectation

6.1.1. Assumption of similarity

6.1.1.1. Acknowledgement of the difference between Norway and South Korea

The first thing to do in order to mitigate the challenges identified in Chapter 5 is to acknowledge that there is a huge difference between Norway (Offshore) and South Korea (Shipbuilding). Everyone involved in the Norwegian project in South Korea may agree that the two countries are different in general, but it seems that both do not agree on how different they are. Establishing common ground on the differences between the two is the first step for better cooperation.

6.1.1.2. Get out of the box

Agreement on how different the two are is much more difficult than it may seem. Doing this requires people to see beyond what they are used to, including even what they have thought was universal and absolute. The tendency to assume similarities across cultures is very powerful, and it takes much time and efforts to be able to recognize the difference objectively. Even basic principles that are considered to serve as basis for every project can be challenged in the context of managing Norwegian EPC projects in South Korea from many different perspectives including the interpretation of the contract.

Interpretation of contract

Modern legal systems in most countries in the world are deeply influenced by Western society and have many things in common. In particular, South Korea adopted a German civil law system from because of Korea's history with Japan, which had adopted the German model. However, it does not necessarily mean that the way the law is interpreted and accepted in South Korea is also the same as it is in Germany.

McConnaughay (2000) indicates that there is a fundamental difference in the role of law and contracts for the commercial transactions between East Asia and Western world, and he called for rethinking the role of law and contracts. One of the fundamental differences is based on the different recognition of "individualistic notion of rights" (Leonhard, 2009). The individualism in the Western world gives a person

or an entity freedom to engage in an agreement with others for his, her, or its own interest. In contrast, in a Confucian society, the emphasis is on social relationships, thus restricting individuals' freedoms while putting more value on a harmony in the society. As discussed in 5.1.1.7, this provides ground for frequent changes to contracts in Confucian countries, while contracts hold a more absolute reverence in the Western world.

Of course the Confucian approach can be hardly approved if any dispute arising from the contract is brought to the court in Norway as NTK 07 format states. Still this does not approve the expectation that South Korean shipyards will take the same logical sequence in interpreting the contract as Norwegian counterparts do. McConnaughay (2000) observes a significant gap between commercial law and commercial behavior across Asian countries "with traditional expectations often still strong regarding the subordination of law and contracts to evolving circumstances and relational values."

6.1.2. How different they are in relative terms

Table 6-1 presents the relative difference between Norway (Offshore) and South Korea (Shipbuilding)

	Norway (Offshore/Process industry)	South Korea (Shipbuilding industry)
National culture	• Individualism • Self-orientation • Active towards law	• Social relationship • Harmony • Negative towards law
Organization structure	• Flat • Lateral communication • Project-oriented • PM with substantial authority	• Hierarchical • Top-down communication • Functional • PM as project coordinator
Industry	• Multi-disciplinary engineering tradition • Functional requirement • Agile production (flexibility) • Focus on how to manage change effectively • Focus on quality (broad quality scope) • NTK 07 (Hoppeplikt) • Small size offshore yard (2-3 offshore project in parallel)	• Deep expertise in a discipline tradition • Prescriptive requirement • Lean production (optimization) • Focus on how to minimize changes • Focus on productivity (narrow quality scope) • Shipbuilding contract (change order) • Giant size shipyard (15 offshore & 60 shipbuilding projects in parallel)

TABLE 6-1 DIFFERENCE BETWEEN NORWAY AND SOUTH KOREA

The differences noted in this table suggest that there is inevitably a gap between Norwegian operators' and South Korean shipyards' expectations. Norwegians expect compliance with their requirement and contract terms through the multi-disciplinary and agile concept approach which require flat and project oriented organization. They may also want to have full support from the whole organization of the contractor as Norwegian offshore yard does. On the other hand, however, South Korean counterparts anticipate delivering project with their already established systems designed for lean production and utilization of deep expertise in a discipline, suitable for their hierarchical and functional structure. As a Norwegian project usually accounts for 2-3% of business portfolio of the shipyard, it is natural that the shipyard views the project as one of ordinary project, and there is a fierce competition for more attention from the shipyard between the many projects going in parallel.

6.1.3. How to achieve the goal in different circumstance

Based on the same agreement on how much gap is there between the Norwegian and South Korean companies, what should be done and how it should be done can be determined. For each of the many differences, Norwegian operators can decide whether the difference is what it can accept or not. More specifically, operators can divide the differences into three categories: differences that it cannot accept so that it should maintain its own way; differences that it should and can accommodate from the shipyard and adapt itself to the new environment; and differences that stand somewhere between the first two types of differences.

From the Norwegian operators' perspective, the differences can be divided into the three categories as shown in Table 6-2.

	What to maintain ⟷		What to accommodate
National culture	• Individualism • Self-orientation • Active towards law		• Social relationship • Harmony • Negative towards law
Organization structure	• Flat • Lateral communication • Project-oriented • PM with substantial authority		• Hierarchical • Top-down communication • Functional • PM as project coordinator
Industry	• Focus on quality	• Multi-disciplinary engineering • Functional requirement • Agile production • Focus on how to manage change effectively • NTK 07 ⟵ • Deep expertise in a discipline • Prescriptive requirement • Lean production • Focus on how to minimize changes • Shipbuilding contract	
	What	**Where**	**How**

TABLE 6-2 CLASSIFICATION OF DIFFERENCES

How the differences are categorized is self-explanatory. National culture and organization structure cannot be changed thus the difference should be acknowledged. The quality cannot be compromised.

The three categories point to practical implications for Norwegian operators on how to approach challenges in Norwegian EPC project at South Korean shipyards.

- The “What” category refers to what to be achieved by the project and maintained by Norwegian operators. The operators should clearly communicate the items falling into this category to South Korean shipyards so that the shipyards fully appreciate the criticality of such items.
- The “Where” category refers to areas where operators should focus their efforts to narrow the gap between the two parties. Operators’ supporting activities to reinforce shipyard’s capability aim items in this category.
- · The “How” category refers to what operators need to accommodate. By adapting themselves to different cultural and organizational structures, the operators obtain a powerful tool for communication (“how” communicate), which facilitates and assists in supporting activities identified in “where” category.

Depending on its project execution strategy, the operator may conduct further analysis to determine more differences and add them into this categorization process. In doing so, the process can yield more items for each category.

Common understanding is essential

In order to effectively address the project challenges, it is of critical importance to establish a common understanding between the two parties about the significance of the difference between them and to focus on the areas where the operator will put its effort to support shipyard activities. This is prerequisite for both parties to help bring down the communication barriers resulting from different expectations and to help increase understanding by showing that they have the same goal. A one-sided approach by the operator without the mutual understanding may have some effect but to a limited extent at best. It is more likely that such an approach would only increase the risk of misunderstanding between the two parties and further hurt the relationship.

6.2. How to Communicate

The “How” category identified above implies that, in order to have effective communication and thereby facilitate the activities to fill the gap between Norwegian operator and South Korean contractor, operators need to adapt themselves to the different environments.

6.2.1. General communication in person

6.2.1.1. Understanding of different communication pattern

The Confucian influence on communication patterns, personal relationships, and organizations helps enhance understanding of how South Korean shipyards personnel communicate. On the other hand, Norwegian operators may also inform the shipyard of Norwegian culture and how it affects the way Norwegians communicate. Doing this helps each party better understand its counterpart. Still, it may be difficult for Norwegians to follow South Korean communication rules. In fact, Norwegians do not have to do so because they are in a cultural gray zone (discussed further below). As long as Norwegians can show South Koreans that they are aware of the big difference between them and vice versa, the two can establish a common understanding that there is always a high risk of misunderstanding and being misunderstood. Building this understanding creates a relaxed atmosphere where people can open their minds so as to help reduce risk of miscommunication. This is a good starting point for effective communication.

6.2.1.2. Know your position

The cultural “gray zone”

In the Confucian framework, the operator is positioned at the top of the hierarchy where contractors pay respect to the operator and the operator is given authority over the contractors to certain extent. This helps the operator have influence over the shipyard’s activities as actions to fulfill EPC contractor’s responsibilities.

Flexibility

Notwithstanding such influence, the operator is still regarded as not in the same in-group but as a foreigner. Employees of the operator are not required to follow Confucian rules and are free from local customs. This provides the operator with more flexibility regarding how to deliver its message to the shipyard. In general, following Confucian rules makes the communication easier, but it is worth noting

that the operator can exercise such flexibility to go beyond the cultural boundary and take different communication approach where appropriate.

Being humble and respectful makes difference

Situated at the top of the hierarchy, the operator may try to take full advantage of its position and not show as much respect to the shipyard as the shipyard would show it. Because Confucian shipyards may assume a lower position, they greatly appreciate it when the operator shows a humble attitude toward them. The operator's personnel could make comments to shipyard without giving them an impression of being demanding. This can help operator make differences in many different respects in much easier way in the course of the project. It is also advisable for the operator's personnel to be polite to managers of shipyard. In doing so, the operator can demonstrate its respect not only to its counterpart and his or her manager but also to the shipyard as a whole.

6.2.1.3. Build trust

Build personal relationship through business transaction

As discussed in 5.1.1.3, the overlap of personal and official business relationships results in strong desire to build personal relationship through business transactions. This is one of tips utilized by foreigner to build trust in particular when the relationship just started. Spending time at social events with shipyard personnel and sharing personal matters help make the relationship more reliable.

Being communicative, predictable, and reliable

As the project progresses, more general rules to develop trust apply: be communicative, predictable, and reliable. When implementing certain requirements in the form of procedure or regulations in a daily work, it is important to help the shipyard personnel understand why the requirement should be followed. This is important to make a solid foundation of trust. Once the rule or plan is set out, efforts should be made to adhere to it, thereby enhancing predictability. Making good on promises is also essential. Most importantly, each of operator personnel should be competent and reliable in handling tasks within their specialty. High complexity of offshore projects brings up many challenging situations where the operator's experience and knowledge can count. Having professionals with the right competences to provide proper guidance and effective solution is the most important element to build and maintain trust.

6.2.2. Formal meeting

Formal meetings, regulated by contract between Norwegian operators and South Korean shipyards, are key official communication channels. The effectiveness and efficiency of these meetings is dependent on how the meeting participants prepare for, conduct, and follow-up on them.

6.2.3.1. Preparation for meeting

Determine agenda

First thing to prepare a formal meeting is to decide on an agenda that outlines what issues should be discussed, and these issues will depend on the nature of a meeting. It is a good idea to put a limit to the number of issues. Attempting to address all issues in one session is rather ambitious and does not help efficiency of a meeting. Once confirmed and listed up, the issues are prioritized based on its importance and sensitivity.

Identify key persons and ensure their attendance

According to the nature of the issues, the key persons from the shipyard should be identified. The key persons include a manager who has the authority to handle the issues and discipline level employees who actually works on the issues. If there are middle managers in-between, they can also be included. It is crucial to ensure that the key personnel attend a meeting. This is the most important condition to be met for the effectiveness of the meeting.

Same set-up with shipyard

Once meeting participants from the shipyard are confirmed, the hierarchy among the participants should be determined. Based on the hierarchical relationships identified, the operator can construct the same hierarchical set-up among its own personnel.

Know who is your peer at the meeting

While making hierarchical arrangement, each of operator personnel is assigned to a certain level which corresponds with that of a shipyard person. The focus of communication during the meeting should be on how effectively each of operator personnel communicates the agenda to her/his peer from the shipyard.

Plan how to deliver message

Before the meeting, it should be agreed on among operator personnel who will be a main contact point for each issue to be discussed at the meeting. Participants who take the role of main contact point need to be able to demonstrate their authority over the issue and ready to respond query from the shipyard.

6.2.3.2. Conduct meeting

Mind levels among counterparts

Due to the high power distance between levels in the shipyard, managers in the high level among the meeting participants speak up while low levels, by and large, remain to support the comments from their boss. If this is not the case and there are conflicts among shipyard participants, let them settle the issue so that they can come out with one unified voice. Caution should be exercised when making comments on such issues being disputed among the shipyard personnel, in particular when such comments can be construed to be against opinion from high level personnel.

Deliver the same message clearly

The message should be delivered clearly through communication lines between peers of the both parties. All operator personnel should convey the same message to their counterpart. For each issue to be discussed, the person who is designated as a main contact point can take a leading role in discussion on behalf of the operator. Other colleagues remain supportive of the contact person's opinion. In doing so, the operator clearly shows the participants from shipyard that they have to contact the contact person in relation to the specific issue. It helps simplify communication channels between the operator and shipyard and avoid confusion arising from different organizational set-up of the two companies.

Minute a meeting outcome

Throughout the meeting, either one of the parties should take notes of the discussions. At the end of the meeting, both parties agree on the outcome of the discussion they had. More specifically the outcomes include what actions are to be taken by which party by when. Based on the agreed outcomes, the meeting minutes are produced shortly after the meeting and shared between the two parties.

6.2.3.3. Follow-up meeting

The outcome of the meeting should be closely followed up by the main contact person in the operator's organization before the next meeting is held. The primary role of the contact person is to support her/his counterpart in shipyard organization to carry out the actions agreed by the two parties at the meeting. If

there are any action items which are not closed, the cases should be included in the agenda of the next meeting.

6.3. What to Support

6.3.1. Communication within EPC contractor

The rigid boundaries between functional units hinder across-function communication. The operator can play a role in facilitating the cooperation among those units.

Sales and other functions

At the very early stage of project execution (or even before project award), the operator needs to ensure that all the discussions it has had with sales department of the shipyard are shared with other functional units of the organization which actually work on the project. It is often the case that the sales function does not communicate some of the key elements negotiated and agreed upon with other functions, such as construction and engineering. Thus, it is recommendable for the operator to verify if the communication among the shipyard functions is effective enough to establish same understanding among all the functions regarding what has been agreed with the operator. The operator may request the involvement of construction and engineering department personnel in the negotiation process. One of the interviewees noted that, on some occasions, some of sales department personnel, who get directly involved in the negotiation and conclude the contract with operator, are engaged in the project execution phase at the shipyard construction site. This helps facilitate communication between the operator and the shipyard and reduce the risk of dispute resulting from miscommunication among the shipyard functions.

Construction and Engineering

Cooperation between the construction and the engineering department is crucial for smooth progress of the project. In particular, the communication in low level personnel in different department is important. They are the ones who actually work on the project, recognize problems, and initiate the discussion. The operator may encourage the low level personnel in different functions to get together and facilitate interaction among them. This can help early recognition of the problems and efficient discussion among the low level personnel across functions, thereby contributing to a better solution. Still, low level personnel do not have enough authority to make decisions or take initiative within the shipyard organization. The operator can support low level engineers by communicating with managers who can

assign more resources and back up those engineers. If solving a problem requires involvement of even higher level managers and the issue is important, the operator can help the low level personnel raise the issue upward along the hierarchical structure. The operator needs to communicate the same message to the managers positioned between the low level engineer and the high level manager who can make decision on the issue. In doing so, the operator ensures that everyone in the decision making process chain has the same understanding of the problem and, thus, facilitates the discussions among the shipyard organization.

6.3.2. Communication between EPC contractor and sub-contractors

The operator should remain objective and neutral in relation to conflicts between the EPC contractor and its sub-contractors so that it can play a role of mediator.

Engineering sub-contractor

It is often the case that operator has already establish communication channel with the international engineering sub-contractors, leading the sub-contractor to contact the operator directly when it has a conflict with the EPC contractor. This does not help to solve the problem. It will only make the shipyard feel marginalized and take a more skeptical view of the relationship between the operator and engineering sub-contractor. It is, thus, important to make the communication line transparent by involving the EPC contractor in the discussion between the operator and the sub-contractor.

Oversea vendor

The operator can support procurement activities of the shipyard by baking its engineering capability. Having engineers support the shipyard's procurement personnel helps produce technical input for the POs to be issued to overseas vendors. Such aid from operator also assists the shipyard function in addressing technical queries from overseas vendors efficiently.

6.3.3. Engineering management of EPC Contractor

The lack of multi-disciplinary engineering functions and challenges from functional requirements are other critical issues that demand the operator's support.

Strengthen engineering capacity within operator's project organization

To deal with such issues, the operator is expected to have extensive discussion and cooperation work with the shipyard, which in turn requires more input of resources. Interviews revealed that, as it stands now, the engineering function of the project organization of the operator is not sufficient enough to help the

shipyard fill the engineering capacity gap. Engineers in the operator's organization are already occupied by daily work and do not have enough resources to support shipyard in this respect. Within the operator's project organization, it seems natural that most of the important decisions made for the project concerns engineering issues given the significance of technical challenges arising during project execution. Many of such decisions involve discussions between the project director, project manager, and engineering manager. In particular, the engineering manager provides valuable information that serves as a basis for the decision making process. However interviewees pointed out that the engineering manager is often so busy with many tasks that he cannot focus on core issues including engineering support to shipyard. More assistants can relieve the engineering manager of the heavy burden of administration work so that he can concentrate on critical engineering items.

Having more senior engineers in the project organization is also helpful. They can get involved in communication with the engineering department of the shipyard directly to reinforce the multi-disciplinary engineering capability of the department. It appears that most of the South Korean shipyard uses Norwegian 3D modeling software. For the operator it is also a good option to bolster engineering capability of shipyard by using the customer education program run by the Norwegian 3D modeling software provider in South Korea. In cooperation with the Norwegian software company, the operator can provide the shipyard with a program designed to educate them how to actively use 3D modeling programs and apply it in practice for the project.

7. Discussion and Conclusion

7.1. Overview of Results

7.1.1. Four key contributory factors

In an attempt to answer the first research question, this thesis identifies four major factors contributing challenges during execution phase of Norwegian EPC project in South Korea.

Cultural difference

Confucianism is a dominant social and ethical philosophy in East Asian countries, including South Korea. One of its distinct characteristics is social relationship, which contrasts significantly with individualism in Western culture. The philosophy has had a great impact on communication patterns and personal relationships, which in turn affected how organizations are structured and behaves. Five features of communication within organizations in Confucian society are presented: hierarchical organization, explicit rule of communication, reciprocally obligatory relationship, frequent contact among employees, and loyalty to organization. Generally negative view on law and contract is also very different from Western.

Shipbuilding industry practice

The functional structure of shipyard has a deep structure where the focus is on control over functional units. In this organizational set up, boundaries between functions are clear and rigid, and authority is concentrated on higher position. Another characteristic of South Korean shipbuilding companies is the lean production concept. With the adoption of the concept, the shipbuilders have improved productivity considerably, and the construction departments play an important role and have gained influence over organizations. Such achievement comes at the expense of flexibility and has led to a rather rigid arrangement in the supply chain. Heavy reliance on local service sub-contractors has been intensified for recent years. It helps the shipyard maintain its cost competitiveness but, at the same time, raises concerns over labor control and quality.

Engineering and quality management

Multi-disciplinary engineering function helps have holistic views over the system and is essential in handling technical issues with high complexity. The shipyard does not have a multi-disciplinary

engineering tradition. It does not have positions for multi-disciplinary engineers and does not actively use 3D modeling although it has the modeling software. Interpretation of NORSOK standard is a difficult task for the shipbuilders, who are used to prescriptive regulations. The functional regulation demands users have experience and knowledge to take advantage of the approach fully. For those who do not possess such virtues, the complexity of the standard will present serous interpretation and implement challenges.

EPC contract

As an EPC contractor, South Korean shipyards provide a single point of responsibility. Lack of full functional capability required for EPC project and application of different communication and coordination approaches make it difficult for the shipbuilder to fulfill its obligations as EPC contractor. For those who do not have experience with Norwegian standard contracts, the stringent formality feature of NTK 07 format appears to be difficult to adapt to and to actively utilize. Combined with negative attitudes towards contract in Confucianism, this can have adverse impact on contract management between Norwegian operators and South Korean shipyards.

7.1.2. Communication and coordination challenges

For the second research question, this thesis describes how the key factors interplay and create communication and coordination challenges among major project stakeholders.

General communication

Significant language barriers exist between Norwegian and South Korean stakeholders. The high-context culture of South Korea is difficult to interpret correctly for Norwegians, who have a low-context culture. Differences in business practices also hinder smooth communication.

Within EPC contractor

Confucian influences over organization and South Korean shipbuilding industry practices, identified as key contributory factors, govern how the South Korean shipyard communicates and behaves. Communications in bottom-up and horizontal directions are not effective within the shipyard organization. The project management team of the shipbuilder does not have actual authority to manage the project, and the team operates as formal communication channel. These makes the offshore EPC project challenging for the shipyard.

Confucian framework

South Koreans apply the Confucian framework for interpretation of contractual relationships. Under the framework, the shipyard as EPC contractor situated lower than Norwegian operator and higher than its sub-contractors. Because the EPC contractor cannot fulfill its obligation against operator and its sub-contractor according to Confucian reciprocally obligatory relationship, cultural gray zones are created.

Communication with Norwegian operator

According to the Confucian rule, EPC contractors pay respect to the operators, and this sometimes hinders effective communication. Different organization structures lead both the operator and the EPC contractor to have formal communication in effective way. As formal communication channel does not work well, but communication in informal manner takes place extensively.

Communication with sub-contractors

Interview revealed that the EPC contractor is demanding to its sub-contractors in general in Confucian framework, which is generally strongly opposed by overseas sub-contractors. It is also noted by interviewees that international engineering contractors have communication issues with EPC contractor. The friction created between high-context cultures seem to contribute to the issue. The engineering firm often already has direct communication line with the Norwegian operator, and this can lead to worsened communication problems with the EPC contractor. Because of the challenges the EPC contractor has in relation to interpretation of NORSOK, its procurement department fails to provide full engineering input for the PO. The Norwegian vendors find it time-consuming to obtain all the technical information they need for their products.

7.1.3. Recommendation

Based on the findings, this thesis makes recommendations for Norwegian operators on how to approach and address the challenges arising during project execution phase of Norwegian EPC project in South Korea.

Alignment of expectation

To address challenges, it is critical for the both parties to agree on how different they are and on how they are going to resolve issues. Without such common understanding, it is difficult to expect efforts by either of the two be successful.

More involvement of operator

Given the Confucian framework, the operator needs to take initiatives to implement any solutions. As it stands at the top of the hierarchy, the operator can have substantial influence over the shipyard much easier than those who are situated lower.

What to maintain

The operator needs to communicate to the shipyard clearly what it should maintain throughout the project execution so that the contractor can understand the significance of it.

How to communicate

To support the shipyard in effective way, the operator needs to communicate effectively. Understanding the differences in communication patterns and its own position under the Confucian framework is the operator's first step to having good interactions. Formal meetings between the operator and the shipyard are not efficient in general. A series of preparatory work can help enhance the effectiveness of the meeting: ensuring attendance of key personnel, having same set-up with shipyard, and planning how to deliver messages. While conducting meeting, it is important to mind levels among the participants from shipyard and deliver the same message to each of the participants in every level.

What to support

The operator can help effective communication between different functional units within the shipyard by requiring the different functional units have a common understanding of the project and facilitating discussions between low level engineers. The operator should also try to make the communication it has with other sub-contractors transparent and serve as mediator between the EPC and its sub-contractors for any conflict. It is also important to reinforce the engineering capacity within its project organization. In the current set-up, engineering resources are not enough to support the shipyards in handling challenges resulting from lack of multi-disciplinary function and insufficient experience with the NORSOK standards.

7.2. Suggestions for Future Study

This thesis targets Norwegian oil and gas industry players. Thus, it assumes that readers are familiar with Norwegian culture, business practice, and Norwegian oil and gas industry and focuses on introducing South Korean culture and shipbuilding industry practice. Future research can put its focus on Norwegian

culture and oil and gas industry so that more precise comparisons between the two countries and industries can be made.

Customers of South Korean shipyard include almost all of the big oil and gas companies in the world including major NOCs (National Oil Company) and IOC (International Oil Companies). Many of them also awarded EPC projects to the shipbuilders. One statements that came from South Korean shipbuilders is that Norway has some of the toughest clients who can be hard to deal with as compared with other clients. Comparisons between EPC projects from Norway and other countries can reveal what makes Norwegian operators distinct from others.

South Korean shipyards also recognized that there are serious challenges for Norwegian EPC project. In an attempt to address the challenges, they are making various efforts including increasing engineering capacity by acquiring engineering companies and enhancing understanding of NORSOK standards by initiation of dedicated task force team activities. Additional research on such efforts can touch on how effective and successful such efforts are in terms of closing the gap between the Norwegian operator and South Korean shipyard.

7.3. Challenges

Data collection through interviews is very time consuming in this research. Interviews were conducted at five different cities in Norway and South Korea. With a view to including various perspectives of different project stake holders, the researcher has contacted around 25 companies to obtain consent for interviews from 13 of them. Afterward considerable amount of correspondence to arrange meetings for interviews follows. As most of the interviews were conducted outside the town, the researcher made frequent trips to other regions. Thus, considerable time and effort was spent on administrational activities. To comply with the time constraint put on this study, the researcher chose to facilitate the study activity by simplifying data analysis process and spending less time for idea development.

Some of the companies, which were asked to have interviews, rejected interviews on the ground that they do not have any issues with Norwegian EPC projects at South Korean shipyards. However, in the researcher's view, they seem very concerned about any unexpected consequences which may result from this study even offered anonymity. For some of the companies which were sub-contractors, their experiences concerning Confucian hierarchical framework, where sub-contractors are subject to the EPC contractor's demanding attitude, may affect their responses. For others which were operators, they seemed to reject interviews as they were known to have serious issues with their on-going projects at South Korean shipyard.

8. Conclusion

This thesis concludes that there are four key contributory factors to challenges arising from EPC project awarded by Norwegian operators to South Korean shipyards. Each of the factors is closely connected with each other and gives a rise to the projects challenges together. In particular, this thesis reveals that the differences in national culture and industry practice have a significant influence over communication and coordination pattern in the project. Such differences, in combination with other two factors, relate to almost every element constituting the challenges.

Identification of the key factors and how they play out has practical implications for management of EPC project involving Norwegian operators, South Korean shipyards, and international sub-contractors. Based on the analysis of its findings, this thesis provides practical advice for Norwegian players on how to approach and tackle the challenges occurring during execution of their projects. In particular, it argues that it is of critical importance to have common understanding of how different Norwegian operators and South Korean shipyards are.

In all, this thesis concludes that the four key contributory factors provides an insight for Norwegian companies to address the challenges arising from project execution phase of Norwegian EPC project in South Korean shipyard.

Reference

Bae, Y.I., Lee, C.H. and Park, C.S., 2009. *Analysis on Competitiveness of South Korean Shipbuilding Industry*. [pdf] Seoul: Samsung Economic Research Institute. Available at: <http://www.seri.org/db /dbReptV.html?g_menu=02&s_menu=0202&pubkey=db20090204001> [Accessed 12 January 2015].

Baram, G.E., 2005. Project execution risks in EPC/Turnkeys contracts and the project manager's roles and responsibilities. *AACE International Transactions*, p.1-8

Barna, L.M., 1988. Stumbling blocks in intercultural communication. In: L.A. Samovar and R.E. Porter, ed. 1988. *Intercultural Communication: A Reader*, 5, p.322-330. Belmont, CA: Wadsworth Publishing.

Bloomberg, 2015. *Baltic Dry Index*. [online] Available at: <http://www.bloomberg.com/quote/BDIY:IND > [Accessed 5 June 2015].

Bryman, A., 2012. *Social research methods*. 2nd ed. Oxford: Oxford university press.

Creswell, J.W., 2007. *Qualitative inquiry & research design : choosing among five approaches*. 4th ed. Thousand Oaks, Calif: Sage

Chen, G.M. and Chung, J., 1994. The impact of Confucianism on Organizational Communication. *Communication Quarterly*, 42(2), p.93-105.

Ecorys SCS Group (Ecorys), 2009. *Study on Competitiveness of the European Shipbuilding Industry: Within the Framework Contract of Sectoral Competitiveness Studies – ENTR/06/054*. [pdf] Rotterdam: Directorate-General Enterprise & Industry. Available at: <http://ec.europa.eu/enterprise/sectors/maritime /files/fn97616_ecorys_final_report_on_shipbuilding_competitiveness_en.pdf> [Accessed 03 March 2015].

Engen, O.A., Hagen, J., and Kringen, J., 2013. *Tilsynsstrategi og HMS-regelverk i norsk petroleumsvirksomhet*. [The Norwegian Safety Regime for the Petroleum Industry]. [pdf] Stavanger/Bergen/Oslo: Arbeidsdepartementet. Available at: <https://www.regjeringen.no/globalassets /upload/ad/publikasjoner/rapporter/2013/utvalgsrapport_hms_regelverk.pdf>

Gloria, J.T., Siegfriedt, W.E. and Carstens, A., 2011. Project contracting strategies: Evaluating costs, risks and staffing requirements. *Power Engineering*, 115(3), p. 50-57.

Gardiner, P.D., 2005. Project management: A strategic planning approach. Hampshire: Palgrave Macmillan.

Griffin, R.W. and Pustay, M.W., 2003. *International Business: a managerial perspective*. 3rd ed. Upper Saddle River: Prentice Hall.

Gudmestad, O.T., Zolotuchin, A.B. and Jarlsby, E.T., 2010. Petroleum resources: with emphasis on offshore fields. Southampton: WIT Press.

Hall, E.T. and Hall, M.R., 1987. *Hidden Differences: Doing Business with the Japanese*. New York: Anchor Books.

Hassan, K. and Kajiwara, H., 2013. Application of Pull Concept-based Lean Production System in the Ship Building Industry. *Journal of Ship Production and Design*, 29(3), p. 105-116.

Haugstad, T., 2015. Teknisk Ukeblad Mener. *Teknisk Ukeblad*, 16 Apr. p.5b.

Hofstede, G. and Hofstede, G.J., 2005. *Cultures and Organizations: Software of the Mind*. 2nd ed. New York: McGraw-Hill.

INTSOK, 2014. *Global Procurement Processes – Phase I*. Oslo: INTSOK.

Johannsen, H.K., 2013. *Design-Build Project Delivery in Practice - Some Practical Issues.* In: Department of Public Works and Services Government of the NWT (Yellowknife, NT), Project Management Conference. Yellowknife, NT, Canada, 3-5 December 2013.

Kaasen, K., 2003. Some major features of Norwegian offshore standard contracts. *Scandinavian Institute of Maritime Law Yearbook (SIMPLY)*, 309, p.271-289

Kaasen, K., 2009. Formalism in complex onshore and offshore construction contracts. *Scandinavian Institute of Maritime Law Yearbook (SIMPLY)*, 394, p.103-137

Korea Offshore & Shipbuilding Association (Koshipa), 2011. Analysis of offshore industry competitiveness and long-short term development strategy. Seoul: The South Korean Ministry of Knowledge Economy (MKE).

Korea Offshore & Shipbuilding Association (Koshipa), 2014. *Shipbuilding Yearbook 2014*. [pdf] Seoul: Korea Offshore & Shipbuilding Association . Available at: <http://www.koshipa.or.kr/data/down.jsp?MN=20141.pdf&RN=20141.pdf> [Accessed 15 February 2015].

Kringen, J., 2014. Liability, blame, and causation in Norwegian risk regulation. *Journal of Risk Research*, 17(6), p.765-779.

Leonhard, C., 2009. Beyond the Four Corners of a Written Contract: A Global Challenge to U.S. Contract Law. *Pace International Law Review*, [online] Available at:< http://digitalcommons.pace.edu/pilr/vol21/iss1/1/> [Accessed 03 March 2015].

Liker, J.K. and Lamb, T., 2000. Lean Manufacturing Principles Guide, Version 0.5. A Guide to Lean Shipbuilding. National Steel & Shipbuilding Co. Available at: <http://dtic.mil/dtic/tr/fulltext/u2/a450192.pdf> [Accessed 02 February 2015].

Løvås, J., 2015. Frykter nye smeller i Sør-Korea. Dagens Næringsliv, [online] 14 April. Available at: <http://www.dn.no/nyheter/naringsliv/2015/04/14/1954/Olje/frykter-nye-smeller-i-srkorea> [Accessed 17 April 2015].

Maloney, K., Gray, J. and MacGillivray, S., 2013. *Interface Management for EPCM Contractors:*

Gaining a Competitive Advantage. [online] Kitchener, Ontario, Canada: Coreworx Inc. Available at: <http://www.coreworx.com/wp-content/uploads/2013/07/Coreworx-Interface-Management-for-EPCM-Contractors-Comp-Advantage-wp.pdf> [Accessed 18 March 2015].

Maslin, E., 2015. Statoil's Cat D rig deliveries near. Offshore Engineer, [online] 29 May. Available at: <http://www.oedigital.com/component/k2/item/9232-statoil-s-cat-d-rig-deliveries-near> [Accessed 29 May 2015].

McConnaughay, P.J., 2000. Rethinking the Role of Law and Contracts in East-West Commercial Relationships. *Virginia Journal of International Law*, 41, p. 427. Available at <http://ssrn.com/abstract=252659>

Moura, D.A and Botter, R.C, 2011. Can a shipyard work towards lean shipbuilding or agile manufacturing? In: E. Rizzuto and C.G. Soares, ed. 2012. *Sustainable Maritime Transportation and Exploitation of Sea Resources.* London: Taylor & Francis Group. Ch.66

Norwegian Petroleum Directorate (NPD), 2013. *Evaluation of projects implemented on the Norwegian shelf.* [pdf] Stavanger: Norwegian Petroleum Directorate. Available at: <http://www.npd.no/Global/Engelsk/3-Publications/Reports/Evaluation-of-projects.pdf> [Accessed 01 May 2015].

Odland, J., 2013. Project management and project execution, *OFF515 Offshore Field Development.* University of Stavanger, unpublished.

Organization for Economic Co-operation and Development (OECD), 2014. Peer Review of the Korean Shipbuilding Industry and Related Government Policies. [pdf] Paris: OECD. Available at: <http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=c/wp6(2014)10/final&doclanguage=en> [Accessed 17 March 2015].

Pattison, P. and Herron, D., 2003. The Mountains Are High and the Emperor Is Far Away: Sanctity of Contract in China. *American Business Law Journal*, 40(Spring Issue), p. 459-510.

Project Management Institute (PMI), 2015. *What is Project Management?* [online] Available at: <http://www.pmi.org/en/About-Us/About-Us-What-is-Project-Management.aspx> [Accessed 10 June 2015].

Radio and Electronic Engineer (REE), 1981. Multi-disciplinary engineering in the process industries. *Radio and Electronic Engineer*, 51(6), p.255-256

Schramm, C., Meißner, A. and Weidinger, G., 2010. Contracting Strategies in the Oil and Gas Industry. *3R*, Special Edition, p. 33-36.

Skotnes, R.Ø. and Engen, O.A., 2015. Attitudes toward risk regulation - Prescriptive or functional regulation? *Safety Science*, 77, p.10-18.

Statoil, 2014. *New commercial framework requires improved Performance*. In: NPF (Norwegian Petroleumsforening), Mature Fields: Business Opportunities and Challenges. Sola, Norway, 1-2 April 2014.

Sung, K.J and Lee, H.S., 2015. Shipbuilding: Long Korea, short China. [online] Seoul: KDB Daewoo Securities. Available at: <http://www.kdbdw.com/bbs/board/message/view.do?messageId=208063&messageNumber=183&messageCategoryId=0&startId=zzzzz%7E&startPage=1&curPage=1&searchType=2&searchText=&searchStartYear=2014&searchStartMonth=06&searchStartDay=02&searchEndYear=2015&searchEndMonth=06&searchEndDay=02&lastPageFlag=&categoryId=75>

The Conference Board, Inc. (TCB), 2014. *International Comparisons of Hourly Compensation Costs in Manufacturing, 2013*. [pdf] New York, New York: The Conference Board, Inc. Available at: <http://www.conference-board.org/ilcprogram/index.cfm?id=28269> [Accessed 8 May 2015].

Torres, N., 2014. Development cost overruns hit Norway offshore projects. Petro Global News, [online] 9 October. Available at: <http://petroglobalnews.com/2014/10/development-cost-overruns-hit-norway-offshore-projects/> [Accessed 17 February 2015].

Turner, R. R., 2009. *The Handbook of Project-Based Management*. 3rd ed. Berkshire: The McGraw-Hill Companies, Inc.

Ulven H., 2006. *Internasjonal skikk og bruk*. Oslo: Index Publishing.

Wiarda, H.J., 2013. *Culture and Foreign Policy: The Neglected Factor in International Relations*. Farnham: Ashgate.

Yum, J.O., 1988. The impact of Confucianism on interpersonal relationships and communication patterns in East Asia. *Communication Monographs*, 55(4), p.374-388.

Yusuf, Y.Y. and Adeleye, E.O., 2002.A comparative study of lean and agile manufacturing with a related survey of current practices in the UK. *International Journal of Production Research*, 40(17), p. 4545-4562.

Appendix A

Interview protocol

1. Introduction

a. Welcoming

• Nice to meet you and thank you so much for participating in my study.

b. Propose of interview

• The purpose of this interview is to ask you to reflect on your work experiences with South Korean EPC contractor. I want to hear your opinions about challenges arising during project execution phase of Norwegian EPC project.

c. Who I am

• I am in a master course of offshore technology at University of Stavanger. I want to develop this study as my master thesis.

d. Letter of consent

• The interview will be treated completely as confidential.
• You may choose to not answer any of the questions.
• May I have your permission to record this interview?

e. Structure of interview

• Questions are about your experience and belief with respect to challenges arising in the course of EPC project at South Korean shipyards
• There is no right / wrong answer
• Your subjective opinion on the study subject counts
• Questions may not be directly related to the area of your specialty.

2. Basic Interviewee information

- How long have you stayed in South Korea? Have you visited South Korea before this project?
- What is your age range?
- Have you worked at other shipyards in East Asia?
- Please briefly describe your role in the project.

3. Culture

a. Cultural difference

1) What is your opinion on cultural difference between Norway and South Korea? How different are they?

b. Contractor's organization

1) In your mind, how high is the power distance between levels within Contractor's organization?
2) How challenges arise within Contractor's organization at different levels?
3) In your opinion, how rigid is the boundaries between disciplines or functions within Contractor's organization?
4) Do you think Contractor's PMT is given enough authority by the Contractor? Is there any gap between what you expected from the Contractor's PMT and how it actually is?

c. Relationship with Contractor

1) How do you establish relationship with Contractor's personnel?
2) How do you identify your counterpart within the Contractor?
3) Do the factors which Korean uses to establish relative relationship (age, gender, title, etc.) also influence your relationship with Koreans? What is the most influential?
4) How do you think the still male-dominating social environment in South Korea affects establishment and management of relationship with Contractor?

d. Communication with Contractor

1) In your opinion, what are the important communication lines in Contractor's organization during execution phase? Are they formal or informal? Are they effective?

2) Do you find the formal meeting with Contractor effective? What do you do to make the meeting more productive?

3) How do you deal with Contractor's personnel who do not respond? In your opinion, what makes them not to respond in proper manner?

4) When is it appropriate to use formal and informal communication respectively?

5) To what extent do you agree that personal relationship can affect official business transaction?

6) What do you think about whether intermediary can help address the communication challenges with Contractor?

e. Trust with Contractor

1) What is the perceived level of trust with Contractor?

2) What are some of the techniques Norwegian operator employ to build trust in daily operation as well as after work hour?

3) What are major challenges for you to build trust?

4. Contractor capability

a. Key competences of EPC Contractor

1) What are the key competences that Contractor lacks or weak on? How to mitigate the associated risk?

b. Functional capability

1) What are your thoughts of engineering capability of Contractor?

2) What are your thoughts of procurement capability of Contractor?

3) What are your thoughts of construction capability of Contractor?

c. Change management

1) What are your thoughts of change management capability of Contractor?

2) In your opinion, Contractor has a correct understanding of VO regime (NTK 07)?

d. NORSOK and Norwegian regulatory requirements

1) What are your thoughts of requirement management capability of Contractor?
2) What is your thought of Contractor's capability of interpretation of NORSOK?
3) What do you do to address the challenges?

5. Communication and coordination challenges for each interface with sub-contractor

a. Contractor – Engineering sub-contractor

1) What communication and coordination issues do you observe between Contractor and Engineering sub-contractor?
2) In your opinion, what are the major causes of those issues based on the discussions we had?
3) What are your views on the role of operator to resolve the issues?

b. Contractor – Norwegian vendor

1) What communication and coordination issues do you observe between Contractor and Norwegian vendor?
2) In your opinion, what are the major causes of those issues based on the discussions we had?
3) What are your views on the role of operator to resolve the issues?

c. Contractor – Local sub-contractor

1) What communication and coordination issues do you observe between Contractor and Local sub-contractor?
2) In your opinion, what are the major causes of those issues based on the discussions we had?
3) What are your thoughts of the quality of local sub-contractor's performance?