Høgskolen i Østfold

MASTEROPPGAVE

Project Management of Suppliers' Fixed-Price
Deliveries to EPC Contractors in the Oil and Gas
Industry
-A Qualitative Case Study of Strategies used by
Project Managers in Delivery Projects

Guttorm Torsetnes

15.05.2021

Masterstudium i organisasjon og ledelse
Avdeling for økonomi, språk og samfunnsfag

Table of Contents

Preface

This thesis is submitted in partial fulfilment of the requirements for the Master of Science degree at Østfold University College (HIOF, Høgskolen i Østfold). The research has been conducted at the Department of Economics, Languages and Social Sciences (Avdeling for økonomi, språk og samfunnsfag) at HIOF. Egil Jostein Skorstad, Professor Emeritus at HIOF, has been my main supervisor.

I have not received any financial support or funding for this research.

Acknowlededgments

First of all I would like to thank my family for having the patience, and giving me the time and opportunity to finish the work with this thesis. My wife, Sigrun Lurås, thank you so much for the support and good advice.

I am most grateful to all the individuals I have interviewed for this case study. Thank you all for sharing your time, perspectives and experiences. Without you this thesis would have been non-existing.

Further I would like to thank my main supervisor Egil J. Skorstad. Thank you for fruitful discussions, feedback and good advice.

Then I would like to thank Professor Ivar Jonsson who was my first supervisor at HIOF. Thank you likewise for your time and support in the initial phase of this thesis. And thanks to Bjørn Engebretsen, Associate Professor at Oslo University College, for interesting discussions in 2016.

Finally, thanks to Østfold University College (HIOF) and the "Organisation and Management" program. Thanks to all the lecturers in the period from 2012 to 2016 and former classmates. And thanks to the administration at HIOF for their support and patience.

Thank you everyone!

Guttorm Torsetnes

Kristiansand, May 2021

Summary

This case study is a small journey into the world of project management in the oil and gas industry. More specifically, it investigates project management of suppliers' fixed-price deliveries to EPC contractors, which is referred to as fixed-price delivery projects. This has been investigated by performing a qualitative case study of strategies used by project managers of a multinational supplier company, and eight individual interviews have been conducted. The findings are extensively presented and discussed in view of other relevant literature and research.

There has been little research on management of this type of projects. This thesis contributes with more insights and knowledge on this topic. To address the vast and far-reaching scope of project management of delivery projects in the oil and gas industry, this thesis draws on a combination of multiple theoretical perspectives. To understand why project managers do what they do, it draws on management and organizational theory, sociology, psychology, game theory, project management and business administration. A description of the organizational context is also included.

The first research question (RQ1) asks which challenges project managers of suppliers face in the execution of delivery projects in the oil and gas industry. In response to this, this thesis presents findings from the case study. The case study was focused on challenges outside the supplier's own organization, and the findings show that there is a broad range of challenges; from human relations to organization of the projects.

The second research question (RQ2) asks which strategies are used by project managers of suppliers in the execution of delivery projects in the oil and gas industry. In response to this, this thesis presents findings from the case study. The findings show that there are multiple strategies depending on each specific project.

The third research question (RQ3) asks which factors are influencing the strategies used by the project managers. In response to this, this thesis presents findings from the case study. The findings show that there are a range of factors influencing the strategies. The factors depend on the customer and each specific project.

The fourth research question (RQ4) asks how RQ1, RQ2 and RQ3 can be understood in the context of management literature. In response to this, this thesis presents excerpts from literature on management and organizational theory, sociology, psychology, game theory, project management and business administration. The referenced literature is discussed and seen in the context of oil and gas delivery projects and the findings from the case study.

Motivation

As part of the work with the master thesis, all the master students and myself included, were throughout the 3rd and 4th year presenting their ideas and status of their work to get feedback and criticism from fellow students, teachers and supervisors. One of the comments I received after my presentation was about the following. That is at least how I remember it:

"-I cannot see the point of your assignment. Which different strategies could there possibly be to choose from? Is it at all possible to complete projects like this in more than one way?"

This comment has been a constant reminder for me during the work with this thesis. Since I planned to investigate *"strategies used by project managers of delivery projects in the oil and gas industry"*, which implies that there could be more than only one single strategy, the question raised was understandable. Another key point that this question is (I believe unintentionally) addressing is the following: To which extent is a strategy something you choose? Is a strategy like a plan you choose a priori, or is it something that is *emergent*? I will get back to this in chapter 2, chapter 6 and chapter 7. And a third point that this question is (unintentionally) addressing is: Who are the actors required to complete the projects? Can the supplier company complete the delivery project all alone? I will get back to this in chapter 3, chapter 4, chapter 6 and chapter 7. At the time I was a bit puzzled and thinking to myself: How could anyone honestly think that there is only one way of doing anything?

One of my intentions with this thesis has been to shed some light on these issues. Perhaps things will not be any clearer after reading this thesis, but hopefully it will

provide some more insight on the topic. I have also been working as a project manager and lead engineer for a number of delivery projects in the oil and gas industry, so there is no secret that my working hypothesis has been that there are multiple strategies and ways of conducting projects.

> **H1**: There are different ways of conducting projects in the oil and gas industry and there are multiple strategies being used depending on a range of different factors for the specific project in question.

This thesis presents my findings and analysis based on eight individual interviews, literature reviews, examples and discussions. It is coloured by my personal experiences and thoughts on the subject, however I intend to give voice to the interviewees who each have 10 years or more working experience from the oil and gas industry.

1   Introduction

On Thursday 2nd of June 2016, my employer in Norway announced the second round of downsizing in about 6 months. The downsizing was a consequence of the sharp fall of the oil price starting in the autumn of 2014 that led to reduced activity in a number of oil and gas related businesses worldwide. In Norway it was estimated that around 35.000 jobs related to the oil and gas sector were lost (Havnes, 2016).

Figure 1-1 A symbol of the downturn in the oil and gas industry in Norway: Supply vessels from Farstad Shipping laid up outside Ålesund in 2016.

So at the beginning of this case study, in 2016, the oil and gas industry was in a downturn. There was less activity and suppliers were faced with demands from the oil companies to lower their prices, and I was also personally in danger of losing my job.

Even before the downturn in 2014, there had been concerns in the industry about increasing costs, and some oil companies had already started cost reduction programs. For example, Statoils launched their cost saving STEP program (Statoil Technical Efficiency Program) already in 2013.
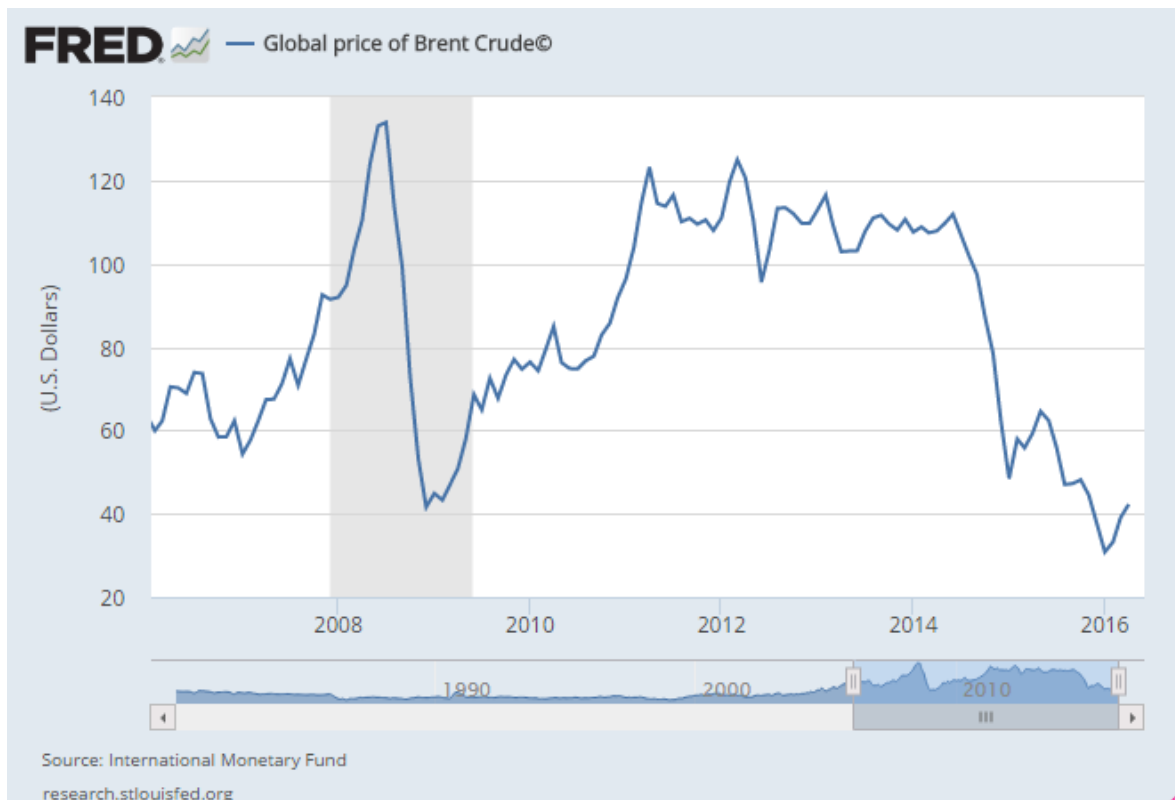
Figure 1-2 Global price of Brent Crude©, 2006-01-17 to 2016-05-31, U.S. Dollars, Monthly, Not Seasonally Adjusted, POILBREUSDM, Updated: 2016-05-05 11:56 AM CDT (FRED, 2016)

A number of oil and gas companies also changed their name in this period: Danish Oil and Gas (DONG) became Ørsted in October 2017. Statoil changed its name to Equinor in May 2018. And Eni Norge and Point Resources (who took over Exxon's Norway assets) merged to Vår Energi in December 2018 to name a few. Many of the oil and gas companies tend not to have "oil," "gas," or "petroleum" in their names any more. The challenges of climate change, the growth in renewable energy, and the pressure from governments to cut emissions from fossil fuels are driving many of these changes. Still, I will refer to them as oil and gas companies, or end customers.

The topic of this study is however not cost reduction, nor environmental concerns, but how suppliers conduct their delivery projects on behalf of the oil and gas companies via EPC contractors, and the challenges they face. It is not limited to the recent few years as the interviewees have also been managing various types of oil and gas projects since before the recent downturn.

1.1   What is a supplier's delivery project?

New oil and gas production facilities, such as offshore platforms, are typically procured by oil companies in fixed-price contracts. The construction is normally done by engineering, procurement and construction (EPC) contractors. The EPC contractors are typically shipyards.

For the construction, the EPC contractor normally has to buy equipment and services from a number of suppliers. All depending on what is to be constructed, this can for example be drilling equipment, electrical equipment, separators, gas compressors, computer and automation systems and so on. The contract between a supplier and the EPC contractor is typically also fixed-price. The delivery of equipment and services from a supplier to an EPC contractor I will refer to as a *delivery project*. These deliveries are typically fixed-price until commissioning.

It should be noted that a delivery project can also be a *brownfield* project, meaning that part or even the whole production facility already exists. An example of this would be that some part of an existing plant is going to be replaced or upgraded with something new. I will return to more details in later chapters, but first I will give an example of a *greenfield* project, meaning a project executed in a completely new area.

1.2   An example: The Johan Sverdrup field development

The biggest and most recent project on the Norwegian Continental Shelf (NCS) is the Johan Sverdrup project. Contractually the Johan Sverdrup project is a type of EPC contract with multiple EPC contractors. According to Equinor, it was the project size and market conditions that made Equinor separate the project into more contracts compared with earlier developments (Oljedirektoratet, 2020b, p. 33).
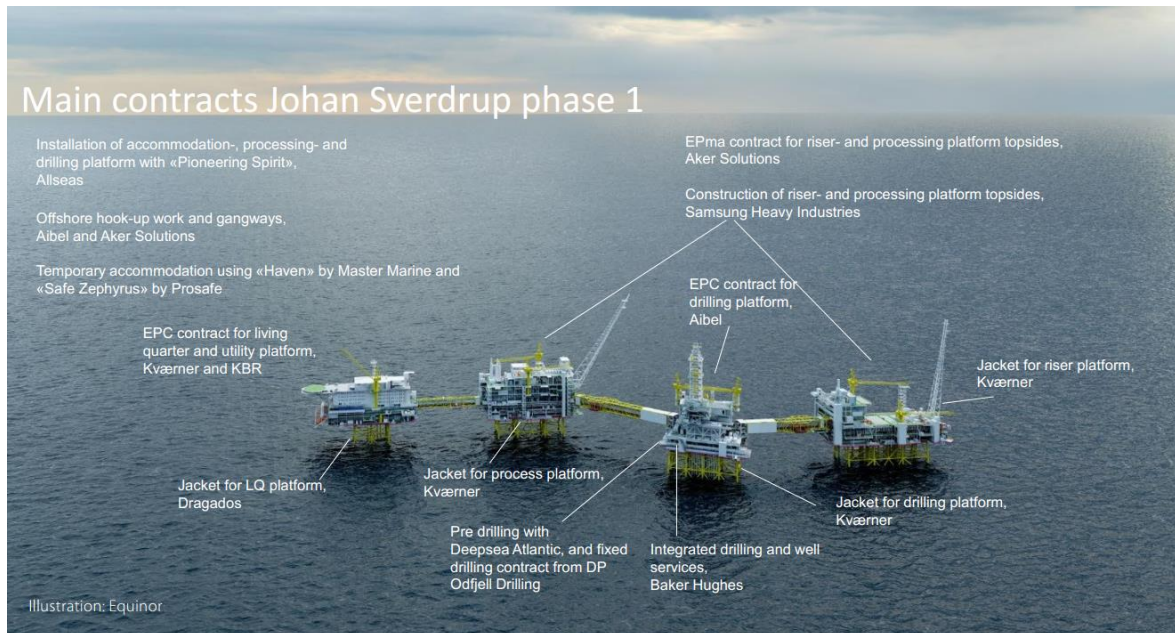
Figure 1-3 Main contracts for Johan Sverdrup phase 1 (Oljedirektoratet, 2020b, p. 33)

Johan Sverdrup is the biggest field development on the NCS since the 1980s. It has five offshore platforms, multiple subsea systems and power from shore. It has expected resources of between 2.1—3.1 billion barrels of oil equivalents, and is expected to be in production for about 50 years.
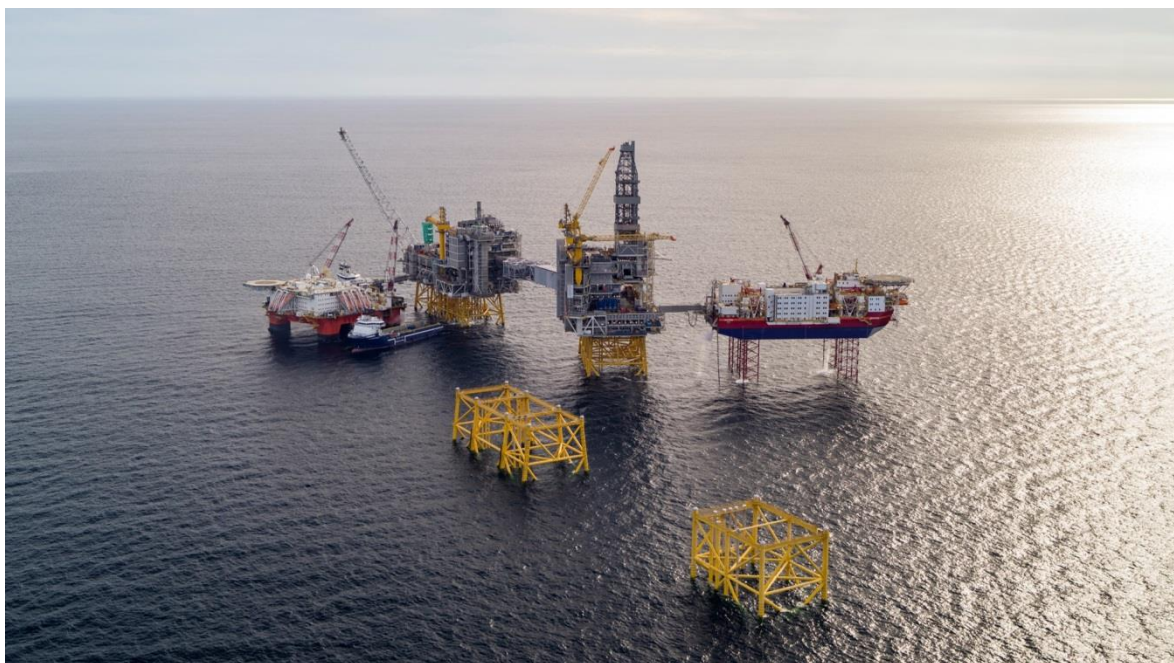
Figure 1-4 The Johan Sverdrup field.Photo from Johan Sverdrup on 09 October 2018. (Equinor)

Figure 1-5 The Johan Sverdrup drilling topside at the Aibel yard in Haugesund in May 2018 (Equinor)

The Johan Sverdrup field was officially opened 5th of January 2020 by the Norwegian prime minister. The field development was however not completed. The fifth platform, part of Johan Sverdrup phase 2, is planned to come into operation in 2022. Equinor is the operator and the owners are Equinor Energy AS(42.6267%), Lundin Norway AS(20.0%), Petoro AS(17.36%), Aker BP ASA(11.5733%), and Total E&P Norge AS(8.44%). (Oljedirektoratet, 2020a).

1.3   Aim and research questions

The aim of this study is to explore strategies used by project managers of a supplier of fixed-price deliveries to Engineering, Procurement and Construction (EPC) contractors in the oil and gas industry.

Such fixed-price deliveries typically consist of equipment and engineering services needed to build oil and gas installations worldwide. This includes offshore installations such as oil and gas platforms, various topside and subsea installations, and land-based petrochemical plants, or other types of land-based installations such as remote control facilities and power supply installations. These fixed-price deliveries are executed in what

I will refer to as a *delivery project*. Delivery projects normally have strict requirements with respect to delivery time, cost and quality.

I am personally employed in a multinational company that is a supplier to EPC contractors of these kinds of projects. Understanding the context and organisational environment in which these delivery projects are conducted, and the mechanisms that operate in this environment, I consider important for understanding strategies used by project managers of the suppliers. Fully understanding the organisational environment can however be very difficult even for an insider, since this can be huge international projects involving a number of companies worldwide. The overall development projects from exploration and early phase feasibility studies, basic design and planning, detailed engineering and manufacturing phase, to commissioning and start of production, typically go on for several years. The overall project organization may consist of many different companies and can be changed for each phase or stage of the project. The delivery projects, which belong to the engineering and manufacturing stage prior to commissioning, are also typically multi-disciplinary, multi-cultural and subject to comprehensive contracts that may require the suppliers' project team to have legal advisors.

My interest lies in the project management, in particular with the project manager or the project management team, and how they execute delivery projects for a supplier.

One opinion I share with Bjørn Engebretsen, and others, is that fixed-price delivery projects favours those that have done it before (Engebretsen, 2013). Furthermore I assume the strategy used by the supplier to be dependent on the experience of the project management team, so I expect experienced project managers will contribute more than less experienced ones to reflect on their strategic thinking, simply because they have more experience to draw upon. Based on this I have identified the following research questions:

> **RQ1**: Which challenges do project managers of suppliers face in the execution of delivery projects in the oil and gas industry?

> **RQ2**: Which strategies are used by project managers of suppliers in the execution of delivery projects in the oil and gas industry?

RQ3: Which factors are influencing the strategies used by the project managers?

RQ4: How can RQ1, RQ2 and RQ3 be understood in the context of "management literature"?

Since the strategies and methods used - not only the ones used by the suppliers, but also the ones used by the end customers, EPC contractors and other parties in the overall project - can depend on the political and economic context of the oil and gas business, knowledge about the context and institutional surroundings of delivery projects could be important for understanding the strategies used by the very people involved. One such factor can for example be whether the oil and gas business is in a period of economic upturn or downturn. One more research question I identified was therefore:

RQ5: Which changes have taken place in the oil and gas industry in the recent decades that have influenced delivery projects?

RQ5 I did however give lower priority not to derail from RQ1-RQ3 during the interviews. These research questions require in my opinion a good understanding of the context and organisational environment, and of how delivery projects are typically executed. A description of delivery projects to EPC contractors in the oil and gas industry is therefore provided in chapter 3.

1.4   Limitations of the study

One-sided perspective: This case study, and consequently the research questions identified in the previous sections, is limited to data collected from selected representatives from one supplier. Representatives of end customers (oil companies), EPC contractors or other parties in the projects have not been interviewed.

Furthermore, this case study has been conducted in Norway . Most of the persons I have interviewed are Norwegian, or they speak Norwegian, and I am also Norwegian myself. This case study can therefore to a large extent be viewed "as seen from Norway". My description of the context and the organisational environment is also largely based on the history of Norwegian oil and gas. I expect my findings to depend on culture so similar studies performed elsewhere may have given other results.

External focus: The focus of this case study is external as seen from project managers of a supplier. That means, the area of interest is not the supplier company and how they are organized internally. But rather how a supplier- as seen from project managers of delivery projects, relate to end customers, EPC contractors and other parties in the overall projects. How the projects relate to the parent organization's strategy is also not part of this case study.

1.5   What is meant by *strategy*?

The importance and consequences of different strategies have recently received a lot of public attention due to the Coronavirus disease (COVID-19) pandemic. As multiple vaccines have become available- or even long before, COVID-19 vaccines strategy has been publicly debated: How many COVID-19 vaccine doses will be available? When will they be available? How shall they be distributed? Who shall be prioritized? And who shall make the decisions? These are among many questions related to national and international COVID-19 vaccines strategy, and its consequences locally and globally. And there are a number of academic papers about it without going into details.

In the Norwegian media, a lot of the debates about the COVID-19 vaccines strategy have been about planning and being prepared. And unexpected things happen such as shipments of vaccine doses that do not arrive as planned, or an unexpected side effect is discovered (e.g. in the case of the AstraZeneca vaccine), and the vaccination is put on hold. And as the situation continuously changes, the plans have to be re-planned, and changes in the vaccine strategy are made. This has for example been announced by the Norwegian Institute of Public Health (NIPH) or Folkehelseinstituttet (FHI) as it is called in Norwegian (FHI, 2021).

The literature about different types of strategies is enormous, and there are many definitions and settings. Military strategy is for example dating thousands years back in time to works such as *The Art of War,* which is an ancient Chinese military treatise dating from about the 5th century BC.

But back to the context of this case study: What is meant by the term *strategy* in the context of project management in the oil and gas industry? And what was the

interviewees' understanding of this term? One the project managers explained it the following way:

> "- When you talk about strategy, when I talk about strategy, it means something that I am aware that I am doing. With some kind of premeditation. Not the first thing that comes to my mind. I may say something at this moment. With premeditation it means that I chose exactly those words, and that moment, and that meeting, with that person. It was not a coincidence. Right?" (Int#01-08, from individual interview, 2017-2019)

In chapter 6 I will present many more findings.

1.6   The structure of the thesis: A quick overview

Chapter 1 is the introduction as you surely have seen already.

Chapter 2 introduces the theoretical frameworks which are continued in the analysis in chapter 7.

Chapter 3: In this chapter I have tried to describe some characteristics of the background and organisational environment of delivery projects in the oil and gas industry.

Chapter 4: In this chapter I have summarized some of the challenges with delivery projects as described by the persons I have interviewed.

Chapter 5 describes my research method.

Chapter 6 presents further findings from the interviews.

Chapter 7 contains my interpretations, analysis and discussion.

Chapter 8 contains some concluding remarks.

Chapter 9 is the list of references.

Please also use the table of contents (and PDF bookmarks) to navigate to that of interest.

1.7 Why so many and lengthy quotes?

This is my personal preference so please bear with me if you are used to a more compact form with few quotes and no excerpts. I simply prefer being able to read a document without looking up the references to understand what they are about. References may also not be easily available to everyone. And for the interviews, I have presented so many quotes because I find them very insightful, and I have aimed to give a rich description and not only give my interpretation of what the interviewees said.

As Karl E. Weick wrote it in his book about *Sensemaking in Organizations*:

> "That is why I have sketched it in the form of guides that allow the reader considerable latitude in their application. This approach can be seen, oddly enough, in the many quotations used throughout the book. A book that is about interpretation would be a shame if it were grounded in paraphrase that rubbed the nuance off an author's remarks, discouraged reader exegesis, and squelched diverse readings." (Weick, 1995, p. xii)

The bold markups in the quotes and excerpts have been added by me.

2 Theoretical frameworks

2.1 Introduction

There are countless papers, articles, books and other works about each of a number of research areas and topics that could be both relevant and useful for this case study. This includes project management and engineering, business administration, organizational and management theory, sociology, psychology, economics and public policy to mention but a few. So where to start this case study from a theoretical point of view?

A theory is not the real world, but rather a simplified description. But to get some perspectives on the complexity of oil and gas projects, and to describe some concepts and theoretical ideas that have been used by researchers before, I will start with research summarized in a book titled "*Organization theory and project management : administering uncertainty in Norwegian offshore oil*" from 1985, by Arthur L. Stinchcombe and Carol A. Heimer (Stinchcombe, 1985).

> "The first essay of the book "gives a general introduction to the system by which large scale construction projects are managed in the Norwegian North Sea". It introduces "a number of important theoretical ideas for looking at the administration of projects, which help us understand what is distinctive of this sort of administration." (Stinchcombe, 1985, p. 11).

This research was done of the oil and gas industry in Norway in the 1970s and beginning of the 1980s, during the first decades of field developments in Norway with for example the Statfjord A and Statfjord B field development projects.

Figure 2-1 Statoil took over the responsibility from Mobile as operator for the Statfjord field in 1986, after a decision by the Norwegian Parliament in December 1984. The case was a big political controversy and could have brought down the Norwegian government. (Oljemuseum, 1999).

Many things were evidently different 40 years ago. However many things are also similar. The main organizations and government bodies have remained. Oil companies that were in the business about 40 years ago still exist today, typically after company mergers and other changes over the years. For example, Phillips Petroleum Company that discovered the Ekofisk oil field in 1969, exists today as ConocoPhillips after a merger with Conoco in 2002. In 1972 the Norwegian Parliament (Storting) decided that a state-owned Norwegian oil company should be established. Statoil was established the same year, and so were the Norwegian Petroleum Directorate (Oljedirektoratet) and the Petroleum Safety Authority Norway (Petroleumstilsynet). Statoil was partly privatized and made a public limited company in 2001, merged with the oil and gas division in Hydro in 2007, and is known today as Equinor.

Figure 2-2 In the 1970s there were oil rigs of this type «Aker H-3» anchored to what is today Aker Brygge in Oslo. Photo: Henrik Ørsted, Oslo Museum (Aftenposten, 2016)

Similar things can be said about EPC contractors. The Norwegian company Aker, that in 1967 delivered the "Ocean Viking," an offshore drilling rig that was used in 1969 to discover the Ekofisk field, still exists today as Aker Solutions. In South Korea, Hyundai Heavy Industries (HHI) was founded in 1972, Daewoo Shipbuilding (DSME) in 1973 and Samsung Heavy Industries (SHI) in 1974. These "big three" Korean shipbuilders have been among the world's largest shipbuilding companies, and have constructed a number of offshore installations operating on the Norwegian Continental Shelf. Despite a crisis in recent years due to oversupply of vessels, combined with low oil prices and a decrease in new orders, they still exist today or have done so until recently. And the EPC contracts have evolved along with bigger and more complex projects.

2.2   *Administering uncertainty in Norwegian offshore oil*

"*Organization theory and project management : administering uncertainty in Norwegian offshore oil*" (1985) was published in cooperation with the Institute of Industrial Economics in Bergen, Norway. In the preface, Ole Berrefjord and Per Heum has written:

"During the last couple of years, research on the different aspects of offshore petroleum activities has been organized in one unit at the Institute of Industrial Economics. Eight researchers are currently engaged on permanent basis to work

on different but substantively related projects in this field. The common theme in their research is the internal and external governance of the petroleum sector, with special attention to the interplay between economic and organizational aspects, between micro and macro, between local and national. **More concretely, these questions are analyzed by looking at the way government bodies, oil companies, suppliers, and companies in other industries make their strategic choices and organize their business, as well as by studying how the relationships between these parties are arranged**. (Stinchcombe, 1985, p. 11). ().

Obviously this reseach has to draw on different schools and disciplines within the social sciences. Thus in our empirical work, we make use of sociology, organizational theory, economics, business administration, and public policy analysis. We hope that this orientation to the social sciences will help us to formulate our applied research questions in such a way that we will be able to shed light on issues of general theoretical interest. In particular, our aspiration is to use Norwegian petroleum activities as a case where we can develop and test more general theories about how the mixed economies of small capitalist countries function.

The work of Arthur Stinchcombe and Carol Heimer, presented in this book, plays a crucial role in this program." (Stinchcombe, 1985, p. 13)*.

Arthur Stinchcombe (1933 – 2018) was an American sociologist, and was appointed a honorary doctor at the University of Bergen in 2017 (University of Bergen, 2017). Carol A. Heimer is Professor of Sociology at Northwestern University. The first essay of the book "gives a general introduction to the system by which large scale construction projects are managed in the Norwegian North Sea"

2.2.1 Uncertainty, engineering decision making and decoupling

In the introduction (Stinchcombe, 1985), Stinchcombe and Heimer summarize the work as follows:

"In particular, one distinctive feature of the technical job to be done, that one starts off with almost complete technical uncertainty about what ought to be done (and

certainly cannot do what one did yesterday even if that made money then), sets the parameters of the rest of the administrative process.

In resolving this uncertainty, the crucial process is *engineering decision making*. In the link between starting off not knowing how much gas or oil is in the reservoir and having to know eventually exactly what should be welded to what before a skilled craftsman can be instructed to weld it, engineering decisions add information about what ought to be done, and provide the basis for the economic decision about whether doing that will be worth the while.

In the actual arrangement of engineering and construction, **the crucial problem is that many organizations have to cooperate, and in the design of such complexes of many organizations the crucial considerations are summarized in the** *decoupling principle***, namely that if two activities are very dependent on each other, they should be carried out by the same organization under the same authority, and that if one wants to separate activities in different organizations one must** *decouple* **them, reduce their detailed interdependence.** ().

Chapter 4, "Authority and the Management of Engineering on Large Projects," **is focused specifically on the production of engineering decisions.** The way most investment is done in the North Sea, the resolutions of technical problems proposed by the consulting engineers have to be acceptable to their client, the "operator" of the oil field (the operator acts as an agent for the owner group of the field, who hold the concession, arrange the investment financing, manage the construction and production of the field, and are responsible to the government for adequately meeting Norwegian objectives and regulations in the field).

Arranging authority over professional level workers like engineers is always problematic, and in the North Sea this is further complicated by the fact that the professionals are emplyed by one or more consulting organizations which are not themselves responsible for the decisions to be taken on the basis of engineering information. ().

This chapter **then enters into the microsociology of uncertainty reduction**. Besides deciding the large questions of uncertainty about, say, whether to build a steel or a concrete platform, one has to decide also the detailed questions of uncertainty such as whether the specifications for steel tubes are ready to go out to bid, or later whether the welds that hold them together satisfy the safety standards that the "client" can accept delivery of the uncertainty at different points in this flow of detailed decisions shape the temporal variations and the variations between engineering specialties in how the approval process and authority system actually works.

The uncertainty of the oil construction business generally produces uncertainty in the careers of employees of the contractors. Chapter 5, "Organizational and Individual Control of Career Development in Engineering Project Work," looks at the reactions of engineers, managers, and clerical workers working for engineering consulting firms to the problems of developing their competences, and of convincing their employer and potential competing emplyers that they indeed have these competences. The employers in their turn have to try to hold the loyalty of their valuable emplyees (partly valuable because of the emplyer's training investment in them), in the face of the fact that they do not know for sure what work they will have next year, or whether their client at that time will be convinced that a particular engineer is, say, an appropriate manager for a task force on platform safety.

So the employers have to make their policies on personnel, on investment in competences and promotions, in an environment in which the payoffs to them are very uncertain even if the employee stays; and of course the employee is developing contacts in the oil business and establishing a reputation by working with people from other companies, and may not choose to stay. The problem of who benefits from the investment in competences and from adequate reward levels for employees is thus complicated by the uncertainty of the oil business in Norway as a whole.

Chapter 5 **then shows how uncertainties at the macroeconomic level in the flow of work, in who gets the contracts, and in who ends up making personnel assignment and training decisions, affect the way individuals develop their competences. Macroeconomic and administrative uncertainties, here as elsewhere, end up creating uncertainties in the lives of individual workers.**"(Stinchcombe, 1985, p. 21)

2.2.2 The Activities Approach to Organization

"The key reason that practical people describe the project as a network of activities is that the activities provide a link between three major project resources. On the input side of each activity there are the resources of *hours of work* and *calendar project time*. On the output side the central resource is *administrative readiness to go ahead to the next stage*, wherether this is production or further construction." (Stinchcombe, 1985, p. 28)

"If practical men and women in project administration find it strategic to organize their thinking around activities, and around series of activities connected in networks, it seems likely that organization theory ought to organize its thinking the same way. Our argument will be that project organization is made up of activities and sequences of activities, rather than positions and lines of authority on an organization chart (Thompson, 1967)."

The central theoretical approach of this paper, then, is that in order to reduce the great uncertainty about what should be done so as to produce detailed directions about individual activities, project management has to produce a large mass of decisions, and has to do this so that the system of activities as a whole stays within reasonable limits on hours of work used, on calendar time used, and on achieving objectives on time so as to be ready to go on to the next stage on schedule. The core of project administration, then, is a system for producing decisions under conditions of uncertainty to guide activities on schedule. It is the effectiveness of the existing system, and any future system that might be created by Statoil as operator, in accomplishing these core tasks, which

must be studied to analyze management problems in the North Sea."

(Stinchcombe, 1985, p. 30)

2.3   Project Management research

Project management has become a profession of its own, and there are now many Universities worldwide that offers Master of Science degrees in project management. Project management research and theory I consider relevant because it is both the theoretical framework in which project managers are usually trained, and the theoretical framework in which project management is often discussed. And within the project management literature there are topics related to strategy. For example "Strategic project management" which attempts to integrate traditional project management focus on time, cost and quality with the company's business strategy. However it is not the supplier's overall business strategy that is the topic of this case study.

2.3.1   Global Projects

In a PhD thesis titled "An empirical study of organizational cooperation in large traditional and global projects execution" (Aarseth, 2012), a new definition of global projects was proposed:

> "A Global Project is a temporary collaboration between organizations across nations and cultures with the intention to jointly deliver a unique product or service in a complex external context requiring relationship management".(Aarseth, 2012, p. 107)

This was also published in a paper and the authors commented that: "Compared to Ainamo et al´s and Orr et al´s definition, our new definition of global projects focuses on the project collaboration and key findings from our study, i.e. the importance of collaborating with and understanding the external environment and relationship management, which is absent in prior definitions" (Aarseth, 2012, p. 235)

The PhD thesis is referring to that that there are "limited amounts of published literature on global projects," and "limited published research on issues of organizational cooperation in projects," whereas "the body of knowledge on technical structural issues

in permanent organizations (called "engineering literature") is tremendous" (Aarseth, 2012, p. 32).

The PhD examined organizational cooperation and challenges in projects in the oil and gas industry and in the construction industry, and other global projects. Challenges in global projects were summarized in the model shown below.
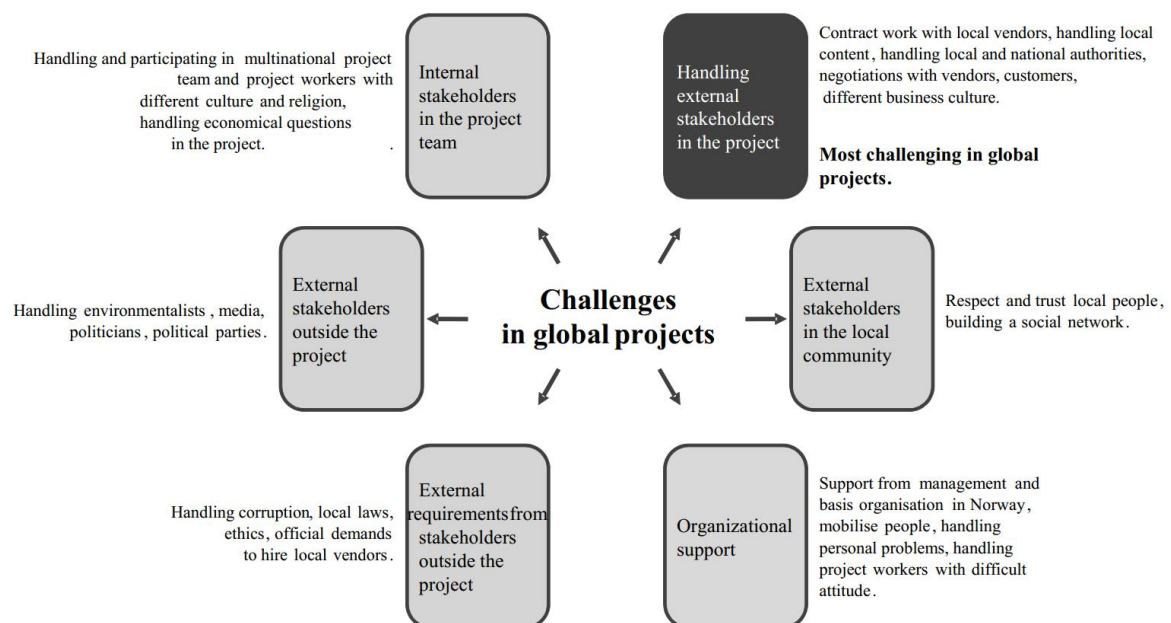
Figure 2-3 The Global Challenge Model (GCM model). From (Aarseth, 2012, p. 257), and published in (Aarseth, Rolstadås, & Andersen, 2013, p. 16)

Among the key findings and contributions of the PhD are "the need to understand and manage interface challenges", "the concept of "cooperative power" in projects as opposed to the more widely used concept of competitive power," and "identification of the most challenging organizational issues in global projects (e.g. managing the external stakeholders in the projects)" (Aarseth, 2012, p. 4).

> "Ultimately, the empirical studies of traditional projects show the importance of managing and acknowledging your project partners by using cooperative power and a partnering approach. In the context of global projects, the results show that it is vital to have a holistic view of the project and its external surroundings, and to

select managers and staff who have high RQ (relationship intelligence), along with IQ, EQ (emotional intelligence) and CQ (cultural intelligence)." (Aarseth, 2012, p. 4)

In their studies the authours found that managing the organizational challenges in traditional and global projects need different management approaches.
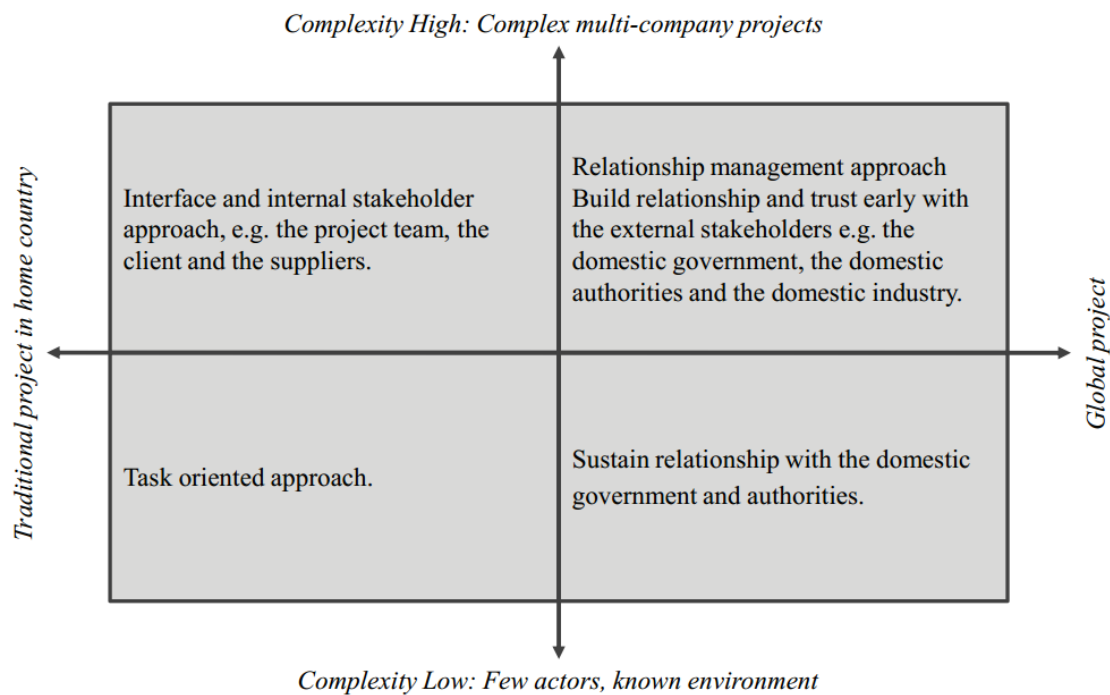
Figure 2-4 Traditional project approaches versus global project approaches to managing organizational challenges. From (Aarseth, 2012, p. 264), and published in (Aarseth et al., 2013, p. 20)

"The professional organizations in project management today, such as the Project Management Institute (PMI) and the International Project Management Association (IPMA), are promoters of the standardization of project management (Söderlund, 2004a, b) and professional associations all over the world are introducing ever more project management standards (Thomas and Mengel, 2008). In traditional projects in the company's home country, where the project team knows the government, the industry, the authorities' regulations and the supplier industry, the organizational challenges can be managed by a standardized task oriented approach, e.g. PMI, focusing on the task and the technical solutions. Further, in complex multi-company projects, traditional projects

organizational challenges can be managed with a focus on the interfaces between and close cooperation with the internal stakeholders (described as "cooperative power"), e.g. the project team, the client and the project suppliers (Aarseth and Sørhaug, 2009). In global projects on the other hand, with a complex external environment, unknown external stakeholders, e.g. government, authorities or the domestic businesses, a relationship management approach is necessary to manage the organizational challenges. Even in global projects with few actors, to sustain the relationship with the domestic government and the authorities is important; because they intervene in the contract, establish new rules and regulations overnight, which leads to delays or can even stop the project." (Aarseth et al., 2013, p. 21).

Further, a framework for handling organizational challenges in global projects was proposed. "This framework spans three main dimensions:

(1) Developing a global projects strategy with a relationship management plan. Such a strategy should remedy some of the shortcomings identified by clearly outlining how to deal with the most frequently occurring, problematic stakeholders in global projects.

(2) Developing a global human resource management plan. Through learning from past projects in different countries, such a plan would help ensuring that people assigned to various countries are armed with the best knowledge available in the company. This involves training, but most likely also a "global projects support team". This is in line with recommendations from Huemann et al. (2004) which consider the role of the project management office as the unit that in cooperation with the Human Resource Department is responsible for managing project management personnel.

(3) Defining global systems. This will help achieving alignment between central approaches and procedures, and tailored ones to global projects in different national settings, including the systems and technology necessary for effective processes and communication in global projects.

We have presented our findings from this study to 75 project managers in global projects in the oil and gas industry. In an evaluation of the presentations, we asked the global project managers "to which degree are these findings relevant for your job". On a scale from 1 to 6, where 1 equals "to a very small degree" and 6 equals "to a great degree" our findings were rated an average of 5, which implies that we have important practical findings for project managers in global projects.

In terms of further research, we have so far only identified general organizational challenges across countries and types of projects. Further knowledge would be created by trying to correlate these challenges with type of project or specific project conditions (e.g. time pressure, cost pressure, technological complexity, stakeholder complexity, project size, etc.)." (Aarseth et al., 2013, p. 23).

2.3.2 Influencing factors and strategic perspectives

In a journal article titled "Global projects: Strategic perspectives", the authors claim that:

> "**Most project management research to date has developed extended theories and concepts that de-contextualize projects from their cultural and institutional surroundings. Such de-contextualization tends to highlight instrumental factors and considerations, while at the same time downplaying norms, practices, ideologies, and other cultural, institutional and psychological effects related to projects and their management.** We claim that cultural and institutional variation becomes significant in relation to what we call "*global projects*". These are large-scale and complex business or military ventures and engineering projects that involve participants from more than one country, and require participants to negotiate great geographical distances and cultural and institutional differences. []. To date, little research knowledge exists on global projects." (Ainamo et al., 2010).

Very large global projects are often also referred to as *megaprojects*. It should be noted that the project manager or managers of a global project or a megaproject will not be the project manager of one of the suppliers. The global project is the overall project that the supplier is part of.

A study investigating "the impact of information feed used by project managers on the strategic value delivered by mega-projects in the oil and gas industry" is given in (Müller, Eweje, & Turner, 2012).

> "A global survey of 69 managers of mega-projects was conducted. Results showed that information feed to project managers significantly influences the strategic value created by megaprojects. Also some moderating effects of contextual factors on this relationship were found. The contextual factors that influenced project manager decision-making relate to what they perceived to be Senior Management drivers for their projects. **However the hypothesized moderating influence of project manager experience on decision-making was not found—an interesting observation.** It was found that the extent to which project managers feel in control should influence the scope and quality of information-feed that should be sought. Four risk areas were observed as significant to long-term value creation from megaprojects: government relations; host community relations; contract management and procurement; and the influence of multi-location execution." (Müller et al., 2012).

Within the project management literature there are also descriptions of the concept of *project strategy*.

2.3.3   What is project strategy?

In a journal paper titled "What is project strategy" (Artto, Kujala, Dietrich, & Martinsuo, 2008) the authors give the following comment:

> "**Current project management literature on strategy of an individual project – or project strategy – mainly considers that project strategy is mostly about goals and plans**. Existing research suggests that such goals and plans are aligned with a parent organization's strategy. However, it is not always appropriate that one parent organization dictates a project's goals or sets the success criteria from outside the project. It is not always feasible that a project serves as its parent organization's obedient servant while copying an image of its parent's strategy to something that is called project strategy. Indeed, in existing project strategy studies projects are assumed to take a fairly tactical role as nonstrategic and non-

self-directed vehicles in one parent firm's context. **The existing literature uses a much too narrow perspective when assuming that projects' strategies consist of plans or plan-like descriptions,** such strategies are created in the front end of the project, such strategies are dictated always from outside the project rather than allowing the project itself to take a position in its environment, **and such strategies are static rather than dynamic in their nature.**" (Artto et al., 2008, p. 1)

Furthermore, the authors summarize their literature reivew as follows:

"We identified three dominant tracks of project literature, referring explicitly or implicitly to the concept of project strategy.

In the first and most dominant track, *projects are viewed as subordinate to the parent organization* where project strategy is derived from more significant business strategies of the parent. This literature track tends to use the project strategy term explicitly whereas the other tracks mostly refer to the concept only implicitly. This literature track mostly suggests that project strategy consists of a mere static plan or predetermined goals for the project.

In the second track with somewhat fewer literature sources, *projects have been considered as autonomous organizations connected loosely or tightly to a parent organization*. In such literature, projects themselves develop their own strategies and plans independent of the surrounding organizational context.

In the third track, *projects have been considered as organizations that are not subjected to clearly defined governance or authority setting in relation to their surrounding organizations or stakeholder organizations*. In such cases, projects interact with their uncertain and complex environment and adapt to the ongoing changes as strategic entities of their own. This track dominantly includes studies on large projects that rather discuss strategic project management related to success and failure issues, rather than project strategies. " (Artto et al., 2008, p. 2)

2.4   The concept and process of strategy

One of the topics for my interviews has been the project managers' reflections on their own strategy for delivery projects. I did not assume that they thought of strategy as a

deliberate plan. They could for example view it as a "pattern". Henry Mintzberg is a Canadian academic and author on business and management, and has described the many different definitions and perspectives on strategy reflected in both academic research and in practice. He wrote:

> "Thus there is good reason to drop the word "tactics" altogether and simply refer to issues as more or less "strategic", in other words, more or less "important" in some context whether as intended before acting or as realized after it (Mintzberg, 1987, p. 14)

Neither have I differentiated between "tactics" and "strategy" in this case study. Mintzberg examined the strategic process and concluded it was much more fluid and unpredictable than people had thought. Because of this, he could not point to one process that could be called strategic planning. Instead Mintzberg concluded that there are five types of strategies as he described in the "*Five Ps For Strategy*"(Mintzberg, 1987):

- Strategy as **plan** – a directed course of action to achieve an *intended* set of goals; similar to the strategic planning concept;
- Strategy as **pattern** – a consistent pattern of past behavior, with a strategy *realized* over time rather than planned or *intended*. Where the realized pattern was different from the intent, he referred to the strategy as *emergent*;
- Strategy as **position** – locating brands, products, or companies within the market, based on the conceptual framework of consumers or other stakeholders; a strategy determined primarily by factors outside the firm;
- Strategy as **ploy** – a specific maneuver intended to outwit a competitor; and
- Strategy as **perspective** – executing strategy based on a "theory of the business" or natural extension of the mindset or ideological perspective of the organization.

Prior to this, Henry Mintzberg and James A. Waters (Mintzberg & Waters, 1985) researched the process of strategy formation for over 10 years based on a definition of strategy as 'a pattern in a stream of decisions' (Mintzberg & Waters, 1985, p. 2). The definition was developed to 'operationalize' the concept of strategy, namely to provide a tangible basis on which to conduct research into how it forms in organizations.

Comparing intended strategy with realized strategy allowed them to distinguish between *deliberate strategies*-realized as intended- from *emergent strategies*-patterns or consistencies realized despite, or in the absence of, intentions. Mintzberg and Waters categorised types of strategies summarized in the table below:

Strategy	Major features
Planned	Strategies originate in formal plans: precise intentions exist, formulated and articulated by central leadership, backed up by formal controls to ensure surprise-free implementation in benign, controllable or predictable environment; strategies most deliberate
Entrepreneurial	Strategies originate in central vision: intentions exist as personal, unarticulated vision of single leader, and so adaptable to new opportunities; organization under personal control of leader and located in protected niche in environment; strategies relatively deliberate but can emerge
Ideological	Strategies originate in shared beliefs: intentions exist as collective vision of all actors, in inspirational form and relatively immutable, controlled normatively through indoctrination and/or socialization; organization often proactive vis-a-vis environment; strategies rather deliberate
Umbrella	Strategies originate in constraints: leadership, in partial control of organizational actions, defines strategic boundaries or targets within which other actors respond to own forces or to complex, perhaps also unpredictable environment; strategies partly deliberate, partly emergent and deliberately emergent
Process	Strategies originate in process: leadership controls process aspects of strategy (hiring, structure, etc.), leaving content aspects to other actors; strategies partly deliberate, partly emergent (and, again, deliberately emergent)
Unconnected	Strategies originate in enclaves: actor(s) loosely coupled to rest of organization produce(s) patterns in own actions in absence of, or in direct contradiction to, central or common intentions; strategies organizationally emergent whether or not deliberate for actor(s)
Consensus	Strategies originate in consensus: through mutual adjustment, actors converge on patterns that become pervasive in absence of central or common intentions; strategies rather emergent
Imposed	Strategies originate in environment: environment dictates patterns in actions either through direct imposition or through implicitly pre-empting or bounding organizational choice; strategies most emergent, although may be internalized by organization and made deliberate

Table 2-1 Symmary description of types of strategies from (Mintzberg & Waters, 1985, p. 14)

Furthermore, Mintzberg and Waters wrote:

> "At a more general level, the whole question of how managers learn from the experiences of their own organizations seems to be fertile ground for research. In our view, **the fundamental difference between deliberate and emergent strategy is that whereas the former focuses on direction and control- getting desired things done- the latter opens up this notion of 'strategic learning'**. Defining strategy as intended and conceiving it as deliberate, as has traditionally been done, effectively precludes the notion of strategic learning. Once the intentions have been set, attention is riveted on realizing them, not on adapting them. Messages from the environment tend to get blocked out. Adding the concept of emergent strategy, based on the definition of strategy as realized, opens the process of strategy making up to the notion of learning. **Emergent strategy itself implies learning what works - taking one action at a time in search for that viable pattern or consistency**." (Mintzberg & Waters, 1985, p. 15).

2.5   Strategic thinking and systems thinking

Strategic thinking has been researched in both the management and psychological literature. A review of the management and psychological literature that was published in 2011, with particular focus on factors affecting strategic decision making, claims that the management literature has been focusing on the process of strategic thinking and making strategic decisions, whereas the psychological literature has focused on factors affecting strategic thinking and decision making (Steptoe - Warren, 2011). The organisational environment includes both internal factors such as the culture of the organisation and individual values and beliefs as well as external factors such as technology, the environment, legislation and politics. The literature review concludes that that strategic decision making competencies are important, but that there is no agreement on what these competencies might represent. As an example, the review refers to Liedtka (1998), according to which the strategic decision making competency consists of five characteristics (Steptoe - Warren, 2011, p. 5):

1) Appreciating how different parts of the organisation influence each other, so that a holistic view can be taken that is influenced by internal as well as external factors.

2) Creating a fit between existing resources and opportunities as there needs to be resources in place including people, processes, finances and technology, in order for the vision to be implemented.

3) Understanding the inter-connectivity and opportunities between the organisation and the marketplace including understanding competitors and their limitations so that opportunities can be developed.

4) Hypothesising and testing by asking "what if?", "if then?" type questions. This includes managing risk in terms of what if a product or service does not work well? What do we do then? It is looking at all the possible outcomes from the implementation of the new vision so that plans can be put in place for a variety of outcomes.

5) Having an intelligent opportunistic view, which enables the strategic decision maker to recognise and take advantage of new opportunities.

Characteristic four of hypothesizing is based on the strategic decision making competency described by Judge and Miller (1991) where strategists utilise their experience from their personal, business and functional expertise to inform their choices. This relates to how managers process information and analyse it in relation to new situations. This process is known as *managerial cognition*.

2.5.1 Managerial cognition

Gail Steptoe-Warren, Douglas Howat and Ian Hume from Coventry University in UK described *managerial cognition* as follows in their literature review of "Strategic thinking and decision making":

"Managerial cognition refers to the capacity and inclination to attend to analytic detail and to cut through that detail by the use of intuitive processing strategies (Hodgkinson and Clarke, 2004**). It is the ability to process complex information, and think analytically. Thus, what is ultimately needed is the ability to switch back and forth between "habits-of-the-mind" and "active thinking," a process referred to as "switching**

cognitive gears" (Louis and Sutton, 1991). In practice, the ability to switch from one processing strategy to another (past experience to present situation) is difficult because of strong individual differences in the way in which information is gathered, organised, processed and evaluated (Messick, 1984). Each individual uses different ways to process information. Based on processing differences, Lewis (2002) argues that we should be asking whether there are different approaches that strategic decision makers choose dependent on their circumstances, objectives and personal preferences. Lewis suggests that an organisation adopts strategies as a direct result of a strategic decision maker's choice which, is constrained by societal, sectoral, environmental and organisational factors. If strategists choose the approach depending on their personal circumstance, it suggests that strategic thinking is a conscious individual mental process.

Individuals think about decision problems and evaluate possible responses using two complementary processes:

> (1) a largely automatic, pre-conscious process which involves developing and using heuristics (i.e. basic rules of thumb based on past experience); and

> (2) a deeper, more effortful process involving detailed analysis (Hodgkinson and Sparrow, 2002).

This is based on the cognitive theory where individuals construct meaning and make sense by building mental representations that guide their thinking and the direction of their decisions (Rumelhart and Norman, 1985). **They visualise the likely situation, the action to be taken and the likely outcome. However, problems can arise when there is too much information to process and individuals become overloaded with complex information. Individuals have limitations on their memory in terms of how much information they can process (Tversky and Kahneman, 1974). Thus they develop a limited repertoire of strategic choices.** These limit their ability to envision alternative courses of action (Geletkanyez and Hambrick, 1997). This is because individuals fall back on past learning and experience in a variety of business settings (Gavetti et al., 2005). Strategic thinkers have at their disposal a wealth of information and research designed to help them make the "right decision," but strategic choices often reflect their personal views on the nature of strategy and how it should be formulated based on

past experience. **This is known as reasoning by analogy, where strategic thinkers think back to similar situations and apply lessons learnt from that experience to the current experience** (Jarzabkowski and Seidl, 2007). However, relying on individual experience can result in "biases and beliefs which may mean that something is excluded because it is not seen as important" (Hussey, 2001, p. 2,003). This may be due to past experience of a similar situation. **This is because when faced with a dilemma, a strategic decision maker relies on their own perspective of strategy and how it relates to the organisation and the environment** (Hendry, 2000). Therefore, strategy is linked to a strategic thinker's view of how the organisation should operate and function (Hambrick and Frederickson, 2001) and is subject to biases such as complex problems being based on simple past decisions, for example. **The fact is that decision makers will bring a cognitive base and individual values on which to base a decision.** This may create a barrier between the actual situation and the perception of the situation. Barriers to effective decision making are important in considering why certain decisions have or have not been made. The psychological literature has focused on such barriers to effective decision making and has researched the effect of individual values and beliefs as well as organisational values and beliefs (corporate values). "
(Steptoe - Warren, 2011, p. 6).

2.5.2   Systems Thinking

Since this case study is about project management and strategy in an engineering environment, *systems thinking* should also be mentioned. Systems thinkers have long been interested in strategy. Again, what is referred to as *systems thinking* and *systems theory* is a comprehensive field of its own, and I will try to stick only to what is relevant and useful for this case study.

In short, as the name suggests, *systems theory* is the interdisciplinary study of systems, and *systems thinking* is an approach to reasoning and treatment of real-world problems based on the fundamental notion of 'system.' System here refers to a purposeful assembly of components. Thus, systems thinking is aimed at understanding relationships between components and their overall impact on system outcomes (i.e., intended and unintended) and how a system of interest similarly fits in the broader context of its environment. (Amissah, Gannon, & Monat, 2020).

The fundamental concepts of systems thinking were developed (in modern times) in the early part of the 20th century in disciplines such as organismic biology, ecology, psychology and cybernetics. As a minimum they include: parts/wholes/sub-systems, system/boundary/environment, structure/process, emergent properties, hierarchy of systems, positive and negative feedback, information and control, open systems, holism, and the observer. The application of these concepts across many disciplines was recognized by von Bertalanffy (1950) and called *general systems theory* (Mingers & White, 2010, p. 3).

One of the areas of application has been strategy, and can be found as the basis for works within for example project management and strategic or corporate planning. A literature review "of the recent contribution of systems thinking to operational research and management science" is given (Mingers & White, 2010), and they wrote:

> "**Ackoff** was primarily the first to propose an explicitly systems approach to strategic or corporate planning. **His major contribution was to argue that strategic decisions are messes, often characterised as an interactive systems of related issues** (Ackoff 1970; Ackoff 1974b; Ackoff and Emery 1972). Others have also highlighted this observation where, for example, the context for strategy has been defined as *wicked problems* (Rittel and Webber 1973). From the systems literature, Ackoff (with his concept of corporate planning) provided one of the first recipes for a rational approach required to develop strategy. **Nowadays, systems thinking in strategy has incorporated ideas from complexity theory, particularly seeing strategy as 'order out of chaos', and regard strategic decision making as complex, involving different issues and many interacting factors and stakeholders** (Aligica 2005; Broman et al. 2000; Floyd 1999; Houchin and MacLean 2005; Mason 2007; Stacey 1995)." (Mingers & White, 2010, p. 15).

2.6 Sensemaking and decision-making

This topic has been introduced already, but more has to be said: Before making decisions, a decision maker typically has to ask himself the following question: What is actually going on? He or she has to make sense of the situation and be able to describe it to others. This is in short what Karl E. Weick refers to as *sensemaking*. (Weick, 1995). So

making decisions could be just as much about *sensemaking* as *decision making*. Karin and Nils Brunsson describe *sensemaking* as part of the decision making process in their book "*Decisions*" (Beslutninger) (K. Brunsson & Brunsson, 2015, p. 62).

As there are many literature reviews included in the references I have made already, written by known academics and professionals in peer-reviewed articles, I will use one of them to summarize some key findings and perspectives related to decision-making. (Müller et al., 2012) summarize "**Decision theory in megaprojects**" as follows:

> "In a general sense, a decision is a position, opinion or judgment reached after consideration (Miller, 2009). It is a cognitive phenomenon, and the outcome of a complex process of deliberation, which includes an assessment of potential consequences and uncertainties (Müller et al., 2009). Skinner (1999) defined a decision as a conscious, irrevocable allocation of resources with the purpose of achieving a desired objective, indicating that it involves thinking, judgment and deliberate action. So a decision is only regarded as such when it has been communicated someway and accepted for implementation. Basic elements of a decision process include information seeking, ascription of meaning (interpretation), applying a decision criteria and subsequent implementation action (Thomas et al., 1993).
>
> Decision theory has its root in economic theory, with the assumptions that people make decisions to maximize utility based on self-interest and rationality (Skinner, 1999; Mackie et al., 2007): *the expected utility or normative decision theory*. This however does not consider the possibilities or effects of moderating or intervening factors that make decisions reference-dependent (Kahneman and Tversky, 2004). Nonetheless expected utility theory has been applied in the oil and gas industry with some success (Mackie et al., 2007), and has been the predominant model for normative decision making (Tversky and Kahneman, 1992). **The theory is considered idealistic however because it focuses on how people should make decisions** (Mackie et al., 2007) rather than how they actually make decisions (Skinner, 1999). **Technical people in the oil industry have been observed to exhibit a tendency for normative approach to decision making,**

thereby weakening their ability to deal with uncertainty (Capen, 1976; Mackie et al., 2007). Project management in the oil and gas industry is dominated by technical people, and probably more than a few are struggling with tendencies towards this normative thinking phenomenon. An alternative approach is the *descriptive decision theory*.

***Descriptive decision theory* deals with how people actually make decisions.** It postulates that people make decisions by choosing ways to satisfy their most important needs even if they do not have all the required information and their choice is not optimal (Mackie et al., 2007). **When people are faced with making decisions under uncertainty they simplify the challenge by relying on heuristics or rules of thumb (Kahnemann and Tversky, 1979; Tversky and Kahneman, 1992) that are largely rooted in acquired knowledge and past experiences.** There are two relevant offshoots of descriptive theory:

- the theory of bounded rationality (Simon, 1976; Kahneman, 2002)
- prospect theory (Kahneman and Tversky, 2004, 1979)

Both recognize the ample limitation of human beings to be rational most of the time, and postulate that inductive thinking is more natural (Arthur, 1994; Kahneman, 2002; Kahneman and Tversky, 2004).

***Prospect theory* explains decision making under risk (Kahneman and Tversky, 2004, 1979), which more realistically reflects megaprojects.** The theory distinguishes two phases in the decision process, framing and valuation. Framing consists of a preliminary analysis of the prospects offered (by the challenge) to the decision maker, leading to a representative construction of his or her perception of the challenge, associated contingencies and possible outcomes. **A heuristic simplification of perceived risks or challenges takes place such that the decision-maker can make some meaning out of it. During this phase, the quantity, quality and timeliness of information (information feed) available to the decision maker; past experiences, and knowledge about relevant subject matter will have huge effects on how he or she models the possible prospects, which is the outcome of this process. Information timelines have also been**

hypothesized as a factor due to the time pressure that most project managers are under.

Time pressure affects decision-making (Hwang, 1994), and information suffers degradation when not delivered timely (Greer and Kropp, 1983). Valuation follows framing in which the decisionmaker assesses the value of each prospect based on an "opportunity-threat" or a "gain-loss" principle, and then chooses accordingly (Thomas et al., 1993; Kahneman and Tversky, 2004). Prospects are consequently labeled, for example as "opportunity" or "threat".

Ultimately the aim of decision-making is to minimize surprises, which arise from mismatches between what actually happens and what was expected to happen (Gharajedaghi, 1999). Four reasons, largely related to the management of information to support decisions, have been advanced for why mismatches can occur following decisions (Gharajedaghi, 1999):

1) wrong information or input data—a decision process problem

2) wrong implementation of what was decided

3) change in the assumed context after the decision was made (such as business or social context around the project). This may be caused by poor awareness of the environment or by a chance event

4) the decision itself may be fundamentally flawed in quality, which would be a problem with the decision approach or process."

(Müller et al., 2012, p. 4).

The literature related to that of making sense of things and making decisions is enormous, and here I have only referred very briefly to selected parts that I have found relevant for this case study. I will only make one more references and then get back to this topic in my analysis and discussion in chapter 7:

In *The Reflective Practitioner* (Schön, 1983), Donald A. Schön describes how professionals find themselves in complex situations often with conflicting demands. **In such situations the task is not primarily to solve a problem, but rather the task is both to define what is the problem (*problem setting*) as to solve it (*problem solving*). Schön also discusses what strategies professionals use to gain the necessary understanding of the problem area they face through his theories of *reflective practice*.** One example is how

professionals make move experiments, where they do something to see what happen, and from this they expand their understanding of the problem area.

2.7 Culture

Knowledge of cultural dimensions and effects are relevant since oil and gas delivery projects can be global projects, involving companies and people from multiple countries and different cultures. This is for example addressed in research on *global projects* as referred to earlier, and a topic that was discussed in the interviews that I will revert to in chapter 6.

"Culture eats strategy for breakfast" is a famous quote attributed to Peter Drucker, although there is no source reference of him having said it. The quote was made legendary by Mark Fields, President of Ford. To bring home the need to become competitive again managers hung up a banner with this quote at Ford (Kaul, 2019).

Culture and strategy, and the relationship between them is typically discussed on corporate level; whether a company's strategy leads to a complimentary culture, or whether its culture determines the strategy its executives and managers formulate to implement.

One of numerous definitions of culture useful in a business environment suggested is *"patterns of assumptions, premises, values, or beliefs generally adopted by an identifiable group"* (Louis, 1985). Similarly, organizational culture may be defined as, *"a pattern of basic assumptions, invented, discovered, or developed by a given group, as it learns to cope with its problems of external adaptation and internal investigation"* (Schein, 1992), (Kaul, 2019).

Does strategy follow from culture or vice versa? How are strategy and culture related? Below is a figure with conceptual propositions from (Kaul, 2019).

Figure 1.
Strategy precedes
culture; culture is to be
aligned with strategy
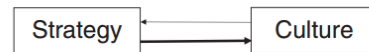
Strategy ⟶ Culture

Figure 2.
Culture precedes
strategy; strategy is to
be aligned with culture

Culture ⟶ Strategy

Figure 3.
Strategy precedes
culture; culture is
aligned with strategy;
culture promotes
new strategy

Strategy ⟶ Culture ⟶ Strategy

Figure 4.
Strategy precedes
culture; culture is
aligned with strategy;
culture promotes new
strategy; culture is
realigned with strategy

Strategy ⟶ Culture ⟶ Strategy ⟶ Culture
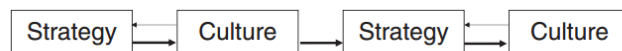
Figure 2-5 Conceptual propositions of relationships between strategy and culture from (Kaul, 2019)

Corporate strategy can be a result from culture, and strategies can influence organizational culture. An example of a strategic model often used in companies that adopts a total quality management approach is the PDCA cycle. The Shewhart (1939) cycle or Deming (1950) cycle referred to as plan, do, check, act (PDCA cycle) effectively is a corporate-level directed strategy for continuous improvement of products, services and processes. Japanese executives replaced the Deming terms with the PDCA terms (Imai, 1986), (Kaul, 2019, p. 11).

Figure 2-6 The strategic management process for continuous quality improvement from (Kaul, 2019). Adapted from the PDCA or Shewhart-Deming cycle.

Within cross-cultural management- the study of management in a cross-cultural context, one of the most known scholars was Geert Hofstede whose work had been cited more than 40.000 times in 2006 (Beugelsdijk, Kostova, & Roth, 2017).

2.7.1 Hofstede's cultural dimensions theory

Gerard Hendrik (Geert) Hofstede (1928-2020) was a Dutch social psychologist, well known for his pioneering research on cross-cultural groups and organizations. His most notable work has been in developing *cultural dimensions theory* where he described national cultures along four to six dimensions.

Hofstede developed his original model as a result of using factor analysis to examine the results of a worldwide survey of employee values by IBM between 1967 and 1973. It has been refined since. The original theory proposed four dimensions along which cultural values could be analyzed*:*

- *individualism-collectivism*
- *uncertainty avoidance*
- *power distance (strength of social hierarchy)*
- *masculinity-femininity (task-orientation versus person-orientation).*

Independent research in Hong Kong led Hofstede to add a fifth dimension,

- *long-term orientation*

to cover aspects of values not discussed in the original paradigm. In 2010, Hofstede added a sixth dimension

- *indulgence versus self-restraint*. (G. Hofstede, 2010), (Wikipedia, 2019).

There are also many critics of Hofstede's cultural indices and universalist approach. One example is (Baskerville, 2003) who commented that:

> "In social sciences, studies in which the nation is treated as the unit of analysis are primarily concerned with how differences in social institutions correspond to variations in national characteristics (Kohn, 1996, p. 30). However, when the nation was treated as the unit of analysis by Hofstede, he was concerned with how national characteristics could be one variable in the analysis of organizational or business institutional behaviour. That focus for explanatory investigation is a core distinction between cross-cultural studies in commerce and business research, compared with cross-national research in sociology and anthropology. This leads to the first major contention in the assumptions Hofstede utilized: equating nation states with cultures. Cultures do not equate with nations" (Baskerville, 2003).

A review of empirical research incorporating Hofstede's cultural values framework is given in (Kirkman, Lowe, & Gibson, 2006).

2.7.2 Norwegian projects with contracts in South Korea

A large number of Norwegian oil and gas projects have been awarded to East Asian shipyards since the 1990s, many of which have had significant time and cost overruns. An MSc student at the University of Stavanger wrote a thesis in 2015 on "Managing the Efficiency of Foreign Engineering Contracts: A Study of a Norwegian and South Korean Project Interface" (Ahn, 2015). Ahn interviewed 44 persons from 13 companies covering 4 project stakeholder groups: Norwegian operators (2), South Korean shipyards (3), Norwegian suppliers (5), and local service sub-contractors (3). The study concluded that four principal factors add to **challenges for Norwegian EPC projects in South Korea**:

- **cultural differences** (e.g. strong collectivism, use of indirect communication, and the role of listeners and listening rather than that of the speaker and speaking in South Korea)

- **industrial practices at the shipyards** (e.g. rigid boundary between functional units, less flexibility, and heavy reliance on local sub-contractors and hired-ins in South Korea)

- **engineering design and quality control** (e.g. no multi-disciplinary engineering culture in the shipyards in South Korea, the functional regulation of NORSOK and goal oriented approach vs. prescriptive regulation and rules)

- **the EPC contract form** (e.g. negative attitudes towards contracts in Confucianism and shipyards being reluctant to and do not want to follow the "*Hoppeplikt*" as stated in the EPC contract)

These four key contributory factors come into play as a project progresses and result in various communication and coordination challenges (Ahn, 2015, p. 54). Ahn describes challenges with the offshore EPC projects as opposed to the traditional shipbuilding contracts as follows:

"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). 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." (Ahn, 2015, p. 59).
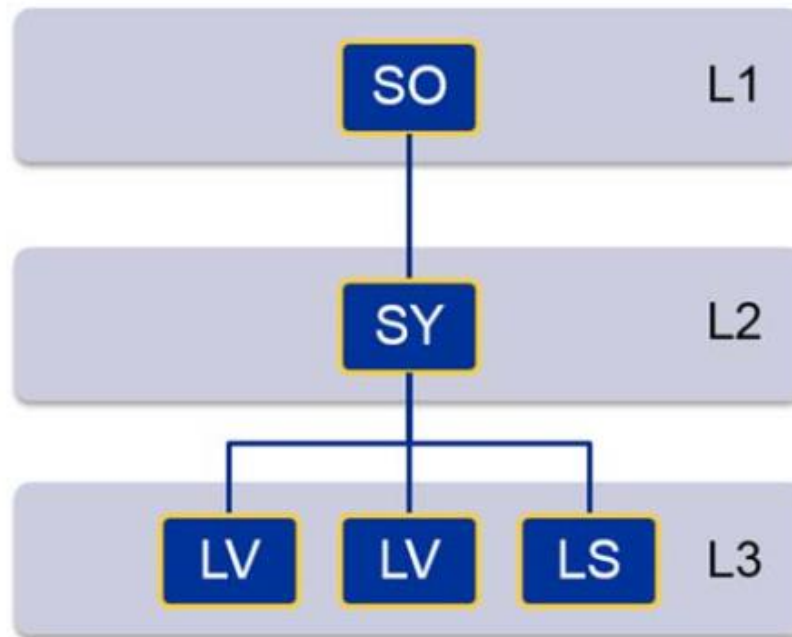
Figure 2-7 Contractual relationship in shipbuilding project. Figure from (Ahn, 2015, p. 59)

"The figure (below) 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 background gives rise to significant communication and coordination challenges.

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 subcontractors (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.
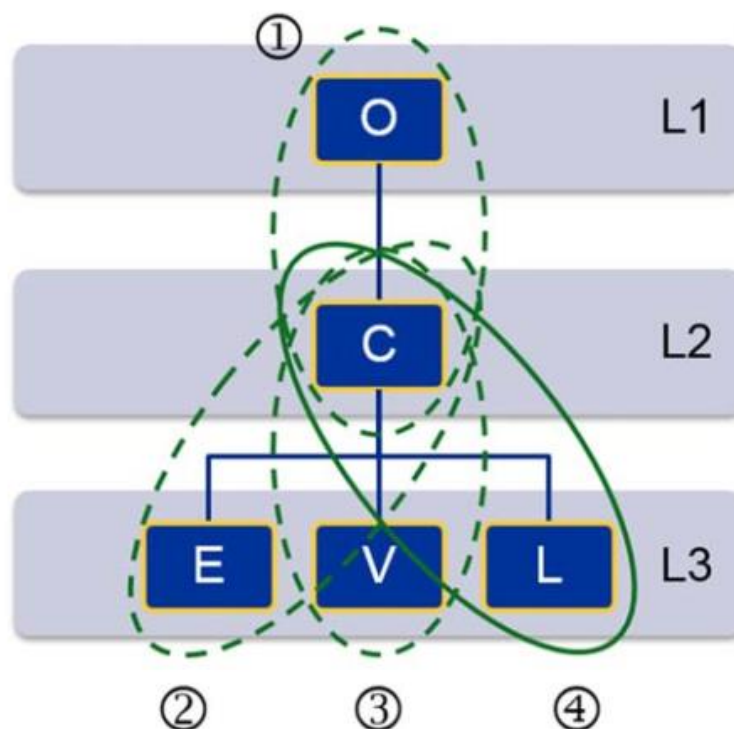
Figure 2-8 Contractual relationship in offshore EPC project. Figure from (Ahn, 2015, p. 60)

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 instance, 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 (above), O and E (2), and O and V (3), where communication among parties gets difficult. **Combined with insufficient functional and interface management capability, 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.**" (Ahn, 2015, p. 60).
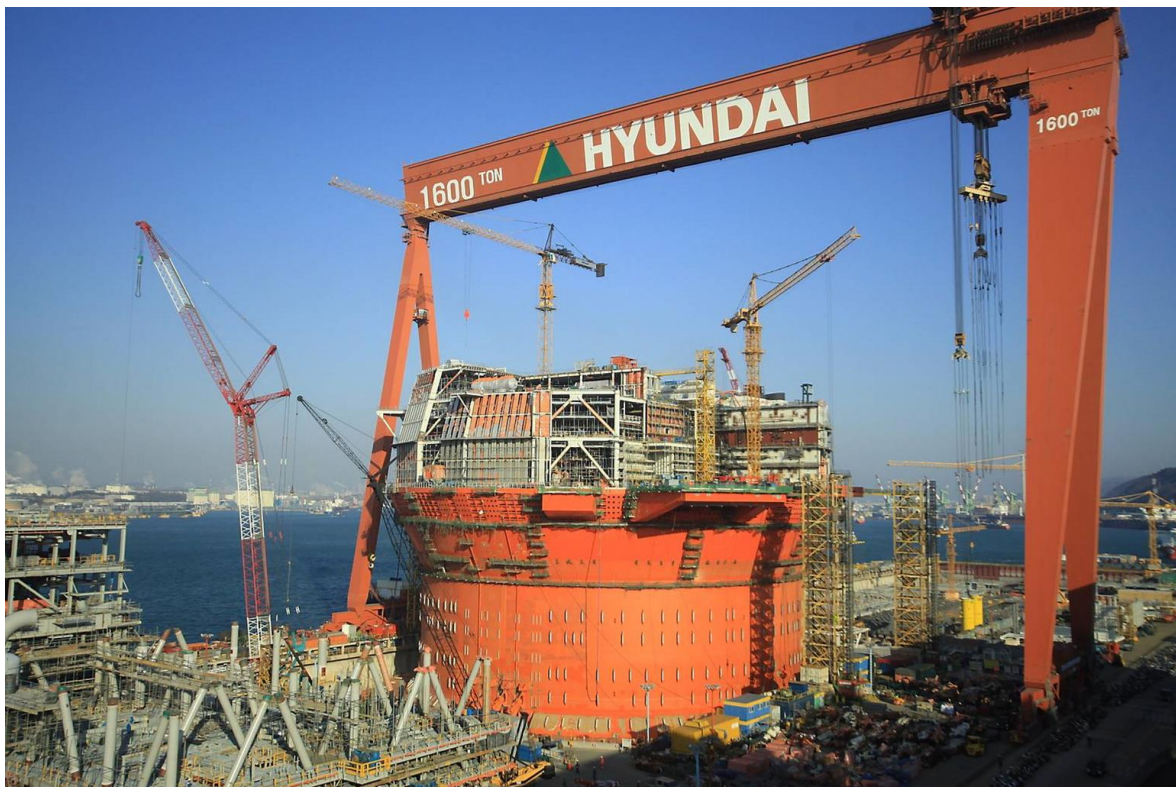
Figure 2-9 The Goliat FPSO under construction at Hyundai shipyard in Ulsan in South Korea. The Goliat FPSO started in February 2015 its voyage from Ulsan to the Barents Sea in Norway on board the Dockwise Vanguard, the world's largest heavy lift vessel.

3   Background and context

3.1   Introduction

I have devoted much time in trying to understand the context and the organisational environment better, which has also been a topic in my interviews. Why do I consider this important? Structure influences behavior. The relationship between individuals - often referred to as agents, and social structures, is a central topic in e.g. sociology and management literature.

In *"The Fifth Discipline"* , Peter M. Senge discusses how companies can be converted to learning organizations. One of his five disciplines is *Systems Thinking* (as briefly described in chapter 2). "Systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years, to make the full patterns clearer, and to help us see how to change them efficiently. Though the tools are new, the underlying worldview is extremely intuitive; experiments with young children show that they learn systems thinking very quickly." (Senge, 2006, p. 7). In chapter 14, Peter M. Senge discusses what it means to think and act strategically in building learning organizations. Senge wrote: "The overarching viewpoint behind this framework is known in social theory as 'structuration', or the theory of 'enacted systems'. (Senge, 2006, p. 286). To my understanding, Senge is here referring to Anthony Giddens' theory of structuration, presented in *The Constitution of Society* (Giddens, 1984). About structures, Peter M. Senge continues with the following:

> "Chapter 3 presented **the central principle of systems thinking, that structure influences behavior** and that the leverage for change increases as we learn to focus on underlying structures, rather than events or behaviors. These structures are made up of beliefs and assumptions, established practices, skills and capabilities, networks of relationships, and awareness and sensibilities – in other words, the elements of the deep learning cycle. The second key element of the systems view is that the structures that govern social systems arise through the cumulative effects of the actions taken by the participants in those systems. In other words, as Winston Churchill put it, we shape our structures and then they shape us." (Senge, 2006, p. 286)

In this chapter I have given some more background information about delivery projects and the oil and gas industry –mainly as seen from Norway. Combined with quotes from the interviews, this may help to give further insight into the structures that influence the behavior of project managers of delivery projects.

3.2 Changes in the oil and gas industry

One of the topics I discussed with the project managers was changes that have taken place in the oil and gas industry. This is related to research question RQ5. Why did I raise the topic of changes in the interviews? Before I conducted the interviews I had an assumption that overall conditions in the business and in society in general, e.g. if the business was in an economic downturn or upturn, could affect the conditions and thereby the strategy used by suppliers in delivery projects.

3.2.1 From high investments to cost reduction

One of the project managers describes the changing conditions in this way:

> "-What is perhaps very symptomatic, is that I have been Project Manager in the oil business, which is a young business. So the criteria and conditions for running projects in a business that in the beginning was flooding with money, that is quite special. The world has changed, and so has the spending. So one of the strongest conditions in my experience, is that it is much more difficult to sell the projects today than it was before. Before they (the customers) came on the door to get the services and the deliveries, whereas today we have to pursue them much stronger. That I think is a big difference. And that is directly towards the customer. With respect to third parties, the picture is much the same. The third parties were neither squeezed a lot on margins before, but gradually they have been. So that means it has become a tougher climate towards third parties also than it was before. In particular what concerns money." (Int#01-08, from individual interview, 2017-2019)

Another interviewee explained:

> "The biggest change in my 20 years in the industry is that one is using the word standardization to cut cost. ( ). Before it was only a matter of being able to

execute (the projects) because everything paid off" (Int#01-08, from individual interview, 2017-2019).

Perhaps due to the increased focus on cost reduction, and since it may not be so evident that every oil and gas project pays off any more, the project managers told about more focus on contractual matters. One of the interviewees said it this way:

"...before it was more so that things were agreed afterwards, like a gentleman`s agreement, but it is not like that anymore. We have to make sure that we relate to the contract." (Int#01-08, from individual interview, 2017-2019).

The focus on cost reduction in recent years can also give opportunities for the suppliers. Another explained:

"-In some cases we (as a supplier) want to take on responsibility, and in other cases we may not want to do it. It depends. How big a piece of the cake do you want? What do you want to help the customer with? Because when the customer tries to be LEAN, it means there is an opportunity for us to do a job for them. We can help them with things they do not want to do themselves. (). If you look at the oil companies in Norway, it is a fact that they struggle to make money. And that is not because they do not find oil, but it is because they have so high cost. Now they have squeezed the suppliers very far down, and then they have to do it internally themselves also. (). And if they do there is a possibility for us to do the job. " (Int#01-08, from individual interview, 2017-2019).

Without going into details about the economic situation in the oil and gas industry, an indicator that gives a quick overview is investments and operating costs. NorwegianPetroleum.no, a site run in cooperation by the Ministry of Petroleum and Energy and the Norwegian Petroleum Directorate, summarizes the overall costs as follows:

"The high level of investments and exploration activity, combined with rising operating costs, resulted in record overall costs on the Norwegian continental shelf in 2014. The development after 2014 has led to a considerable reduction in

total costs, but the cost level remains historically high."

(NorskPetroleum/NorwegianPetroleum, 2020b)

Key numbers for investments, operating costs, production and fields for Norwegian oil and gas are given in Appendix C for reference. A good source for background information about projects in Norway is also the Official Norwegian Report (NOU) from 1999 (Kaasen et al., 1999). It should however be noted that the supplier company in this case study also deliver equipment and services to other parts of the world.

3.3   Lifecycle of oil and gas construction projects

From a main supplier's point of view, the overall project of constructing new oil and gas installations typically follow the phases show in the figure below.
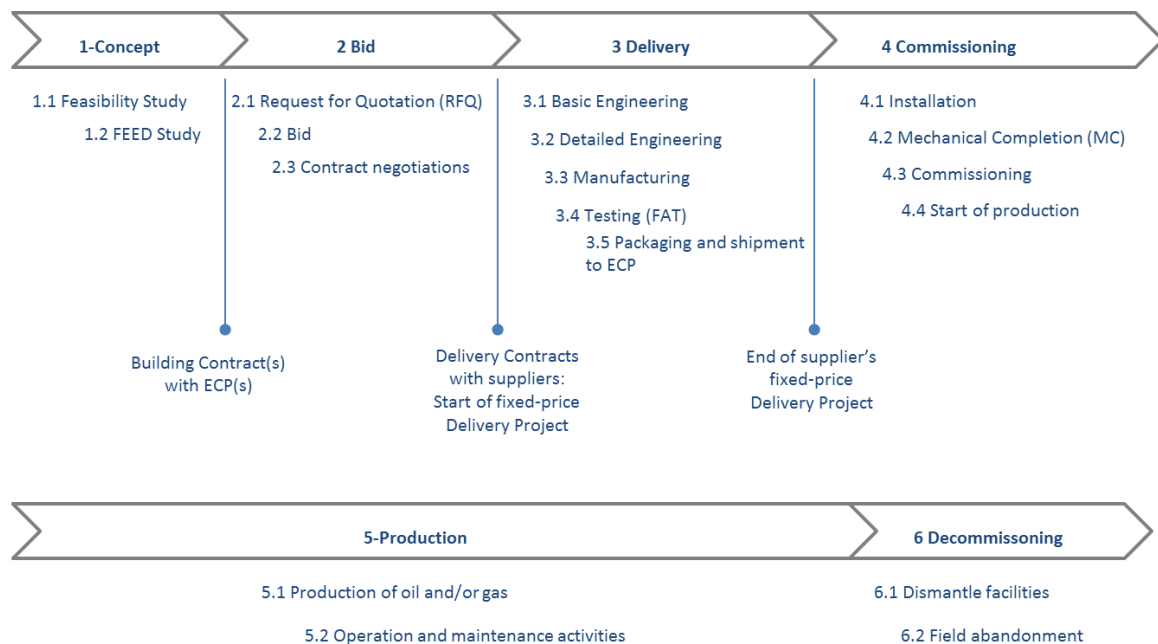
Figur 3-1 Typical phases in oil and gas projects. Timeline from left to right.

The concept phase can be initiated by new discoveries, or the need for extensions or changes to existing oil and gas fields. Different concepts and possible solutions are considered, of which a limited number is selected and studied in more detail. If the resulting decision is to proceed, the owners of the license to produce oil and gas (the oil companies) have to get approval from the authorities before starting the field development. In Norway this is the "plan for utbygging og drift" (PUD) (Regjeringen.no,

2014). The operator is usually the biggest owner.

The building (or EPC) contract(s) between the operator (on behalf of the owners) and the EPC contractor(s) can be signed before the bid phase in which the main suppliers are selected. The operator then typically request quotations from the main suppliers, and, depending on the contract, could instruct the EPC contractor(s) on which main suppliers to be used.

The start of a delivery project for a main supplier is marked by a contract with the EPC and/or the operator being agreed. This contract specifies what is to be delivered, based on the supplier's bid and the owner's requirements, and the agreed terms and conditions. A critical part of the delivery project is to gradually increase the level of detail to a point where it is clearly defined and agreed between the parties what exactly is to be delivered. From a technical point of view, this is the "engineering". The better planned what is to be manufactured and delivered, and how all the equipment and systems from all the different suppliers are to fit together, the better the chances of avoiding problems and modifications after the equipment has been shipped to the EPC contractor for installation, typically marking the end of the fixed-price delivery project.

When the equipment is received at the EPC's site, typically a shipyard, the equipment is loaded and installed into the construction (offshore oil platform, FPSO or similar). The different equipment and systems are then checked and tested (Mechanical Completion) and made ready for commissioning. Offshore constructions are typically transported to or near the oil and gas field where the commissioning is finalized. The suppliers are typically also participating in the commissioning phase until start of production. Commissioning is typically done on reimbursable basis (paid by the hour), and not part of the fixed-price delivery project. Commissioning can however be part of the same contract. The commissioning could be performed by a different part of the supplier's organization in the form of a commissioning project. The EPC contractor and the operator may also have separate commissioning teams. When the commissioning is completed, the installation is handed over to the operator's operations and maintenance team for start of regular production.

The production period may last for many decades, with maintenance and different types of upgrades being done on the installation. Offshore installations are typically required to

be designed for a lifetime of 20 to 50 years. After the production period has ended, there will typically be a decommissioning phase where the installation is removed. The Frigg field is the largest field on the NCS where decommissioning of the facilities has been completed. (NorskPetroleum/NorwegianPetroleum, 2021).

Figure 3-1 The Ekofisk field, located about 300 kilometers southwest of Stavanger. Discovered in 1969 by Phillips Petroleum Company, it still remains in production.

One small note with respect to the quality of crude oil before continuing with the EPC contract form:

There are many different types and qualities of oil. The differences may appear to be minor, but the consequences can be substantial. Gullfaks is one example. The Gullfaks A, Gullfaks B and Gullfaks C offshore platforms began production in the late 1980's in the Norwegian North Sea. When Statoil found out that the quality of the oil from Gullfaks A and B, and Gullfaks C was different, it was a big and important discovery. The oil from Gullfaks C had a slightly higher quality, and by separating the two qualities of oil, Statoil earned billions of NOK *more* over the lifetime of the field. (Lerøen, 2002, p. 211).

Figure 3-2 Different types of oil. Samples from Norsk Oljemusem

3.3.1 The EPC contract form

EPC is a particular form of contracting arrangement where the EPC contractor is made responsible for all the activities from design, procurement, construction, to commissioning and handover of the project to the owner.

EPC projects are generally high-risk propositions, and the contracts are usually heavily negotiated. Most EPC projects include a detailed completion/acceptance protocol, as well as damages for both delays and failure to achieve the agreed-upon performance (Kelley, 2012, p. 46).

EPC contracts are widely used for oil and gas installations, but are also used in other types of construction projects. Different types EPC contracts include:

- EPC- Engineering, Procurement, Construction

- EPCI- Engineering, Procurement, Construction, Installation

- EPCIC- Engineering, Procurement, Construction, Installation, Commissioning

In offshore construction projects, EPCI is often called EPCH for "hook-up".

Figure 3-3 Offshore hook-up and completion: The last module of the Johan Sverdrup riser platform lifted into place April 2018 by the heavy-lift vessel "Thialf". (Equinor, 2018) .

To complete the construction, the EPC contractor usually has to buy equipment and services from a number of suppliers. The delivery from one of the main suppliers is what I refer to as a *delivery project*. There are numerous of topics related to these types of contracts. These contracts and their formalities will however not be discussed in further detail in this case study.

For those interested in more information I recommend the Official Norwegian Report (NOU) from 1999 titled "Analyse av investeringsutviklingen på kontinentalsokkelen" (Kaasen et al., 1999). (Only available in Norwegian).

3.3.2 The Delivery Project

One of the characteristics of suppliers' deliveries to EPC contractors in the oil and gas industry is that they are strictly defined with respect to delivery time, cost and quality. When a fixed-price delivery is agreed, which often is the case, it sets clear boundaries for this type of projects: To earn money short term on the delivery, the supplier will have to fulfil their contractual obligations using less money than their production cost. However in a long term perspective, since the delivered equipment may be in use for decades, the suppliers may also consider the potential value of service agreements and upgrades.

This makes this type of projects well defined with respect to the goal and resources needed. As Bjørn Engebretsen wrote in his book "Leveranseprosjektet" (Engebretsen, 2013), *"…the delivery project's cynical production of an expected result with one goal in mind –namely to make money on this specific project and lay the foundation for further revenue in the future"* (p. 9, translated from Norwegian). One of the consequences of this is that *"…the project method clearly favours those who have done it before"* (p. 37, translated from Norwegian).

The figure below shows a typical (contractual) organization of a big EPC project in the oil and gas industry: An oil company (the end customer) has decided to build multiple oil platforms including other necessary equipment (e.g. subsea installations) required to start production of a big new (greenfield) offshore oil and gas field. The oil company may order the platforms (e.g. drilling platform, accommodation platform, riser platform, processing platform, or FPSO vessels or similar topside installations) to be built by one EPC contractor, or the oil company can split the job between multiple EPC contractors. In the example below, the oil company has split the job of building the oil platforms between two EPC contractors (A and B).

For planning and preparation, and engineering in later stages of the project, the oil company may hire an engineering consultant company to do engineering on behalf or in cooperation with the oil company.
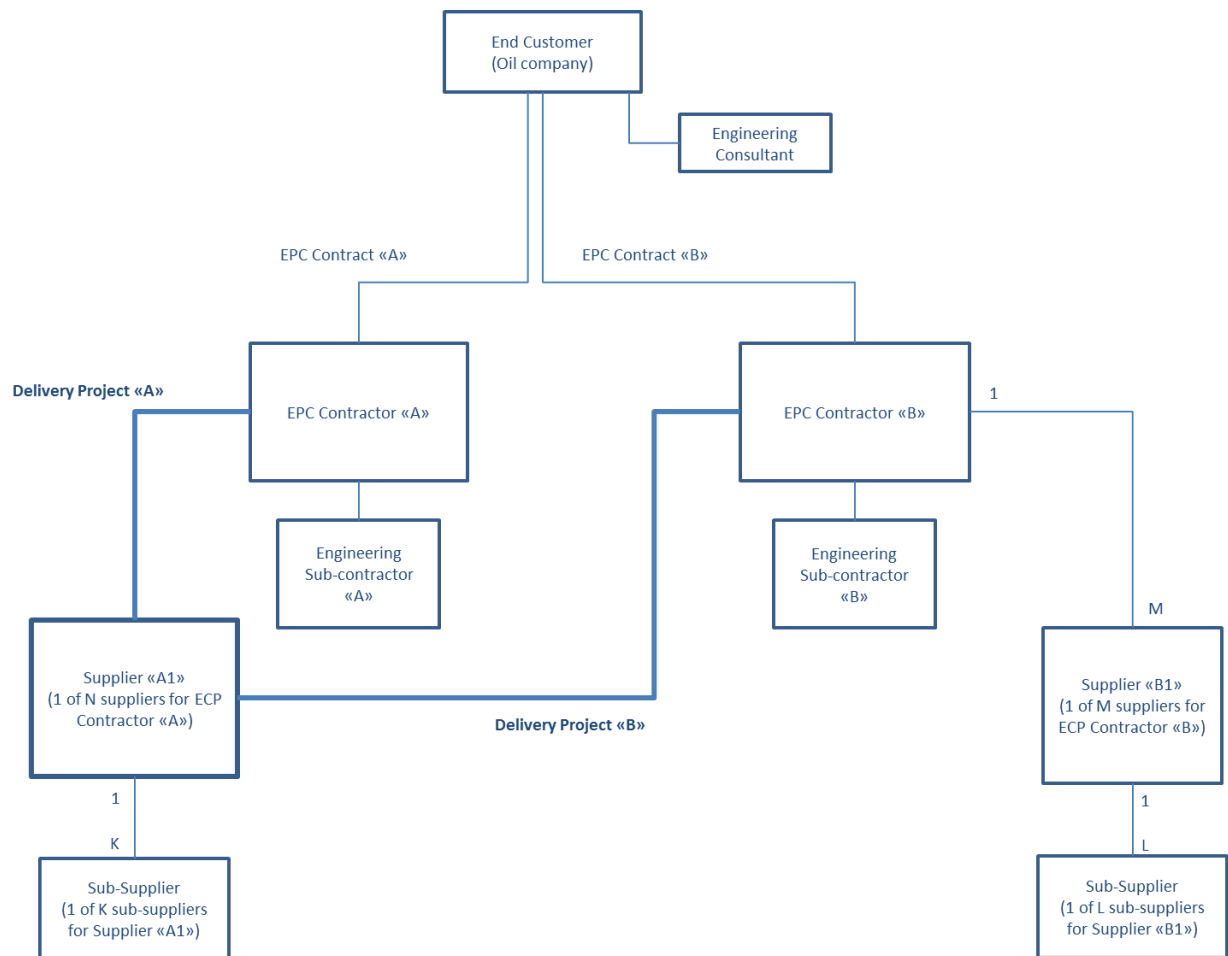
Figur 3-2 Organization of EPC project in the oil and gas industry in which Supplier A1 has a contract with both EPC Contractor A and EPC Contractor B.

To build an oil platform (FPSO or similar) according to the specification and delivery terms of the oil company, the EPC contractor typically needs to purchase equipment and services from a number of suppliers. Examples of such suppliers include automation system vendors, electrical system vendors and different mechanical system vendors. Typically the oil company determines the equipment to be installed, and approves the main suppliers. The EPC contractors could be instructed to use the same supplier, for example the same automation system vendor to get the same automation system installed on all the platforms. Hence, one or more suppliers could have contracts with multiple EPC-contractors as part of the same overall project as shown with supplier A1 in the example above.

Each supplier of the EPC contractors could again have a set of sub-suppliers (which again could have their sub-suppliers and so on), and a sub-supplier could deliver equipment to multiple equipment suppliers in the project. For example, a computer vendor could be a

sub-supplier delivering computers to a number of different computer systems to be used on all the platforms.

The EPC contractor(s) may sub-contract the engineering to another company. The engineering company will then typically be responsible for all the engineering on behalf of the EPC contractor.

And again it should be noted that a delivery project can also be a *brownfield* project, meaning that part or even the whole production facility already exists. This can for example be an additional offshore oil or gas platform, or subsea production facility to be installed and connected to an existing field, or upgrade of existing equipment. So a delivery project is not necessarily a *greenfield* project.

3.3.3   What is Engineering?

Even if the contracts used in the oil and gas industry are detailed and trying to capture many eventualities, they cannot replace all the decisions required to perform the work. A large number of decisions are left to be done during the delivery phase, and is often referred to as "engineering" or "detailed engineering". From a technical point of view, this can be to specify exactly how something is going to be built and configured –prior to the actual implementation or construction. How exactly is the automation system going to be programmed? How is the Emergency ShutDown system (ESD) going to be implemented? How are the different systems going to be tested? And so on.

3.3.4   Documentation, quality, time and money

During the last decade, a number of statements have been made in the Norwegian media about the amount of documentation in the oil and gas industry as part of the focus on cost reduction. Examples include headlines about "a document explosion" (Ånestad & Løvås, 2014) and the "documentation jungle" (RAMSDAL, 2016).

An analysis of cost data from suppliers in the period 2010-2015 showed that the oil companies payed 26% more than rig companies for orders of almost identical products. The analysis showed that difference in cost to a large degree correlated with documentation and specification requirements, and in lesser degree with increased margins for the suppliers (Jakobsen et al., 2018).

The Petroleum Safety Authority Norway (PSA/PTIL), issued a report in 2016 about the extent of documentation in the petroleum business (PTIL, 2016) . The background for the survey was the increased cost to operate on the Norwegian continental shelf. The industry refer to that the amount of documentation that is being produced as part of construction and operation of new oil and gas fields, have increased considerably in recent years, even if the companies have tried to reduce the amount of documentation through increased standardization, and use of new and more efficient methods. The survey was carried out through a series of meetings with selected operators and contractors. One of the findings in the report was that "there is a large degree of company specific and un-nuanced documentation requirements". And "the suppliers agreed that the amount of requirements, documentation and manhours had increased", and that "combined with lack of multidiscipline understanding and decisiveness, it can lead to unnecessary complex solutions, which is not cost effective and can pose a safety hazard". (PTIL, 2016, p. 24).

Why is documentation so important for oil and gas delivery projects?

The documentation serves many purposes. Documents specify requirements that the supplier has to fulfill. This can be functional requirements, safety requirements, lifecycle requirements etc. that are normally issued to the supplier from the customer. Some of these requirements originate from country specific laws and regulations, others can be company specific.

For the supplier, a very important part of the documentation is documents specifying how something is going to be built and delivered to the customer. This is documentation that is being produced by the supplier based on the requirements from the customer, and then issued to the customer for approval during the delivery phase. This is an important part of the engineering process. A supplier will normally not want to start building something without first getting the specifications approved by the customer. That could be a risk for both the supplier, the customer and the overall project. So the documentation is central in what Arthur Stinchcombe (Stinchcombe, 1985) called *the production of engineering decisions* and *the authority system*:

"The core of the authority system for engineering is then a system of proposals by the engineering consulting firm and approvals by the project organization of the operator as client. That system has to be adapted to the different amounts and kinds of uncertainty in different kinds of engineering, to the different engineering decision tasks that need to be done at different stages of the project, and to various normal malfunctions of engineers and of large complex organizations." (Stinchcombe, 1985, p. 20)

And then, how is the project organization making decisions?

During my interviews, one of the project managers explained the following about the approval process for project documents and deadlines:

"Depending on the Contract, one person could be interested in getting as many (working) hours as possible. If a document has five review cycles, the project gets delayed, but the person does not care because he gets to review the document five times. If the contract he has is reimbursable per hour, and they have not achieved (approval). Because your job you will say, my job is to achieve maximum quality. And nobody told me in how many review cycles. ().

But if you give your work to somebody else to review, and you say I pay you 500 NOK an hour for reviewing, he will keep on reviewing because you wanted him to give you the best document possible. In the beginning two or three cycles, and then it is every time a little bit better. But the project has to finish with a deadline, and the project has to finish with a closed price. And those two factors are not affecting him. **The money factor is not affecting the end customer, because maybe he said everything is included. I don't pay anything extra. Everything is included because my Contract is very strong. But the EPC, whenever he has to pay, he will be against that decision because that decision is going to cost him money. So you see that quality, time and money are the 3 things that every Project Manager has to keep. But these parameters are not constant for all the individuals in the project. They are totally different. My deadline can be much earlier than the deadline from my End Customer. And my deadline can be**

influenced by the EPC contractor who is not telling me the truth. He is telling me

it has to be ready tomorrow, but in principle he knows that next month would

not be a problem either. (Int#01-08, from individual interview, 2017-2019).

So then why not deliver something *standard*?

In my interviews, one of the project managers explained the following:

> "Well. We could have delivered things completely standard and said this is what
> you will get. But that is not how it is. A lot of what we deliver can be modified quite
> a bit. Both software and hardware. It can be a cabinet with hardware, or something
> we program. In either case it can be modified a lot during the delivery projects. It is
> very few deliveries we have where the cabinets are identical, or where the graphics
> is identical. And then you must comply with the specification of the customer. So
> then you do that instead of trying to push what you have." (Int#01-08, from
> individual interview, 2017-2019)

3.4   Project management of oil and gas projects

All parties in the overall project typically have project managers. The end customer has

one or more project managers, each EPC has one or more project managers, and each of

the suppliers have one or more project managers.

> "The subject of project management has become one of the most common themes
> in the recent past, and that is due to the increase in the number of mega projects
> worldwide and the development of modern technology in all areas of knowledge,
> which requires new methods of project management to cope with fast-pace
> developing.
>
> Oil and gas companies are clear examples of the difference between the concept of
> a project and daily routine operations. These companies, in most cases, have an
> operations department and project department and they should work
> together."(El-Reedy, 2016, p. 1)

Delivery projects usually follow many of the same activities. A supplier can deliver the

same type of equipment over and over again to many different installations and

customers. In fixed-price delivery projects, the supplier has a strong incentive to reduce their production cost. One approach is to have an efficient and standardized way of executing the delivery projects. Project management can be part of such a standardized methodology. Standardized production methods and manufacturing techniques can be another.

Project management has long been considered as an academic field for planning-oriented techniques and, in many respects, an application of engineering science and optimization theory (Söderlund, 2004). The basis of project management theory is what could be referred to as an "articulated collection of best practices", drawn for the most part from the study of major North American engineering projects (Garel, 2012).

Project management has been in vogue since the end of the 1980s, and there is substantial literature about the topic. There is however a concern in the project management community about the lack of historical understanding of the emergence of project management and the importance of landmark projects (Söderlund & Lenfle, 2011).

Project management has become a profession, being part of higher education, and with professional associations and certifications regimes. Still, there are indications that many professional project managers do not intend to be project managers, but "fall into" the profession (Richardson, Earnhardt, & Marion, 2015).

Typical project management activities for the delivery phase are shown in the figure below. The project manager can be appointed early in the sales phase, but this may of course also not be the case. The activities are usually based on best practices, and part of the supplier's quality system for project management. A number of activities that project managers perform, or supervise, are also typically specified in the contract, such as reporting progress to the customer periodically throughout the project, inviting the customer to factory acceptance tests (FATs), and various other meetings between the parties.

1-Concept	2 Bid	3 Delivery	4 Commissioning
1.1 Feasibility Study 1.2 FEED Study	2.1 Request for Quotation (RFQ) 2.2 Bid 3.3 Contract negotiations	Hand-over from sales team Project planning and mobilization Kick-off meeting with customer Manage engineering design Progress reporting Manage procurement and manufacturing Manage contractual committments Manage customer relations Manage delivery to customer Demobilization. Close-out and hand-over to commissioning team	4.1 Installation 4.2 Mechanical Completion (MC) 4.3 Commissioning 4.4 Start of production and operation phase

Building Contract(s) with ECP(s)

Delivery Contracts with suppliers: Start of Delivery Project

End of supplier's Delivery Project

Figur 3-3 Typical phases and project management activities in an oil and gas delivery project as seen from a supplier
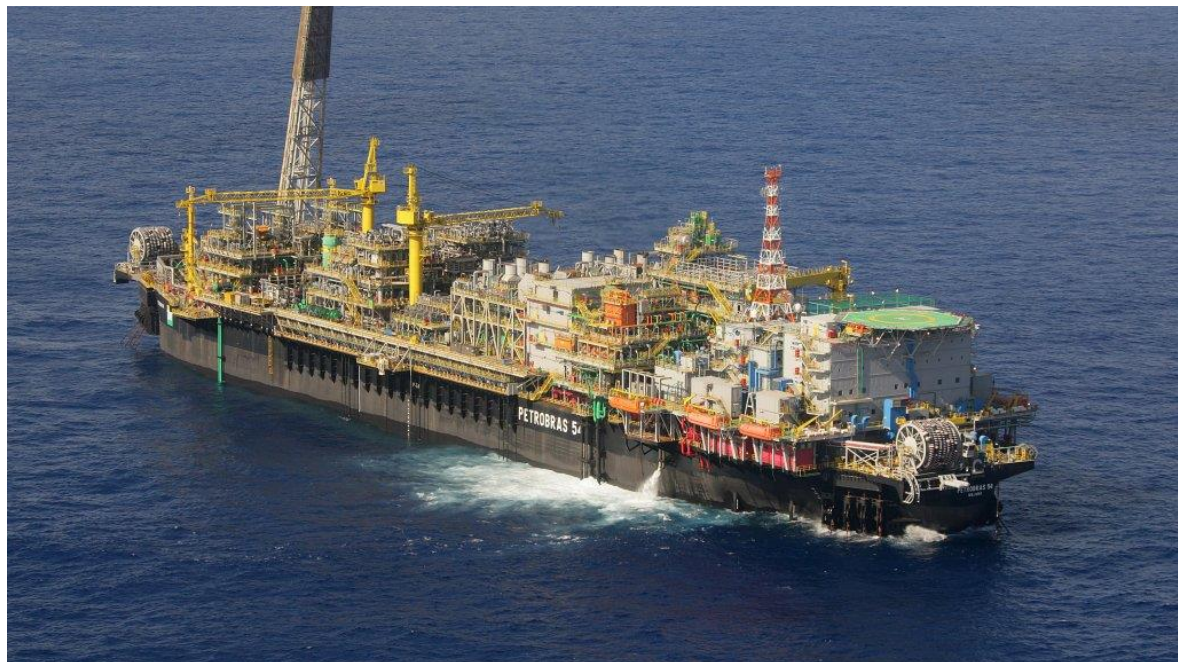
Figure 3-4 The P-54 FPSO on the Roncador Field in Brazil. Statoil acquired 25% in 2017/2018.

4   What are the challenges?

4.1   Introduction

In the following sections I will summarize some of the challenges with fixed-price delivery projects that were identified during the interviews. My first research question (RQ1) was about which challenges the project managers face in the execution of their delivery projects.

If there were no challenges, if nothing were to be produced or customized given limited time, money and resources, then there would be no delivery project either. Imagine for example that the customer has ordered something that the suppliers already have on stock. The supplier would then only need to ship the equipment and send the invoice. Then the order would be finished. This may very well happen for a spare part or similar, but this resembles more sales of off-the-shelf or consumer products. Delivery projects in the oil and gas industry however rarely consist of only off-the-shelf products. This is one of the reasons for delivery projects in the first place.

4.2   Fixed-price for risk avoidance

One of the main reasons, perhaps even *the* main reason that EPC and delivery projects in the oil and gas industry are fixed-price, is for the customer to reduce risk.

> "There are many ways to reduce the risk in general and these methods depend on eliminating the source of risk or transferring the risk to a third party. If this is done with a firm fixed-price contract, the risk is effectively transferred to the vendor." (El-Reedy, 2016, p. 312).

This is both a challenge and an opportunity for the suppliers: It is a challenge because the supplier has committed to deliver something at a given date for a fixed price. This is also an opportunity for the supplier to make money if they keep their production cost lower than the agreed price.

4.3   The delivery time

The delivery time can often be a challenge for a supplier. One of the project managers told the following:

"[-Which external factors would you say have the biggest influence on your job as project manager?]

-What I think is the most stressful. Of course it is not good to lose money, but I have to admit that if the time, if we cannot make the delivery times that are important for the customer, which are not necessarily contractual. But if we cannot make the delivery times that are important for the customer. That I think is what causes the most stress in my head. (). What is important, is that we do not actually delay the project of the customer. Then it strikes back at customer satisfaction and our economy. That is for sure. So we have to do all that we can to deliver the best that we can."(Int#01-08, from individual interview, 2017-2019).

4.4 Design freeze

To perform the work, the supplier is normally dependant on design input from the customer.

"The customer typically has a department that is working with us and giving us input. (). For a control system that we deliver, then it could be that after we have started building, different electrical and mechanical equipment package suppliers are decided. And it depends on the solution of everyone else in the project. So it will also affect our design. So after some months the customer may give us a new design where a lot has been changed. And they will make comments in our drawings that we have to adjust to the new design. And then we get to the design freeze. That you must have a design freeze and milestones for it. As supplier you will work hard to make sure every freeze is 100%, and not accept any change after that. But the problem is typically that you can have an agreement, and you may have in the contract that there shall be design freeze at specific dates. But if you freeze part of the design in November, and the rest in January, then the piece from January may not match what was made before. And then the customer may for example say that it was us who initiated that the original design had to be changed. (). **So design input and design freeze should be very simple, but in practice in projects it is always a bit floating.**" (Int#01-08, from individual interview, 2017-2019).

4.5   More people and more paperwork

One of the challenges was summarized as follows:

«**There is a lot more paperwork, and many more people involved in a project** .().

Before it was like the end customer and yourself talking one to one. Whatever he

told you it was no discussion about it, and whatever you told him was the real

knowledge. And **nowadays there are a lot of people around the table in every**

meeting. In my opinion, too many. And this is a very big part of the challenges.»

(Int#01-08, from individual interview, 2017-2019)

4.6   Different customers, different contracts

Another challenge for the suppliers can be the contracts. One of the project managers
explained:

"[-Are there many different types of contracts?]

-**Yes, for each customer there is a completely new contract**. So two different

customers means two different contracts. There is no standard. Standard terms

and conditions for contracts exist, but there is a big difference on customers who

have their own terms and conditions they want to have included in the contracts.

So if the project is of a certain size, this is often very demanding. (). Then you need

to use the legal department for interpretation of the contracts, and get them to

review the contract together with you to identify where the pitfalls and the

opportunities are. And that sets the premises for the project.

-So does that mean that the projects are very dependent on who the customer is

because each customer has different contractual terms and conditions?

-Yes, that I will say." (Int#01-08, from individual interview, 2017-2019)

4.7   Dependent on individuals

Delivery projects may not only depend on the contract, but also on the individuals
executing them. One of the project managers explained:

"Contractually the customers are the big oil companies in Norway, and more and

more often now it is also foreign oil companies. (). That is how it is contractually.

But in the next step, the customer is your contact person with the customer. And that too sets the premises for how the project will be. Very much so. You have the contract, but the coloring of how it is conducted is very person dependent." (Int#01-08, from individual interview, 2017-2019).

4.8   The customer may sit down and wait

A delivery projects cannot be executed by the supplier all alone. The supplier is typically dependent on the customer for a number of things during the project, and this may also be a challenge for the supplier. One of the project managers explained the following:

"-For example, the customer has a lot of systems you have to adapt to. And if they are not willing to help you, as vendor you will get a lot to struggle with.

-What do you do in situations like that?

-That is a good question. **It happens that the customer just sits down and is just waiting to get the delivery. And then you have a challenge.**" (Int#01-08, from individual interview, 2017-2019)

4.9   Customers can delay commercial decisions

The variation order regime is central and variations can be a topic for disputes.

"**Very often the customer uses variations, they postpone decisions regarding the commercial part of variations. They postpone it as long as possible to get in a position to negotiate, typically at the end of the project. Then we never get what we claimed to get in the first place**, because then the customer is in a position to negotiate. We want to end the project, and then we are willing to lower our demands.

-Is this something the customers are doing deliberately?

Yes, that I am absolutely sure about. Absolutely sure. They want to get in a position to negotiate the price. But if you are clever as a Project Manager, then you know, and then you increase the price instead, **so it often becomes this game. Or can become a game. So the best for us is to finish the variation orders as early as possible**." (Int#01-08, from individual interview, 2017-2019).

4.10 Not getting payed

Payment milestones and getting paid is evidently important for all parties in a project. That may however not always be as easy as it may sound.

"**The most challenging in that respect is customers who are not paying**. That is a challenge .In this project it was a deliberate holding back, detainment of paying. And unless you have very good judicial crowbars you have a big problem. (). It is very difficult to sit on a project for an indefinite time which goes in minus. (). Then you have no control. There is nothing you can do about that. (). Very little you can do." (Int#01-08, from individual interview, 2017-2019).

4.11 Customers requesting new offers

Changes in the original project scope often means that the supplier has to prepare new offers. But that should mean that the supplier gets to sell more, so how could this possibly be a challenge?

"-Are the variation orders you mentioned something you as a vendor give notice to your customer, that there has been some kind of change in the specification or something, so that it is *you* who take the initiative?

-Yes, normally it is we who take the initiative in the project phase. But they can also come to us and ask for things that they realize they should have had. How much does it cost? Then we make an offer. In one of my projects I issued a big VOR for setting up a test system that was not to be included in the delivery itself, but that was for testing different things. (). But then it can happen that they don´t want it after all. In this case they had also secured themselves **in the contract which said that these kinds of offers should be made for free, even in the project. That is not normal, but in this contract it was clearly written.** So we had laid down 4 man weeks of work to prepare this offer. But there is a risk that they say no, we don´t want it. It is too expensive, or it will be finished too late. (). **There was also another option we worked with for several man weeks, and not just us, but also another company. And then they said no, we don´t want it.** So that can happen." (Int#01-08, from individual interview, 2017-2019)

4.12 Individuals can have multiple roles

Who are the project counterparties or customer representatives with whom the project manager of the supplier is communicating?

> "I had a project with a bit of challenges. It was a customer who wanted to just sit there and get things delivered. And the main essence here is that everything is not as it seems when you look at it the first time. In this case it was a contact person who was not willing to help much. In projects you typically have to get data from the customer. And sometimes they can be difficult to retrieve. And in this case we struggled a lot to retrieve data, and to get answers on our requests. And then, after a long time, we found out that the contact person did not have a permanently position (with the customer), but that he was a consultant. And that you do not know in the first place because you get a name and maybe you get an email address that indicates that he is working for that company. So this person had multiple roles and was feathering his own nest at the same time. And that you cannot do much about, but it helps a little to know. And that is a challenge because you get a problem delivering on time, all the time. And all the time you need to find arguments in the Contract to make them do something, or to get paid for the time you are sitting and waiting. And they may not be willing to pay. So that is a big challenge (Int#01-08, from individual interview, 2017-2019).

4.13 Risk of theft

Can or should the supplier always trust the customer?

> "-There are always some challenges. We have experienced customers directly stealing solutions. There have been customers we had to convince to make them buy a service, and then we had to explain a little bit more than we wanted. Then they said no, and then it turned out they had been using the information we gave them.
>
> -To make their own solution?
>
> -Yes. That we have actually experienced multiple times. So you should be careful with how you write offers, and what you disclose of IP (Intellectual Property)

unless you know the customer very well." (Int#01-08, from individual interview, 2017-2019)

4.14 Cultural differences

Cultural differences are often a challenge in global projects.

"[What is the most challenging you have experienced with respect to customers or other companies in a project?]

- One of them is working towards the Middle East. They have this inherent belief that the suppliers are there to trick them. (). We see the opposite working towards Statoil in Norway, where we discuss with people who are Norwegians, or who have been working in Norway for many years, or who are similar to us culturally. (). When both parties are of the same opinion, or have the same attitude, it quickly becomes a much more constructive dialogue. Then you can sit and discuss and solve a problem, and the customer understands that we are there trying to help them. So the preconditions are quite good to reach a solution. However, when we come as naïve or very open Norwegians to the Middle East to run the same tactics there. Then we say, but yes, here you have chosen a solution that is perhaps not so good, so here we propose to rather do it like this, which is a newer and much better way to do it, we think. Or it will be a much better solution for the project. But the way this has been interpreted by the customer, is that we have some way of saving money. And that we, as the supplier, have a cheaper way to do it, that they think must be much worse. **So they think we save a lot of money by tricking them to do that instead of giving them what is written in the specification. While we, our thinking is that they get something that is much better than what they have paid for.** (). So they perceive it as if we are trying to trick them. (). And that is very frustrating. The more we argue that it is something we in a way give them for free, the more skeptical they become, because they think nothing is for free .(). **And that took a long time before we understood, that they shall have what they asked for. Nothing more, and nothing less.**" (Int#01-08, from individual interview, 2017-2019).

5   Research method

5.1   What is a Case Study?

One of the advocates for case study research is Robert K. Yin (Yin, 2014). He considers the working definition of a case study to be:

> "An empirical inquiry that closely examines a contemporary phenomenon (the case) within its real-world context". (Yin, 2015).

It should be noted that case studies can be conducted using different research strategies: Case studies can be performed using quantitative research methods, qualitative research methods, or with combined *mixed methods research* or *triangulation*.

Case studies can involve either single or multiple cases. They typically combine data collection methods such as interviews, questionnaires and observations, with evidence that can be qualitative (words), quantitative (numbers) or both.

"The resulting case study will be an up-close and in-depth inquiry into a specific, complex, and real-world phenomenon (the case). []. The interviews and documentary sources will not only add depth to your case study but also can cover actions over an extended period of time. With such a range, your completed case study can be more than a mere 'snapshot' of events." (Yin, 2015).

Modern case study research has antecedents in anthropology, sociology, and psychology. "Qualitative case studies share with other forms of qualitative research the search for meaning and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigative strategy, and the end product being richly descriptive." (Merriam, 2009, p. 39).

5.2   Research strategy

To explore challenges and strategic considerations that project managers can be faced with in delivery projects, and the decisions they make, means to understand at some level how they think about strategy. This again requires understanding the context and organisational environment that project managers operate within. This led me to

conclude that a qualitative research approach, taking the practitioners' experience into consideration, was well suited to answer my research questions.

In answering the research questions, I have used inductive reasoning as my primary mode of analysis. However, by going back and forth between theory and other relevant research that I have identified along the way, and data from my own interviews collected over a period of more than 1 year, I have used what could also be referred to as an iterative research approach or iterative strategy. As acknowledged for example by Alan Bryman, "that social research often does not conform to a neat, linear process" (Bryman, 2015, pp. 13, 22).

Deductive approach: Inductive approach:

Theory	Observations/ Findings

Observations/ Findings	Theory
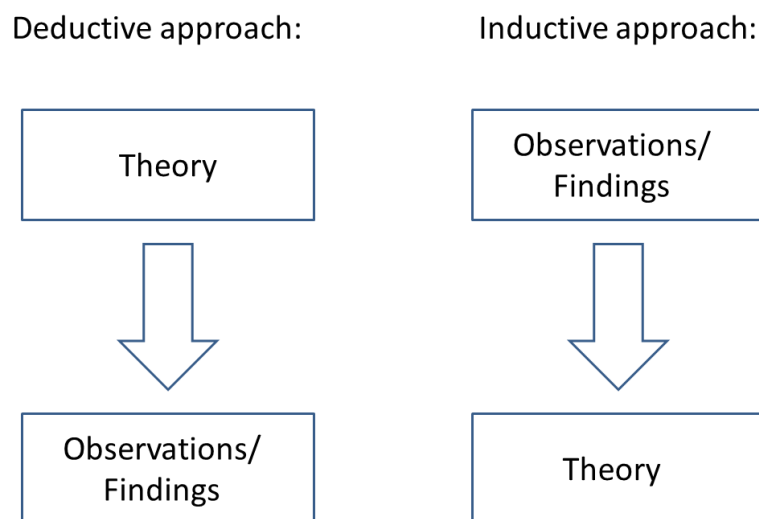
Figure 5-1 Deductive and inductive approaches to the relationship between theory and research

5.2.1 Purposeful sampling

Michael Quinn Patton describes different "design strategies" for qualitative inquiries (Patton, 2002, p. 40):

1. **Naturalistic inquiry** - Studying real-world situations as they unfold naturally

2. **Emergent design flexibility** - Openness to adapting inquiry as understanding deepens and/or situations change

3. **Purposeful sampling** - Cases for study are selected because they are "information rich" and illuminative, that is, they offer useful mainfestations of the phenomenon of interest; sampling, then, is aimed at insight about the phenomenon, not empirical generalization from a sample to a population.

I have used purposeful sampling by interviewing experienced persons from the industry precisely for this reason. To meet the research objectives, I interviewed project managers of oil and gas projects who each had 10 years or more working experience. I have used qualitative research because it allows interviewees to share their experiences and understanding of the world, and because it facilitates mutual knowledge construction between the interviewer and the interviewee (Kvale & Brinkmann, 2009).

The data were collected using semi-structured interviews which resemble a conversation, and centres around predefined topics. The interview guide that I used is included in Appendix B.

The research has been approved by NSD (Norsk senter for forskningsdata) with the requirements given in Appendix A. The company was also informed, and permission to conduct interviews was granted by a management representative before any potential interview candidates were contacted.

5.2.2   Insider research and data collection

The individual interviews were conducted with persons being employed in the same multinational company as me. I have been working as *project engineer* and *lead engineer* in a number of delivery projects. I have also been working as *project manager* for smaller projects, but not as line manager and neither project manager of large projects. Potential interview candidates have therefore not been persons who have been reporting to me.

Suppliers to oil and gas construction projects are in a highly competitive worldwide business. Being personally employed by one of the main suppliers I considered the possibility to conduct this kind of research in competing companies not to be an option. I therefore did not make any attempt to ask for permission to interview project managers of competing companies. Perhaps they would have accepted, but I decided not to do so. Representatives from EPC contractors and oil companies I simply did not have the time

and capacity to interview. That would also have required a different research strategy and other research questions.

Michael Quinn Patton describes one of the challenges with insider research to "*combine participation and observation so as to become capable of understanding the setting as an insider while describing it to and for outsiders.*" (Patton, 2002, p. 268).

The primary benefit of doing insider research is my personal experience and knowledge of the company and the industry. At the same time I had to be careful not to let my personal experiences influence the interviews too much. In (Andersen, 2006), Svein S. Andersen discusses strategies for "active interviewing" (aktiv informantintervjuing). Andersen wrote (translated from Norwegian):

> "Conversational interviews are often referred to as unstructured, unsystematic, open-ended, thematic or qualitative (Yin 1989, Hellevik 2002, Pawson 1996). (). **In the literature on conversational interviews, the ideal is most often a passive listener role, characterized by open-ended questions where the informants' response largely controls the conversation. It may be wise in some contexts, but in conversations with resourceful informants, a more conscious and active research role will be able to pay off more in the form of analytical control - and thus increased validity and reliability.**" (Andersen, 2006)

This balance between being active during the interviews to avoid potentially being completely derailed from the topic of interest by the interviewee, and being passive and careful enough to listen and reflect on the meaning of what the interviewee was telling, and avoid bringing my personal experiences and opinions too much into the conversation, was perhaps my biggest challenge with the interviews.

At the end of the interviews I asked the interviewee if they had any recommendations for other people who could provide insight into this topic and be willing to participate in an interview with me. The recommendations I got I also used for selecting the next person to interview.

5.2.3 The research process

The starting point of this study was my personal experience and interest in the topic of project management. During the work with this study I have also been working full-time in the oil and gas business both as project engineer and project manager.

A short summary of my research process is a follows:

- Preparations for the thesis started in 2015/2016 as part of "Organisasjons- og LedelsesUtvikling" at HIOF: Preliminary work on topic, literature review, problem statement and research method.
- Discussions with Professor Ivar Jonsson (my first supervisor) at HIOF in 2016
- Application to NSD in 2016 regarding treatment of personal information
- Approval from Company for conducting interviews
- New supervisor assigned. Discussions with Professor Egil J. Skorstad at HIOF in 2016
- Interview no.01 was performed, 2017-2019
- Interview no.01 was transcribed and anonymized, 2017-2019
- Work on thesis, literature review etc.
- Interview no.02 was performed, 2017-2019
- Interview no.02 was transcribed and anonymized, 2017-2019
- Further work on thesis, literature review etc.
- Interview no.03 was performed, 2017-2019
- Interview no.03 was transcribed and anonymized, 2017-2019
- Further work on thesis, literature review etc.
- Discussions with Professor Egil J. Skorstad. Review of the first 3 interviews.
- Interview no.04 was performed, 2017-2019
- Interview no.04 was transcribed and anonymized, 2017-2019
- Further work on thesis, literature review etc.
- Interview no.05 was performed, 2017-2019
- Interview no.05 was transcribed and anonymized, 2017-2019
- Further work on thesis, literature review etc.
- Discussions with Professor Egil J. Skorstad. Review of interview 4 and 5.

- Interview no.06 was performed, 2017-2019

- Interview no.06 was transcribed and anonymized, 2017-2019

- Further work on thesis, literature review etc.

- Interview no.07 was performed, 2017-2019

- Interview no.07 was transcribed and anonymized, 2017-2019

- Further work on thesis, literature review etc.

- Interview no.08 was performed, 2017-2019

- Interview no.08 was transcribed and anonymized, 2017-2019

- Further work on thesis, literature review etc.

- Discussions with Professor Egil J. Skorstad. Review of interview 6, 7 and 8.

- Further work on thesis, literature review etc.

- Final write-up of thesis and submission to HIOF in May 2021.

Here I would like to add that during these last years of my studies at HIOF, my wife and I have raised two children, my wife has completed her PhD, and we have both been working full-time. Then came the COVID-19 pandemic. This is a brief explanation as to why I have been delayed finishing this thesis. So the research process has been stretched out in time with long periods in between where I have not worked on the thesis at all. The long period of time has however allowed me to reflect more on the subject while working full time both as an engineer and project manager.

5.2.4 Interview quotations

All quotations from the anonymized transcriptions of my interviews have been made to appear identical. The eight individual interviews were performed in the period between 2017 and 2019, and all of them where voice-recorded with permission of the interviewees. I personally transcribed the voice recordings of all the eight interviews. The voice recordings consisted of about 10 hours and 20 minutes of interviews, which resulted in about 136 pages of transcribed interviews. And, not to forget, first I transcribed everything in Norwegian, and then I translated selected quotes to English, so the quotes are my broken English translation. Originally, I arranged my interview quotations as shown in the table below.

Example reference	Description
(Int#01, #00:54:00#)	From interview number one, 54 minutes into the interview
(Int#05, #01:45:00#)	From interview number five, 1 hour and 45 minutes into the interview
(Int#08, #00:33:00#)	From interview number eight, 33 minutes into the interview

Table 5-1 Example of interview quotations

Instead I have made all the interview quotations that I have used appear identical:

(Int#01-08, from individual interview, 2017-2019)

The reason for this is to hide the identity of the interviewees. Personal details have been removed. Quotes from all the eight interviews have been made, but who said what among the interviewees is not of any interest for the discussion. These details have therefore also been removed.

Empty brackets, "()" or "[]", means that something was said in-between that has been removed from the quote. That also applies to quotations from the literature.

5.2.5   How the data were analysed

There are so much data presented here in the form of interview quotes that I think it should be possible for any reader to judge if my analysis fits with the data or not. I have had discussions with my supervisor Egil J. Skorstad based on the anonymized transcriptions of the interviews as described about my research process, and I surely have received good advice (many of which I have probably not managed to follow up on), but I think it is fair to say that the analysis has been done by me. Or- if you think it was poor, then yes I am to blame. So then, how did I do it? Again, I think this will be so transparent that I do not see any need for a detailed explanation. It was just old fashion logical reasoning, trying to categorize and see how the data fit with other research. No computer software has been used to analyse the data from the interviews, absolutely not. No counting of words or anything like that. I have kept far away from any type of computerized data analysis (maybe because I have been working too much with computers and software). What I did however, that I think is worth mentioning, was to reflect and do some analysis after each interview. And then I have spent quite a bit of time searching for and reading other research that I have found to be relevant.

5.3 Ethical considerations

There are a number of ethical issues that can arise when conducting social research. According to David Silverman, the most prominent principles that most researches would agree on are the following (Silverman, 2017, p. 57):

- Voluntary participation and the right to withdraw

- Protection of research participants

- Assessment of potential benefits and risks to participants

- Respecting the privacy of participants and avoiding deceiving them

- Obtaining informed consent

- Avoiding harm

I have strived to follow this and other "ethical issues checklists" such as (Merriam, 2009, p. 233) by obtaining informed consent from all the participants, and informing them that their participation is voluntary and that they could withdraw at any time. Personal information about the participants is not of any interest for the research questions, and I only made a few inquiries about it during the interviews to get the conversations started. I have therefore strived to remove information that could be linked to individuals, and this is also why I have not distinguished between the participants in the quotations as explained in the previous section.

Neither, in my opinion, is the specific supplier company of any particular interest as there are a lot of suppliers in the oil and gas industry. As to avoiding harm, I would of course not allow this thesis to be published if I thought it would make any harm.

5.4 Method for identifying the research questions

A method I used to identify both the research questions and topics for the interview guide was to list and described conditions that I believed could influence the project execution. Most of the conditions I identified have not been investigated in this study. My motivation for making this overview was:

- To limit the scope of this study by identifying selected key topics to be explored in more detail.

- To get an overview of conditions that I believed to be of importance. To reflect on possible interconnections and dependencies and the way the conditions could affect the project execution strategy.
- To prepare for the interviews by trying to get a better overview and knowledge of the topic, and try to improve my ability to recognize and clarify findings when collecting and analysing the data.

One of my main insights from this work was to focus on challenges during the interviews. If there is no challenge or problems, then why would you need a strategy?

5.5 Credibility , validity and reliability

A common critique of qualitative research is the bias of data collected and analysed through the researcher. Being for example closely tied to the company where the interviews were done might challenge the independence of the researcher and influence the researcher to focus on some findings while ignoring others.

Similar professional and educational backgrounds of the participants and the researcher could also create a risk of their identifying too closely with each other. Not only could the researcher identify too closely with the participants, but the participants could also perceive the researcher as a "likeminded colleague".

At the same time this is what I expected would be my main advantage of conducting qualitative insider research on a topic of which I have personal experience. I believe the participants indeed perceived me as a "likeminded colleague". One thing I had to be careful of in this respect during the interviews was not to take understandings for granted (as if I already knew since I was an insider), and remember to ask follow-up questions. So I acknowledge there could very well be biases, but they could also be seen as strengths as Uwe Flick explains:

"In quantitative research, criteria for reliability and validity are more or less based on standardization of the research situation. It has sometimes been suggested that the classical criteria of empirical social research - reliability, validity and objectivity – may also be applied to qualitative research. This raises the question of how far these criteria, with their strong emphasis on standardization of procedures and the exclusion of

communicative influences by the researcher, can do justice to qualitative research and its procedures, which are mainly based on communication, interaction and the researcher's subjective interpretations. Often, these bases are not seen as biases but as strengths or even preconditions for the research." (Flick, 2015, p. 236).

Flick further describes suggestions for reformulating the concept of reliability (such as the exactness, degree of consistency and repeatability) with a more procedural emphasis have focused on the questions of how data are produced. A requirement is that

- (a) statements by participants, and
- (b) interpretation by the researcher

should be clearly distinguishable. And finally, that one way to increase the reliability of the whole process is to document it in a detailed and reflexive fashion. (Flick, 2015, p. 237). One measure I did was to do voice recording of all the interviews (with informed consent) and transcribe all of them in detail. All statements by participants are based on these anonymized transcriptions (and some participants also reviewed them), and they are quoted separately as explained earlier.

Sharan B. Merriam also explains why reliability of a qualitative study is problematic: "Reliability is problematic in social sciences simply because human behaviour is never static, nor is what many experience necessarily more reliable than what one person experiences. (). Replication of a qualitative study will not yield the same results, but this does not discredit the results of any particular study; there can be numerous interpretations of the same data. The more important question for qualitative research is whether the results are consistent with the data collected." (Merriam, 2009, p. 221).

Still, even if reliability of a qualitative study is problematic, it does not mean the researcher should be deliberately biased and one-sided unless there are good reasons for doing so, and it is part of the research strategy. In my case I have tried to be as neutral as possible, in the sense of not acting for or against any participants in a one-sided way.

Validity

The concept of validity (whether for example findings result from changes in other variables (internal validity), and how far results can be transferred (external validity)) also requires reformulation for qualitative research. "One suggestion is that researchers should scrutinize interview situations for any signs of strategic communication. That means that the interviewee did not openly respond to the questions but was selective and reluctant to give answers. This leads to the question of how far you can trust the statements of the interviewee." (Flick, 2015, p. 237). Will the participants' statements be reliable and trustworthy? I think so yes, but this should of course also be up to others to judge. This is also a reason why I have included a number of quotes from the interviews.

Another proposal of reformulating the concept of validity is from Mishler (1990) who goes further and starts from the process of validating (rather from the state of validity). He defines 'validation as the social construction of knowledge (1990, p.417). (Flick, 2015, p. 237).

"One of the assumptions underlying qualitative research is that reality is holistic, multidimensional, and ever-changing; it is not a single, fixed, objective phenomenon waiting to be discovered, observed, and measured as in quantitative research." (Merriam, 2009, p. 213)

Credibility

Credibility can be seen as an aspect of trustworthiness, to which degree a research is believable and appropriate. According to Michael Quinn Patton (Patton, 1999), the credibility issue **for qualitative inquiry** depends on three distinct but related inquiry elements:

- Rigorous techniques and methods for gathering high-quality data that are carefully analysed, with attention to issues of validity, reliability, and triangulation
- The credibility of the researcher, which is dependent on training, experience, track record, status, and presentation of self; and

- Philosophical belief in the value of qualitative inquiry, that is, a fundamental appreciation of naturalistic inquiry, qualitative methods, inductive analysis, purposeful sampling, and holistic thinking.

Again, as with the analysis, I think the question of to which degree this case study is reliable, valid and credible will be so transparent that any reader will be able to judge himself. I therefore see no need to make a statement or comment further on this.

5.6   Alternative research approaches

One alternative to a qualitative interview study could have been action research. For example, Patanakul and Shenhar describe an empirical research to test their proposed project strategy construct consisting of two phases. The first phase based on case study research, and the second phase involved action research where they introduced an initial project strategy framework to project teams they addressed in the first phase.

During the action research phase, the research teams presented the formal framework of project strategy to the (three) project teams during an overview session of several hours.

> "They were first asked to perform an exercise in which they defined the elements of strategy for a given learning case. They then had to look for specific items in their original project documents that had to do with strategy, and were presented the relevant findings from the first phase. Finally, they were asked to develop a detailed, specific, and explicit strategy document for their own projects" (Patanakul & Shenhar, 2012, pp. 10–13).

As opposed to Patanakul and Shenhar, who used a case study approach that included an action research phase, my objective is not to demonstrate how project teams can adopt a certain strategy concept. Rather my interest has been to explore the strategic thinking and practices of experienced project managers of oil and gas delivery projects, and the organizational context they operate within.

This does not necessarily exclude action research as an alternative. There are however in my situation some major problems with action research. Action research involves actively participating in changing a situation, which in my case would mean to intervene with ongoing delivery projects. This is simply no option on my own workplace, and possibly

even less of an option for me to conduct in competing companies. Action research is typically motivated by solving a problem, which is also not the objective of this case study.

Another alternative could have been to conduct a quantitative study. Quantitative methods can be used to test hypothesis and is often motivated by a desire to generalize findings. That is neither the objective of this case study. An example of a quantitative study related to project management is described in "What is Enough Planning? Results From a Global Quantitative Study" (Serrador & Turner, 2015) that "investigate the impact of project planning and project plans on project success. Does better project planning lead to more successful outcomes on projects?" The result can be very briefly summarized as: "Data was collected on 1386 projects from 859 respondents via a global survey. A significant relationship was found between the quality of the planning deliverables and success." (Serrador & Turner, 2015).

A third alternative could have been observations. But how can a strategy be understood merely by observation? If at all possible, it would have been very time consuming and practically very difficult as it could take years for a strategy to play out. Nevertheless, observations and experiences from my own job are an important part of my understanding of the topic.

A fourth possibility could have been to first conduct a quantitative study to identify cases and persons that meet certain criteria, and then to perform a qualitative study for a rich description of selected cases. This type of extensive studies I personally did not consider realistic for me to conduct as a single researcher doing this in addition to a full time job and having small children.

6   Findings

6.1   Introduction

This chapter I have devoted to what the project managers said during the individual interviews. Again there are a number of lengthy quotes. Why have I included so many quotes?

In "On interpretation in the qualitative research interview" (Kvale, 2005), Steinar Kvale addresses some practical problems with interview studies. In his description of "the five phases of the research process", he notes that a "save what can be saved" approach is probably the most common "in the final resignation phase" (translated from Danish):

> "A report where the results from the interviews are presented mainly as live and exciting single quotes, but without any systematic analysis of the content of the many interviews. And in cases where a systematic 'final report' is presented, the researcher may show a pronounced resignation, as he did not succeed to communicate the original richness of the material from the interview in a methodologically sound form." (Kvale, 2005, p. 2)

Maybe I have not succeeded with the presentation either, but I have included all these quotes because they are short stories, experiences and reflections on which my case study is based, and I do not want to hide them all behind my own personal interpretations. The quotes give valuable insight and are part of the basis for my discussion in chapter 7. I have also presented them as evidence for my findings and as answers to my research questions, even though many fewer and shorter pieces of evidence would probably be more than sufficient. This chapter is organized in the following sections:

6.2 Problems and influencing factors: A selection of quotes that give further insight into research question RQ1 about challenges. Chapter 4 was also dedicated to challenges. Problems and factors that can affect a delivery project are closely linked so this chapter also gives insight to my research question RQ3 about influencing factors. Some strategic considerations related to RQ2 are also mentioned.

6.3 Cultural differences: A selection of quotes related to cultural differences. This applies to challenges in *global projects* as explained in chapter 2. Some strategic considerations are also mentioned.

6.4 Strategies used: A selection of quotes that give insight to my research question RQ2 about strategies used by the project managers.

6.2 Problems and influencing factors

6.2.1 Expectations

The projects could have been ongoing for years before the reach the delivery phase, and before startup of the delivery phase there must have been a "sales phase" to agree on the Contract. Naturally there will be expectations from all parties on different aspects of the project. One of the project managers gave the following example:

> "**Some customers say; but you are the specialists, this you have to handle. And then maybe they give us a responsibility that we are not paid to do**. Something that is not in our scope of work. (). Then we say, yes we can help you, but this will cost money. We could have delivered only some equipment package without any FEED (study), and without any engineering except for specifically that equipment package, based on input we have received from the customer. Then this is to be integrated into an existing system, and then they say it doesn't work. Then they say, but you are the specialists, you have to tell us why it doesn't work. And very often, because they bought it from us, they expect us to tell them everything for free." (Int#01-08, from individual interview, 2017-2019).

6.2.2 The situation of the customer

The situation of the customer is part of what I have previously referred to as the context and organizational environment that can affect delivery projects. One of the interviewees explained:

> "**If our customer is under pressure, then we also get under pressure.** If our customer has little money and has a bad contract with the end customer, then it comes down on us. It is not so much we can do about it, but you can be aware of it. If you show you have the understanding you may get a better dialogue and

relationship with our customer." (Int#01-08, from individual interview, 2017-2019).

Another example that one of the interviewees commented was the following:

"A typical thing we notice is this: **Even if you and your project have deadlines, then maybe the customer has payment milestones that are tied to what we are delivering.** For example you can be pushed to deliver documentation at a certain date. And that it becomes very important for them maybe because they need the documentation to invoice the end customer. And when commissioning is approaching, or towards the end of the project when they are to tow the offshore platforms, then it typically is a small windows of a few months when they can do it, or else they have to wait until next year. And then of course it is a lot of pressure to finish within that time. So there are many external factors that can affect the project. (Int#01-08, from individual interview, 2017-2019)

6.2.3   The quality of the design input

Another challenge can be the design input required to manufacture the delivery according to the specifications:

"**What perhaps affects us the most is the quality of the design input from the customer.** That differs a lot between customers, how experienced the customer is and which country they are from, and how experienced the EPC contractor is." (Int#01-08, from individual interview, 2017-2019)

6.2.4   Design changes

Design changes are normal and can be a challenge in a many different ways. Here is one example:

"There can be customers that want to get more than what is written in the contract, or they have a different interpretation of what is written there. It can be that they do not want to pay, or they try to postpone or detain the payment. That is quite common. It can be that they try to introduce some changes. For example, it can be an unfinished cabinet that they had from before, and then they changed

the design and they want to have the change for free. (Int#01-08, from individual interview, 2017-2019)

6.2.5 Negative Variation Order

A Variation Order normally means that the supplier is compensated for additional work. This may however not always be the case as one of the interviewees explained:

"I have experienced to manage a project. I got the project, started the project and were about to start delivering. Then comes the customer and says they would like a Variation Order. Oh that's good, I'm thinking. But then it turns out it is a *negative* Variation Order. The customer has had a product that we were to upgrade. It turned out that they were not satisfied with the product so they had had a third party working for them for more than a year to make a new product for them. We had not even been told. Then in the project they came and told us they would remove two of the deliveries from the project. We have been buying somewhere else." (Int#01-08, from individual interview, 2017-2019)".

6.2.6 Delays and penalty fees

The contracts normally specify some form of penalty if the supplier is delayed. How this is practiced can however be another matter. Here is one example:

"-There was a funny episode in a project I had previously. There we clearly were too late with our delivery. So I wanted to find out if they intended to give us a penalty fee or not. It was little doubt that they could give us a penalty fee if they wanted. And I wanted to meet them face-to-face and discuss with them to find out if they intended to penalize us. But I did not want to put it on the agenda. So I sent them an email and asked if we should discuss how we could help them with the installation and commissioning. But no, that they did not want. So I had to tell them what I really wanted, and tell them that I wanted to discuss how big a penalty fee we should get. I remember I sat at home one evening and sent them an email where it clearly said what I wanted to discuss with them.

And the day after when I came to work, they had changed the order so that it said we should deliver exactly on the day we delivered. So that was how they did it.

They actually revised the order, and changed it so that it said we should deliver the day we actually had delivered. So that was really good. They did not intend to give us any penalty fee, that was clear. They made it clear by revising the order. They could just have replied that they did not intend to give us any penalty fee, and I still would have had a bad feeling in my stomach that maybe one day they would. But they revised the purchase order. (). This was a customer in the Middle East.

-Why do you think they changed the delivery date?

-I think they were very satisfied with the delivery. It had extremely good quality. We delivered it without any punches. That is unique. So they were very happy about the quality. And then I think we delivered in time for when they actually needed it. So in my experience it is not normal to give penalty fees." (Int#01-08, from individual interview, 2017-2019).

6.2.7 Every project is like a multi-customer project

Related to the context and organizational environment, one of the interviewees explained the following:

> «**The first thing we find is that there is no *one* customer. Every project is like a multi-customer project.** Why do I say that? Because in every meeting, in every decision making, in every discussion you have to do with the End Customer, you have to do with EPC Contractor, and you have to do with the Engineering Company who is being the consultant of the EPC Contractor. In many projects, like for example in Korea, they don´t do the engineering. The engineering is sub-contracted to an Engineering Company. And the End Customer that does not have the resources to do the projects themselves, they sub-contract it to a Project Management Contractor (PMC) or Advisors. « (Int#01-08, from individual interview, 2017-2019)

6.2.8 Decisions get disturbed

During a project, numerous decisions have to be made. The decision-making process is critical, so how does this happen in practice?

"The End Customer also has one entity that is in every meeting, and he will also be in the approval cycle of one (delivery) document. So you can imagine that one document that we (as a Supplier) generate goes to our direct customer. This customer is sending it to his engineering partner, processing it with several people, and passing it to the end customer. The end customer is also passing it to this Advisor or this PMC. And then you get the whole thing back. In that cycle there is a change of people that are contracted only for that project. And they are contracted only to give their opinion about something, their technical opinion. In many cases, in 90% of the cases it is a technical opinion. So when you have four people, four engineers commenting some technical document I will tell you that you get four opinions. But the project has to continue with one. We cannot make four cabinets, we cannot make four colours, we have to decide on one. **So all the complications that are arriving to the table is because of too many opinions.** ().

If they hire you to give your opinion in a meeting, and there is a round of opinions, then the tendency is that each person will differentiate himself from the others. Because if you say the same as the rest and you say that always, or you don´t say anything because you agree which would be in many cases the most intelligent thing if somebody gave an opinion that you think is quite smart, you do not say anything. Then your added value would be what? Why did he not say anything? So the decisions get disturbed. **The discussion gets disturbed because of the multi customer structure of the projects. In my view this is the biggest challenge that I see in the projects I have been doing in the oil and gas industry.**

On top of that, and this is also part of the reason why there are so many people, on top of that it is true that what you have is a multi-country, multi-location and multi-culture (project). So normally it is like this that a typical project could be an End Customer being for example in the Middle East. And Middle East will contract maybe one European company as Advisor. (). Then you have an EPC Contractor that maybe is Japanese, or maybe Korean. The Japanese are strong EPCs and they are going to build a refinery, or a gas plant or an offshore (installation), so this is Far East mentality, oriental mentality. And they will have hired an Engineering

Company. The Singapore branch of an Engineering Company will maybe be different from the UK branch, for example. Because the engineers will have different nationalities. So even though each of them have studied the same engineering and they have the same engineering skills, the way of thinking and the way their brains are working is different because of their background. (). Also the way of communicating that thinking and the way of bringing outside that thinking, is totally different, and this mix is influencing the whole thing.

For example, a Korean engineer can be very skilled, but if he is in a meeting and there is an American person who looks to be very skilled, but he is shouting a lot, then the Korean person will not open his mouth. It is a typical example of how these situations get disturbed.

So only by having these two persons in the meeting, you may have one outcome. And if the person, the American in that case, if he is sick the next day, and then in the next meeting only the Korean will be there and maybe the outcome will be very different. «(Int#01-08, from individual interview, 2017-2019)

6.2.9 People get replaced or change jobs

And further, related to challenges with the overall project organization that can affect delivery projects and how a project manager deals with it:

"Even on top of the fact that you have so many different people from different backgrounds, you find very often in projects that takes 1 year, 2 years from beginning to end, **that the same position is being changed 2 or 3 times.** It is not that you have *that* team. That team is being renovated all the time, and this will happen. And you cannot say this happened, what bad luck. No, **this will happen and the moment the new person is coming, then you have to analyze**. Ok. A new person is coming. How is he? Is he old? Is he wise? Where was he working before? Many times you find a person who was working in the same company as you. If you don´t ask, he may not tell you. In fact, most of the time they will not tell you. Why? Because he has some information. He is your customer. He has some information and he doesn't want you to know that he has that information. He wants to see you, what you say about things. But if you know that he has been in

the same company as you, then you can also share different things with him, and you can explain to him things in a different way. So where are they coming from? What was his job before coming here? How long is he going to stay? Indians, for example, they really come, do something and disappear, because they are very focused on their career. So if they are not happy they will not be there for long. They will leave and not care about the project. They are in their career mindset. So these things affect the project a lot." (Int#01-08, from individual interview, 2017-2019).

6.2.10 Conflict between other parties

What do you do if there is a conflict between other parties of the project? Here is an example:

"-I had a project some years ago where we experienced a customer in a phone meeting who was quite angry, and to us it was very difficult. It was a big quarrel on the other side of the phone. It was a lot of yelling back and forth, and we were wondering what was going on. There were two parties on the other end of the phone, and they were going to come visit us because we were three parties who were going to cooperate. It was the end customer, the other third party and us. And then we prepared very carefully with respect to the technical matters, and very carefully with respect to the psychology for how we should conduct the meeting. (). It turned out that the person representing the customer was not difficult to work with as such, but there was a conflict between the other two parties that we did not know about.

We tried to analyze what had happened. We gathered information from project which had actually already started, so we got some data on the table. And based on the data we made a plan for how to conduct the kickoff meeting. We made an analysis of the persons, and based on that analysis we decided how to conduct the meeting. **That could for example be as simple as learn not to be assertive even if you know you are right.** (). **In addition we decided very early that we had to have a social happening, so that we could get this over on another arena for some time, so that it would be possible to establish a friendship and a relationship**

outside the technical and the project. And those two factors I think made the project a success." (Int#01-08, from individual interview, 2017-2019).

6.2.11 Horse-trading

Often project managers have to make compromises. Here is one example:

"[Did you ever have to make some kind of compromise with your customers?] -Yes, yes, yes. All the time. (). I have an example from one of my projects where the customer had bought these test suitcases. For the mechanical packages we travel and perform tests. For example with those who deliver air compressors. We test as much as possible with our control system. So we have these test suitcases with controllers inside that we travel with to the supplier of the air compressors and test it to make sure it works before it is installed on the platform.

These test suitcases are actually the property of the end customer, but we have them and travel around in Europe. And then we had to buy a carnet. (). A carnet is a customs document. It is a document you bring with you, and you get a stamp in it when you travel (in and out of a country) to get the equipment with you without any problems. And they are expensive. I think we had to pay between 100.000 and 200.000 NOK in total for these carnets. And it is a lot of administration with them. So I sent a VOR on it. Look, this is your property and we are stuck with them. But the contract did not mention anything about it. So the customer said it should have been highlighted in the contract that these costs would come. And it is not difficult to agree that it should have been written in the contract. So they mean we had undervalued these costs. But purely legally I think we had a quite good case.

But then there was a case with something we had been far too late to ask for. Because the rates, the hour rates for example, are to be escalated every year. But in the contract it is written that you have to notify 2 months before. And this we had not done. Then we said we wanted to have the rates escalated, but they said no. And legally this was clearly a lost case, but unreasonable and not industry practice as far as I know. So I actually became quite angry about it.

And then after a while I understood that it was this VOR on the test suitcases that irritated them so intensely. And then we traded horses. Ok, you get to escalate the rates, and we had to cover these costs (with the test suitcases) ourselves. Typical. A typical thing that happens. (). So horse-trading happens all the time." (Int#01-08, from individual interview, 2017-2019).

6.3   Cultural differences

One of the characteristics of global projects is cultural differences. This has been commented already as most of the oil and gas projects are global. I have however grouped some more stories in this chapter.

6.3.1   Different customers, different conditions

One of the interviewees explained the following related to cultural differences:

«He is pushing me to work at night, or pushing my people, even knowing that the project does not need it. But somehow he is pushing me because he is of Indian nationality, and he will just push, push, push.

A Statoil person on the other hand, will be more pragmatic and will say, what is your problem? And I will say I don't have people. The Middle East person will say I do not care. The Indian will say this is your problem, and then you have to multiply the number of people by three. Because in India they are used to multiplying the number of people like that. But in Europe we cannot do that. The Statoil person will understand that you cannot do that. He will say, let us tell them that, ok, when can you be ready if you have the right people with a reasonable working time etc.? Oh then it is not tomorrow but in one week. He will say maybe, ok, you have five days. You see? With Statoil I have five days. For the Indians I just have to multiply my number of people, and for the Middle East person he does not care. You see the differences? So in the life of the Project Manager it is all about getting the right decisions that are helping your project to progress fast and smoothly and with as little cost as possible. (Int#01-08, from individual interview, 2017-2019).

6.3.2   Claims

So you feel that the project has been going well?

"I think the Dutch are much more cynical. (). You think the project has been going really well, but then they come with a case they have built up in the background. And then they suddenly come and slam it into the table. Even if the atmosphere is very good and all. (). And we see that much more often now. That if there have been delays, and the input from the customer was delayed, causing us to be delayed with our delivery. But we did perhaps not notify the customer that they were delayed with their input. Then they come with a claim towards us because we delivered too late.

That we see more and more. Perhaps more from European customers, but also from some Norwegian customers. (). You don't necessarily have to pay the claim, but they present the claim even if the whole project has an understanding that there is no claim. And very often you can get away by documenting that the customer was too late with input compared to what was in the contract. So for example with these Dutch customers, you get the understanding that everything is going well, or at least fairly good. And then they come with a claim and pushes very hard with a number of lawyers and everything, and postpone payments, and are very cynical on the contract." (Int#01-08, from individual interview, 2017-2019).

6.3.3 Observe and think

How do you deal with working with people from other nationalities and other cultures?

«The less experience you have, the more you should think and observe. Observe individuals and read about it. The first time I worked in Japan I bought a book about working with Japanese. Of course it is a generalization, but there you get a fair start if you don´t have a clue. And in the book they tell you if a Japanese do like this it doesn't mean that he agrees with you. It means that he hears you. And if he does not say anything, it does not mean that he does not have any questions. You have to wait 5 seconds at least, because they never start talking before you are silent for 6 seconds. It takes a lot, which for me was very annoying in the beginning, because if you don´t get a reaction, then my thinking was he did not understand. So immediately I was starting again the explanation with other words

when the person maybe understood me the first time. But he was still processing, thinking, structuring in his head before he raised the question. All these things you can read in a book. The difference between one Japanese and another Japanese, if it is a senior person or a junior person, this you see a little bit with the time, of course.

In the end of the day this is about human relations, and still, even though each company has a lot of procedures and all the procedures are the same, and you would expect that everyone is doing the same thing, the reality is that it is not. (). **This is why I tell you that you may have a standard, but a standard being read by different people result in different decisions and different reactions.** (Int#01-08, from individual interview, 2017-2019).

6.3.4 Different business cultures

One of the project managers told the following about different business cultures:

"I have worked a lot abroad. A lot with customers with different business cultures. And then you have to be careful. In some countries there is a dominant culture for bargaining. So there you have to keep your cards closer and not give away anything for free before it has been negotiated. **While in Scandinavia we can perhaps have a more open dialogue, and it is more a question of what is reasonable.** In England and countries where they use the language very actively, and have clearly written rules, you have to be clear on how to formulate yourself. (). It depends on the customer and the culture how you communicate. ().

In England there is a different business culture. It is very hierarchical. So if you have a meeting and you have problems, then it is not like in Norway that the management sits down with the lead engineers and agrees on a solution. They first want to speak with the project manager or the management. (). While in Norway the project manager is almost like a secretary for the engineers. So you notice the hierarchy very well. ().

In the Middle East there is a culture for bargaining on everything. Every drawing is an opportunity to get an extra component. It is in their blood that everything shall be bargained. **And then it will not work with the Norwegian approach to be**

reasonable. If you give something away, then you have given it and you will get nothing for it. So you have to bargain a bit and try to think differently.().

In the Norwegian culture, and even in the law, your intention has a lot to say. If you had good intentions. But in the Middle East there is much more negotiations and bargaining. (). During meetings they may find something, it does not even have to be something valuable, and then push very hard, perhaps gambling that we did not know what it was, and try to get us on the defensive so that we give them something. So there is a lot of different tactics. Never to approve a document unless you have gotten something more or an additional change. So it requires us to be vigilant and prepared." (Int#01-08, from individual interview, 2017-2019).

6.3.5 Good intentions

Speaking of good intentions. Here is another story from the Middle East told by one of the project managers:

"We had a meeting with a customer from the Middle East and were discussing something purely technical. Then we needed expertise on something. We were in the meeting and discussing with the customer and they were technically stronger than us on that subject. And then they were quite obliging.

We had a solution that we thought was much better, that we had designed and presented. And we who were in the meeting could defend it. We said we were not so strong (on that subject), but that it was the solution we recommended and wanted them to look at. The customer was (technically) stronger than us, but also not experts on the subject.

So then we were sitting there discussing, and apparently we had an agreement. Well, they said, maybe they could adjust, so it seemed to be ok. We thought we had a design that were more or less accepted. But then it was a couple of minor clarifications that were to be done. It was just trifles really. And then we called an engineer, a woman, who was in the office in Norway, and who was an expert on the subject.

We had prepared her on the customer and how they were, and how we should communicate, and that we should be humble and so on. And she was really good. She was very polite and nice and all of that, but in the meeting it was obvious that she knew the subject much better than them. And no matter how humble she was, it was so that she had to explain things to them, and she did it very elegantly. It was very impressive, but that was because we had prepared her.

Then I think the customer, at least a couple of persons in the meeting, felt that they were not the strongest party any more. And on top of it, it was a woman teaching them. But she was not at all instructive. So after the 30 minutes phone meeting, the customer returned to their original position on everything that we had agreed throughout the meetings the whole day.

The customer got moody and resisting, and almost left the meeting. They said no, we want to have it as it is written (in the contract), so there was nothing to discuss. And that was very frustrating for me because we sat there and had been so diplomatic and thought we got it accepted, playing a little bit on our incompetence. Or at least we made ourselves a little dumber than we were in trying to get it accepted. And they almost pulled it through themselves, and then came that small clarification that actually was regarding something else, or it was something on the side. But only that small clarification where they felt they were in a sense inferior to a woman made it all stop." (Int#01-08, from individual interview, 2017-2019).

6.3.6 Like a dog that can be kicked

And one more experience from the Middle East:

"The Middle East has been challenging. They (the customer) say it, and they have been very clear that we are their supplier and then we do as they say. We are a dog that can be kicked. And they are actually like that. We cannot come and make demands to them, or dictate them or anything. It is simply completely unacceptable. It is very different. At least compared to all we have been doing here

in Norway. Here everyone is kind of equal, but there they really treat you like a dog that they can kick.

There is a lot of shouting. (). We had some discussions with them where we did not agree. So we went through earlier communication (records) and discussed. And if we were not completely correct, then for sure they were not correct either. So if we are trying to meet them half way, then they typically meet that with getting in some manager shouting at us. It is completely distant to us. We had some meetings there where they were not satisfied with the progress. And then they shouted and screamed. They stood and really shouted, and we were to be banned from all projects in the Middle East for the rest of our lives. It was very unpleasant, but also a bit surreal. Because it was totally unreasonable. Not at all a fair discussion.

It could have been *they* who were delayed with something, and then we get shouted at for not delivering on time. And then we meet them a week or two later and the atmosphere is good and everyone is very nice and real buddies. It is a very big cultural difference.

The highest ranking managers typically do not say so much in the meetings. But those who are to confront you shout highest. First you meet the project manager, and then you meet his boss, and then the boss's boss. Then the first shall yell and shout a bit, then the next enters to shout a bit more, and then comes the last who only shouts a little. (). Maybe he only opens the door and looks inside and then leaves. (). You should think they are just kidding with us because it is so unreasonable. But it is clearly a hierarchy for shouting. (). But it is the culture and a kind of game they are playing. To get respect and. It is very peculiar. It can be the same persons who scream and shout at you about things you have to fix, and then they call you the day after to tell you that they have looked at it and done it, and politely thank you for the help. ().

It is a type of cultural learning. How you should handle it, and how you should react. And there is no point in arguing back. Just let them finish the screaming and shouting. And then we travel back home to have a look at it. And that is how it goes.

And the engineers there operate the same way. They can come into a meeting and scream and shout, then leave the meeting and come back again and continue the meeting as if nothing had happened." (Int#01-08, from individual interview, 2017-2019)

6.4 Strategies used

Some strategies have been mentioned already, but in this section I have grouped more explanations of strategies used by the project managers.

6.4.1 Clarifying expectations

To continue on the challenge of different expectations:

"[How will you describe your strategy for how you conduct projects?]

-You know nothing when you get the project on your desk, so that is number one. Then you have to carefully study the paperwork and what you have received from the sales process. If for example you need judicial assistance, but you have to form a picture. (). The main job after that is to clarify what has been sold, what is to be delivered and when, and where, and to what cost etc. **But then you have to start to clarify expectations. And there can be many different expectations on different levels. What did we think when we sold it? What did the customer think when they bought it? It has to be clarified as soon as possible. Then you need someone who is capable of delivering what they expect to get.** And you do not necessarily know who that is. ().

[What if you discover that the expectations are not in line with what you have in the contract?]

-Then you have to speak with the customer and clarify expectations. (). As some famous person said, "a plan is one thing, planning is everything". It means it is a continuous process. (). **So every time you encounter something like that you have to clarify it with the customer so that you agree. That is the key to be able to finish.** Because if you continue without speaking to him, and you are on the wrong track, then you get a much bigger challenge later on." (Int#01-08, from individual interview, 2017-2019).

6.4.2 How big should the contract be?

Further on the role of the contract:

> "-So does that mean that with respect to the contract, there can be an agreement that is outside of what is written in the contract?
>
> -How big contracts should you make? It will have no end if you try to explain and describe everything. The oil business has had a tendency to make them big. If you go to the craftsmen industries they are written on a napkin. So somewhere in between should be possible, because no matter how much you describe you will not be able to describe everything. You can try to protect yourself as good as you can, but unless you talk to each other you will not finish anyway. Because if you finish and the customer is not satisfied, it will not really help you anything. All the time it is about agreeing. You have to understand which expectations the customer has, and then you may have to say that yes, but that is not what we have sold. And then you have to agree on how we should get where we should have been. Maybe you have to go back to the sales department again and say that you think there could be something wrong. (). **But in the same way as you may try to get away with something, it could be that the customer is trying to get away with something. It is not necessarily clear who becomes a winner or a looser in contractual challenges.** But if you agree and write it in a minutes of meeting, it is a bit difficult to get away from it afterwards. Then in a sense you have shaken hands and said ok, now we agree that is the way we are going. ().
>
> -So are minutes of meetings something you use continuously in projects to document the agreements with the customer?
>
> -**Yes. Minutes of meetings, email, anything really. And that is to clarify expectations and to agree. All the way.**" (Int#01-08, from individual interview, 2017-2019).

6.4.3 Get the customer with you

Again, is the supplier dependent on the customer?

"-Yes, we are dependent on the customer, and we are dependent on our suppliers. (). **I think it is very important to establish a cooperation where we realize that we are in the same boat, because we are.** So when we have a problem to deliver it is the same for them who have to go to their management and say that we cannot get the cabinets. (). It has been very important that we have been able to be there, and to support them when they needed us. And that we have done quite well. And then we have managed to establish a trust relationship that we try to respond faster than what is specified in the contract, if needed. And then they are also a bit understanding if we have problems with a delivery time. (Int#01-08, from individual interview, 2017-2019).

And one other comment related to this:

"-He represents the customer, so for us he is the customer. (). I think the same applies either if he is a permanently employed, or if he is a consultant, or whoever the person on the other side of the table is: You have to establish a relationship with the person as best as you can, no matter what agenda he has.

[-You have experienced customers who are not paying, who are not willing to give needed data and customers who have been stealing your solutions. Has that affected the way you think and handle customers in projects?]

-**Yes, definitely. I think that psychologies are more than 50% of completing the project. If you fail to get the customer with you, you will get a heavy burden to carry**. You normally cannot complete a project alone towards the customer. My experience is at least that the projects where the customer has ownership and wants to cooperate, the delivery always becomes good. Whereas the projects where the customer does not, it is a bit random how good it becomes. The first time you meet the representative of the customer, it could be that on the other side of the table is a complete stranger. You have no information of who is sitting on the other side of the table. And if you make that assumption before you are going to meet the person, you have to make up your mind about how you should behave to get the best outcome of the meeting. **Because if you get the person turned against you, you will get a huge challenge. But if you get the person with**

you, then instead you have a person helping you, and that is crucial." (Int#01-08, from individual interview, 2017-2019).

6.4.4 Build trust

To continue with more thoughts on the importance of cooperation and trust:

"As Project Manager I am being measured on three things: That is improved margin, on-time delivery and a satisfied customer. And in this project I will show you here we managed all that. We improved the delivery time. Here is the actual success. (). The contract said the equipment were to be delivered in 42 weeks. But then we agreed on an incentive on 10% if we delivered in 35 weeks. So we increased the value of the contract and the gross margin. And we got a very happy customer who gave us only positive feedback. (). So how did we manage that? **I had some rules for my team. That it is important to build trust, and to be honest. So they (the customer) must trust us, and we have to work honestly. And we should be service minded, responsible and available. So when the customer comes we are always available. And we should not postpone tasks until tomorrow if we can do them today. And it is important to plan. Fail to plan, plan to fail. So your success can be planned. The better you plan, the more likely you will have luck. And then it is important to work together, and win together. A project is a cooperation between us and the customer. It is not a competition.** ().

And then it is important to follow up on our sub-suppliers. That we did every week. And we had a meeting with the customer every week. (). **So we agreed with the customer when we started that if we were to meet this aggressive delivery plan of 35 weeks, then we had to have short review time on the documentation. We had to have face-to-face design meetings. One after basic design, and one after detailed design. And that we approved drawings when we were sitting together. (). We worked in a way that gave the customer a trust that we managed to solve the tasks. And we worked closely with the factories. So we simply built trust.** And we were always available, and always had answers to their questions. (). So if we work like that we get trusted. And it is also important with

trust when we give offers. That they trust that we have given a correct price."
(Int#01-08, from individual interview, 2017-2019).

6.4.5   Show that we perform and think money

More thoughts on strategy:

"[-How will you describe your own strategy? The way you execute projects and the way you think.]

-**Priority number one that you have to begin with in the projects is to show that we can, and that we are performing.** Then we think money all the time. And of course also the time schedule. (). I am very conscious to look for where we can demand different things. (). So then, **if you have been performing, it is much easier to make these demands.** But if you are a non-performer and you make demands. That is a very distasteful combination. But if you perform it is easier to make demands regarding things that change. And it is not only that they (the customer) want to change things. **It is also the time aspect. If they cannot meet the deadlines for when they are to give us the input, and we have to accelerate, then it is extra cost for us.** Then you can say they have to pay even if the scope is exactly the same, only that we have to do it in shorter time. ().

It is very important for a project manager that he has awareness for possibilities to make more money. And it is not a one-man show. It is important that the organization is aware. (). So it is important to address the engineers. Look, if you see anything, then let me know. It is a lot of talk about money being a project manager. **To think money all the way. But this balance up against that the customer should be satisfied.** So they do not feel ripped off, or that they have been demanded unreasonably. (). So the strategy is different ways to make money. (). I would say that we try to deliver what is as good as possible. **But of course, you cannot deliver more than what is in the contract.** That is completely dead. You have to deliver what is written in the contract. I do not try to sell them things just to sell. If we propose something they should really need it." (Int#01-08, from individual interview, 2017-2019)

6.4.6 Avoiding trouble and disturbances

Further thoughts on strategy:

"So ideally a project manager, and this is the magic. **The magic of a project manager is to bring his project into a kind of smooth path that this is what I can do. This is what my people know how to do. This is where my people feel comfortable. And get out of the way all the stones, and all the obstacles that different interests and different people in the project may bring to your contract.** It could be additional things that they say you should do. *No*, this is not in my contract. Yes, but this is normal, this is normal engineering (they would argue). This is disturbances. **So the job of a project manager is really to seek the path of more calm waters.** It is not to be like I have so many weapons, I have to be very strong and fight, or I have to be with a strong Contract Manager who starts writing letters immediately when something happens. *No*. The first thing is to try to have a look at it, analyse the situation and try to visualize what is the smooth path to my final end.

The problem is that there is no strategy that you can write down in a book in advance, and say my strategy will be like this. The strategy is very short term. So the strategy is every day, with every decision, you try to find the right strategy for every decision to get the smooth path. So you don't know the total smooth path. You know only in the next 3 or 4 steps which would be smooth. And if I do this all the time, at the end I will see that my path was relatively smooth. **So avoiding trouble, avoiding disturbances is in my case fundamental.** ().

That goal would not be the same if I were the End Customer, because he has his own priorities. So I have to put that on top of my mind and see how do I achieve this without them feeling that they are getting totally out of their own path. Because each of them has their own priority. **And that́s the magic. There is no *one* strategy. There are *many* strategies.**" (Int#01-08, from individual interview, 2017-2019).

6.4.7 Visualize and get to know people

Back to the startup of the delivery project for the project manager:

> "**I spend a lot of time in the beginning of a project to understand who the players are.** (). You want to learn which individuals compose the team, and try to know as much as possible about them at a personal level. At the level of where are they coming from, where have they studied. It is not the same. For example, a person from the Middle East who has studied in England is totally different from a person who has not. It is not the same the way a Korean person speaks if he has been in America for a while for a Master's degree or a student exchange. So you cannot say these are Koreans and Koreans is like this. *No.*
>
> First of all, where are they coming from? And then each of the individuals; are they married, are they young or old? Are they old generation or are they young generation, or one in the middle? How far are they from me? And by doing this exercise with all the key persons that you are going to be working with during the next year, you get a lot of insight." (Int#01-08, from individual interview, 2017-2019).

And further:

> "[-Are you for example trying to anticipate what other people are doing?]
>
> -Yes. Normally, if we have meetings with a customer I make a kind of preview of the meeting in advance. A kind of movie of the meeting. And different scenarios of the meeting, and make very clear for yourself what you want to achieve in that meeting. What can go wrong? And a couple of plan B´s. I will go for this. If this is not good then I will go for that. It is a kind of negotiation. (Int#01-08, from individual interview, 2017-2019)

6.4.8 When, what and who

Continuing with more thoughts on strategy:

> «**What fights to choose, when to choose those fights, when to have a discussion, and when to address a problem in the project is very important as well.**

If you think black and white you say ok, we have a problem. So I call the customer, we have a problem, one moment. What will be the consequence if you now are saying to the customer that you have a problem? () What will be the consequence if you communicate this in 3 months from now when we have finished these other things and there is a kind of positive atmosphere? (). So the timing in my view, the timing for good news and for bad news is also something we can manage as a project manager. So this is also a tool. Not what, but *when*.

So it is when, what and who. Who is the person you want to (address). Do you want to bring a matter to the table for example. This is very typical for the politicians, but I believe this is very normal in management also. You want to bring something on the table for 11 people. Any you say ok this is a big bomb. But you do not know how people will react. So you may choose 1 or 2 persons and tell them in advance in private. What do you think about this? This is like a test. This is what I call the who. To whom you bring it. And then they may say, ok, don´t bring this to the table because this would be a big problem and next month mister X will be retiring. So if you bring it next week, mister X is retired and there is a new person coming in the project, and for this person this will not be a problem. But for the other it will be a problem. You see? The same situation can affect your project if you bring it at a moment T1, or moment time T2. I do this all the time. Mentally speaking I have trained myself, or I have a kind of thinking routine, about these three things. Because the what, what happened is something not dependent of me. What happened in a project is in many cases... Things happen in your project. You can choose *who*, you can choose *when* and you can choose of course *how*." (Int#01-08, from individual interview, 2017-2019).

6.4.9 How you communicate

Then how do you communicate?

"You have seen how elections, political elections. And all parties win. Whenever they ask them, what do you think about the result? We got an increase of 2%. And the other one says, we got 2 million votes. Everybody brings you something and with the answer you feel that this is a positive message. He said 2 million votes, but last election he had 4 million votes. But by saying 2 million and smiling, then

the perception is that it is not so bad. So how you bring things, in which mood you bring things. (). My personality is quite positive in general, so I believe there is nothing we cannot manage, so there is no disaster. **But if you bring something to a meeting, and in many cases technical stuff are not even understood. If you talk about IT for example, you may have half of the table that don´t really understand what you are saying.** But they cannot say, excuse me, I don´t understand anything of what you are saying. Very few people dare to say that. **So they may be there and they just listen to the intonation of the message.** You can bring a message with the same wording, and the person go out of the meeting and say this is going to be a disaster. Because your face, your way of talking, your way of bringing it, you are not so optimistic. And they say, but when are you going to finish? I don´t know. You know, these uncertainties. I try not to be like that. **I try to say, ok, at this moment I don´t know, but normally when this happens it is solved in a couple of weeks. So I don´t think there is a reason to worry about it. Try to bring something also where there is bad news in a positive way. And of course it is good news, also to choose the right moment to bring a good news.** That a good moment for the company, for someone, or to compensate for some other thing. So this is why *how*, when and who, or whom you talk to. It is very important. This is practically the essence of the strategy." (Int#01-08, from individual interview, 2017-2019).

6.4.10 Adapt all the time

More thoughts on strategy used by the project managers:

"If I feel the technical part is going well, then you can in a way let it be and get an overview, and see to that things are moving forward. And that we do not forget anything. (). Perhaps use more energy on diplomacy, or on the commercial part. So that I can control my focus. The most important is clearly that we make money, or else we would not have any business. **And then it is all the time the balance: How shall we, where is it worth to invest more hours now? That is the way we have to look at it, I think. Maybe it is wise to use so much money on a meeting to get things flowing again. Or could we save some money there because it is going well? It is about how to use the money most effectively.** It is the conditions

we have to play by. We have so many hours, and so long time to deliver. How can we use that as good as possible? **When you get the feel with the project, then you see where it is wise to invest these hours. Some customers may want a lot of meetings. Then you have to calculate with more travelling and more time with the customer. Other customers may want longer testing, or maybe even no tests at all. It is very different. You have to adapt all the time.**

Even if you have a certain way to conduct testing, you kind of have to adjust to the customer's expectations, and what you see as challenges. **And the focus of the customer typically reveals as we move forward.** So given that you have control of what you shall deliver, which often is a challenge. (). Then we may also have new third parties that we are cooperating with, but little experience with. So then it is important to focus on that, while our own factories may need less attention. (). So it is very much controlled by what we shall deliver, and the customer, what we have to focus on. If you have a local customer, and a small geographical area to work within, then you often have more control than if you are working in Brazil, Singapore and Norway on the same project. (). When you have set up a plan, then you have to try to adjust it according to how things are moving forward. (Int#01-08, from individual interview, 2017-2019).

6.4.11 Look at yourself as a seller

Should you stick to the scope of delivery specified in the contract, or should you try to sell more?

"Usually the customer is satisfied if we deliver according to the contract. For us the times have changed. For what is possible with respect to the price. Some projects are priced very low. **And it can be a challenge to do the job that the customer expects, and at the same time make money**. But we have to see what opportunities we have to earn more by offering more. **You have to look at yourself as a seller.** And have good knowledge about the scope. So if the customer asks for something more. And say yes, that we can deliver, but that will be a variation order. (). And then it is a matter of identifying the pain threshold of the customer. Because the customer has an opinion about what it should cost. And

the customers are a bit different." (Int#01-08, from individual interview, 2017-2019).

One more comment related to this:

> "You have the triangle with cost and time, right. And yes, those are the most important factors, but unless the quality, and the reception of what you deliver is good, you will not get any credit from the customer over time. The customer shall live with it afterwards, and that is just as important. There is no point in delivering a Rolls Royce to someone who has it parked in the garage if you see what I mean. It has to be used and they must be satisfied. (). If you have a product which to a high degree is dependent on training, I think the supplier company should demand that the customer buys the required training if they buy the product. If not it is bad advertising for the company that they get something that is not being used, but perhaps is very valuable. (). **So if the required training is not part of the delivery, I consider it my job to point that out**. Either I have to tell the customer, or I tell our seller who speaks with the customer. (). The more they use something, the more feedback we get, and the better products we make. (Int#01-08, from individual interview, 2017-2019).

6.4.12 Easy but expensive to make the customer happy

So how far are you willing to go to keep the customer happy? And how do you know if he is really happy or not? What are the trade-offs?

> "So to have the balance between the quality that the customer has paid for based on the specifications, for the best outcome for your project. And the best outcome for your project also means that you have to be happy. Your people in your project have to have fun also, your management has to be happy. So the project has to perform, that is very clear. A performing project is the best. On time, on budget. On time or better, on budget or better, and with that quality or better. Plus, what I say about the outcome of the project is the customer satisfaction. **Customer satisfaction is not a first priority because the customer by showing you that they are *not* satisfied you keep on giving.**

And this happens in many countries. And it depends also of the culture of the people. You may have a person and for example you give him a wallet. And he is super happy with this wallet, but he is negotiating. So he will say, yes but this wallet, I see this and I see that. So he starts telling you things, making you believe that he is not so satisfied. So he is lying to you in order to get a little bit more. **The satisfaction of a customer is real satisfaction, not whether he says he is satisfied or not. So this is also why the moment of asking a customer satisfaction is also very important. (). Sometimes even when you supply the right quality of the project and the customer at the end is not happy, the customer will not give you the job again.** So the reputation towards the customer is like a price for me, like earning money. **Of course it is very easy to make the customer happy. If you give him everything they want, tomorrow, very fast and very expensive, but then you are killing your project. So this balance, to keep the balance between keeping the good reputation with the customer, and at the same time not losing money on the way, and getting your targets, commercial targets, and not getting your team burned out, letting your team still have fun. This balance, keeping this every day. Not in the long term. No. Every day, every moment, every meeting.**"
(Int#01-08, from individual interview, 2017-2019).

6.4.13 Imagine you are delayed

One final quote from the interviews:

"[-Does that mean that there are a number of things you need to decide throughout the project that are not specified in the Contract? Such as the delivery time for something?]

-Imagine the delivery time for something. Imagine the situation that you are late already. One day. Ok. So you are not going to comply with the delivery time. So you call your customer and it is Friday. And you call and you say; do you mind if I ship everything on Monday? Like are you going to charge me liquidated damages for 3 days? And the customer is saying yes, if you are late 3 more days I will charge you liquidated damages. Then, if they do that I call my people and I make them work during the weekend in order to get it shipped as soon as possible. Because these people's overtime will be cheaper than one day of liquidated damage. So my

decision is depending on what I heard from him. Now imagine that this person will tell you, yes I will apply liquidated damages. Then I look to my Contract, and my Contract says liquidated damages will apply every day if the delay of the equipment is causing delay of the construction. Ok. So if my 3 days (late) delivery is not causing delay in the construction, then it is not a problem. But if it is causing delay in the construction it is a problem. Now, I am now late and my customer said I will apply liquidated damages. Why? Is that because of delay in the construction? Yes, I will have delay in the construction. Now, I don't trust him, so before I put my people to work I say hmm. I don't trust him, it is the purchase department. I call my site manager. Site manager, can you go to site and tell me if they are preparing the substation to receive my delivery tomorrow? He goes and says it is at least two weeks until they can do something with it. So are you telling me that if I delivery next week, one week too late, this will not affect the schedule? Of course, this will not affect the schedule, of course not. So the conclusion, he was lying, he was putting pressure. Then my decision will be not to work during the weekend. Then, shall I go to the customer and tell the customer? I heard you were lying to me so I know that it is not possible so I decided that my people will go to the beach in the weekend? This is the truth. We will go to the beach in the weekend and we will continue on Monday because we don't affect your schedule. This is the truth, but I don't say that either. I will call him. I will say I will do my best, yes, I do my best, thank you very much, I will try my best. Ok, on Monday we will talk again. Let's see how far we are. Bye. Then on Monday. Yes, I think we did our best but we are going to be 3 days late. Ok, 3 days late, but not one day more, not one day more he will say.

Ok so you analyze this scene. He was lying to me, then I was lying to him maybe because I was saying we did our best. But I will say no, no, this is not a lie. My people is working from Monday to Friday, yes. But you could give overtime. Yes, but here in Norway it is not normal to work overtime so I still did my best. All this, not trusting, calling the other person, checking different sources, is influencing my decision and money in the Project. You see? Imagine in many cases you make the people work during the weekend. They come and maybe they do not get

overtime. They will come for you, they do it, they go there and then they hear that the delivery is neglected there (at site) for 2 weeks. Very annoying for my team, right? I can imagine.

So if you are blind you can say, guys you have to come this weekend. Why? My customer told me that this is delaying the construction. So you take it. Are you doing something wrong? No, your customer told you that this is causing a delay. You are the project manager. This is going to cost you 1 million NOK, and then automatically you make your people come in the weekend. Strictly speaking, without strategies, without thinking. Coming, going, input, output. But the input, hmm, is this true what you are saying? Do you have to consider that everything you hear is the truth? No, you don't have to consider that everything you hear is the truth. In fact, also the contract is not the truth. The contract has many flavors also. Interpretation of the contract is always, has different point of views. This is the reason why lawyers make a living. Because the truth is not black and white. This is not binary, zero or one. (Int#01-08, from individual interview, 2017-2019)

7   Analysis and discussion

7.1   Introduction

In this chapter I will try to balance the findings with some interpretations and analysis. Do my findings from the interviews fit with other relevant research such as presented in chapter 2? Yes I think so. I have not been able to identify any major deviations or unexpected findings that are not in line with any other research or theories. This is really not very surprising. The opposite would have been surprising and could have questioned the reliability of my findings. So what more is there to discuss? With reference to the earlier quote from Steinar Kvale: Is there really anything that can be saved "in the final resignation phase" of this thesis?

My research question RQ4 was about how the findings could be understood in the context of "management literature". This thesis is after all part of a University College education about "Organization and Management". So does this type of project management have anything to do with management? Clearly it does. I think that should be rather evident based on the cited literature. But it should be noted that project management is a distinctive form of management, and managing delivery projects in the oil and gas industry is again a distinctive form of project management. The project managers interviewed in this case study are part of what could be called a project-based matrix organization: It is a multinational company that has been running large projects for decades. Literature about projects, project organizations, and project management often tend to emphasize that projects are unique, time-limited, and non-recurring. Every project is of course unique to a certain degree, but EPC and delivery projects is a type of projects that have been recurring for decades in the oil and gas industry, and this particular supplier is among a group of multinational companies that have specialized in executing them. Hence my earlier statement that it favors those that have done it before.

In the following analysis and discussion I will address a few topics and perspectives one by one. The scope is so vast and far-reaching that I fear any attempt of lumping it together in a generalized or holistic approach could fail miserably. You may of course object that my "one by one perspectives approach" is necessary because the topic of this case study was far too wide in the first place (a classic beginner's mistake I assume), and that I should

have narrowed down the scope to the size of the atom to be able to stay sufficiently focused. Well, that will have to be at my expense, because here goes my attempt of moving a mountain by carrying away small stones.

7.2   Uncertainty

If we first go back to Arthur Stinchcombe and Carol A. Heimer's "activities approach to organization" that I started off with: As commented by the authors of the book titled "*Global Projects: Institutional and Political Challenges*", "**activities to resolve uncertainty** include: collecting information, making decisions and plans, and then measuring and comparing the outcome to the plan, approaches such as experimentation, trying multiple solutions simultaneously, sensemaking, and learning become just as important as planning and executing" (Scott, W. Richard, Raymond E. Levitt, 2011, p. 31). And further that resolving uncertainty has obvious implications for the need for coordination, as "uncertain events in one part of a project can trigger chain reactions of unanticipated, interconnected events that further amplify coordination costs."

I think that is absolutely correct, and that many of the activities of project managers of delivery projects are about resolving uncertainty. As project manager of one of the suppliers, being part of a bigger project with other companies, the project managers are typically not (or never) in a situation where they have full overview. As one of the project managers said during the interviews about their starting point: "You know nothing when you get the project on your desk". The uncertainty described in the beginning by Stinchcombe and Heimer was as see from the operator or end customer for the whole field development project.

So the project managers typically will have to start by collecting information to get an understanding of what the project is all about. This can also be viewed in terms of Donald A. Schön's theory of handling uncertainty, problem setting vs problem solving, which again is related to sensemaking that I will get back to in a minute. For many reasons, resolving uncertainty can be necessary throughout the whole project. But there is more to it than changes in the project scope, handling of Variation Orders and updating the project schedule. As seen from the quotes from the interviews in chapter 3, chapter 4 and chapter 6, the project managers may have to question if the information they have been

given is reliable: Is the EPC contractor telling the truth? Do they really need the equipment at the shipyard by that date? Just to give an example. The question is then perhaps to which degree the parties trust each other? I will get back to the question of trust in a minute, but first a few words about the game metaphor.

7.3   The game perspective

As seen from the quotes from the interviews already presented, there were comparisons or statements about a game, such as "it often becomes this game", "it is the culture and a kind of game they are playing", and "it is the conditions we have to play by".

This thesis is an investigation into strategic thinking, and then we have these game metaphors. This was also something I expected to find as I have heard the game metaphor before. I will therefore briefly comment on *game theory*.

In 1994, the Nobel Prize in Economic Sciences was awarded jointly to John C. Harsanyi, John F. Nash Jr. and Reinhard Selten "for their pioneering analysis of equilibria in the theory of non-cooperative games" (Nobelprize.org, 2021). And for those more interested in movies: "A Beautiful Mind"(2001) was an American Hollywood biographical drama based on the life of the John Nash. Game theory is a science about strategic thinking. Some may even argue it is *the* science about strategic thinking. It can also be described as the systems science that studies interactions between rational and strategic players (or agents) that are coupled in their decision makings. But for those of us who are not mathematical geniuses, it has been described and presented in more understandable terms in books such as "Thinking Strategically"(Dixit & Nalebuff, 1991). Since the mid-1980s, game theory also became increasingly popular among sociologists. A good read of historical perspectives of sociology and game theory is given by Richard Swedberg in (Swedberg, 2001).

In a *game theoretical perspective*, a delivery project in the oil and gas industry could be considered a ***cooperative game*** since the *players* form binding commitments (the Contract). And further it could be considered a ***repeated game*** since it is the same players (not necessarily individuals, but companies) that perform the same type of projects over and over again. Thinking of delivery projects as games could be useful. In terms of game theory, the key elements of a game address the following:

- Players: Who is interacting?

- Strategies: What are their options?

- Payoffs: What are their incentives?

- Information: What do they know?

- Rationality: How do they think?

Further it addresses **how to anticipate others' behavior** in a game? Even without knowing anything about the game theoretical rationale (and it is no guarantee that game theory will give you a useful answer to this), it could be useful to just ask the question: What is likely to happen when I do this? How will the customer react when I send this email to him? And so on. Game theory also addresses **themes for acquiring advantage in games**. These include:

- **Commitment / strategic moves:** Credibility, threats, and promises.

- **Leveraging limited rationality:** Reputation and surprise.

- **Exploiting incomplete information:** Signaling, selection, and info cascades.

As seen from the quotes presented earlier from the interviews, there are a number of elements in the strategic thinking of the project managers that resemble those found in game theory. For example, getting to know the players in the project and how they behave, whom to talk to in the project, when to present things, how to present it and so on.

Another example of a game theoretical analysis is "The judgment policies of negotiators and the structure of negotiation problems" (Mumpower, 1991):

"In choosing among the many possible offers or counteroffers to make. negotiators are likely to rely upon a heuristic or tactical rule that they hope will lead to a satisfaction outcome. Encumbered by limited, imperfect information about the other party's (and perhaps their own) payoff function and negotiating orientation, and hampered by the limits of their cognitive capacity, **negotiators' tactical "rules-of-thumb" are likely to look ahead only a move or two.** Because they are short-sighted, they sometimes (but not always) result in a negotiation dance that leads to suboptimal outcomes, falling into traps posed by local maxima

and failing to find Pareto superior packages of tradeoffs."(Mumpower, 1991, p. 13).

"A potential explanation for this "compromise bias" is simply that, for the most frequently encountered negotiation problem structures, issue-by-issue compromise constitutes a good approach for reaching satisfactory agreements. **The heuristics that people bring to negotiations are likely to be habits precisely because they work well for commonly encountered problem environments. Because negotiators typically find it difficult to detect the precise nature of the negotiation problem structure, they are likely to try first whatever strategy has in the past most frequently proved appropriate**, abandoning it only after interactions with the other negotiator indicate that the strategy will not work well in this particular circumstance. If their default strategies lead to passably satisfactory settlements, the negotiators may never discover that more efficient ones exist." (Mumpower, 1991, p. 19).

The findings from this case study also shows examples of this where for example project managers describe their strategy as "very short term", and the experiences of bringing the "Norwegian mentality" of negotiators to the Middle East. So as a theoretical framework for analysis I should perhaps have mentioned it already in chapter 2. There are however challenges with the *application* of game theory *in practice* that has been addressed from a sociological perspective. Some of these challenges include:

- Difficulty in determining exactly what are the rules and the payoffs (Jessie Bernard referred to in Swedberg, 2001, p. 305).
- "A game theoretical approach also involves (…) important limitations for the study of face-to-face interactions" (Erving Goffmann referred to in Swedberg, 2001, p. 312).
- Game theory is also unable to handle a number of other empirical phenomena: "Persons often don't know what game they are in" (Erving Goffmann referred to in Swedberg, 2001, p. 312).

Game theory also concerns the problem of how trust is established. Trust and reciprocity (trustworthiness) issues have been examined in a behavioural game context, and there

has been extensive exploration and investigation of the roles of reputation and repeated interaction. One famous strategy is for example *tit-for-tat*: The actor starts out by being cooperative and then continues to do so – as long as the other actor cooperates. I will however not go into further details and analysis of game theoretical perspectives. As one of the project managers said as quoted earlier in chapter 6; "In the end of the day this is about human relations", and for this reason I think game theory is not the best approach to project management. Thinking of the customer (EPC contractor or operator) as an opponent in a game can be a strategy, but it may not be the best starting point for cooperation and trust. As one of the project managers said as quoted earlier: "A project is a cooperation between us and the customer. It is not a competition."

7.4   Cooperation and trust

As seen from the quotes already presented, there were a number of quotes related to trust. There were statements like "it is important to build trust, and to be honest", and "we worked in a way that gave the customer a trust that we managed to solve the tasks", and that "we have managed to establish a trust relationship".

This brings me to one of my questions from the introduction: Can the supplier company complete the delivery project all alone? We have also seen examples of that "the customer may sit down and wait", "not telling the truth" and "customers directly stealing solutions". Strictly speaking, this question does not address the need of trust between the parties, but the need for cooperation or exchange of information. Whether the supplier company can complete the delivery project without cooperation *and* trust is another question. I will try to be a bit careful of just mentioning trust in the passing. Diego Gambetta is known for analytical contributions to the concept of trust by using game theory and signalling theory, and he commented the following in the introduction of the book title "*Trust: Making and Breaking Cooperative Relations*"(Gambetta, 1988):

> "In the social sciences the importance of trust is often acknowledged but seldom examined, and scholars tend to mention it in passing, to allude to it as a fundamental ingredient or lubricant, an unavoidable dimension of social interaction, only to move on to deal with less intractable matters." (Gambetta, 1988, p. 10).

Cooperation and coordination between the parties in oil and gas projects are normally formalized in some form in the Contract. That said, it is no guarantee that well-functioning cooperation and coordination are actually taking place. And from the interviews the importance of good cooperation with the customer was emphasized in statements like "If you fail to get the customer with you, you will get a heavy burden to carry." My interpretation is that the project managers clearly meant trust ("tillit" in Norwegian) and not only cooperation (I translated "tillit" to trust), but I did not make any attempt to dissect forms of trust during the interviews.

Cooperation and trust is not the same thing. "*Trust: Making and Breaking Cooperative Relations*" is a collection of essays by multiple contributing authors, and it has also been criticized:

> "In the last essay in this collection, the editor, **Diego Gambetta, makes explicit an issue that concerned me throughout: the necessity for distinguishing between cooperation and trust. Trust can be a basis for cooperation, but it is neither the only condition nor even an essential condition.** This volume does not go nearly far enough in clarifying the requirements for trust or specifying the mechanisms that link trust and cooperation. It does, however, raise some important questions through a set of lively, interesting, and eminently intelligent essays.
>
> As a book about social cooperation, this volume does little to advance our understanding beyond what we have already learned, principally from Hobbes and Mancur Olson (1965), on the one hand, and Michael Taylor (1987 [1976], 1982), on the other." (Levi, 1991)

Can there also be cooperation without trust? This is also a question that has been investigated in a game theoretical approach. Strategic cooperation without mutual trust is one example (e.g. between China and the United States). Gambetta has also addressed this topic in his book "Codes of the Underworld: How Criminals Communicate"(Gambetta, 2011). This is however clearly another starting point and organizational environment than that of delivery projects in the oil and gas industry.

Trust can again be categorized into different forms or types, and there are many classifications in the literature. It is for example a topic that has been discussed in the study of *buyer-supplier relationships*, where the categories of 'contractual trust', 'competence trust' and 'goodwill trust' have been proposed and analyzed.

A literature review and analysis of successful buyer-supplier relationships is presented in (Vanpoucke, Vereecke, & Boyer, 2014). "We review the literature and analyze multiple buyer–supplier relationships to explore developments over time, identify triggers for change, and identify effective management practices for long-term inter-organizational relationships." As part of the literature review the authors wrote the following:

> "Regarding the role of formal/informal governance mechanisms, Ring and Van de Ven (1994) argue that formal and informal negotiation and commitment mechanisms should be in balance throughout the life-cycle of inter-organizational relationships. While there is a need for formal bargaining in the negotiation stage, this should go together with informal sense making.
>
> **Similarly, formal legal contracts should be accompanied by psychological contracts in the commitment stage. When significant imbalances between formal and informal processes arise in repetitive sequences of negotiation, commitment and execution, the likelihood of dissolving the relationship increases (Ring and Van de Ven, 1994). Dwyer et al. (1987), on the other hand, argue that trust replaces the need to cover all contingencies in a formal contract for sustained commitment. As such, informal communication in the form of trust is seen as a mechanism to hedge against incomplete contracts.** Moreover, these relational mechanisms should be present in the relationship to the extent that they reduce opportunism, which does not necessarily imply that formal and informal mechanisms should be in balance as suggested by Ring and Van de Ven (1994). These two governance mechanisms i.e., formal or transactional and informal or relational, are also fundamental in the traditional literature. **Transaction oriented studies, which rely on transaction-cost theory, focus on the deployment of rules and contracts to safeguard transactions from opportunistic behaviour (Puranam and Vanneste, 2009; Williamson, 1999).**

Relational mechanisms, on the other hand, emphasize inherent and moral control, governing exchanges through consistent goals and cooperative atmospheres (Liu et al., 2009; Dyer and Singh, 1998). In general, the literature assumes both mechanisms are complementary (e.g., Poppo and Zenger, 2002) and states that transaction-cost oriented approaches lead to better process control and relational approaches to better coordination of complementary activities (e.g., Mellewigt et al., 2007)" (Vanpoucke et al., 2014, p. 4).

As seen from the quotes from the interviews presented earlier in chapter 3, chapter 4 and chapter 6, there were a number of examples of the importance of personal relationships and informal processes. For example the stories presented about building trust, conflict between other parties, and horse-trading in chapter 6.

In the literature there are also studies of the relationship between trust and project performance. "Interweaving Trust and Communication with Project Performance" (Cheung, Yiu, & Lam, 2013) is one example from the construction industry. The study reports that: "

> "An analytical approach of mediation analysis was performed to achieve this objective. Five significant mediation models were identified. These models demonstrate that trust affects communication and in so doing influences project performance. Specifically, effective information flow is the versatile mediator to the trust-project performance relationships among all of these significant models. This implies that the improvement of information flow would likely improve project performance (i.e., achieve satisfactory and worthwhile quality, maximize project time, cost, and quality). In this context, the findings point to the need for managers to direct efforts or resources to effectively manage information flow as part of the project management system." (Cheung et al., 2013).

The study has classified trust into "*system-based*" trust (objective and related to the formalized system), "*cognitive-based*" trust (relies on objective information and develops through communication between team members), and "affect-based" trust (highly related to personal feelings). The findings of the study seem to be in line with the other references that I have presented in this thesis.

Another example of a study relevant for this discussion is "Organizational climate in large-scale projects in the oil and gas industry: A competing values perspective" (Hannevik, Lone, Bjørklund, Bjørkli, & Hoff, 2014) from the Department of Psychology, University of Oslo. This study aimed to "identify central dimensions and develop a model of *organizational climate* in large-scale project organizations in the oil and gas industry." And without going into further details:

> "The findings indicate that a climate characterized by a strong focus on a) communication and cooperation with actors in the external environment such as vendors, and b) internal cooperation and communication with other projects and with the line organization, is perceived as critical to success in large-scale projects in the oil and gas industry." (Hannevik et al., 2014).

And there are more examples of similar findings. In the opposite case, if there is *distrust* between the parties in a project I think it is easy to imagine a range of scenarios with problems of all kinds. So then: What else can be gained by trust and cooperation between the parties in an oil and gas project? Better decisions perhaps? As described in "*Organization theory and project management : administering uncertainty in Norwegian offshore oil*" by Stinchcombe and Heimer quoted in chapter 2, these type of projects are characterized by a large number of decisions, and that *engineering decision making* is the crucial process for resolving uncertainty. With that I will continue with some more comments about sensemaking and decision-making.

7.5   Sensemaking, decision-making and strategies

Some may argue that sensemaking and decision-making are two completely different things that should be kept separate, but I will argue, as Karin and Nils Brunsson referred to earlier, that sensemaking is part of decision making and therefore comment on both at the same time. The distinction between sensemaking and decision-making can be understood by the following quote from "Management: Tasks, Responsibilities, Practices" (1974) by Peter Drucker, made by Karl E. Weick in "Sensemaking in Organizations":

"The early emergence of sensemaking is also what sets it apart from decision making, as Drucker(1974) made clear:

The Westerner and the Japanese man mean something different when they talk of "making a decision". **In the West, all the emphasis is on the *answer* to the question. Indeed, our books on decision making try to develop systematic approaches to giving an answer. To the Japanese, however, the important element in decision making is *defining the question*.** The important and crucial steps are to decide whether there is a need for a decision and what the decision is about. And it is in that step that the Japanese aim at attaining consensus. Indeed, it is this step that, to the Japanese, is the essence of decision. The answer to the question (what the West considers the decision) follows from its definition. During the process that precedes the decision, no mention is made of what the answer might be…**Thus the whole process is focused on finding out what the decision is really about, not what the decision should be.** (pp.466-467)

To talk about sensemaking is to talk about reality as an ongoing accomplishment that takes form when people make retrospective sense of situations in which they find themselves and their creations." (Weick, 1995, p. 15).

There were a number of examples presented in chapter 3, chapter 4 and chapter 6 related to **sensemaking and the decision-making process, and this I think is at the core of project management of delivery projects in the oil and gas industry. The quality and progress of a project is dependent on numerous decisions throughout the project, so the process in which decisions are made is in my opinion critical to the outcome of the project** – given a reasonable starting point and project conditions and no type of completely unexpected and devastating events. If the decision-making process stops so that the engineering and manufacturing process stops, the project will soon come to an end. And from the interviews we have seen problems mentioned with the decision-making process of oil and gas projects being described.

One of the problems that were emphasized is that "every project is like a multi-customer project" and that there are "too many people around the table in every meeting". As opposed to "before it was like the end customer and yourself talking one to one." I will not make any attempt of generalizing, but these are statements saying more people are involved in the decision-making process and that by itself is a challenge: The more people

that have to agree, the more difficult it will be to reach a mutual agreement. To deal with this challenge, **one category of strategies used by the project managers** has been described **as finding the "smooth path" and "to avoid disturbances"** as seen from chapter 6. This applies in particular to global projects, where there are many parties involved from many nationalities and different cultures.

As Karin and Nils Brunsson have pointed out in "*Decisions*" (Beslutninger) (K. Brunsson & Brunsson, 2015), it is not always necessary to make a decision either to get something done. So one could ask if involving so many people and so many meetings are really necessary?

The Swedish book titled "Mötesboken : tolkningar av arbetslivets sammanträden och rosévinsmingel" (Patrik Hall, Vesa Leppänen, 2019) describes research into the role of working life meetings. The English title of the book would be something like: "The meeting book: interpretations of working life meetings and rosé wine mingling". The research is summarized on the web by NRK (NRK, 2019) and Malmö University (Universitet, 2019) saying the research shows that there are more and more meetings, but no more decisions being made. Working life has become more democratic and there are more people involved when decisions are to be made, as opposed to before when working life was more hierarchical and the manager could make decisions and delegate tasks. Working life has become more complex, and more organizations need to cooperate. This appears to be a similar development or tendency as that described by the project managers in this case study.

Here I could also add a an observation from Richard Sennet: In an interview with Morgenbladet (Gundersen, 2017) he shared some thoughts on project work, based on observations of the working conditions in companies e.g. in Silicon Valley where the employees are said to have big individual freedom, but no one is being monitored more (in the US) than those working from home. Richard Sennet argues that project work leads to more formalities and bigger bureaucracies than a truly cooperating organization, and refers to the contrary in companies he has observed where people work together for so long that they can do the most intricate thing almost without words.

Another strategy used by the project managers as described in chapter 6 could be categorized as "doing the best we can", with for example statements like "show that we can, and that we are performing", and that "we have to work honestly". And part of this strategy and practise is to give advice the customer if there are better technical solutions available than what has been specified in the contract – as part of (what the project manager think is) being service minded and wanting to give the customer the best quality and technical solution. As we have seen, this approach seems to be normal in Norway and similar business cultures, and the formalities of the Contract can be negotiated more with respect to what is "what is reasonable" and doable.

However, as we have also seen, this strategy may not work at all in other parts of the world such as in the Middle East. Bringing the "Norwegian mentality" to the Middle East may not be understood by the customer who can react with suspicion and distrust. The project managers then revert to **a third group of strategies that can be categorized as "nothing more, and nothing less."** Here the focus is to stick to the formalities of the Contract; that is what the customer has asked for, and that is what they will get.

From the findings we have also seen the emphasis on **"clarifying expectations"** and not taking anything for granted. If something fails it is very tempting to point to a reason why in retrospect. And in this example the temptation is to say that the strategy failed because the expectations were not sufficiently clarified. But that is easier said than done. As seen from the example in chapter 4: "That took a long time before we understood". Then we are back to the introduction and that the projects "favors those that have done it before" (which is of course something that could be said about everything), but you would also need to know the customer from before. And even then it might not be the same as last time.

A journal article titled "Institutional Exceptions on Global Projects: A Process Model" (Orr & Scott, 2008), reports on an inductive study "examining 23 cases in which informants from firms engaged in large-scale global projects reported unforeseen costs after failing to comprehend cognitive-cultural, normative, and/or regulative institutions in an unfamiliar host societal context. The study builds on the conceptual framework of institutional theory. The findings, which include propositions and a generic narrative

model, contribute to theoretical knowledge of how institutional exceptions arise, how they are resolved, and how they typically involve three general phases: ignorance, sensemaking, and response." (Orr & Scott, 2008). An *institutional exception* was here defined as "an episode that involves an entrant first being surprised by, then making sense of, and then adapting to institutional differences arising between itself and local project players or external stakeholders." And that they are accidental. The authors further commented that "institutional exceptions tend to be born more of ignorance, arising out of a lack of familiarity with the existence, applicability or salience of the novel institutions encountered."

So the example above from the Middle East could also be considered as an *institutional exception* as described here.

The common ingredient in all the strategies can therefore be summarized as **"adapt all the time"**. This we have seen described by statements such as "for each customer there is a completely new contract", "the coloring of how it is conducted is very person dependent", and "you may have a standard, but a standard being read by different people result in different decisions and different reactions."

Discussing all the different aspects of this case study and the research questions, would, I'm afraid, require a book. I had however not planned on writing a book. I should be well into "the final resignation phase" by now and my time is running out. So if this is the point where you first thought it was becoming interesting, then I'm sorry to tell that this thesis is about to come to an end.

7.6   Few women

To continue on the excuses: Sorry to only mention this in the passing, but yes, there are few women in the oil and gas industry. I will not go into the statistics, but only make a few remarks to the fact that it is a working environment dominated by men. There are female engineers, and there are female project managers, and female top executives and/or in the upper management - in Norway at least, but the vast majority in this business is men. In 2016 there were about 20% women in the petroleum sector in Norway according to numbers from SSB, compared to about 16% in 2003.

And among the interviewees there were no women: They were all men. I did not make any attempt to balance the ratio, or to balance the views or perspectives by interviewing women. The participants were selected based on that they were "information rich", regardless of gender. So the fact that they were all men I think only reflects that it is a working environment dominated by men.

7.7 Improvisation

Yes, the theatrical characterizations this rings a bell to Erving Goffman (Wikipedia, 2021), and I also have a paperback of the 1959 edition of "The presentation of self in everyday life"(Goffman, 1959) laying on my desk. The stories from the interviews make it tempting to also analyse the projects as *stage plays* or *theatrical performances*. There were for example statements like "this is also a poker game, you put on a face", and "we made ourselves a little dumber than we were in trying to get it accepted", and the stories from the Middle East must have made the project managers feel they were part of a stage play. Erving Goffman is one of the most cited sociologists, so again the literature on this subject is enormous, and I will not go into the academic discussions and disagreements over the contributions of Goffman, but very briefly:

Goffman is known for his study of symbolic interaction and dramaturgical analysis, and he contributed for example to the concept of *strategic interaction* (and published a book with the same title in 1969) used in game theory. Strategic interaction could be summarized as calculative, game-like aspects of human interaction; game-like events in which an individual's situation is fully dependent on the move of one's opponent and in which both players know this and have the wit to use this awareness for advantage. With respect to strategies used by project managers in delivery projects in the oil and gas industry, which is not exactly "everyday life" for most people, I think concepts and phenomena described by Goffman can be identified from the interviews. For example "how you communicate", which could also be viewed as stories for another audience (the customers) with the intent of "avoiding trouble." That observation that stories told by managers (in general as this has been investigated a number of times, in a number of ways, and in many difference places and organizations), deviates from what is practice (how things are actually done by the members of the organization) can be found in the

works of Chris Argyris and Donald A. Schön. (Peter Senge also draws extensively on the works of Chris Argyris in "The Fifth Discipline" that I referred to in chapter 3).

Then one could ask: What is the impact of this in the oil and gas projects? That is also another question that I have not aimed to answer, and this case study is not designed to try to provide an answer to that (and I am not sure if it is possible to measure or quantify such a thing). So it is maybe not so wise of me to comment on this, but I dare say the following: I have difficulties seeing (or should I say believing) that strategic interaction or theatrical performances have significant impact on the outcome of delivery projects. Many of the participants in oil and gas projects are engineers, or they have engineering background, and I presume most engineers are not very good actors. At least I know I am a terrible one myself. That is not to say that one has to be an actor for this to be relevant, but as part of a strategy for a project manager I think this is for the very few. I doubt this is something you will learn in any Project Management training or course. I doubt it can even be learnt by most people. So the examples we have seen from the case study describing this being used as part of a (deliberate) strategy I would claim is advanced (in lack of a better word). The performance (to use the terminology of Goffman) has to flow naturally (as also described in the interviews), or the performance could fail and the performer (or the act) "could be seen through" as outlined in (Goffman, 1959). The COVID-19 pandemic I think has also limited the influence of face-to-face interactions as there are hardly physical meetings any more. That is another discussion I will not go into.

But there is more to it: Now combine the reflections from the interviews that could resemble the use of theatrical performances (such as "how you communicate") with strategic thinking described in statements like "premeditation", "deep understanding" and *intentionality* in general: I do not want to give the impression that I interpret this only as "advanced", but not so important. **On the contrary, but could this behaviour rather be characterized as *improvisation*?**

I discussed this with my supervisor Egil J. Skorstad who asked me if I use to listen to jazz music? Sadly I am not much of a musician, and that is probably why I have missed out on the dual meaning of *improvisation*, or should I say misuse? In everyday language in Norway (I do not know if it also applies to other countries), improvisation has a negative

meaning; something careless, random, like an unprepared emergency solution being used almost in panic in the last moment. If you are into jazz, music or theatre then you would know that is not the true meaning of *improvisation*. Skorstad then shared with me a newspaper article by Bjørn Alterhaug (Alterhaug, 2018), in which this misuse of the word *improvisation* is described: Alterhaug explains: Improvisation comes from the Latin word *improvisus*, which means "not seen before" or "unforeseen". Alterhaug continues (my translation from Norwegian): "**Improvisation means to be very well prepared through careful and purposeful practical and theoretical training. A thorough preparation to deal with the unexpected. Improvisation is aggravating and contributes to alertness**. " (Alterhaug, 2018).

This description I think fits well with the behaviour described by some of the project managers in the case study. At least I think it could support my claim above that "it is for the very few", since improvisation require considerable skill and experience. If not, what should the improvisation be based on?

"The important point is that improvisation does not materialize out of thin air" (Weick, 1998, p. 5) as Karl E. Weick writes in his essay "Improvisation as a Mindset for Organizational Analysis" (Weick, 1998) where he discusses *organizational improvisation* using jazz improvisation as the source of orienting ideas. Weick continues:

> **"Cognition in Improvisation**
>
> As this more detailed picture of improvisation begins to emerge, there is a recurring implication that retrospect is significant in its production. **In jazz improvisation people act in order to think, which imparts a flavor of retrospective sensemaking to improvisation**. Ted Gioia puts it this way: unlike an architect who works from plans and looks ahead, a jazz musician cannot "look ahead at what he is going to play, but he can look behind at what he has just played; thus each new musical phrase can be shaped with relation to what has gone before. He creates his form retrospectively" (Gioia 1988, p. 61)." (Weick, 1998, p. 6).
>
> ().

To improve improvisation is to improve memory, whether it be organizational (Walsh and Ungson 1991), small group (Wegner 1987), or individual (Neisser and Winograd 1988). **To improve memory is to gain retrospective access to a greater range of resources. Also implied here is the importance of listening to oneself as well as to other people.** Prescriptions in organizational studies tout the importance of listening to others (e.g., the big news at GE is that Jack Welch discovered ears) **but miss the fact that good improvisation also requires listening to one's own comments and building on them**." (Weick, 1998, p. 6).

With that I will leave the improvisation-trail.

Instead I will continue by asking: What is the power ratio between the parties in the oil and gas projects? Is the supplier just "like a dog that can be kicked"?

7.8 Power and negotiations

Who is the strongest party in these projects? How can strategy be discussed without addressing power relationships? For example; is one party so much stronger than the other that they are in a position to fully control and dictate the other? Why has not power and power relationships been mentioned or discussed as part of influencing factors? Or has it? Where is the analysis of power relationships in this case study?

Yes I have been wondering about the same so let me give a few comments: Firstly, what is power? Again there is an enormous amount of literature on this topic. In social science, power is often seen as the capacity of an individual to influence others, but there are many definitions and categories of power. A review of power in sociology is given in "The Power Concept in Sociology: A Theoretical Assessment" (McNamee & Glasser, 1987).

But first: During the interviews I deliberately did not ask direct questions about power like "who do you think is the strongest party in the project?" or anything similar. Instead my cunning plan was to indirectly look for signs or evidence of any disproportionate power balance as seen from the project managers of the supplier. It may sound as if I made it all up "in the final resignation phase" of this thesis, but this was part of my main insights from the preparations that I mentioned in chapter 5.4 – namely "to focus on challenges during the interviews," and then on reflections on their own strategy. So if this has been

any success there should be some "evidence" in the findings and discussions already presented. And I think there are.

Cooperation and trust I have already discussed, so instead I will give some other examples from the findings presented in chapter 4 and chapter 6. Telling about one of the projects the project manager explained:

> "*We improved the delivery time. Here is the actual success. (). The contract said the equipment were to be delivered in 42 weeks. But then we agreed on an incentive on 10% if we delivered in 35 weeks.*" (chapter 6).

It sounds as if he was very confident that the supplier could deliver what was specified in the contract, and even with shorter delivery time. Isn't that a sign of power? Or is it confidence or bravery? Or is it being experienced and very well prepared?

Now imagine that what you are going to deliver in your project is still under development. That can happen and such examples were also given during the interviews. Something has been sold that is still under development, and your project will be the first to deliver this product. Maybe you have received news from your development department that they are delayed, and they are not even sure if it will work. Would you then try to make a deal with the customer to gain 10% if you could deliver in shorter time? For sure I would not, absolutely not.

Then imagine that the services and/or products you are going to deliver in your project are known to have the best quality in the industry. You have delivered the same many times before, and your company is the only supplier that can deliver them. Would you be more confident then? For sure I would.

Or imagine that the customer (your contact persons in the project) does not have a clue about what you are going to deliver, and that they seem to accept everything that you are saying and delivering. How would that make you feel as project manager?

So if one envisions power as something that is flowing, then one could imagine endless scenarios on how power could flow back and forth between the parties and/or individuals in a project. Some theories in sociology for example think of it as a unidirectional flow

from the more to the less powerful, and there are a number of other problems with theoretical power analysis as well (McNamee & Glasser, 1987, p. 17).

The story about "good intentions" from chapter 6 I think also illustrated very well that being the stronger party in a discussion is not necessarily an advantage either.

As a project manager I think one has to develop a feeling with the project; what is going well, what is not going so well, and so on, and this has also been described quite extensively in the findings presented. Yes the EPC contracts (at least the ones used in Norway) have the so-called "*Hoppeplikt*" (the supplier's immediate obligation to implement change orders, even if the effect of the change on remuneration, progress plan and other has not yet been determined) which favours the operator or owners (the oil companies). The reason for the "*Hoppeplikt*" is the large amount of *concurrent engineering* in these types of projects compared to classical ship-building which is more sequential. (Kaasen et al., 1999, p. 174). If there were no "*Hoppeplikt*", then how would the operator be able to control the construction project and all the suppliers? Another argument has been the consequences of delays in the oil and gas projects.

Now imagine that the operator and/or EPC contractor had "total power" and could decide everything; they made all the decisions and the suppliers only followed direct orders on what to do in the project. I think you see my point. Management is not always fun if you do not know what to do or what to decide. From the interviews we have also seen examples of the importance of *psychological contracts*, the balance between the formal and informal. And even if the supplier is delayed and the customer (EPC contractor and/or operator) could claim compensation in the form or penalty fees they may not try to enforce it, and if they do the outcome of a legal trial may not be so evident. So with this I will end the discussion about power.

Finally I will get back to the question of to which degree the strategies are deliberate?

7.9 Deliberate or emergent?

This is a question about how strategies form in organizations, and the work of Mintzberg and Waters was referred to in chapter 2. So to continue: There are different strategies used because the projects and the customers are different, but what are the project managers deliberately doing, and what is a reaction of other things?

> "Deliberate and emergent strategies may be conceived as two ends of a continuum along which real-world strategies lie." (Mintzberg & Waters, 1985, p. 1)

There is a considerable amount of intentionality and rationality in the findings from the interviews and I think that is also as expected. I asked questions such as "what is your strategy", or "how will you describe your strategy", which could imply that it is something that the project managers should be conscious about. Maybe they thought; "that I have never thought of before, but you make it sound as everyone has a strategy so I'd better come up with something." Then you would not expect to get answers like "my strategy is random and reactive" or "I really have no control". So yes, I think it is as expected that the strategies that have been described are intentional and deliberate in nature.

Mintzberg and Waters researched the process of strategy formation based on **the definition of strategy as 'a pattern in a stream of decisions**'. (Mintzberg & Waters, 1985, p. 1). In chapter 2 I also repeated a table of types of strategies they made, categorizing strategy as *planned*, e*ntrepreneurial*, *ideological*, *umbrella*, *process*, *unconnected*, *consensus* and *imposed*. Mintzberg and Waters also paid "particular attention to exploring the relationship between leadership plans and intentions and what the organizations actually did. Using the label strategy for both of these phenomena-one called *intended*, the other *realized*." (Mintzberg & Waters, 1985, p. 1).

As an example of an organization with "the planned strategy" (the most deliberate strategy in the continuum), Mintzberg and Waters refers to a "mining company that had to engage in a most detailed form of planning to exploit a new ore body in an extremely remote part of Quebec" (Mintzberg & Waters, 1985, p. 3).

I can imagine that mining has similarities with oil and gas construction projects, so I would also say that "**the planned strategy**" fits well with what we have seen in this case study.

Not very surprising. Now it should be mentioned of course that project managers are not the top-level managers, they are not CEOs or directors or central management of a company. But still I think the categories and theoretical concepts can be applied at other management levels (project management in this case) to see if it can improve the understanding of the phenomenon. So to continue:

What about "the imposed strategies"? "The environment can directly force the organization into a pattern in its stream of actions"(Mintzberg & Waters, 1985, p. 12) so "patterns dictated by the environment". Yes I think "**the imposed strategies**" also fit well with what we have seen in this case study. A supplier of oil and gas delivery projects has a lot of requirements they have to deal with. Why else would the project managers need to "adapt all the time"?

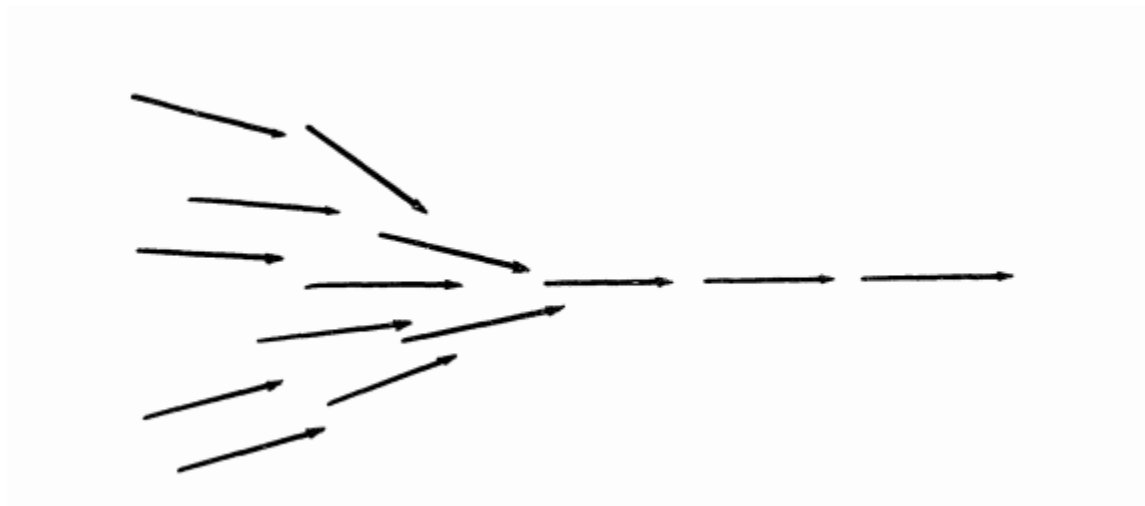Then there is "the consensus strategy".

Figure 7-1 The Consensus Strategy from (Mintzberg & Waters, 1985, p. 11)

Consensus can be recognized in the project managers' emphasis on "clarifying expectations", having to agree all the time with the customer, and all the meetings as described in chapter 6. So yes, I think "**the consensus strategy**" also fit well with what we have seen in this case study.

8   Concluding remarks

This case study started out with a broad approach to which strategies are used by project managers of suppliers in fixed-price delivery projects to EPC contractors in the oil and gas industry. From the beginning I deliberately did not narrow down the type of projects any further, for example limiting the discussion to projects in specific regions of the world, or with specific EPC contractors or end customers (oil companies), or of projects of a certain size in terms of project members or contractual value in dollars, or projects with certain types of supplied equipment or services.

One specific multinational supplier company was then used as a case in which experienced project managers were interviewed about the challenges they had experienced in their projects, and about factors influencing the projects and the strategic considerations they made. What I got back was - not very surprisingly, a wide range of examples from different projects. Of course there can be problems of many kinds. That is not something new. However I think it illustrates the challenges and complexity with this type or projects, and the approach allowed the project managers to reflect on their strategic thinking.

Further, this case study was conducted without involving other parties such as EPC contractors and end customers. That is a limitation, yes, but it was also not required for the purpose of this study. Involving EPC contractors and oil companies would have been a completely different study to answer different questions. Asking EPC contractors of their challenges and strategies will give other stories, and so it will for the end customers. They too have their challenges and strategies for how to deal with them. The EPC contractors presumably experience a range of problems with end customers and suppliers in the very same projects, and vice versa for the end customers. So interviewing representatives from multiple parties would presumably bring many more problems and challenges on the table, and more perspectives on how the parties consider each other, how they cooperate, what is working well and so on. Then it is tempting to ask what can or should be done to make things (even) better? Surely this must have been done before as well. I think there are some examples in my list of references. This is not to say that there are a large number of successful projects in terms of meeting financial targets, meeting early project plans and deadlines, and/or meeting quality requirements etc., but whether

advice with the intention of making things better have an effect is a different matter (and it is not only because I have children that I say so). I have therefore not been tempted to propose any recipes or measures for improvement. That has not been the objective of this case study.

The objective has been to provide a rich description, both for those who do not have working experience from the industry, and for those who are not deeply into the academic literature. **Management has to be understood in the context and organizational environment in which it is performed or operating within.** Then I hope of course that it has had some form of added value or inspiration for those who have experience with either, neither, or both. For those with working experience from the industry it could perhaps be an inspiration or stimulation to reflect on their own "knowledge-in practice". If not I will take comfort in that it has been a good learning experience for myself, and a good exercise for reflecting on my own practice. Just as there is always room for improvement, one (on a personal level or on behalf of an organization) could always say that something has or could be learnt. Here I think I am on steady ground. As Gudmund Hernes pointed out in Morgenbladet no. 15 in April 2021, in Norway there is a long tradition of Official Norwegian Reports (NOUs). And Professor Harald Koht's review of the ones from 1827 to 2009 showed a clear tendency: from placing the responsibility on individuals to identifying system failures or problems in the surroundings beyond the control of the individual. Fewer in the public administration are held accountable, and the focus is moved from whom to be punished to what can be learnt. (Hernes, 2021).

I will however not derail into the COVID-19 vaccines strategy, which is another discussion, a completely different challenge and another context and organizational environment. Instead I will go back to the introduction where I referred to a question from someone who could not see the point of my assignment, and was asking; *"Which different strategies could there possibly be to choose from? Is it at all possible to complete projects like this in more than one way?"*

My answer will be: Yes it is. There is no single *"one way"* to conduct oil and gas delivery projects, and there is no single *"one and only strategy"* that all project managers are

using. And a strategy is not something project managers choose a priori and pull up from the drawer and say "in this project I will choose this strategy", and then try to stick to it as best as they can. No, I think that is not exactly how it typically works.

As explained about "managerial cognition" in chapter 2, I think there is surely an element of "**(1) a largely automatic, pre-conscious process which involves developing and using heuristics**". The use of basic rules of thumb based on past experience we have seen from the findings in chapter 6. For example a type of "doing the best we can"-strategy based on past experience that was then used in the Middle East. And also the use of "**(2) a deeper, more effortful process involving detailed analysis**", with examples of "deep understanding", think before you act and so on from the interviews. So yes, both the use of "System 1" and "System 2" modes of thought to use the terminology of Daniel Kahneman.

There are many similarities between projects of this type since they have been recurring for decades, and many companies have specialized in executing them. However, the technical scope of delivery and what is to be constructed in each project can be different, and the technical and contractual requirements can be different, the customers are different, the expectations can be different for different parties within the same project, and the overall project organization can change (individuals can be exchanged or replaced, and even companies) during execution of one and the same project, so the projects each have their own specific characteristics and challenges. And in response to this the project managers of the supplier basically try to adapt all the time. It may all seem evident, but there are many factors that can influence the strategy used by project managers as identified throughout this thesis.

Then one could ask: Which are the patterns evolving over time? A supplier is only one of many parties in an oil and gas construction project. This thesis has briefly touched upon this by identifying some changes that have taken place in the industry, and given references to other research that has also included EPC contractors and end customers (oil companies). Trying to answer that has however not been the objective of this case study which has been focusing on the perspective of a supplier. So then I will revert to the claim that structure influences behaviour, and therefore that management (or anyone's

actions really) has to be understood in the context, social structures and environment they are operating within. And in this case study it has been project managers of a supplier. As one of the project managers said: "It is the conditions we have to play by." And with that "the final resignation phase" of my thesis has come to an end.

9 References

Aarseth, W. (2012). *An empirical study of organizational cooperation in large traditional and global projects execution* (Doktoravhandlinger ved NTNU (online)). (N. teknisk-naturvitenskapelige universitet I. for produksjons-og kvalitetsteknikk, Ed.). Norwegian University of Science and Technology, Faculty of Engineering Science and Technology, Department of Production and Quality Engineering, Trondheim. Retrieved from https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/240801

Aarseth, W., Rolstadås, A., & Andersen, B. (2013). Managing organizational challenges in global projects. *International Journal of Managing Projects in Business*, *7*(1), 103–132. https://doi.org/10.1108/IJMPB-02-2011-0008

Aftenposten. (2016). Oslo før: Oljeplattformer i Oslo sentrum? Retrieved from https://www.aftenposten.no/osloby/i/2zqkR/oslo-foer-oljeplattformer-i-oslo-sentrum

Ahn, B. (2015). Managing the efficiency of foreign engineering contracts: A study of a Norwegian and South Korean project interface. University of Stavanger, Norway. Retrieved from http://brage.bibsys.no/xmlui/bitstream/id/339804/Ahn_Byungmu.pdf

Ainamo, A., Artto, K., Levitt, R. E., Orr, R. J., Scott, W. R., & Tainio, R. (2010). Global projects: Strategic perspectives. *Scandinavian Journal of Management*, *26*(4), 343–351. https://doi.org/10.1016/j.scaman.2010.09.005

Alterhaug, B. (2018). Improvisasjon. *Klassekampen Nr. 132, 2018-06-13*, p. Last page.

Amissah, M., Gannon, T., & Monat, J. (2020). What is Systems Thinking? Expert Perspectives from the WPI Systems Thinking Colloquium of 2 October 2019. *Systems (Basel)*, *8*(1), 6. https://doi.org/10.3390/systems8010006

Andersen, S. S. (2006). Aktiv informantintervjuing. *Norsk Statsvitenskapelig Tidsskrift*, *22*(03), 278–298.

Ånestad, M., & Løvås, J. (2014). Dokument-eksplosjon på ti år. *DN*. Retrieved from http://www.dn.no/nyheter/energi/2014/05/15/Statoil/dokumenteksplosjon-p-ti-r

Artto, K., Kujala, J., Dietrich, P., & Martinsuo, M. (2008). What is project strategy? *International Journal of Project Management*, *26*(1), 4–12. https://doi.org/10.1016/j.ijproman.2007.07.006

Baskerville, R. F. (2003). Hofstede never studied culture. *Accounting, Organizations and Society*, *28*(1), 1–14. https://doi.org/10.1016/S0361-3682(01)00048-4

Beugelsdijk, S., Kostova, T., & Roth, K. (2017). An overview of Hofstede-inspired country-level culture research in international business since 2006. *J Int Bus Stud*, *48*(1), 30–47. https://doi.org/10.1057/s41267-016-0038-8

Brunsson, K., & Brunsson, N. (2015). *Beslutninger*. (N. Brunsson & I. S. Holmes, Eds.), *Beslut*. Oslo: Cappelen Damm akademisk.

Brunsson, N. (2006). *Mechanisms of hope: maintaining the dream of the rational*

organization. Copenhagen Business School Press.

Bryman, A. (2015). *Social Research Methods*. Oxford: Oxford: Oxford University Press, Incorporated. Retrieved from https://ebookcentral.proquest.com/lib/hiof-ebooks/reader.action?docID=4776951

Cheung, S. O., Yiu, T. W., & Lam, M. C. (2013). Interweaving Trust and Communication with Project Performance. *Journal of Construction Engineering and Management*, *139*(8), 941–950. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000681

Datatilsynet. (2018). Om personopplysningsloven med forordning og når den gjelder. Retrieved from https://www.datatilsynet.no/regelverk-og-verktoy/lover-og-regler/om-personopplysningsloven-og-nar-den-gjelder/

Dixit, A. K., & Nalebuff, B. J. (1991). *Thinking strategically: the competitive edge in business, politics, and everyday life*. New York: Norton.

El-Reedy, M. A. (Mohamed A. (2016). Project management in the oil and gas industry. Hoboken, New Jersey: Scrivener Publishing : Wiley. Retrieved from https://ebookcentral.proquest.com/lib/hiof-ebooks/detail.action?docID=4405579

Engebretsen, B. V. 1955-. (2013). *Leveranseprosjektet* (2. utg.). Trondheim: Akademika.

Equinor. (2018). The first Johan Sverdrup topside installed. Retrieved from https://www.equinor.com/en/news/26apr2018-johan-sverdrup.html

FHI. (2021). Changes in the vaccine strategy. Retrieved from https://www.fhi.no/en/news/2021/changes-in-the-vaccine-strategy/

Flick, U. (2015). *Introducing research methodology : a beginner's guide to doing a research project*. *Sozialforschung* (2nd ed.). Los Angeles, Calif: SAGE.

FRED. (2016). Economic Research-Federal Reserve Bank of St. Louis. Retrieved from https://research.stlouisfed.org/fred2/

Gambetta, D. (1988). *Trust : Making and Breaking Cooperative Relations*. (D. Gambetta, Ed.). Oxford: Blackwell. Retrieved from https://www.nuffield.ox.ac.uk/users/gambetta/Trust_making and breaking cooperative relations.pdf

Gambetta, D. (2011). *Codes of the Underworld: How Criminals Communicate*. Princeton University Press.

Garel, G. (2012). A history of project management models: From pre-models to the standard models. *International Journal of Project Management*. https://doi.org/10.1016/j.ijproman.2012.12.011

Giddens, A. (1984). *The constitution of society : outline of the theory of structuration*. Cambridge: Polity Press.

Goffman, E. (1959). *The presentation of self in everyday life* (First Anch). Anchor Books.

Gundersen, H. (2017). Sennet, kongen og den nordiske modellen. *Morgenbladet Nr. 12*.

Hannevik, M. B., Lone, J. A., Bjørklund, R., Bjørkli, C. A., & Hoff, T. (2014). Organizational climate in large-scale projects in the oil and gas industry: A competing values

perspective. *International Journal of Project Management*, *32*(4), 687–697. https://doi.org/10.1016/j.ijproman.2013.08.006

Havnes, H. (2016). Ny undersøkelse: Én av ti oljeingeniører har mistet jobben. *Dagens Næringsliv*. Retrieved from http://www.dn.no/nyheter/energi/2016/05/31/1711/oljesmellen/ny-underskelse-n-av-ti-oljeingenirer-har-mistet-jobben

Hernes, G. (2021). Nødrett eller nødløgn? Erna Solbergs håndtering er en mulig sak for riksrett. *Morgenbladet Nr. 15*.

Hofstede, G. (2010). *Cultures and organizations : software of the mind : intercultural cooperation and its importance for survival*. (G. J. Hofstede & M. Minkov, Eds.) (3rd ed.). New York: McGraw-Hill. Retrieved from https://e-edu.nbu.bg/pluginfile.php/900222/mod_resource/content/1/G.Hofstede_G.J.Hofste de_M.Minkov - Cultures and Organizations - Software of the Mind 3rd_edition 2010.pdf

Jakobsen, E. W., Kolltveit, E., Fjose, S., Skålvik, A. M., Seeberg, A., & Helseth, A. M. (2018). Spesifikasjons- og dokumentasjonskrav som kostnadsdriver på norsk sokkel. *Praktisk Økonomi & Finans*, *34*(01), 64–74. https://doi.org/10.18261/issn.1504-2871-2018-01-06

Kaasen, K., Aslaksen, I., Bergseth, S., Grønner, E., Hervik, A., Moe, B., & Tranøy, A. (1999). Analyse av investeringsutviklingen på kontinentalsokkelen : utredning fra Investeringsutvalget oppnevnt av Olje- og energidepartementet 28. august 1998 : avgitt 3. februar 1999. (K. Kaasen & N. O. Energidepartementet, Eds.). Oslo: Statens forvaltningstjeneste, Statens trykning. Retrieved from https://www.regjeringen.no/no/dokumenter/NOU-1999-11/id141693/

Kaul, A. (2019). Culture vs strategy: which to precede, which to align? *Journal of Strategy and Management*, *12*(1), 116–136. https://doi.org/10.1108/JSMA-04-2018-0036

Kelley, G. (2012). *Construction Law : An Introduction for Engineers, Architects, and Contractors*. New York: Wiley.

Kirkman, B. L., Lowe, K. B., & Gibson, C. B. (2006). A quarter century of Culture's Consequences: a review of empirical research incorporating Hofstede's cultural values framework. *Journal of International Business Studies*. https://doi.org/10.1057/palgrave.jibs.8400202

Kvale, S. (2005). Om tolkning af kvalitative forskningsinterviews. *Nordic Studies in Education*, *25*(1), 3–15. Retrieved from https://www.idunn.no/file/pdf/33192248/om_tolkning_af_kvalitative_forskningsint erviews.pdf

Kvale, S., & Brinkmann, S. (2009). Det kvalitative forskningsintervju. Oslo: Gyldendal akademisk.

Lerøen, B. V. (2002). *Dråper av svart gull : Statoil 1972-2002*. (Statoil, Ed.). Stavanger: Statoil.

Levi, M. (1991). Trust: Making and Breaking Cooperative Relations. *Public Choice*. Kluwer Academic Publishers. Retrieved from

https://www.jstor.org/stable/pdf/30025495.pdf?refreqid=excelsior%3Adce16fc3cd8 49196fcf20916c557a175

McNamee, S., & Glasser, M. (1987). THE POWER CONCEPT IN SOCIOLOGY: A THEORETICAL ASSESSMENT. *Humboldt Journal of Social Relations*, *15*(1), 79–104. Retrieved from https://www.jstor.org/stable/23262616?sid=primo&seq=1#metadata_info_tab_cont ents

Merriam, S. B. (2009). *Qualitative research : a guide to design and implementation* ([3rd] rev.). San Francisco, Calif: Jossey-Bass.

Mingers, J., & White, L. (2010). A review of the recent contribution of systems thinking to operational research and management science. *European Journal of Operational Research*, *207*(3), 1147–1161. https://doi.org/10.1016/j.ejor.2009.12.019

Mintzberg, H. (1987). The strategy concept I: five Ps for strategy. (Organizational Approaches to Strategy). *California Management Review*, *30*(1), 11. Retrieved from http://search.proquest.com/docview/215883258?OpenUrlRefId=info:xri/sid:primo& accountid=43205

Mintzberg, H., & Waters, J. A. (1985). Of Strategies, Deliberate and Emergent. *Strategic Management Journal*, *6*(3), 257–272. https://doi.org/10.1002/smj.4250060306

Müller, R., Eweje, J., & Turner, R. (2012). Maximizing strategic value from megaprojects: The influence of information-feed on decision-making by the project manager. Retrieved from https://www.sciencedirect.com/science/article/pii/S0263786312000063

Mumpower, J. L. (1991). The Judgment Policies of Negotiators and the Structure of Negotiation Problems. *Management Science*, *37*(10), 1304–1324. https://doi.org/10.1287/mnsc.37.10.1304

Nobelprize.org. (2021). The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1994. Retrieved from https://www.nobelprize.org/prizes/economic-sciences/1994/summary/

NorskPetroleum/NorwegianPetroleum. (2019). Status of production. Retrieved from https://www.norskpetroleum.no/produksjon-og-eksport/produksjonsprognoser/#status-pa-produksjon

NorskPetroleum/NorwegianPetroleum. (2020a). Fields. Retrieved from https://www.norskpetroleum.no/en/facts/field/

NorskPetroleum/NorwegianPetroleum. (2020b). Investments and operating costs. Retrieved from https://www.norskpetroleum.no/en/economy/investments-operating-costs/

NorskPetroleum/NorwegianPetroleum. (2021). CESSATION AND DECOMMISSIONING. Retrieved from https://www.norskpetroleum.no/en/developments-and-operations/cessation-and-decommissioning/

NRK. (2019). Ny undersøkelse: Flere og flere jobbmøter, men ikke flere beslutninger. Retrieved from https://www.nrk.no/urix/ny-undersokelse_-flere-og-flere-

jobbmoter_-men-ikke-flere-beslutninger-1.14783197

Oljedirektoratet. (2020a). Factpages: Johan Sverdrup. Norwegian Petroleum Directorate. Retrieved from https://factpages.npd.no/factpages/default.aspx?nav1=field&nav2=PageView%7CAll &nav3=26376286&culture=nb-no

Oljedirektoratet. (2020b). *Project execution on the Norwegian continental shelf*. Retrieved from https://www.npd.no/globalassets/1-npd/publikasjoner/rapporter-en/report-project-execution-on-the-norwegian-continental-shelf.pdf

Oljemuseum, N. (1999). *Norsk Oljemuseum Årbok 1999*. Retrieved from https://www.norskolje.museum.no/wp-content/uploads/2016/02/316_007b05b42d964342a1ec8ba70b8cbc33.pdf

Orr, R. J., & Scott, W. R. (2008). Institutional Exceptions on Global Projects: A Process Model. *Journal of International Business Studies*, *39*(4), 562–588. https://doi.org/10.1057/palgrave.jibs.8400370

Patanakul, P., & Shenhar, A. J. (2012). What project strategy really is: The fundamental building block in strategic project management. *Project Management Journal*, *43*(1), 4–20. https://doi.org/10.1002/pmj.20282

Patrik Hall, Vesa Leppänen, M. Å. (2019). *Mötesboken : tolkningar av arbetslivets sammanträden och rosévinsmingel*. Malmö: Égalité Förlag.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Serv Res*, *34*(5), 1189–1208. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1089059/

Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks, Calif: Sage Publications.

PTIL. (2016). *Dokumentasjonsprosjektet-Kartlegging av dokumentasjonsomfanget i petroleumsnæringen*. Retrieved from http://www.ptil.no/getfile.php/1340598/PDF/Dokumentasjonsprosjektet - Endelig.pdf

RAMSDAL, R. (2016). "Det overspesifiseres og brukes unødvendig gode løsninger på småting"-Leverandørenes forklaringer på dokumentasjonsjungelen. *TU*. Retrieved from https://www.tu.no/artikler/det-overspesifiseres-og-brukes-unodvendig-gode-losninger-pa-smating/351385

Regjeringen.no. (2014). PUD - Plan for utbygging og drift. Retrieved from https://www.regjeringen.no/no/tema/energi/olje-og-gass/pud---plan-for-utbygging-og-drift/id2001287/

Richardson, T. M., Earnhardt, M. P., & Marion, J. W. (2015). Is Project Management Still an Accidental Profession? A Qualitative Study of Career Trajectory. *SAGE Open*, *5*(1). https://doi.org/10.1177/2158244015572098

Schön, D. A. (1983). *The reflective practitioner : how professionals think in action*. New York: Basic Books.

Scott, W. Richard, Raymond E. Levitt, and R. J. O. (2011). *Global Projects: Institutional and*

Political Challenges. Cambridge University Press. Retrieved from https://www.cambridge.org/core/books/global-projects/792905721AC0A0EF67535926EE9E0E0F

Senge, P. M. (2006). *The fifth discipline : the art and practice of the learning organization* ([Rev. and). New York: Currency/Doubleday.

Serrador, P., & Turner, R. (2015). What is Enough Planning? Results From a Global Quantitative Study. *IEEE Transactions on Engineering Management*, *62*(4), 462–474. https://doi.org/10.1109/TEM.2015.2448059

Silverman, D. (2017). *Doing qualitative research* (Fifth edit). Los Angeles, CA: SAGE.

Söderlund, J. (2004). Building theories of project management: past research, questions for the future. *International Journal of Project Management*, *22*(3), 183–191. https://doi.org/10.1016/S0263-7863(03)00070-X

Söderlund, J., & Lenfle, S. (2011). Special issue: Project history: International journal of project management. *International Journal Of Project Management*, *29*(5), 491–493. https://doi.org/10.1016/j.ijproman.2011.01.001

Steptoe - Warren, G. (2011). Strategic thinking and decision making literature review. *Journal of Strategy and Management*, *4*(3), 238–250. https://doi.org/10.1108/17554251111152261

Stinchcombe, A. L. (1985). *Organization theory and project management : administering uncertainty in Norwegian offshore oil*. (C. A. Heimer, Ed.) (Vol. [58]). Oslo: Norwegian University Press. Retrieved from https://www.nb.no/items/URN:NBN:no-nb_digibok_2007080301046

Swedberg, R. (2001). Sociology and game theory: Contemporary and historical perspectives. *Renewal and Critique in Social Theory*, *30*(3), 301–335. https://doi.org/10.1023/A:1017532512350

Universitet, M. (2019). Arbetslivets möten har oförtjänt dåligt rykte. Retrieved from https://mau.se/nyheter/arbetslivets-moten-har-ofortjant-daligt-rykte/

University of Bergen. (2017). American sociologist is awarded honorary doctorate at UiB. Retrieved from https://www.uib.no/en/sosio/106788/american-sociologist-awarded-honorary-doctorate-uib

Vanpoucke, E., Vereecke, A., & Boyer, K. K. (2014). Triggers and patterns of integration initiatives in successful buyer–supplier relationships. *Journal of Operations Management*, *32*(1–2), 15–33. https://doi.org/10.1016/j.jom.2013.11.002

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, Calif: Sage.

Weick, K. E. (1998). Introductory Essay—Improvisation as a Mindset for Organizational Analysis. *Organization Science*, *9*(5), 543–555. https://doi.org/10.1287/orsc.9.5.543

Wikipedia. (2019). Hofstede's cultural dimensions theory. Retrieved from https://en.wikipedia.org/wiki/Hofstede%27s_cultural_dimensions_theory

Wikipedia. (2021). Erving Goffman. Retrieved from https://en.wikipedia.org/wiki/Erving_Goffman

Yin, R. K. (2014). *Case study research : design and methods* (5th ed.). Los Angeles, Calif: SAGE.

Yin, R. K. (2015). Case Studies. Elsevier Ltd. https://doi.org/10.1016/B978-0-08-097086-8.10507-0

Appendix A: NSD project no. 50600

NSD - Norsk senter for forskningsdata. Research application, data protection and privacy.

Attached "NSD-Svar til Guttorm Torsetnes-2016-11-18.pdf"

GDPR also enforced in Norway from summer 2018 (Datatilsynet, 2018).

NSD

Frode Haaland

Avdeling for økonomi, språk og samfunnsfag Høgskolen i Østfold

Remmen

1757 HALDEN

Vår dato: 18.11.2016	Vår ref: 50600 / 3 / AGH	Deres dato:	Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 17.10.2016. Meldingen gjelder prosjektet:

50600	Project Management of Suppliers' Fixed-Price Deliveries to EPC Contractors in the Oil and Gas Industry
	-A Case Study of Strategies used by Experienced Project Managers in Delivery Projects
Behandlingsansvarlig	Høgskolen i Østfold, ved institusjonens øverste leder
Daglig ansvarlig	Frode Haaland
Student	Guttorm Torsetnes

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Appendix B: Interview Guide

1) Before starting the interview

Explain the objective of the study.

Inform about anonymity and voluntary participation. Ask for permission to do voice recording of the interview.

2) Introduction: Experience as Project Manager

INTRO: Work experience:

Could you please tell me a bit about your background?

When did you start working as PM?

What kind of projects?

INTRO: Strategy

How would you describe your strategy for conducting delivery projects?

INTRO: Parties in the overall project:

Which are the different parties you as PM need to relate to in the overall project?

3) Changes over time

Is there something that has changed since you first started working as PM?

What has changed?

4) Thoughts on the PM role

How will you describe yourself as Project Manager?

What is your objectives as PM?

5) Challenges and problems:

Have you been challenged by customers? In what way?

What is the most demanding and challenging you have experienced as PM with respect to customers and other parties in the project?

Have you ever had to make compromises with customers or other parties in a project?

What do you think determines whether a project is successful or not?

6) Experiences from a challenging project

What characterizes a challenging project?

Which factors influence the strategical decisions you made?

Do you try to predict what other parties are doing? How?

Challenging project: Contractual terms:

Challenging project: Expectations:

Challenging project: Personal relations:

Challenging project: Trust:

7) Experiences from a successful delivery project

Successful project: Contractual terms:

Successful project: Expectations:

Successful project: Personal relations:

Successful project: Trust:

8) Overall thoughts and view on strategy

How will you describe your strategy for managing fixed-price delivery projects?

Is there anything particular in the way you manage a fixed-price project compared to reimbursable or other types of projects?

Which conditions have the biggest influence on how you manage a fixed-price delivery project?

Appendix C: Numbers from Norwegian Petroleum

Norwegian oil and gas investments

The figure below shows historical figures and forecasts for the Norwegian shelf for investments, field operation, exploration, decommissioning and disposal, as well as various costs. In 2019, the overall costs were about NOK 250 billion. Investments made up about 60 per cent of this, operating costs 25 per cent, and exploration costs about 10 per cent. (NorskPetroleum/NorwegianPetroleum, 2020b). The numbers for 2020-2024 in the figure are forecasts.
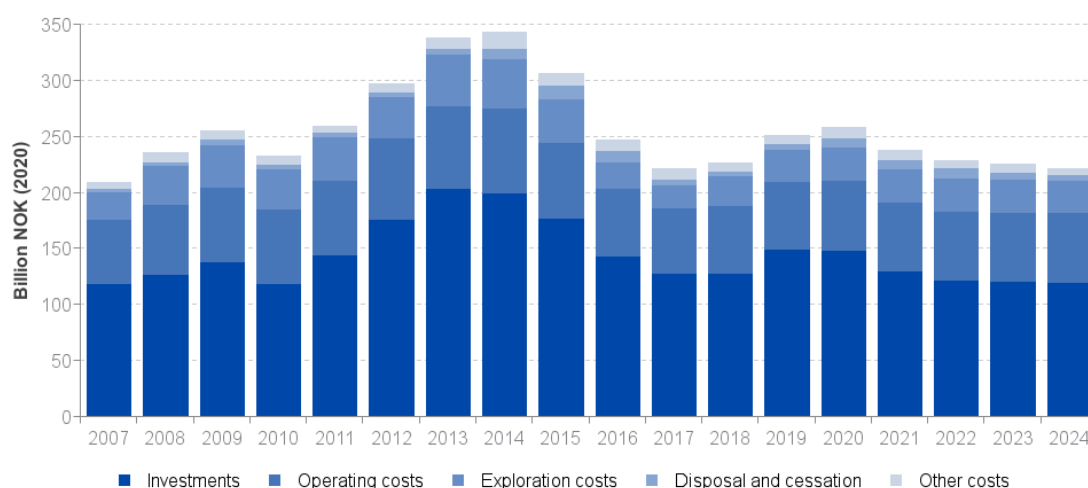

Figure 0-1 Norwegian oil and gas investments and operating costs: Overall costs (NorskPetroleum/NorwegianPetroleum, 2020b)

Norwegian oil and gas production

Norwegian oil production peaked in 2000 with 181,2 million barrels per day.
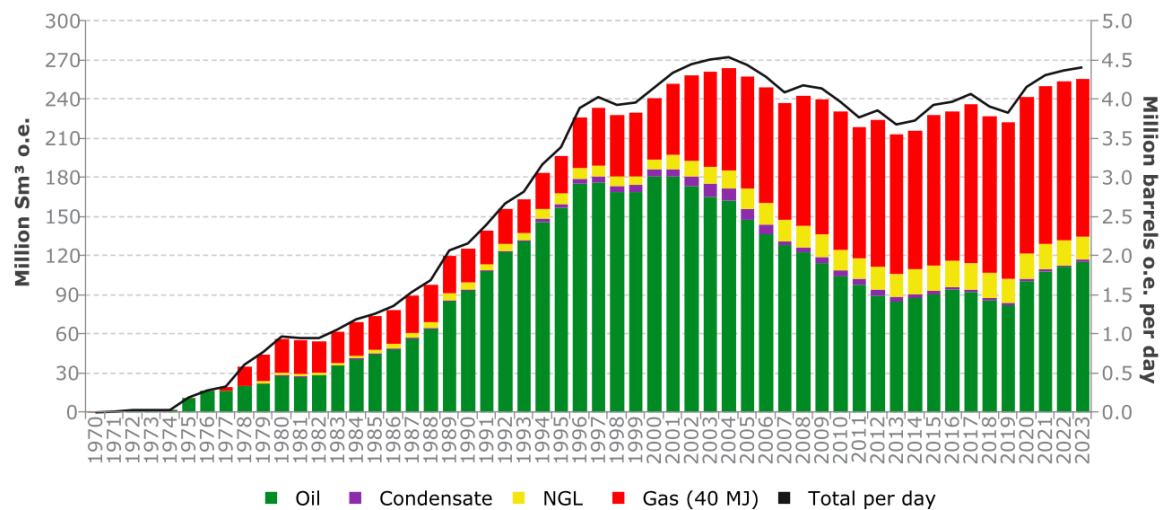
Figure 0-2 Norwegian oil and gas production per June 2019 (NorskPetroleum/NorwegianPetroleum, 2019)

In 2018 the oil production was 86,3 million barrels per day. As seen from the figure, the reduction in the oil production from year 2000 has been compensated by increased gas production. The production numbers for 2019-2023 in the figure are forecasts.

Fields on the Norwegian shelf

Since production started in 1971, oil and gas have been produced from a total of 112 fields on the Norwegian shelf. At the end of 2019, 87 fields were in production: 66 in the

North Sea, 19 in the Norwegian Sea and 2 in the Barents Sea.

(NorskPetroleum/NorwegianPetroleum, 2020a)

Field	Year found	Original resources	Production start	Operator
JOHAN SVERDRUP	2010	425,37	05.10.2019	Equinor Energy AS
IVAR AASEN	2008	29,08	24.12.2016	Aker BP ASA
KNARR	2008	10,53	16.03.2015	A/S Norske Shell
VISUND SØR	2008	10,14	22.11.2012	Equinor Energy AS
EDVARD GRIEG	2007	45,03	28.11.2015	Lundin Norway AS
RINGHORNE ØST	2003	16,88	19.03.2006	Vår Energi AS
VILJE	2003	14,97	01.08.2008	Aker BP ASA
MORVIN	2001	15,3	01.08.2010	Equinor Energy AS
GOLIAT	2000	31,45	12.03.2016	Vår Energi AS
SKARV	1998	60,77	01.01.2013	Aker BP ASA
ALVHEIM	1998	60,68	08.06.2008	Aker BP ASA
ORMEN LANGE	1997	325,14	13.09.2007	A/S Norske Shell
KRISTIN	1997	65,47	03.11.2005	Equinor Energy AS
AASTA HANSTEEN	1997	55,04	16.12.2018	Equinor Energy AS
SYGNA	1996	11,22	01.08.2000	Equinor Energy AS
TUNE	1995	22,93	28.11.2002	Equinor Energy AS
KVITEBJØRN	1994	148,7	26.09.2004	Equinor Energy AS
VOLUND	1994	14,43	10.09.2009	Aker BP ASA
NORNE	1992	109,71	06.11.1997	Equinor Energy AS
GRANE	1991	148,79	23.09.2003	Equinor Energy AS
FRAM	1990	63,09	02.10.2003	Equinor Energy AS
ALVE	1990	14,17	19.03.2009	Equinor Energy AS
SKIRNE	1990	12,63	03.03.2004	Total E&P Norge AS
GJØA	1989	69,75	07.11.2010	Neptune Energy Norge AS
EMBLA	1988	19,17	12.05.1993	ConocoPhillips Skandinavia AS
TORDIS	1987	73,46	03.06.1994	Equinor Energy AS
MIKKEL	1987	60,06	01.08.2003	Equinor Energy AS
VISUND	1986	113,63	21.04.1999	Equinor Energy AS
VIGDIS	1986	77,2	28.01.1997	Equinor Energy AS
NJORD	1986	66,8	30.09.1997	Equinor Energy AS
TRESTAKK	1986	12,44	16.07.2019	Equinor Energy AS
HEIDRUN	1985	246,68	18.10.1995	Equinor Energy AS
VALEMON	1985	15,77	03.01.2015	Equinor Energy AS
SNØHVIT	1984	249,32	21.08.2007	Equinor Energy AS
DRAUGEN	1984	150,21	19.10.1993	OKEA ASA
OSEBERG SØR	1984	93,37	05.02.2000	Equinor Energy AS
TYRIHANS	1983	94,1	08.07.2009	Equinor Energy AS
TAMBAR	1983	16,14	15.07.2001	Aker BP ASA

GUNGNE	1982	24,74	21.04.1996	Equinor Energy AS
SIGYN	1982	19,59	22.12.2002	Equinor Energy AS
ÅSGARD	1981	421,83	19.05.1999	Equinor Energy AS
SLEIPNER ØST	1981	120,73	24.08.1993	Equinor Energy AS
VESLEFRIKK	1981	65,68	26.12.1989	Equinor Energy AS
VEGA	1981	45	02.12.2010	Wintershall Dea Norge AS
OSEBERG ØST	1981	25,18	03.05.1999	Equinor Energy AS
BRAGE	1980	69,85	23.09.1993	Wintershall Dea Norge AS
GYDA	1980	45,51	21.06.1990	Repsol Norge AS
TROLL	1979	1766,01	19.09.1995	Equinor Energy AS
OSEBERG	1979	541,76	01.12.1988	Equinor Energy AS
SNORRE	1979	325,7	03.08.1992	Equinor Energy AS
GULLFAKS	1978	412,46	22.12.1986	Equinor Energy AS
GULLFAKS SØR	1978	167,91	10.10.1998	Equinor Energy AS
GINA KROG	1978	31,52	30.06.2017	Equinor Energy AS
STATFJORD NORD	1977	45,35	23.01.1995	Equinor Energy AS
ULA	1976	92,56	06.10.1986	Aker BP ASA
STATFJORD ØST	1976	45,54	24.09.1994	Equinor Energy AS
VALHALL	1975	197,23	02.10.1982	Aker BP ASA
GUDRUN	1975	39,53	07.04.2014	Equinor Energy AS
STATFJORD	1974	704,93	24.11.1979	Equinor Energy AS
SLEIPNER VEST	1974	202,13	29.08.1996	Equinor Energy AS
HOD	1974	12,81	30.09.1990	Aker BP ASA
HEIMDAL	1972	52,85	13.12.1985	Equinor Energy AS
ELDFISK	1970	190,53	08.08.1979	ConocoPhillips Skandinavia AS
EKOFISK	1969	739,43	15.06.1971	ConocoPhillips Skandinavia AS
BALDER	1967	85,69	02.10.1999	Vår Energi AS

Table 0-1List of producing fields on NCS per 2019/2020. Original reserves given in million standard qubic meter oil equivalents (mill. Sm³ o.e.). Fields with original reserves below 10 are not shown. (NorskPetroleum/NorwegianPetroleum, 2020a)

END