Universitetet i Stavanger

Faculty of Science and Technology

MASTER'S THESIS

Study program / Specialization: Industrial Economy	Spring semester, 2021 Open
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Title of master thesis: How can new contract and collaboration models between operators and contractors on the NCS lead to increased added value for both parties?	
Credits (ECTS): 30p	
Keywords: Contract, NCS, Added value, Intervention, Petroleum, Risk	Pages: 69 + enclosure: 2 Stavanger, 07.06.2021

How can new contract and collaboration models between operators and contractors on the NCS lead to increased added value for both parties?

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June 2021

ABSTRACT

During intervention on platform, from rig or vessel the preferred method of compensation is day rates. From a business point of view this gives contractors little to no incentive to complete the work early as fewer days of operation gives less income. Other aspects that is hard to quantify will however be a driver to correct this motivation. These could be reputation, ability to get things done according to plan, availability, performance, and cost reductions.

The thesis seeks to answer how new contracts and collaboration models can benefit operators and contractors resulting in greater value for to both parties. It focuses on well intervention operations and associated contracts on the Norwegian continental shelf (NCS) performed on platforms, rigs, and vessels. Through interviews with managers in key positions in both the operator and contractor companies in the intervention departments, information regarding the internal and external process was gathered.

The research conducted shows that both operators and contractors have different goals and experiences regarding contract structure. Various contracts are currently in use for intervention work such as frame agreements, alliances and integrated contracts however still focused on the day rate compensation. The process from an intervention demand appears until the planning and execution starts is also documented.

The thesis concludes that changes to how and when collaboration takes place and adjustments to a contract format focused on total cost by introduction to more fixed price elements and risk sharing can create added value to operators and contractors.

ACKNOWLEDGEMENT

This thesis is written as part of a master's program in industrial economics at the University of Stavanger. After five years studying together, writing the bachelor thesis, posting an academic article, and now finally wrapping up the master's thesis we are excited and looking forward to the next step in our professional careers. This thesis would not have been possible to complete alone so we want to give recognition to the following persons for contributions to the thesis:

Special thanks to our external advisor André Thorsen for the support and sharing valuable experience and knowledge around the thesis subjects.

We would also like to express our gratitude to our supervisors Kjell Hauge and Finn Sandberg for providing valuable academic guidance and regular feedback on our progress.

We want to thank all participants in the interviews from the operator and the contractor companies with important information regarding contracts and experiences, without your participation in our data gathering the thesis would not have been possible.

We hope you find this thesis engaging and its recommendations valuable.

Birger Haugen & Bjørnar Rødland

Stavanger, June 2021

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ABBREVIATIONS

BOP	Blowout Preventer
CPC	Capped Price Contract
CRC	Cost Reimbursable Contracts
CT	Coil Tubing
EOI	Expression on Interest
EU	European Union
FPC	Fixed Price Contracts
GMP	Guaranteed Maximum Price
HPU	Hydraulic Power Unit
HSE/HSEQ	Health, Safety, Environment, Quality
IC	Incentive Contracts
ITT	Invitation to Tender
LWI	Light Well Intervention
MLC	Most Likely Cost
MLT	Most Likely Time
NCS	Norwegian Continental Shelf
NPT	Non-Productive Time
P&A	Plug and Abandonment
PQQ	Pre-Qualification Questionnaires
PSA	Petroleum Safety Authority
RFI	Request for Information
RFO	Request for Offer
RFP	Request for Proposal
RFQ	Request for Quotation
RFT	Request for Tender
RLWI	Riserless Light Well Intervention
ROI	Registration of Interest
ROV	Remote Operated Vehicle
UPC	Unit Price Contract
VSL	Value of Statistical Life
WOCS	Workover Control System
WOW	Waiting on Weather

1 INTRODUCTION

In the start of 2020, the oil demand in the world plummeted due to covid-19. With low oil- and gas prices combined with the virus outbreak it increased the uncertainty around future developments and created temporary financial and liquidity challenges on the NCS. To help the oil-industry, preventing profitable investments being delayed and creating problems for the contractors, the Norwegian government adopted in June 2020 amendments in the petroleum tax act. The changes involve depreciation and tax-free income, as well as treatment of tax-losses, for a limited period of time. [1, 2] Up until today this has resulted in investments being kept at a high level and sufficient workflow for suppliers, providing jobs.

On the Norwegian Continental Shelf (NCS) there is expected investments of 178,4 billion NOK in 2021. [3] There are also predicted to be large investments in the next years to come. This shows the possibilities with developing new- or optimizing the current contract models between the operators and the contractors, and how this could potentially unlock added value. By interviewing both operators and contractors regarding contracts and gather information about their preferences, thoughts, priorities etc. this thesis hope to find important information and compare the data against each other and with the contract theory. This is to be able to create more efficient contracts and to maximize cost-benefit of doing operations.

1.1 Methodology

This thesis is mainly a document/literature study. The theoretical part and parts of the discussion is based on collected information from the literature. Before looking at how new models and methods can contribute to added value, looking into the past and present is important. To better understand how contracts and collaboration between operators and contractors has been and is currently performed, a qualitative method in the form of interviews was conducted with leading personnel from both sides of the contract. The goal of the interviews was to attain key information regarding amount of intervention work, their contractual structure, the internal process leading up to involvement of contractor and working process for the teams set to conduct the intervention. A project is defined as a specific well operation in this thesis. The project refers to a well and the work scope associated.

When conducting a semi-structured interview, it is possible to obtain the same structure and basis for everyone. If the person being interviewed had more knowledge on the subject, it is possible to investigate further to gather more information that could be useful. To encourage the interviewee to share experience and discuss topics, which may not have been captured in the literature search, open-ended questions were used. This helped to cover a broad topic area and as the interview progressed the questions became more detail oriented to get a deeper understanding on the specific topics. The data collected was anonymised, from the operators and the contractor. The interview questions used can be found in appendix A and B at the end of the thesis.

On the operator side five different companies attended to an interview. The companies vary in how many fields they operate, the number of well interventions yearly on the NCS, number of total oil barrels produced and so forth. The participants were all managers and leaders in departments responsible for intervention work in their company. The interviews were conducted as an approximately one-hour semi-structured qualitative interview online through MS teams. Follow up questions and clarifications were communicated through email and phone calls afterwards.

The contractor interviewed is preforming intervention services globally and gives the insight from the contractor's perspective. The person interviewed is a commercial manager who has worked several years in the industry. The interview was conducted the same way as with the operators and follow up questions were communicated through email and phone calls.

1.2 Delimitations

In this thesis some limitations have been necessary due to capacity and time, and to avoid the thesis becoming too extensive. Limitations set in this thesis is the following:

- Limitation due to the sample size of interview objects makes it challenging to draw solid conclusions. With five interviews conducted with the operator industry and only one with the contractor industry, resulting in this thesis being limited to their answers.
- Although some of the companies are large internationally and operating on a global scale, this thesis has a focus on their operation and contract form on the NCS.
- Contracts contains confidential information. Therefore, the interview finding and discussions in this thesis will be kept at a general level.

1.3 Structure of the Thesis

This thesis consists of four parts: introduction, theory, discussion, and conclusion. The structure is presented in Figure 1 below.

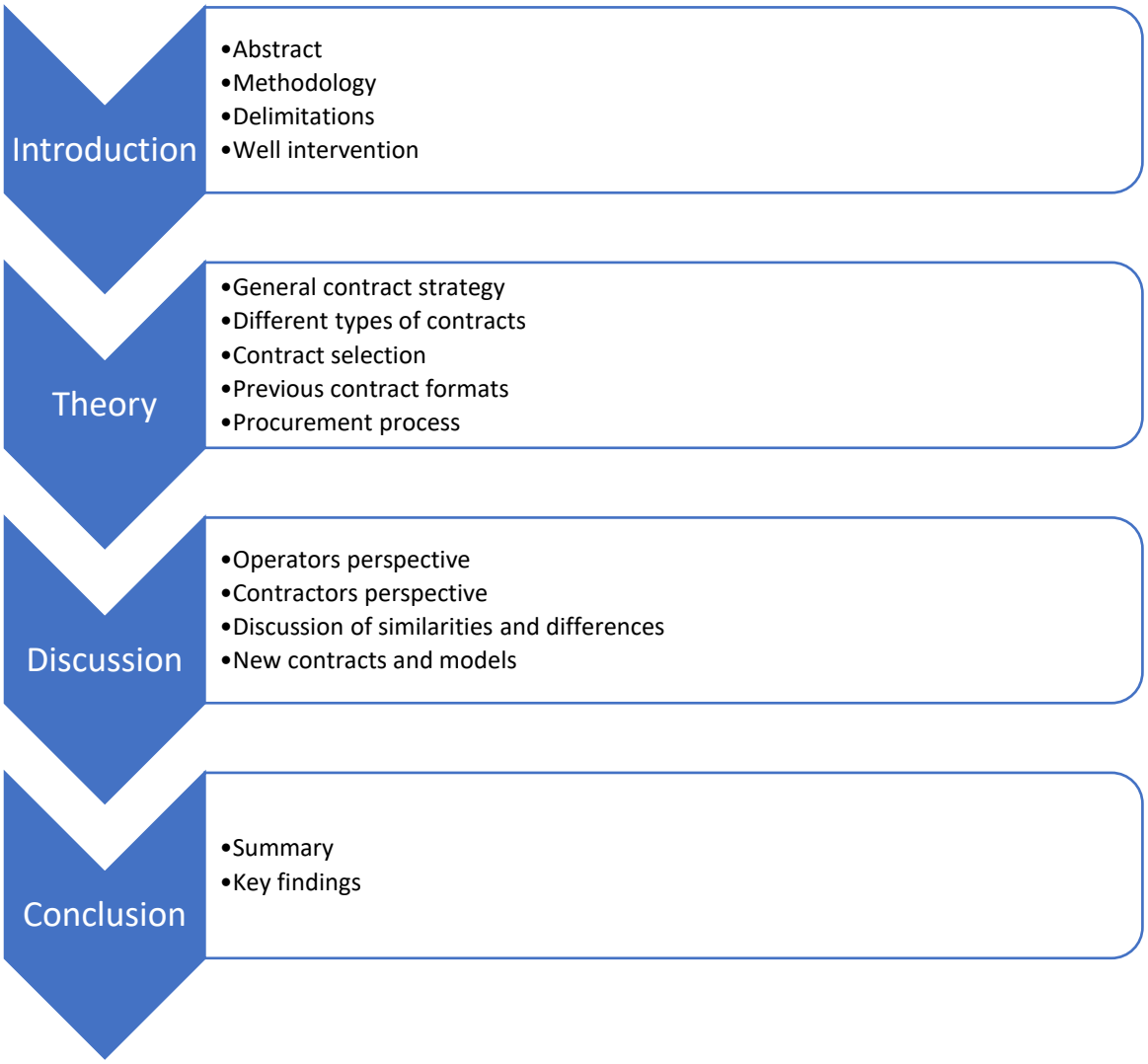

Figure 1 The structure of the thesis

In the first chapter the background of the thesis is presented, the methodology explained, the outline of the thesis and a short introduction about well interventions. In the second part the theoretical background that the thesis is based upon is presented, and the history of previous contract formats used. The third part is the main part of the thesis, where the results from the interview are presented. The discussion is about the similarities and differences and new possible contracts models. The final part contains the key findings from this thesis and a conclusion to the research question.

2 WELL INTERVENTION

Oil fields in Norway is found on the Norwegian Continental Shelf and can be surface or subsea fields. The decision between choosing surface or subsea solution is often dependent on the depth at the location and the location itself, but the choice has also historically been influenced by the dominating solutions used when the field was built. [4]

Important for the choice of intervention procedure is if the christmas tree (valve tree) is placed on surface (called a dry tree) or subsea (i.e. wet tree). All work conducted on pressurised wells are deemed critical. To perform the maintenance in a safe manner the communication between the valve tree and the vessel needs to be secured by pressure retaining equipment that enables the possibility of disconnecting the vessel and closing the valve tree at the same time. [5-7]

2.1 Surface intervention

A dry tree can be intervened using surface equipment rigged up on the platform, and a typical rig up will usually contain at least an intervention blowout preventer (BOP), lubricator and pressure control head and in addition the well specific downhole tools and equipment. On top of the valve tree a cutter valve and an intervention BOP is installed, usually smaller and lighter than a BOP used subsea. This makes sure that it is possible to close the well in case of a blowout. The lubricator, used to pass the downhole tools down the well, is installed over the BOP and with a stuffing box at the top to keep pressure control during intervention. Figure 2 shows a basic rig-up on a surface valve tree ready for intervention. Tool strings with tools such as plugs, perforation guns, logging etc. are run into the well to achieve the desired results. Some tools can be run together while others need to be run on their own, but the limiting factor on the tool string length is the length of the lubricator, also true for interventions on wet trees.

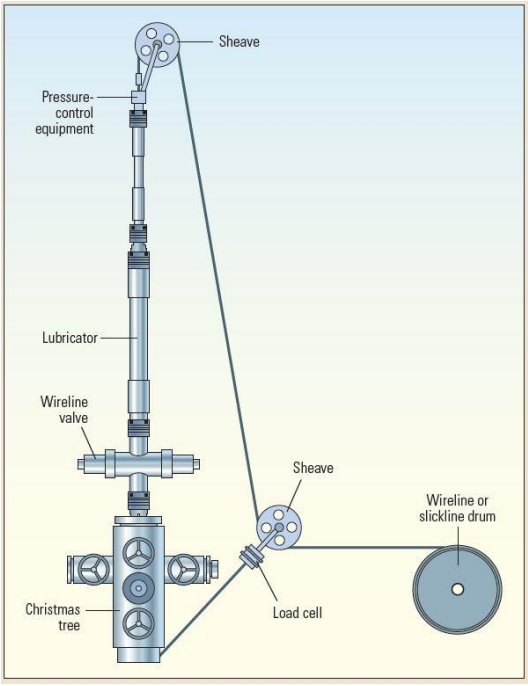

Figure 2 Basic slickline/wireline rig-up [8]

2.2 Subsea intervention

One of the things that makes subsea wells special is the access to them. The valve tree is installed in a subsea structure on the seabed with the deepest to date installed at 2900 meters. [9, 10] It can be installed alone, called a satellite, or together with other wells on a template structure. The well may or may not have a protection structure to protect the subsea equipment and/or allow fishing activities, like trawling, over the well. Since it is installed on the seabed, access to the well is more limited than for a surface tree.

Performing maintenance on a subsea well compared to a dry well is more complicated and costly and requires either a rig or vessel to establish communication between the well and the surface. Different types are used, but the most common is jack-up and semi-submersible rigs and riserless light well intervention ships. They will typically have a blowout preventer, lubricator or riser and control head to gain access to the well. The control system that monitors and controls all functions of the valve tree and the blow out preventer is called a workover control system (WOCS). The system includes a hydraulic power unit (HPU) that supplies hydraulic with the needed pressure, air and electrical signals. To establish communication and perform maintenance in the well there are two different alternatives. Both have a blowout preventer connected to the subsea valve tree using an adapter, and an emergency disconnect function to release the vessel or rig from the subsea well. An umbilical control cable is connected from the subsea BOP and disconnect equipment to the WOCS to control functions.

With a riser: Several pipe sections are connected to “extend” the wellbore up to the vessel. The pipes connect to the BOP/disconnect device on the subsea valve tree and the surface valve tree on the vessel, enables access to the well to perform maintenance.

Riserless: A riser is not used, instead a lubricator is installed subsea onto the BOP/disconnect device to lubricate the cable tools into the well. A pressure control head is installed over the lubricator after the cable tools is inside to act as primary barrier during intervention. [5]

Another tool to perform interventions are coiled tubing (CT) operations. Coiled tubing is plain pipes that can be coiled onto drums, is easily sealed against, and can be efficiently run in and out of the well. The major equipment of a coiled tubing operation is CT injector, BOP, CT reel with the coil itself, and other equipment like pumps, tanks, control, and power units. The injector moves the coil in and out of the well, overcoming the well pressure when running in and lifting the weight of the coil when running out. BOP includes valves to close the well in case of unexpected blow outs and the CT reel holds the coil. Coiled tubing can both be used on a surface well and a subsea well, but the equipment required differs. A subsea coiled tubing operation will require more and heavier equipment and also a vessel to access the well. Figure 3 shows the major equipment and rigup when performing riserless light well intervention (RLWI) with cable and coiled tubing.

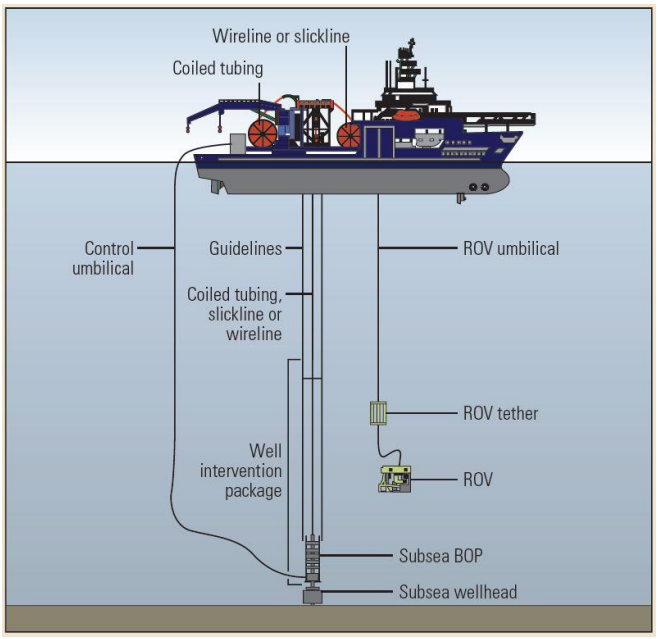

Figure 3 Riserless light well intervention rig-up [8]

3 BACKGROUND

To better understand procurement processes and contract types and how they are used, it is necessary to investigate the theory. There is a plethora of definitions used on what procurement and a contract is as it covers many uses. In his paper “What is procurement?”, J. Mak discusses the different definitions used for procurement. The conclusion is that procurement “is a careful, usually documented process resulting in the delivery of goods or services to be delivered within a set time period”. [11] The article also discusses that the contract is a medium to procurement and questions if procurement exist without contracts.

A contract is a promise or set of promises between parties, which the law will enforce. It is an instrument for balancing risks, with the distribution of risks impacting the motivation of contractual partners to manage the risks towards project success. [12]

The next paragraphs will outline the different types of contracts commonly used for intervention projects and the general procurement process to award them by operators in Norway.

A company’s procurement process can be either structured as a centralized or decentralized system. Full centralization means that all decisions related to a purchase, like what, when and how, is governed by a company headquarter or a unit dedicated to the purchases to satisfy the company's needs. Full decentralization means that local divisions and units are given the responsibility to decide on the what, when and how of purchases. Hybrid models are procurement set-ups in-between full centralization and full decentralization. In a hybrid model the headquarter and the local divisions share the purchase responsibilities.

Fixed-price, cost reimbursement or cost-plus, and incentive contracts are the three commonly distinguished forms of procurement contracts. The next paragraphs will go more into the details on the different types. It is important to note that contracts do not need to be of either type but is in fact often a combination with different aspects covered by different principles of the three types. The most commonly used types are the fixed-price and the incentive contracts. [13]

The contract format for a specific project should be adapted to best suit the project, and different factors should be accounted for when setting the procurement risk. Procurement risk is those events that may affect the realization of the contractual performance, and whose occurrence cannot be accurately predicted and influenced by contracting parties. [13]

Some of the most common procurement risks in petroleum industry are listed below:

- Weather conditions (Depending on season of year work is to be performed)
- Degree of complexity
- Available information
- Financial state of parties
- Public

3.1 Fixed-price contracts

A fixed-price contract (FPC) is a contractual agreement whereby the contractor is paid a fixed price for realizing a project that satisfies a predetermined quality standard. [13] All risk is laid on the contractor to perform the work within budget, and any under- or overspending is the contractor's responsibility. For the contractor it provides a maximum incentive to control costs and perform effectively and the administrative burden imposes a minimum upon the contracting parties. [14] These fixed price principles are often termed as lump sum in the petroleum industry.

These lump sum contracts are highly applicable when it comes to acquiring commercial items or services based on reasonably defined detailed or functional specifications or for acquiring other supplies. This is when fair and reasonable prices can be established at the outset, such as when:

a) There is adequate price competition.
b) There are reasonable price comparisons with similar prior purchases or supported by valid certified cost or pricing data.
c) The available pricing or cost information permits realistic estimates of the probable costs of performance.
d) Identification on performance, uncertainties and reasonable estimates of their cost impact can be made, and the contractor is willing to accept a firm fixed price representing assumption of the risks involved [14]

Lump sum contracts provide strong cost incentives and a more predictable final cost. However, they can produce substantial conflicts over change in orders and quality. When changes are required, such contracts are more likely to produce delays and involve a bureaucratic process. To avoid such disputes the preparation of a detailed project plan is recommended prior to accepting lump sum contracts. [15] One of the prerequisites of success from such a contract model will be the teams previous experience and their confidence. Having previous experiences to draw upon when developing the plan and using the lessons gained to quickly resolve problems during contract execution is invaluable. The experience will also help to deliver a more realistic bid and deliver the project at agreed cost and time. [16]

The contractor should perform a risk assessment where they evaluate the risks and their probabilities. Based on this assessment the contractor can include the costs of these risks into their cost estimates. This can result in a potentially higher cost for the client compared to e.g., material and time contracts. [14]

3.2 Cost-reimbursement contracts

In a cost-reimbursement contract (CRC) the buyer agrees to reimburse all (documented) production costs related to the project and to pay a fee for supervision (also defined as a cost-plus-fixed-fee contract) [13]

The contractor is thus fully insured against any cost overruns from the project but has no incentives by contract to limit the spending's and incorporate cost-reducing measures.

There are different variations to the CRC like CPC and UPC. In a CPC or capped price contract a daily fee is given to the contractor for the agreed number of days. This fee also includes the profit.

UPC or unit price contract is like the CPC but instead of setting a daily fee, a fee is set for each unit of the work to be performed. In a UPC there is not set a cap for the number of days. [13]

Cost reimbursable contracts are suited when there is uncertainty and likeliness of changes in the project during planning and realization that will incur unforeseen costs. These changes can be initiated by different factors like:

- Changes in client requirements
- Legislation requirements
- Design faults
- Delays

Change will result in expenses for the project. Normally a renegotiation of the contract would be needed for the changes, but with a CRC the cost associated with the negotiation can be reduced or even eliminated.

Since all expenses in the project are reimbursable there is no incentive for the contractor to cut cost by reducing the quality of the deliverables. As such the CRC is preferrable when the quality is hard to measure or verify. [13]

A cost reimbursable contract should not be used when there is little to no proper incentive for the contractor to keep project costs within contract budgets. The lack of proper incentive can also result in increasing total cost during the realization of the project.

Another disadvantage of CRCs is that during the tendering stage they prevent the buyer from choosing the most efficient contractor as all costs are reimbursable and therefore the efficiency of the supplier is hidden. For this reason, CRCs should not be given through the competitive tendering process if the buyer seeks to award the most efficient contractor. [13]

3.3 Time-and-Material Contracts

Cost-reimbursement contracts has a sub-category or an alternative form called time and material contracts. With these contracts the contractor gets paid based on the labour hours or material that has been directly used to deliver the service or end-product. In these contracts there is an agreed upon pricelist of direct labour hours (including wages, overhead, general, and administrative expenses, profit and other factors if applicable) and actual cost for materials. The contract or order often includes a ceiling price that the contractor exceeds at its own risk. [14]

Time-and-material contract may be applicable when it is not possible at the time of placing contract to estimate the costs or to anticipate the extent or duration of the work with any reasonable degree of confidence. [14] In well construction projects, time-and-material contracts are commonly used, particularly for long term framework contracts where the scope of work can vary and there are multiple uncertainties. [17]

A normal time-and-material contract provides no positive profit incentive to the contractor for the labour efficient or cost control. Thus, an appropriate monitoring of the contractor's performance is required to give an affirmation that effective cost controls and efficient methods are utilized. [14] Prior to submitting a bid, the contractor must thoroughly appraise their prices. The prices should be competitive and cover all costs and include the profit.

3.4 Incentive contracts

In between the extremes of CRCs and FPCs is the incentive contracts (IC). Incentive contracts typically include a target cost, a target profit and a profit adjustment formula which ensures that (i) actual cost or quality that meets the target will result in the target profit or fee; (ii) actual cost (quality) that exceeds (is below) the target will result in downward adjustment of target profit or fee; (iii) actual cost (quality) that is below (exceeds) the target will result in upward adjustment of target profit or fee. [13] The incentive contracts are designed to obtain specific acquisition objectives by- establishing attainable and reasonable targets; and including suitable incentive arrangements. These arrangements are designed to motivate the contractor's effort and discourage inefficiency and waste. [14]

For example, when an oil company and its contractors work together closely in a collaboration it is important to ensure that all participants pull in the same direction. To achieve the full benefit of close collaboration all the goals should be aligned, this alignment is normally done through the use of incentives. [15] Incentives are in most cases related to cost in some way. Incentives should often encourage the contractor to reduce costs, but it should also motivate the delivery of good quality or service, resulting in bonuses if the delivery is above the minimum performance. [13] Usually, for the client's advantage, the contractor takes appropriate part of the expenditure risk and to assume substantial cost responsibility using incentives. If the contractor exceeds the cost limit, the contractor incurs the difference as a loss. This type of contract provides a positive, calculable profit incentive for the contractor to control costs since the profit varies inversely with the cost. [14]

Incentives should be designed after the controllability principle. If the contractor is to hit their target, the incentives must be connected to conditions and quantities which the contractor can control. If the set incentives are outside the contractor's control, the incentive systems can be related to gambling where luck is a big factor to achieve the rewards. This is sub-optimum from the buyer's perspective with risk-averse contractors increasing their remuneration without having to improve their performance. The incentives agreements should be related to parameters which are measurable, observable by both parties, legally verifiable and within the contractor's control. [18]

Multiple incentives contracts help ensure the contract is performed according to the operator's overall objectives and in a satisfactory manner. A properly structured multiple-incentive agreement should motivate the contractor to exceptional results. Such outstanding results may however not be attainable for each of the incentive areas and such contracts must then include a cost incentive (or constraint) which operates to preclude rewarding a contractor for excellent work when cost of those results outweighs its value. [14] Complex projects can benefit from dividing the incentives into smaller sub-tasks. This will help motivate the contractor, such as if one incentive fails there are others to achieve. One possible consequence from this method is that the contractor shifts its focus to accomplish the easier incentives to attain more profit. The incentives the contractor neglects may still be of high importance to the client and the overall objective of the project may not then be optimal for the client. [13]

With designing the incentives, some challenges may arise: [18]

1. **Asymmetric information** – known as information failure, occurs when one party possesses greater knowledge than the other party.
2. **Renegotiation** – The possibility to renegotiate the incentives of the original contract weakens the incentives.
3. **Distortion of the activity** – Qualitative performance incentives are more difficult to measure and tying incentives to quantitatively measurable performance parameters could be at the cost of quality.

Renegotiation of the incentive system is common for long term agreements and future contracts. The client can experience the contractor achieving all the incentives in a project with excellent performance resulting in high incentive payments. The operator then might want to renegotiate the incentives as it appears the current incentives are too generous and easy to obtain. On the flip side, a thoughtful contractor will foresee this, which in practise also weakens the incentive in the short-term (improved productivity is penalised in the next contract). [18]

For example, to perform top quality well intervention one requires a high level of competence from multiple disciplines. Creating a section-based incentive system where each contract company work towards a common goal can be challenging. More specialized incentives

based on technical performance should be applied as each contract company does not control the entire operation. This system is preferred over a whole well intervention system, this is due to even if one suffers maximum penalty at an early stage in the well, then it is still possible to obtain incentive rewards later in the project. [18] For incentives to function properly, they should extend to the people who perform the work and those who takes the decisions. Where the contractor's personnel also can achieve an immediate reward from the section-based incentive system which provides stronger incentives than future rewards. The downside is if the contractor achieves all the incentives and performed a high-quality intervention with low cost and time, there is a risk the well does not produce as expected and the operator must reward the contractor for successful sections regardless. [18]

Cost incentive contracts typically include only cost incentives. These incentives appear as a fee or profit adjustment formula. Included in incentive contracts are, a target profit or fee, a target cost and a profit or fee adjustment formula that (within the constraints of a price ceiling or minimum and maximum fee) provides [14]:

1. Actual cost that meets the target will result in the target profit or fee;
2. Downward adjustment of target profit or fee from the result of exceeding the target cost.
3. Upward adjustment of target profit or fee from the results of actual cost that is below the target.

Performance incentives may be considered in connection with specific elements of the contractor's performance or with specific product characteristics. These incentives, compared to specified targets, should be designed to relate profit or fee to results achieved by the contractor. When quality of performance is critical and incentives are likely to motivate the contractor the positive and negative performance incentives should be, to the maximum extent practicable, connected to service contracts for performance of objectively measurable tasks. To determine the degree of attainment of performance targets, test and/or assessments of work performance are essential. Hence, the contract must be as specific as possible in establishing performance standards (for instance data interpretation and testing conditions) and test criteria (for instance the quality levels of services to be provided) [14]

3.5 Risk and risk sharing

Risk have historically been associated as a negative word along with hazard or danger. The British Standard on risk management now defines risk as “something that might happen and its effect(s) on the achievement of objectives”. [19] The definition does not speak about threats, but of the impacts, also known as effects or outcomes. Risk can also have a positive effect, creating new opportunities. [19] E.g. taking advantage of new equipment or technology will increase the risk during operation. This is due to the uncertainty associated with new and improved equipment. It will make it harder to predict the outcome if the equipment fails or works as planned or delivers above expectations. If the equipment works better than expected, the risk taken with the new equipment results in a positive outcome. In an industrial setting, when the contractor prepares the bid for a contract, the risk is added to the bid. The identified risks are evaluated on the consequences, probability, and the contractor’s ability to control them. For the contractor to be able to handle the risk without consequential loss of profit, the cost of the risk should be priced into the contractors bid fairly.

The definition of operational risk can be defined as “The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events”. [19] Operators and contractors aim for the operational risk to be as low as possible, following the ALARP principle. [20] Risk management involves a trade-off between time and cost. This is due to most choices considering risk will have an impact on both parameters. But even if they do not, when it comes to seeking a risk efficient set of choices both parameters still need to be considered. [21] If we look at an example from the oil industry during operation of a well, there will be many choices which deals with risk. Choices as how frequent maintenance should be performed, what type of equipment should be used, how much time spent on different operations, etc. How parameters such as time and cost will affect the risk one good example would be to look at the equipment. It is possible to buy expensive equipment, which has a high reliability, perform good quality work, but maybe do not perform as quick as other equipment. This will reduce the overall risk of the operation but result in a high cost. The operator can also choose to buy cheaper equipment, less reliable, low quality, but if it works properly, it will save time. The cheaper equipment will be of higher risk. The operator will have to decide on being risk averse or a risk taker.

3.6 Integrated contracts

Integrated contracts have become more common in the last years. To keep the number of contract companies and the number of contracts involved to a minimum, contracts that offers a high degree of integration is favourable. Looking at integrated well construction project as an example, then usually there are three main parties involved: the rig company, one main contractor company and the operator. Such contracts typically involve subcontracts with third parties, while the main contractor company will be the single point of contact for the operator. Normally the main contractor company will provide a great range of services and have an increase in the risk sharing, but will not be required to directly invest capital in the project. [22]

For field operators, contracting oilfield services with one contractor can reduce the contract administrative burden. Some functions, usually undertaken by the operator, is possible to transfer to the integrated contractor company, such as obtaining licences and approvals, and allow for the transfer of some risk. There are few contractor companies in Norway which can offer such a wide range of services, that is the downside of such contracts, the competition is reduced. [15]

Designing integrated contracts can be complex. The contract must be suitable for multiple disciplines and one must be aware there will be a larger variety of contract models the more disciplines are added into the contract (e.g combination of CRC and IC). If incentives are added to the contract, it can be beneficial to break the incentives into sub-tasks as mentioned earlier due to motivation and the size of the project. The contractor company then has greater control over the progress of the project which makes it easier to work towards incentives. As mentioned earlier this can trigger a beneficial behaviour from the contractor company if designed correctly, where both the operator and the contractor company have closer collaboration and work more dedicated towards the same goal of time, delivery, and performance.

3.7 Procurement process

Large organisations, corporations and multi-national companies will all have their own set of internal procurement rules which will govern how they approach supply and purchasing. Between the different companies the internal rules will vary and the choice to advertise will depend on the type of market and service. A procurement lifecycle has four different phases; preparing bids, submitting bids, evaluating bids and then awarding and executing the contract. [23] To start this cycle the company awarding the contract have different methods when it comes to acquiring the bids. In Figure 4 different procurement methods are listed.

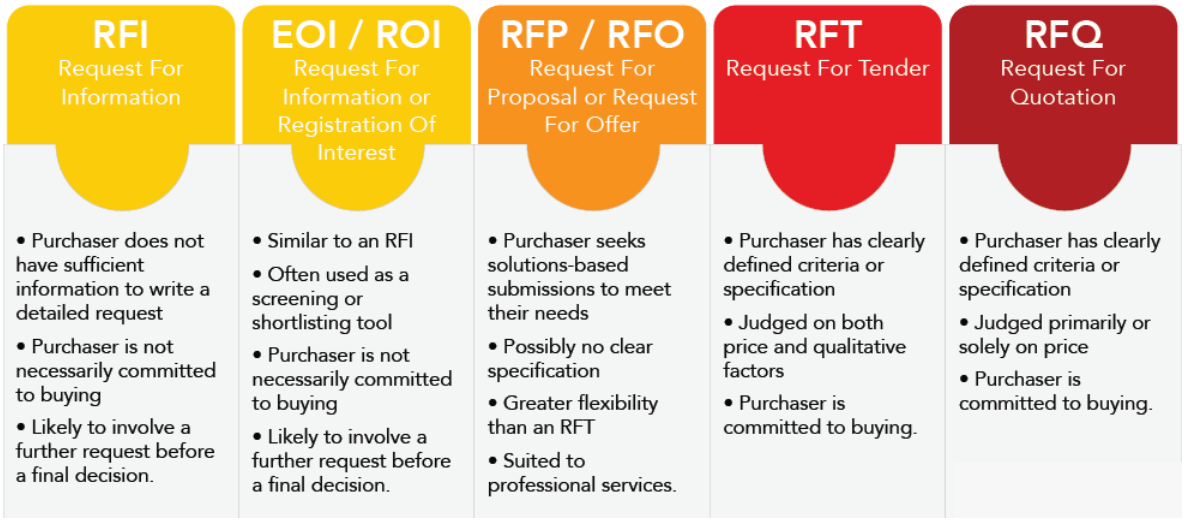

Figure 4 Procurement process [24]

A RFI can be used to initiate a project when the issuer needs the vendor list to be updated or does not have a preferred vendor. The main idea of RFI is simply to assess the market, its capabilities, and alternative solutions. It provides an outline of what is required, both for the prospect as well as respondent qualifications. After an RFI the issuer will have different responders to its offer. Only those who prequalify will be allowed to participate in the next round- which usually will be an RFP, RFT or an RFQ. An RFI does not make any commitment for the purchaser to buy. [25]

A common method for a project is an open tender process or also known as Request for Tender (RFT). In open tendering the details of the proposed project are advertised publicly and contractors of any size or capability may reply to the advertisement and receive the

tender documents. In highly competitive markets an open tender process can result in responses from hundreds of competitors. This can lead to an onerous process, comparing all the proposals from a wide range of suppliers. [26] It is therefore important with prequalification's and clear requirements.

There are options used to streamline the RFT process. One method is to introduce a stage prior to the RFT. It creates a shortlist of contractors who have the necessary credentials to carry out the contract, considering details such as size, technology, finance etc. The method is called Expression of Interest (EOI) or Pre-Qualification Questionnaires (PQQ). This streamlining method will allow progress to the tender process through a restricted tender, only inviting specific shortlisted organisations. And if this process ensues, the opportunity will not be advertised publicly. An EOI/PQQ is similar to and RFI, but are commonly used as a screening or shortlisting tool whereas RFI has the purpose of gathering information. [26]

3.8 Contract Selection

Selection of contract is a critical decision faced by the operating firm. Different contract types mean different incentives, burdens, and relationships. The complexity and uncertainty of the project is greatly affecting the selection. The contract type responsibilities and price should be in accordance with the organization capacities and project needs not knowing this could entail less chances of success and project profitability. In order to develop the right strategies to avoid overruns and improve the project quality, it is necessary to understand the alternatives and how they behave. [27]

A research paper by Suprapto et al. (2015), talks about the issue on how contract types and incentives matter to project performance and acknowledge the importance of more collaborative contracts. These contracts achieve better project performance by promoting a better working relationship between client and contractor. Furthermore, their results show projects with partnering/alliance contract are likely to perform better than those with reimbursable and lump-sum contracts due to better relational attitudes and teamworking quality. Through better relational attitudes and teamworking qualities, projects with contractual incentives are likely to perform better than those without. In the same way, regardless of the presence of incentives and of the contract type, the results suggest the efficacy of teamworking and relational attitudes on project performance. The paper concludes that contractual incentives and contract types are not by and of itself the crucial point, but the attitudes toward collaborative relationship and how the teamworking behaviour actually play out. [28]

Bogus et. al (2010) has a research paper about contract payment and provisions and project performance. The result of their study indicates that compared to projects with lump-sum provisions, contracts using cost-plus-fee with a Guaranteed Maximum Price (GMP) contract pricing provisions are more likely to have no schedule change or cost growth. Basically cost-plus-fee with a GMP contract perform better with respect to cost and schedule compared with lump-sum contracts. Still, it was shown that lump-sum contracts are more commonly used. This could be because it provides certainty in project cost and schedule, and due to the administrative burden, the owner must also deal with in a discrete contract and a discrete payment. [29]

Most genuine incentive systems require a certain amount of risk to be borne by the contractors according to research done by Osmundsen et al. (2010). Incentives should be designed to align the goals of the contractor and the operator. Oil contractor companies must be challenged to design contracts which are suitable for new small companies on the NCS, where the risk sharing requires a different approach. To achieve some degree of flexibility and control by the operator, cost-plus payments such as day rates are used. Renegotiation are usually required if performance-based incentives are used. [18]

3.9 Successful Projects

Successful project can be defined in numerous ways. In some literature, project success refers to “Within budget, on time, to specification” completion; success of the project achieving the business objectives; or success of the produced product. These measures are often contested, sometimes causing it to be hard to evaluate if there is a problem at all. [30] A further impediment is that, like success, quality is perceptual. The stakeholder’s perceptions may vary with the perspective and the passage of time since project completion. [31]

The Five Levels of Project Success is one framework used to help define successfulness in a project and are illustrated in the table below (table 1). This framework helps the stakeholders, as benefits accrue, to progressively map success to perceptions of higher derived value from the project. It enables success to be periodically reviewed and determined as benefits accrue from the project over time. At any point of reflection, the highest level of benefit achieved by the project is the defined project success. [31]

Level 1 – Process success. To successfully complete a project, every project discipline has project-specific and generic best practices that are crucial to implement. Even risk management and project management which are generic processes have their best practices. At this level, the determination of success considers the alignment of the processes used with the project’s purpose, their appropriateness, and their effectiveness and integration in contributing to the project outcomes.

Level 2 – Project management success. Key project design parameters such as budget, performance expectations (such as completing all planned stages and activities), and project schedule are more traditional criterion of project success. At this level project success is determined on closeout against these key parameters.

Level 3 – Product success. From the project, this level considers the success of the major deliverables. This includes measures relating to the deliverable itself (quality expectations, requirements, specifications etc.) and to the satisfaction to the client (effectiveness, use, product acceptance etc.)

Level 4 – Business success. At this level, success is considered as the positive net benefits to the organization from the project and an assessment of the organizational contribution to the

project's outcome may also be included. Hence, it can include whether the expected benefits were realized, and typically include measures to which the project met the objectives and goals that motivated the investment approval initially.

Level 5 – Strategic success. At the final level, external stakeholders assess the organizational benefits. Business growth and development, net improvements in industry position, competitive advantage, and/or other strategic gain is what derives success at this level. [31]

Level	Success Criterion	Description	Empirical Indicators
1	Process	Discipline-specific technical and managerial processes, methods, tools, and techniques employed to achieve the project objectives.	Technical and managerial processes were: • Appropriately chosen for the purpose • Aligned with the project objectives • Integrated with each other (as appropriate) • Effectively implemented
2	Project Management	The project design parameters or objectives. Here "scope" refers to the intended scope of the project (e.g., to specify, build, test, and implement a new system), not the scope of specifications of the main project deliverable.	• Schedule met • Budget not exceeded • Project scope achieved
3	Product	The main deliverable(s) from the project. The nature of the deliverable(s) will be discipline-specific. For example, it might be a product, system, building, bridge, airplane, rocket, or a service of some kind.	• Specifications met • Requirements met • Client/user expectations met • Client/user acceptance • Product/system used • Client/user satisfied • Client/user benefits realized
4	Business	The business objectives that motivated the investment. That is, what the business wanted to achieve from the investment.	• Objectives met • Business case validated • Business benefits realized
5	Strategic	Business expansion or other strategic advantage gained from the project investment, either sought or emergent.	• Business development enabled • External stakeholder/competitor recognition • Competitive response generated

Table 1 Levels of success [31]

3.10 Alliance contracts

An alliance contract can be described in brief as agreements where the contractor and operator execute and develop the different projects together. With great emphasis on trust and collaboration and with the written contract agreement as support, the alliance tries to achieve benefits for both parties. [32] The alliance contract can be tendered as a single alliance contract to be awarded through competition, or more often the alliance contract will be an additional agreement to a framework contract already awarded to the supplier trough competition. [33] The high project occurrence stirs openness and collaboration and is what sets the alliance contract format apart from the others.

A challenge with alliance contracts is to develop different incentive systems that enables a common goal for the contractor and the operator, and by that eliminating the conflicts of interest. Such conflicts may arise if the parties do not have the same or similar interest in the project. These conflicts become clearest when negotiating change orders. With these negotiations each partner tries to promote their own short-term interest within the framework of the contract. This is so called opportunism; this implies that they make dispositions that serve themselves at the expense of the other party. With this behaviour the contractor may risk losing assignments, be subject to unfavourable contract terms, and gain less flexibility. For the operator this may result in fewer bidders, contractor may insist on other forms of contract, and it may lead to less flexibility. [34]

A vertical alliance is an agreement between two or more companies, in various stages of the production or distribution chain that conducts its activities under the terms of the agreement. It is possible to recognize an alliance by attributes such as the emphasized focus on the business outcome and benefits for all parties involved, the compensation format and the level of collaboration. The target price compensation format can be used, where they establish an estimated target cost, and share the expenditures or gain. This is from a specified and reasonable percentage and with a maximum percentage difference of the final target cost.

The goals with this contract format are reduced costs, reduced time, and reduced risks. The close collaboration with the supplier gives the client insight that could help to estimate the target price with the contractors that sit with hands-on knowledge about the deliveries. It is a model where the contractor and client share responsibilities and accountabilities, the risk and

rewards. This motivates both parties to minimize actual costs and work towards a common goal. [33] Understanding the partner's point of view, show trust and respect, and its approach that reduces litigations and stress is what these types of contracts are based on according to Cowan and Warne. [35]

3.11 Historically and present contract formats in the offshore industry

Common contract formats on the Norwegian Continental Shelf, between operators and contractors, have changed multiple times since the first oil was discovered on the NCS. A big factor for the change in the formats is the oil price. Previously with oil prices being historically high there was no need to change the contracts, but with oil crises a need for revisions emerged. The most common contract type between a contractor company and an operator at the current time are time and material contracts. At times these contracts also involve elements from fixed-price contracts. [17] The contractor companies are compensated based on the material and equipment usage, inhouse planning and actual offshore work from the operators. Usually included in these rates are the cost of support services (logistics, administration costs, etc.). Some operators have time and material contracts with incentives to help encourage the contractor company to deliver quicker and with a higher quality. This helps to align the goal for the contractor to the goals of the operator.

4 OPERATORS

Oil companies want to have the optimal amount of output from their and partner fields to generate the most revenue for the company. To achieve this the well's need to be managed and maintained at all times. For issues not possible to be solved by the field control centre alone an option is to perform a well intervention.

Information from the operator side was gathered by interviewing key persons working in the intervention departments from January-March 2021. Interviewees held positions as completion/project/well intervention engineers and managers and had previously held positions both in operator and contractor companies during their carrier giving them an insight into the dynamics between the two. In addition to broad experience, the participants have a high average time working in the oil and gas industry with most working there since they started.

The operators have many similarities but also differences. One parameter differentiating the companies regarding the number of interventions is the oil fields they oversee and the geology in the area. Some fields like the Ekofisk and Skarv field is challenging as oil and gas is produced from chalk and sandstone formations. These types of fields require frequent intervention to optimize the production. [36] These companies have a higher number of interventions per owned well compared companies owning a larger number of wells. To maintain these challenging wells, they have almost as many interventions as the largest operator (by number of operated fields).

	Operator 1	Operator 2	Operator 3	Operator 4	Operator 5
Operated Offshore fields	5	2	3	42	1
Number of interventions	100	3-5	223	360	0
Types of interventions	Platform, rigs, vessel, stimulations, coiled tubing	Rig, vessel	Platform, rig, vessel, coiled tubing	Platform, rigs, vessel, stimulations, coiled tubing	Rig, vessel
Contract types used	Alliance agreements with incentives	Integrated service contracts, performance contracts, cross border agreements	Frame agreements, alliance	Performance contracts	Frame agreements
Use of incentives	Yes	Yes	No	Yes	NA

Table 2 Operator overview

4.1 Background of work

While managing offshore petroleum wells, opportunities for improvement and unfortunate incidents can occur. Unfortunate incidents can be failures in downhole, subsea and/or surface equipment related to the well, both from wear and tear or human factors by operators. If a failure leads to breach of one of the two barrier envelops of the well it needs to be mitigated as soon as possible. This kind of failure will by law need to be fixed and the operators can be ordered by the Petroleum Safety Authority Norway (PSA) to act. [37] Integrity issues are however a small part of the intervention work performed by the operators on a yearly basis.

Primary reasons for interventions for the operators are production increasing operations. This includes data collection in the well from logging and measurement tools, perforations of reservoir zone, plugs or straddles to close of water production and pumping operations. The goal is to increase barrels per day production from the well.

The secondary reason for intervention is plug and abandonment activities on decommissioned wells. There is also intervention associated with the installation and commissioning of new wells. Different tasks are performed as removal of downhole and subsea equipment and pumping of cement to place permanent plugs and opening of newly installed wells to start production.

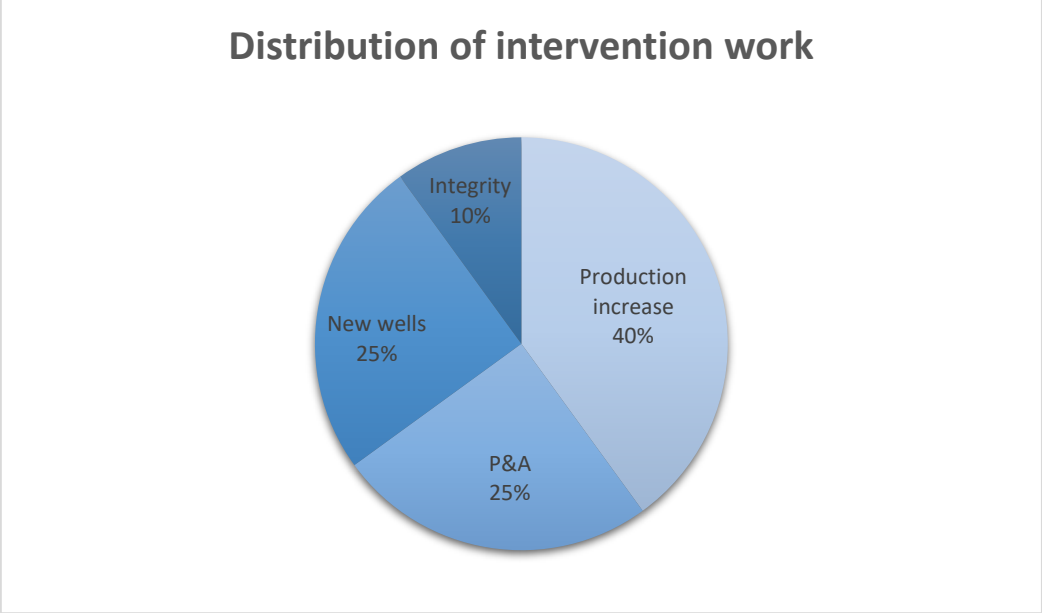

Figure 5 Distribution of intervention work

4.2 Internal process

4.2.1 Input

Production department has teams specialized in different fields of petroleum engineering and they are organized into integrity team, reservoir/production team (often called subsurface) and P&A team. Each gives input for upcoming work on the production departments assets to maintain optimal conditions.

4.2.2 Production department

In all the operator companies there is a governing department that has overall responsibility of a designated production licence which the operator has a majority ownership of. They have different names in different companies but can be called the licence owner or production department. The responsibility of the wells on the licence includes different areas that each team in the production department work on. The integrity team has the overall responsibility of the barriers in place on each well, and that they are according to legislative requirements set by the Petroleum Safety Authority Norway (PSA). The subsurface team works on anything related to the production of the wells. They work to extend the lifetime and production rates of the wells to create more value for the company. The P&A team manages the decline phase of wells. They are handed over wells from the subsurface team that are required to be plugged and abandoned. Several things can be the reason for the decommissioning, for example that there has been equipment failure, cost versus production income break-even point has been reached etc.

The responsible department for planning and execution of an intervention campaign (or drilling operation) is the “drilling and well” department. It is a separate department in the oil company and is described to be like a contractor company within the company. It is hired by the production department to complete a given scope of work. As such the department is not generating revenue but is given budgeted funds to perform the intervention work. It has expertise to plan and find the optimal solution regarding time, cost, and technical solutions.

After receiving feedback from the different specialized teams, the production department sets up economic analysis for each case to rank which will result in the well having the most

uplift in production in relation to the risks and potential of success. That covers the benefits of the case, but the department also need to consider the cost. At this stage, if not already included in the planning during the benefits analysis, the drilling and well department is asked to give their input on the cost-benefit analysis.

An internal start-up meeting is set between the departments to discuss how the work could be performed, what equipment and personnel is necessary, and risks involved in the operation. Depending on the complexity and if it is a routine operation, contractor companies will also be invited to give input. In the early part of planning its most important to get an estimate on expected price, risks, and time estimate. For some operators the method of operation is also of importance but for others its reflected in the risk aspect when considering the case.

After planning the results are a cost-benefit analysis and a risk assessment comparing the cost and risk to the gains and success rate. At this stage of the internal process the production department, drilling and well department, and possibly external contractor companies with relevant experience and services have given opinions to the case. Approval of an operation lies with the production department; it governs the budget for the fields. The analysis and assessments are considered and a return on investment and/or payback period is calculated. Some operators also have policies relating cost with oil barrel increase, with some reporting that they use 10 dollars per barrel as a benchmark. Decision also depends on internal capacity and prioritization with other cases for other wells meaning that one well producing 600-barrels has equal priority to three 200-barrel wells if not considering other matters than production.

Well integrity issues are handled differently than other well issues. The underlying reason is compliance with regulations and not the typical economic gain and therefore the budget has less importance in relation to the actual completion of the repair. The risk assessments include other aspects like the criticality and urgency of the issue.

After case approval by production department the operational planning and execution is handed over to drilling and well with a budget. Contractor is then notified as per frame agreement and a start-up window is agreed. The next phases can be summarized in short; Both departments and external suppliers meet for the next period leading up to the start-up window and plan the operation, write work programs and procedures, and acquire the needed equipment. On start-up the vessel is mobilized, performs the work, and then returns to shore to demobilize.

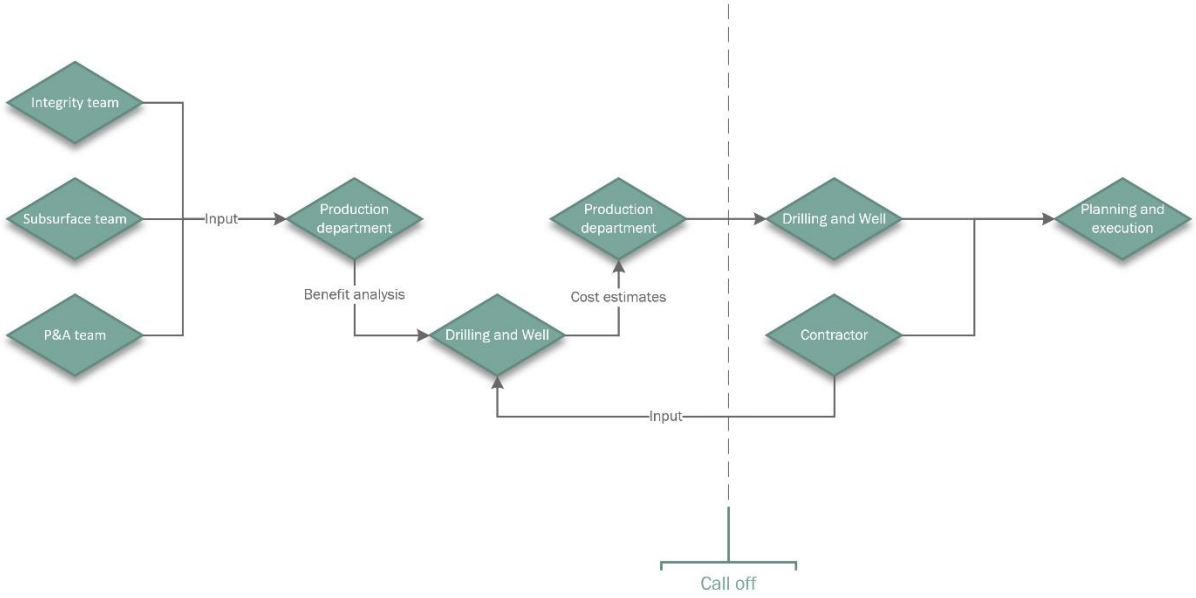

Figure 6 Internal process

4.3 Differences

On the NCS the operators have their own different practises and contract agreements which they find best suited for themselves. Some operators have similar contracts and practises, while others do things very differently, even if it is close to the same work needed to be done. The procurement process of larger operators is observed to be more centralized as there are dedicated supply chain departments established to follow it up. Smaller operators are seen to have a more decentralized procurement process with the operational departments more engaged in the procurement.

Some of the operators have alliances with different contractors. These alliances are usually over a longer term, for example 10-years. The operator involves the contractor in the jobs they do, how they do it and the incentive models resulting in the contractors taking more risk, but then again shares the profit if the job goes well. If they use longer time or something goes wrong, there will be a penalty imposed because of the risk sharing in the contract. The main principles of these long-term contracts are them trusting each other and to contribute with their expertise to create jobs and value for both parties. Experience from the operator position is that it takes time to build trust and change the old perception on the contractor versus operator relationship. Establishing the one team principle and shifting focus to the shared goals and rewards is required to gain the effect of the alliance, but it is not immediate, it needs to mature as projects are proceeding.

AkerBP is an operator that has created alliances to promote continuous improvement and create added value for all parties. The collaboration model in the alliance uses a “one for all, all for one” principle to align the partners with common goals. [38, 39]

While some create alliances with the contractors, there are other operators creating consortiums where they together achieve financial benefits. Cooperating with rig or vessel contracts and intakes it is possible to reduce the overall cost for all parties. One of the larger operators have a long-term contract a with a contractor for the use of their vessel, crew, and equipment. Knowing how many jobs needed to be done for set period, they create a campaign where they try to set up multiple well interventions in a chain to reduce the cost, compared to standalone well interventions. The minor operators would previously join in on this

campaign, but at the moment this happens more rarely due to the fact that minor operators do not want to commit for a longer period of time as will be mentioned later in the thesis.

Time and money are two parameters influencing each other and are two of the key factors to decide if the intervention is feasible or not. These parameters are of high importance for every operator, but there is a difference in how they are weighted by each operator. Some operators want to save as much time as possible even if it could cost more, while others have more focus on the total cost, the success rate and how much the revenue increases. This is due to the need for approval by the stakeholders since they do not care if they use 10 or 50 days on the campaign if the total costs are low and success-rate high. One of the operators used parameters like Most Likely Time (MLT) and Most Likely Cost (MLC) and with these parameters they calculate how long time it can be expected for the contractors to do the intervention and the expected cost of such operation. These parameters are usually connected to the incentives and are designed in such a way that the contractor have a clear goal to work towards in achieving the set time. An operator mentions that they have not had a high focus on time in relation to performance historically. In the operational discussions and planning, time is usually not a subject, it is only discussed within the management to keep track of progression. The contractor will work as efficient as they can, and complete work in a timely manner, and when they have the desired result.

4.3.1 Success

Success is an important parameter for both the contractor companies and operators. Measuring success will help evaluate the work done by the contractor company and help reveal deficits which can be used to improve future work. Success is measured differently from operator to operator. Some operators have the cost per barrel as a useful parameter to measure success and seek to keep this as low as possible for an intervention as a milestone to achieve success. It has been mentioned by the operators that their goal is to keep it as low as 2-10 dollar per barrel for well intervention and for drilling its desirable to keep it under 30 dollars. One operator also mentions the number of missions per crew is a measure to consider when looking at success. This company have a higher focus on multi-campaign jobs to achieve more missions completed per year. For example, doing five 200-barrel wells compared to doing one 1000-barrel well using the same time and resources are worth it while always chasing the best well can result in inefficiency. Common parameters to evaluate the success for operators are time, budget, safety and environmental. There is a difference in how they are weighted and the opinions about them, especially safety. Measurements of success can sometimes be linked to incentives. One operator mentioned having incentives around safety, for example no personnel-injuries or other unfortunate events, can lead to dark figures where incidents are not reported due to the loss of reward from the incentives. One of the operators brought up a dilemma around measuring success. If the operation did go as planned, and the operators and contract company did everything according to the contract, but in the end, it did not give the desired result, is it then a success or failure? This can depend on the contract type and the perspective of success. With alliance contracts or contracts where profit is shared based on the result, it is more likely to deem these projects as a failure. Whilst contracts with a more discrete point with less incentives, the contractor will say this is a good success while the operator will most likely judge it non-successful.

4.3.2 Frame agreements

Frame agreements are arrangements between one or more clients with one or more contractor. The agreement determines the terms and conditions of the delivery by the supplier to the client over a given period. Terms and conditions typically include what product or service is to be delivered, the prices, terms of delivery and other relevant information for the agreement. Once a frame agreement is in place it can give the client flexibility and savings because call-offs can be performed quickly and without a new procurement process. [40]

With every procurement there are cost that incur on both parties to establish the trade. Its sunk cost that is generated from three different parts of the procurement process and it's called the transaction cost: [13]

- Information acquisition - Expenses linked to the search of information about providers and prices.
- Bargaining and communication – Meetings and contract establishment takes time and thus results in expenses.
- Enforcement of contract - Following up the contract and making sure that the product and services listed in the contract are delivered as per terms and conditions outlined.

Frame agreements are widely used between operators and contractor companies for intervention work. They set the contractual agreements between the parties over a period, facilitating operations without delays on the contractual side and with less transaction costs compared to single contracts for each operation. Typical frame agreements span over five years with call options. (Usually two years, and some with additional extended call options)

Operators with a global presence make frame agreements together with departments in other nations to streamline the procurement process. They are often called cross-border agreements and function just as a frame agreement would but can be applied for work on petroleum fields in different nations.

An exception to frame agreements is when oil companies do exploration drilling to find new oil fields. As an atypical activity the rigs performing the work are chartered for the planned number of drilling locations and can include call options for more locations depending on results.

4.4 Previous contract format

With the previous contract formats there is a difference in the contract form based on the size of the operator. It can be divided into major and minor operators based on the wells active and numbers of employees on the NCS. One example to reduce the cost for a single intervention, the minor operators could sometimes cooperate with the major operators or other minor operators to share the cost for equipment and personnel. While this had a big impact on how the minor operators created revenue and saved incurred cost, it was not vital for the major operators.

Day-rate contracts with different rate structures has been commonly used by operators for rig and vessel operations. The contract gave a lot of responsibilities to the contractor having them provide almost everything (Vessels, well-control, equipment, ROV, wireline, etc). This contract could be without incentives and resulting in the operator and contractor having two different goals to how fast they wanted to complete the intervention project. The operator wanted to get done as soon as possible and the contractor wanted longer time so they could make more money due to the day-rate. During previous financial and oil crisis when there was limited work given to the contractors, the operators would sometimes award lumpsum contracts on mobilization or demobilization activities due to its increased predictability on the total cost. During these times the operators had the upper hand during negotiations and could therefore shape the contracts in favour of their concerns such as total cost.

Before 2014 it was more common for the minor-operators to make consortiums to achieve financial benefits. In these situations, there could be a couple of wells that needed intervention or other services. Doing it like a consortium each company did not have to do a rig intake process separately, but instead share the cost of renting it for as long as needed, 3 years for example. If the oil-price was at the current high level this benefited the minor companies, resulting in a reduction in costs. Due to several reasons in 2014 the brent-price of crude oil fell with around 44%. [41] Companies in the consortiums then got stuck with these contracts, resulting in big financial losses. This was due to the commitment with the rig contracts, with the oil-price drop it was no longer possible to drill new wells resulting in huge rig costs with no income. After this experience the minor operators wanted to take in rigs on their own, because they did not want to commit for longer periods of time.

5 CONTRACTOR COMPANY

The party delivering the intervention service to the operator is the service or contractor company. For the contractor company it is important to maximise the utility of their assets, be it vessels, personnel, or equipment. In other words, be in business by providing their services, renting vessels and equipment to clients. It is consequently important for the company to have continuity and predictability in the work performed throughout the year.

The information from the contractor side was collected through interviews with a contractor company providing light well intervention services globally. The interviewee was a commercial manager who had insight into historical contract formats. To add on the perspectives from the contractor companies, some of the findings from I. Moe's thesis on "Are integrated contracts a driver for more successful projects compared to traditional discrete contracts?" is also included.

The contractual arrangement with the operator is set with frame agreements. Frame agreements are established between the contractor and different operators through request for information and then request for quotation and/or tendering processes or direct negotiations. This sets the major contractual agreements to facilitate an operation, thus reducing the cost of contract negotiation. Minor agreements may be set on a per operation base specifically for that work as prices and incentives. The frame agreements can be without any commitments or exclusive with a preferred contractor and a secondary if the first is not available. Before a call off is signed there may be discussions between the operator and contractor on the execution method, time estimates and availability. The company currently has two vessels in operation performing light well interventions.

- One vessel is currently operating on the spot market and has performed intervention work on the Norwegian and United Kingdom sector as well as West Africa.
- One vessel is on hire for a major operator on the NCS, performing continuous work a majority part of the year.

5.1 Continuity

Continuity is important for the contractor company perspective. When operators and contractors work together for a longer period with different projects, it helps to create continuity. Continuity in the work schedule for the vessel provides steady work for the offshore personnel and a stable income. With steady work and a stable income, the uncertainty around the operation of the business will be greatly reduced for the contractor. It will also help increase the predictability for the contractor which is of high importance. Continuity in work and planning for the same client/s gives better operation performance as it is possible to streamline regular tasks needed to be performed. The possibility to streamline such tasks is because of the increase in knowledge around each other businesses (knowledge of processes, preferabilities, capabilities, routines etc.). It also builds confidence and trust between the two parties which also will increase the operation performance. For example, if the operator trusts the contractor in doing their job, the operator doesn't have to monitor their work as closely. The operator trusts the contractor will deliver on time and keep the quality of the work. For continuity to benefit both parties it is important to acknowledge the time perspective of such benefits. It may not yield the expected results the first, or second time, but will increasingly improve, benefiting both parties in the long run.

5.2 Predictability

To establish the most effective and steady work schedule the predictability of upcoming work lessens the process. The amount of work available any given year will certainly vary, but most intervention work by the operators are planned and prioritized. Some operations are unplanned as the odd integrity issues and equipment failure previously mentioned. By working transparently with the availability of the service and the forthcoming intervention operations cost estimates can be reduced as fixed costs are more manageable with the predictability of future earnings.

Before contractual discussions on the call off there might be clarifications between the parties on technical or operational matters, but generally that is part of the call off discussion and the planning phase. Often it is preferable to be part of the discussion as soon as possible to be able to engage company experience from earlier projects that could benefit and impact the planned project execution. This is sometimes resolved by dedicating contractor personnel as inhouse capacity for the operator prior to operations.

The contractor company has had some experiences from projects outside Europe that differs from the Norwegian models, but that could be useful in that market. Projects together with clients separated by a large geographical distance has been resolved by the contractor having full responsibility of all deliverables to the project. By giving the contractor the responsibility, it reduces the number of interfaces and integrations needed with the operator, especially important considering the distance between where the different equipment is located. These projects have also utilized lump sum compensation in a wider aspect than the norm on the Norwegian market. Most activities related to the project execution was given a lump sum price, and only the well intervention specific tasks were compensated by day rate due to the uncertainties involved.

6 DISCUSSION

6.1 Research method

With the different contract models previously used and in use today, a scientific way of collecting experiences around this subject was conducting a semi-structured interview with open-ended questions. The open-ended questions led to more opinions and insight on topics that were not covered by the questions directly but was of great interest in answering the thesis research question. One problem that occurred when conducting the interviews was the different relevance the questions had for each company. For example, some of the companies were in alliances and did not have the same processes so the questions needed to be adjusted during the interview. Another example was the presumption that intervention projects was tendered as standalone contracts, but all operators used frame agreements instead.

Being biased whilst conducting interviews can be a challenge. Avoiding the authors opinion, that could be affected by the literature and personal experience and its effect on the interview with for example leading questions and misinterpretation of the answers, is important to increase the integrity and validity of the thesis. To keep the discussions as unbiased as possible during the interviews and let the interviewees prepare, the questions were sent in advance. The information required to perform a proper interview was then in place and the interviewee was less affected by the interviewers' point of view.

To further increase the validity and reliability of the thesis, materials presented must come from trustworthy and credible sources. Thus, literature presented in this thesis has been collected from various sources, such as books, online news-articles, scientific articles, and other credible sources. Journals that are peer reviewed have been prioritized.

6.2 Total cost-based contract models

Contracts with day rate compensation is experienced to be an easy concept to plan operations by operators. To estimate expenses for a given operation requires knowing how many days it takes to perform it to achieve the goals and then add up the days with the vessel day rate. This gives an estimate of the cost and what budget that needs to be planned for to execute operation. The budget also needs to cover for operational challenges, for example equipment failure and possible weather situations that could cause limitations or halt the operation.

The major concern for most operators in deciding on the feasibility of the project is the total cost. A UPC is used for its advantage with uncertainty and potential changes in the project but it does not control the quantities and thus the total cost. Instead of a complete UPC for projects, a UPC with fixed price compensation on activities that are predictable and more propriate for risk sharing with the contractor should be used. Activities such as mobilization, demobilization and transport of personnel and equipment to the worksite and rig up of equipment on worksite are suitable for fixed prices and performing them are mostly under the control of the supplier. Another activity that could be considered with a combined fixed price and day rate is cable operations. Setting up and down including changing over between cable runs can have a set price while the actual operation in the well is compensated by a day rate.

Operators and contractors have experience with fixed price/lump sum compensated activities, but to different extent. One operator has agreements with a fixed price on a specific type of cable operation, retrieving and installing gas lift valves on platforms, as it is performed regularly. The contractor has also used lump sums to cover activities such as transit, mobilization, and demobilization in some instances. As stated earlier, the contractor has used UPC with fixed fees during operations in countries outside the EU.

Introducing fixed prices results in better estimates to the projects total cost thus reducing the economic risk of budget overruns. By providing a better estimate it also strengthens the decision-making process since uncertainties that the operator must consider is reduced.

6.3 Contract compensation rates and risk sharing

A major concern during an intervention operation, especially when performed on a vessel, is the weather. Weather puts limitations, mainly in terms of wind and sea states, to different parts of the operation. Severe weather situations with high winds and sea can halt the whole operation until it improves. It also affects the operations of helicopters and supply vessels to crew change personnel and transport equipment incurring expenses related to overtime and cost for rental during the operation.

When the operation is halted due to weather it is classified in the current contracts as waiting on weather, but instead of the day rate reducing to zero, it reduces by some amount for the first defined period and is reduced further if the halt extends. This incurs added cost for the operator and the contractor, even though there are limited actions on either part to reduce the risk of it occurring. To make an estimate on the weather influence on the operation it is possible to use historical data and models, called MetOcean data, but it does not do more than that. It is also possible to plan for offshore operations during the calmest months of the year which is during summer, but several things like vessel availability and urgency can hinder it.

Winter is the time of year with the harshest weather and the least amount of weather windows to carry out operations. To make it more advantageous to use more of the calendar year for operations the compensation format for weather could be revised to share the risk better between operator and the contractor, especially the months with the most severe. It is however problematic to add waiting on weather cost into the cost offer as it is hard to estimate and thus results in a less competitive offer.

6.4 Collaboration

As mentioned by both the operators and the contractor there is discussions ongoing to set the terms of the call off. There might also be some technical discussion, but not very often before the call off. As the internal process of the operator requires a cost estimate and project plan to be submitted internally for approval and priority before setting a call off with a contractor it appears that there is no formal project meeting between the parties at the very early stages. Referred to the in literature as the concept or initiation and definition phase of a project, it is the phase that defines the major decisions on project scope and strategy. [42] It is a crucial phase in an intervention as the result of the feasibility of the project defines if it is something the operator will perform. Its therefore important to gather as much vital information as possible to support the decision, but also since the chosen strategy sets the framework for the preceding phases of the project. As visualized in Figure 7 as the project proceeds through its phases the opportunity to influence and make changes is highest at the start and get progressively lower. At the same time the cost of making these changes increases progressively throughout.

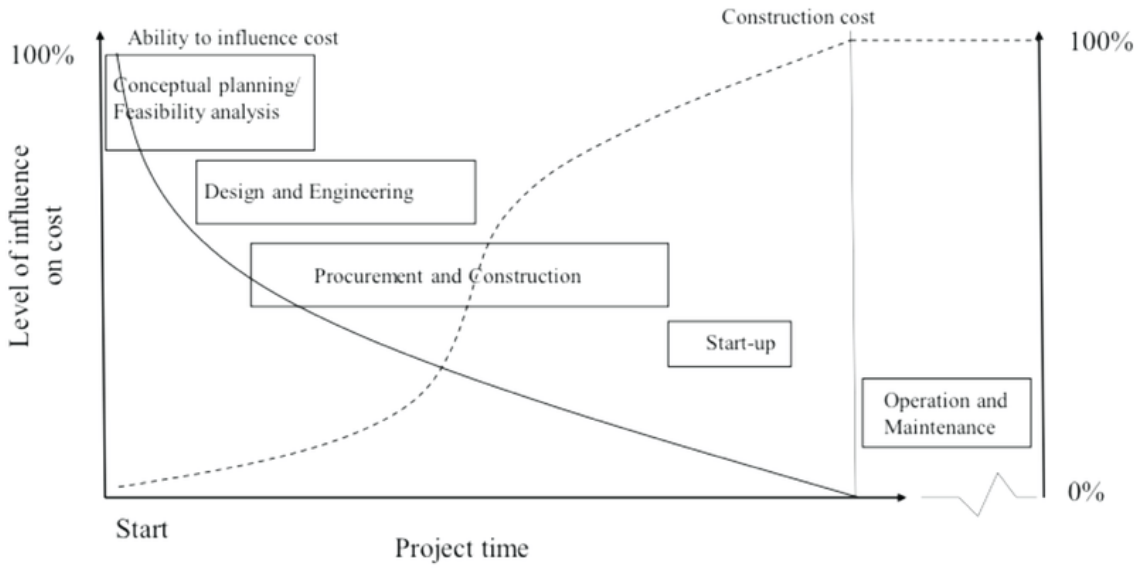

Figure 7 Influence on cost [43]

To most accurately identify the variables needed to put together a cost estimate all major parties that could possibly be involved, including the contractor, should be part of the early stage. By engaging external stakeholders into the discussion, like the contractor, a better overview of the total cost can be established and thus reduce project cost in the later stages.

By engaging people from various companies with different experiences and perspectives, but still within the intervention scope, the uncertainties tied to the project can be reduced and lead to a project better prepared for the forthcoming phases. By not looking at a specific project but the general process for which wells are considered and chosen for intervention it could be an option to develop specific intervention expert teams consisting of the operator and the external stakeholders. These teams, as mentioned, would consist of people with different backgrounds that can support the cost-benefit analysis with the technical solutions, measures to save cost or promote HSE and efficiency, and cost analysis. A team could be set up as part of the frame agreement to provide technical and cost support from the contractor perspective when needed with agreed compensations and terms. The contractor should be responsible for setting the representatives which should also include representatives from their suppliers. This benefits the operator as the premise of whether to go ahead or abandon an intervention project is better documented. Benefits such as increased oil recovery rates, less water ratio in the oil, and information gathering can be predicted by the operator, which has the most expertise, and the contractor can give inputs to what equipment and solutions are convenient for it. Gaps in experience and expertise are thus reduced both the obvious and unknow to the operator.

Teams would also be of importance to the contractor as it gives influence on the internal selection process. As contractors work for different clients, they aggregate experience across various types of equipment infrastructures, environmental challenges such as water depth, currents, and well challenges and how to overcome them. These could affect the process and turn non-feasible projects into profitable and vice-versa.

6.5 Cost and innovation

In contract selection a big factor which has been mentioned by both the operators and the contractor are the total cost of a project. The total cost creates a dilemma, this is due to the different goal of the operator and the contractor. The operator pushes to achieve the lowest total cost possible, within reason, to achieve a higher return on the investment and it also makes it easier to get the project accepted by the stakeholders. While the contractor will acquire benefits if the total cost is not clearly defined. The benefits can be in the form of higher profit, testing new equipment, increasing flexibility and so on. Total cost usually consists of factors such as material, personnel, vessel, equipment, contractors profit etc. Achieving the lowest cost for the operator might be profitable in the short term, but for the longer term it can result in the contractor needing to cut their cost to maintain their profit.

If the only goal, except from the risk, is total cost, what is then the incentive to find new technology for improvements to efficiency, HSE, environmental etc.? Developing new technology is costly and the benefits are often paid back over a period instead of a single use. Improvements to HSE and environment can be difficult to quantify into a monetary value, but with emission tax regulations and the theory on value of a statistical life (VSL) it can be better compared to the cost. [44, 45]

For new technology and innovations to be considered in the projects it needs to be presented with its cost and its benefits at the early stages. It could also be introduced at a later stage, but accepting the proposal is then tied to the available resources left in connection to the cost framework set for the project. With technology already developed and field tested, but not commercially used it is easier to give a cost and benefit estimate into the feasibility analysis. Defining these measures for technology still in the early phases of development will be problematic and will include risk and uncertainties that the project will need to adopt.

Adapting the procurement process with steps promoting innovation can motive the contractors to look for better solutions. Two elements are especially important. [13]

1. Specifications and criteria set by the operator to the suppliers should reflect the desired goal and issue at hand. They should not be set in a way that gives suggestion to a solution or use of a specific technology. Appropriate requirements will give suppliers freedom to use company experience and present the operator with their best solution.

2. Discussions with the suppliers in the early process of procurement, with focus on transparency. Benefits as discussed in previous chapter and to resolve questions regarding the issue and the procurements outlined specifications, criteria and demands.

Governmental strategies have been increasingly focused on innovative and green strategic procurement by not only using tax-payer money well, but also to bring the best added value in terms of quality, cost-efficiency, environmental and social impact and whether it brings opportunities for the supplier's market. [46-48] Experiences from the public method could be used to develop the operator's process.

6.6 Risk

In the offshore-industry risk is one of the most important factors to assess before the initiation of a project. One of the goals in the planning phase is for the risk assessment to identify as many risks as possible but finding all is difficult and some risks will be unknown, often called black swans. [20] With the present discrete contracts, the operator has the main risk responsibility especially when it comes to most of the unforeseen events. For the contract company risk is split into three events; events uncontrollable, events which are to some extent controllable, and events caused by the contractor. The risk the contractor company usually has responsibility for is the controllable and to some degree the “to some extent controllable” events. An example of such events would be equipment failure or delay and personnel issues or shortages.

In most cases it is favorable to attain the lowest risk possible. There are different options to lower the operational risk, where one of them is mentioned in the theory and that involves the selection of the equipment. For the operator to weigh the risk against the cost of higher quality equipment can be very important. It is not always worth increasing the cost for quality if the risk changes only marginally. It was mentioned in the interviews that it could also be possible to lower the risk with involving the contractor earlier. Creating a more diverse team in the planning phase can result in more scenarios and risks being discovered. The contractor has the best experience with their equipment and could be of assistant selecting the best way to solve the project. With the involvement from the contractor in such an early phase, it would be natural for the contractor to participate more in risk-sharing. This is due to contractors being able to influence how the project should be solved.

As mentioned in most cases all parties want the risk to be as low as possible, but from theory being a risk taker every now and then can result in a positive result. For the contractor to utilize new technology the risk will increase due to the uncertainty around the capacity and the result. As this new technology could benefit both the contractor and the operator there should be focus on risk-sharing where the contractor could be compensated for taking the risk. From the interviews it was mentioned to shift risk over to the contractor by utilizing more fixed-price in the contracts. With the fixed-price added, more risk is laid on the contractor to perform the work within budget, and any under- or overspending is the

contractor’s responsibility. The lump sum contracts are highly applicable when it comes to acquiring services based on reasonably defined detailed or functional specifications. Lumpsum also have the benefit for the operators to decrease the uncertainty around the final cost of the project which was mentioned by one of the operators as crucial for realization of projects. The contractor has had success in experimenting with adding fixed-price on certain parts of the contracts in Africa. Fixed-price was added to the work done pre- and post the well intervention. Being downhole during well intervention there are a variety of uncertainties and risks that are outside the contractor's control which makes it hard to set a lump-sum. Taking these experiences over to the NCS could be of interest. With P&A being more of a higher focus in recent years, it will be interesting to see if there are possibilities around lump-sum contracts for these kinds of operations.

6.6.1 Risk-sharing and incentives

Risk sharing has numerous advantages for the parties involved. By pooling their resources closer, one can for example increase the capital at the disposal. Resulting in the partners being able to finance bigger projects and increasing the possibilities of larger profits. Another example is with an increase in risk-sharing, resources such as personnel and experiences can be more conveniently at disposal for the other party. Creating diverse teams and exchanging different advices based on the experience will be an effective way to reduce the risks facing their business enterprise. [49] Risk-sharing can also increase the focus on a common goal and decrease opportunism. From the interviews an increase in risk-sharing was mentioned as something of interest to be further investigated by both operators and contractors.

Alliance contracts was mentioned in the interviews by both operators and the contractor as an emerging contract format. This is a newer model type on the NCS where the data is still being collected on the contract performance. From theory there are good potential in alliances contracts when considering risk and risk-sharing. With the great emphasis on trust and collaboration the alliance contract is set to achieve benefits for both parties. As the reduction in time, risk and cost are mostly benefitting the operator, a reward/penalty system is set in form of incentives for the contractor. This system result in an increase in risk-sharing, where the contractor takes a larger cut of the risk and are compensated if they deliver as expected or better while penalized if performance is below expectations. The issue around aligning the correct incentives was mentioned during the interviews. The contractor needs to experience the incentives as fair and attainable, and not only receive penalties as this will be demotivating and increase the doubt in the alliance. The incentives should be designed after the controllability principle where the incentives must be connected to conditions and quantities in which the contractor can control.

In the literature, incentives have been mentioned to increase the risk-sharing. Before the contract is signed, most of the incentives are discussed and set. Incentives should be created with the use of the controllability principle but sometimes during the operation, it will be necessary to reevaluate the incentives and refine them. The incentives are usually made to share the cost risk and it will create a cost responsibility for the contractor to uphold. For example, if the contractor goes beyond the price ceiling the contractor absorbs the difference as a loss and if below the incentives it will result in a reward for keeping the cost down. How

much of the risk the operator wants to share with the contractor may vary, it depends on the incentives, the amount and how they are formulated. Designing the incentives, one should be aware of the challenges around asymmetric information, renegotiation and distortion of the activity as mentioned in the theory. Performing a top-quality well intervention requires a high level of skill from multiple disciplines. It would be beneficial to create a specialized incentive-system for each contractor as they do not control the entire operation. In the interviews it was brought up that incentives may just lead to benefits for the contractor and that regardless of the incentives the contractor should perform their best. A proposition would be to consider adding incentives at the lowest level, not as a monetary benefit to the contractor, but to the workers. In the end it is the workers who performs the actual work and incentives at this level does not need to be large sums but could result in good returns if they correctly motivate the workers. At this level, rewards from the incentives could go directly to the welfare fund which can be spent on activities or new equipment for the workers to use.

The contractor mentioned they had experience with integrated/total contracts in Africa and had experienced good results. Integrated contracts keep the number of contractor companies involved and the number of contracts to a minimum. Contracts offshore typically involve subcontracts with third parties. These will be managed by the contractor, and they will be the single point of contact for the operator. Integrated contracts reduce the administrative burden for the operator, and in addition opens possibilities of greater risk-sharing. The overall risk for the contractor is higher in integrated contracts if compared with the risk burden in integrated contracts versus discrete contracts. This is due to the risk now lies on the contractor instead of the risk being spread out on multiple contract companies and the operator. The contractor should, however, only carry risk within their control. Sharing the risk between the operator and contractor the controllability principle plays an important part. The contractor will be involved in an earlier stage of the process and as mentioned previously that could prove to be beneficial for risk mitigation and risk-sharing. An additional benefit is the use of the one team philosophy, which means the contractor have more impact to control the operational risk and have a greater impact on operational decisions. This one team philosophy also could have the benefit of a no blame culture. If the solution suggested was not optimal, the team sticks together and instead of blaming one another, tries to fix the problem together.

7 CONCLUSION

The thesis set out to answer if new contract and collaboration models could create added value for both the operator and the contractor. The initial belief being that the current day rate compensation model could be improved with other compensation models and changes in how collaboration takes place.

Based upon interviews with both operators and contractor in intervention projects there are certainly differences but also similarities in intention and goal. Contracts used for intervention work have been subject to changes over the past decade but are to this day still heavily relying on the use of day rates as the main compensation form. Contract owners and users put the convenience of day rate models for planning and estimating cost for a project as an advantage, however an imperative factor in deciding on the feasibility of an intervention is based on the total cost. Contractors consider predictability and continuity as important for improved contract performance and for cost reduction. Other contract models with greater use of fixed price elements and a larger responsibility for deliverables to the intervention project has been tried and proved successful for clients outside Norway. Contract models and risk sharing that could be favorable for work performed on the NCS.

Proposed improvements to achieve added value to the current contract format includes changes to the compensation format for different activities, increasing risk sharing and adaptations to procurement to favor innovation in a cost driven process.

Enabling added value improvements for the operator and contractor is possible by changing how and when collaboration takes place. By establishing more communication during the feasibility analysis of a project, better estimates regarding cost can be made and thus the uncertainty of the project is reduced. A proposed addition to the existing frame agreements between the parties is to construct teams with varied competence all within relevant fields of intervention to assist, when necessary, with their experience and expertise to the feasibility analysis.

8 FUTURE PROSPECTS

The thesis does not cover how to bring changes to the behavioral and culture goals in alliance contracts where both parties share the cost and benefits of operations. The operators using this type of contract experienced that changing the mindset of the teams to the common goals takes time. With the introduction to new contract types and alliances where these targets for the contractor and the operator are aligned, there is a need to form and develop a joint team. How these teams should be introduced, set up and developed to achieve the best results is an issue that could be investigated further.

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10 APPENDIX

A – Operator interview questions

Nr	Spørsmål
1	Hvor mange intervensjons jobber har dere i løpet av ett år? (Plattform/Rig/Fartøy)
2	Hvordan bestemmes hvilken teknisk løsning en vil gå for?
3	Når starter den operative planleggingen, skjer det under kontraktsopprettelsen eller når kontrakter er signert?
4	Hva er driveren for jobbene og hvordan fordeles de? (Integritetsproblemer, preventive, produksjonsøkende)
5	Hvilket type anskaffelsesprosess benytter dere? (RFQ – ITT?)
6	Hvilke type kontrakter/kompensasjonsformat benytter dere for intervensjons oppdragene på deres subsea brønner?
7	Hvorfor blir denne typen format benyttet/foretrukket?
8	Hva er opp- og nedsidene ved denne type kontrakter i deres øyne?
9	Blir det brukt insentiv modeller i kontraktene? Evnt hvilke typer? Hva straffereaksjoner brukes? (WOW, NPT)
10	Hvordan fordeles risiko i kontraktene? (Hvor mye blir lagt hos operatør og hvor mye hos kontraktør?)
11	Hvordan måler dere suksess i oppdragene? (Innenfor budsjett, produksjonsøkning)
12	Benyttes det KPI'er i slike kontrakter, og hvordan implementeres dem?
13	Har kontraktørselskapene måtte endre seg?
14	Har du/dere noen tanker om andre type kontrakter som har potensial i dagens marked?

B – Contractor interview questions

Nr	Spørsmål
1	Hvor mange intervensjons jobber gjør dere i løpet av ett år?
2	Blir dere involvert i den tekniske planleggingen av oppdraget og når, før eller etter utrop?
3	Når starten den operative planleggingen, skjer det under kontraktsopprettelsen eller når kontrakter er signert?
4	Hva er driveren for jobbene og hvordan fordeles de? (Integritetsproblemer, preventive, produksjonsøkende)
5	Hvordan er anskaffelsesprosessen ved inngåelse av rammeavtaler?
6	Hvilke type kompensasjonsformat benyttes for intervensjons oppdragene?
7	Hvorfor blir denne typen format benyttet/foretrukket?
8	Hva er opp- og nedsidene ved denne type kontrakter i deres øyne?
9	Blir det brukt insentiv modeller i kontraktene? Evnt hvilke typer? Hva straffereaksjoner brukes? (WOW, NPT)
10	Hvordan fordeles risiko i kontraktene? (Hvor mye blir lagt hos operatør og hvor mye hos kontraktør?) (Total leveranser?)
11	Hvordan måler dere suksess i oppdragene? (Gjennomfører planlagt scope, innenfor tidsplaner?)
12	Benyttes det KPI'er i slike kontrakter, evnt hvordan benyttes dem?
13	Har operatør/kontraktørselskapene måtte endre seg?
14	Har du/dere noen tanker om andre type kontrakter som har potensial i dagens marked?