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Are Integrated Contracts a Driver for More Successful Projects Compared to Traditional Discrete Contracts?

By

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Abstract

In recent years it has become more common to use integrated contracts between operators and service companies for offshore well construction projects. This thesis evaluates if the change from traditional discrete contracts to integrated contracts can result in a higher degree of successful projects for a specific service company. The experience used in this thesis has been collected through semi-structured qualitative interviews with the manager of contracts and proposals, and the authors own experience in this service company. Integrated contracts are normally more complex to administrate and involves higher risks for the service company, but these contracts also come with a higher reward compared to discrete contracts. The general experience is that integrated contracts can be a driver for more successful projects, as the service company has more impact on the method selection of the projects and has high incentives to deliver a project that is aligned with the operator's objectives. The experience collected for this thesis was also compared to experience and research found in the literature regarding contract and project models. Most of the experience were aligned with the literature findings. However, the literature indicates that a single integrated contract is easier to manage compared to multiple discrete contracts. Experience from the service company indicates that integrated contracts are more complex to manage due to the complexity of contractual requirements.

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Stavanger, June 12th 2020

Ida Moe

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Abbreviations

BHA – Bottom Hole Assembly

HSE – Health, Safety and Environment

NCS – Norwegian Continental Shelf

About the Author

I am currently employed in the service company where I have collected experience for this thesis. Through my work I have gained experience with different contract designs and have noticed that the contract designs have changed over the last few years. I wanted to learn more about these changes and why integrated contracts have become more prevalent in such a short time. This thesis is a personal project and is not sponsored by the service company. The methods and conclusions drawn in this thesis do not necessarily represent the opinions or strategies of the service company.

1 Introduction

After some challenging years in the Norwegian oil industry the contract designs between the operators and the service companies have gradually changed. Prior to the changes the operators often acquired discrete contracts with multiple service companies for one project. Today the contracts are moving towards a higher level of integration where one service company delivers most, if not all, of the service and equipment on the operators' well construction projects. With a higher level of integration in the contracts it also becomes easier to implement performance incentives that, if properly designed, better aligns the service companies' incentives with operators' objectives as well as proper sharing of risks.

2 Objectives

The objective of this thesis is to evaluate if the change from traditional discrete contracts to integrated contracts can be a driver for more successful projects to the service company. Experiences from both types of contracts will be presented and discussed in this thesis.

Integrated contracts come with higher risks and greater rewards. The thesis will therefore also focus on the change in incentive design and how operational risk is shared between the service company and the operators.

The thesis will also use available literature to present the theory of the different contract models that are common to use between operators and service companies related to offshore well construction projects in Norway. The literature findings will be evaluated together with the experiences collected from the service company.

2.1 Delimitations

This thesis will focus on the most common types of contracts where the service company delivers services to operators for offshore well construction projects in Norway. Contracts where the service company buys products and services from third-party companies will not be evaluated.

Contracts contains confidential information. Findings and discussions in this thesis will therefore be kept at a general level.

3 Structure of the Thesis

This thesis consists of ten chapters and one appendix. Chapter 1-3 provides introduction, objectives, and structure of the thesis. Chapter 4 provides information of the company where the thesis data has been collected. Chapter 5 provides the theoretical framework. Chapter 6 describes the methodology for collecting experience. Chapter 7 contains the discussion of the findings. Chapter 8 contains the conclusions. Chapter 9 contains information on potential future work based on the findings in this thesis, and chapter 10 lists the references used. Chapter 11 contains the appendix with interview questions listed.

4 Information About the Service Company

This thesis will present experience collected from a service company regarding discrete and integrated contracts to evaluate if integrated contracts can result in a higher degree of successful projects than the traditional discrete contracts for the service company. The service company's name is kept out of the thesis, as the findings and discussions are kept at a general level.

The service company is an international oil field service company. Since the founding of the company, it has become one of the world's largest product and service providers to the petroleum industry. Providing services from the localization of hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimizing the production throughout the lifecycle of the well.

The service company is one of the largest service companies in Norway and is one of the few service companies able to provide fully integrated services to the operators. Multiple disciplines participate in integrated projects, working as one team with the operator. Examples of disciplines included in integrated projects are well planning, directional drilling, M/LWD (measurements and logging while drilling), fluids (mud and cement), mud logging, completion services, liner hanger services, mechanical packers, casing equipment, project management, coring, logging and wireline services, and more.

5 Theoretical Framework

5.1 Oil crisis – Background Information

After the discovery of oil on the Norwegian Continental Shelf (NCS) in 1969, the petroleum industry has become one of the most important industries in Norway. Over the years there has been several crises in the Norwegian petroleum industry, where the most recent one was in 2014.

From June 2014 to January 2016 the oil price dropped from 114 USD/barrel to 34 USD/barrel. The low oil price resulted in a significant activity reduction on the NCS, as the low price did not match the minimum cost of continued drilling and development. The petroleum industry had to change in order to cope with the effect of the reduction in oil price. Major cost cut measures were initiated by operators and service companies. Thousands of employees lost their job and companies had to deliver products and services for minimal or no profitability.

In January 2018, the former oil director, Bente Nyland, presented "Sokkelåret 2017". There was now more optimism in the industry after the crisis. The industry had successfully reduced the cost of drilling and development projects. Projects initiated at this time were now more profitable and able to handle an oil price down to 30-40 USD/barrel. Multiple measures had been initiated to reduce cost. Each measure may not be large, but the total resulted in significant savings in the industry (Oljedirektoratet, 2018). As of January 2020, there is continued optimism and growth according to the current oil director, Ingrid Sølvberg, when she presented "Sokkelåret 2019" (Oljedirektoratet, 2020).

One of the changes in recent years has been the operators moving away from traditional discrete contracts with multiple service companies to integrated contracts with one service company.

Note: *Due to the Covid-19 restrictions implemented worldwide and an oil price war between Russia and Saudi-Arabia, there was a severe drop in the oil price in March 2020. The price dropped to a record low at 21 USD/barrel. As of April 9th 2020, the price is currently on the increase, however the continued development is volatile and unpredictable. The activity on the NCS has yet again been reduced and the full effect of the Covid-19 restrictions and oil price reduction on the petroleum industry in Norway is not yet known.*

5.2 Contract Models

Prior to the oil crisis in 2014 it was common for the operators to use discrete contracts for well construction projects. The operator would initiate a tender process for the different tasks required to drill and complete a well and choose the service company most suitable for each task. As a result, several service companies could be involved in the process for developing one well. The individual contract models could vary depending on the service type. Today it is becoming more common for operators to offer integrated contracts, where one service company delivers most, if not all, of the services on a project. It can be a complex operation to align all service disciplines into one contract. Because of this, integrated contracts often contain elements from several standard contract designs.

The next sections present the theory of a selection of standard contact designs that are common to use by operators for offshore well construction projects in Norway.

5.2.1 General Contract Theory

A contract can be defined as a promise or set of promises between parties, which the law will enforce (Dingle, Topping, & Watkinson, 1995). 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 (Müller & Turner, 2005). In general, contracts can be divided into three broad categories (Dimitri, Piga, & Spagnolo, 2006):

1. **Fixed price** (often named lump sum)
2. **Cost reimbursement or cost plus** (includes time and material contracts)
3. **Incentive contracts**

Contracts are often a combination of these three categories depending on the complexity of the scope of work in the contract. The owner of the contract, the operator, will choose a contract design that allows an efficient delivery of the project at a low cost.

5.2.2 Lump Sum Contracts

Fixed price contracts, or lump sum contracts as they are often called in the petroleum industry, is when the contractor is payed a fixed price for delivering a project according to an agreed upon design and quality (Dimitri et al., 2006).

With lump sum contracts the contractor has full responsibility for the cost of the service specified in the contract. If the contractor manages costs and risks effectively, and still delivers the quality agreed upon, he can enjoy the benefits of an increased profit. However, if the contractor has made poor estimates prior to submitting the bid, the project may become more expensive and the contractor is exposed to a lower or negative profit upon completion of the project (Dimitri et al., 2006). If there are uncertainties in the project, the contractor must evaluate the risk and probability of these events to occur. Based on the analysis the contractor can include the cost of these risks into their cost estimates, resulting in a potentially higher cost for the owner compared to e.g. a time and material contract. With this contract model the contractor has incentive to control costs and perform efficiently. It reduces the administrational burden on the owner and simplifies the payment process (GSA, DoD, & NASA, 2019). Lump sum contracts may receive one final payment, or several smaller ones based on progress or milestones achieved, such as well sections completed. There is also less need to measure performance, as the contractor has incentives for an efficient delivery (Bogus, Shane, & Molenaar, 2010). The focus of the owner will be on the quality of the project, rather than the coordination of the project.

Prior to accepting a lump sum contract, a project plan should be in place based on realistic expectations. For a well construction contract a detailed drilling plan should be prepared in advance by the operator (Osmundsen, Sørenes, & Toft, 2010). It is beneficial for the contractor to have experience with similar projects, in order to deliver a realistic bid and to deliver the project at agreed cost and time. If there are risks for unplanned events, the contract should also include a contingency option on how to handle this (Willoughby, 1995). Incentives to align the interest of the contractor and owner should also be included in the contract. More information regarding incentives in contracts will be given in a separate section later in the thesis. If changes are required after signing the contract, it requires renegotiation between the parties. This can result in delays and a bureaucratic process with potential conflicts over change orders and quality (Osmundsen et al., 2010).

A challenge with lump sum contracts is the performance quality. These contracts may have tight schedules and time frames, and it can be tempting to take shortcuts (Willoughby, 1995). To mitigate this lump sum contracts also usually contain penalty options in order to discourage the contractor from opportunism (Dimitri et al., 2006). Another challenge with lump sum is the potential decrease of the owners' interest in the project. As the contractor has full responsibility for the delivery, it reduces the owners need to follow up on the project process. This can lead to lack of information transfer between the owner and the contractor, and eventually result in a poor project performance. It can also result in poor collaboration, where the contractor and owners' objectives become misaligned (Müller & Turner, 2005).

Lump sum contracts are generally recommended for projects with low uncertainty and a high level of standard design and/or services. Lumps sum contracts are suitable for projects where realistic estimates are available and performance uncertainties can be identified and reasonable cost estimates can be made (GSA et al., 2019). It may be profitable for the owner to use a lump sum contract on projects that depends on the contractor's initiative to reduce cost. However, it may be a risk on projects where cost reduction may affect the quality or delivery of the project (Dimitri et al., 2006).

5.2.3 Cost Reimbursement Contracts

Cost reimbursement or cost-plus contracts are when the contractor gets all its documented cost related to the project reimbursed by the owner. Often the owner also pays an agreed fee to the contractor based on the performance of the contractor on the project (Dimitri et al., 2006). When the contract includes an additional fixed fee, the contractor can be motivated to perform services that may involve greater risk for the contractor. It can also provide the contractor with a minimum incentive to control costs (GSA et al., 2019).

Cost reimbursement contracts comes with some challenges. Since the contractor is guaranteed to get its costs covered, there is no incentive for the contractor to reduce or limit costs. The contractor may be tempted to maximize their financial result, by compromising on time and performance objectives (Müller & Turner, 2005). The contractor may even try to upsell additional services to increase their profit when the owner bears all the project cost. On the other hand, if unforeseen events affect the project costs and it is outside the contractors control, it is reassuring to the contractor that its costs will still be covered. Additionally, if the

original plans which the contract is based on, is not practically executable after the contract is signed, there is less need for contractual renegotiation (Dimitri et al., 2006). For well construction contracts with cost reimbursement, research indicates that conflict levels are generally reduced, and faster completion of projects can be achieved. It is easier for the operator to make changes after signing the contract and affect the ongoing work process (Osmundsen et al., 2010).

The administration of cost reimbursement contracts is more demanding than lump sum contracts. Each payment must include a detailed cost overview, and there may be a need for multiple payments. However, the detailed cost overview gives the owner a better understanding of the cost of each item or service. This can help the owner to control the project and keep the cost at reasonable levels (Bogus et al., 2010). Some cost reimbursement contracts include a capped price. This way the owner has some cost control, especially if there are some uncertainties in the project scope. If the costs increase above the capped price, the contractor must negotiate with the owner to increase the cap level or accept a potential profit loss (Dimitri et al., 2006).

Cost reimbursement contracts are generally not recommended when the total cost of the project is greatly dependent on the contractor to contain or limit project costs. One may risk that the cost escalates during the execution of the project. However, a cost reimbursement contract may be a good option if project flexibility is needed, e.g. if the project is complex or has large uncertainties. If changes are needed after the contract is signed, there is less need to renegotiate the contract afterwards. Also, since cost is not an issue for the contractor, the contractor has incentives to not cut quality on the project. Unless the contractor has something to gain on time and effort. Then quality cuts could become a reality (Dimitri et al., 2006).

5.2.4 Time and Material Contracts

Time and material contracts are a sub-category or an alternative form of cost reimbursement contracts. With time and material contracts the contractor gets paid based on the material and labor hours directly used to deliver the end-product or a service. The contract includes an agreed upon pricelist for the material and labor hours. Included in the material cost and labor hour rate are wages, administrative expenses, transport, profit and other factors if needed. These are factors which are not directly invoiced in the project, but have been added to the

material cost for the service company to cover its expenses (GSA et al., 2019). Compared to a cost reimbursement contract, there are fewer requirements for providing a detailed cost overview, as several aspects of the cost can be included in the hour rate and material cost. Prior to submitting a tender bid, the contractor must carefully evaluate their prices. The prices must cover all costs and include a profit, but if the prices are too high the contractor risks losing the contract.

This type of contract is typically used when it is difficult to provide an estimated cost prior to signing the contract. It may not be possible to accurately estimate the amount or type of materials needed or duration of the work. The contract does not provide any incentives for the contractor to reduce cost, however a capped price can be included in the contract. Cost exceeding the capped price can be considered as a loss for the contractor. If the capped price is unreasonably low, the contractor can re-negotiate to increase the ceiling, but this needs to be well documented by the contractor (GSA et al., 2019).

Common for the cost reimbursement and time and material contracts is that the scope of work is not well defined prior to signing the contract. Both provides flexibility to adjust the scope of work after the project has started, without the need for re-negotiation of the contract. Time and material contracts are most common to use in well construction contracts, especially for long term framework contracts. In long term contracts the scope of work can vary and there are multiple uncertainties.

5.2.5 Incentive Contracts

Incentive contracts is an alternative contract model, where incentives are added to cost reimbursement and lump sum contracts. Incentive contracts can also be named target cost contracts (Osmundsen et al., 2010). The contract usually includes a target cost, a target profit and a profit adjustment formula based on the contractor's performance. The contract is designed to ensure that when products or services are delivered within or ahead of to the target, the contractor will receive a target profit. If the contractor exceeds the target cost or the quality is below expectations, it will result in a downward adjustment of the target profit. If the actual cost is below the target, the target profit will be adjusted upwards (GSA et al., 2019). With this contract type the contractors' received profit is related to the contractor's performance, however the contractor is not entirely responsible for the total project cost. The

contractor should only be responsible for results they can influence themselves and can handle economically (Osmundsen, Sørenes, & Toft, 2008).

Incentives are used to align the operators and contractors' goals, and they should encourage close collaboration and drive the desired behavior from the contractor (Osmundsen et al., 2010). With the correct incentives there will be less need for the owner to follow up on the project, as the contractor is motivated to deliver products or services according to the scope of the project (Dimitri et al., 2006). The benefit of correctly designed incentives is a continuous focus from the contractor, and the contractor will use all its experience to obtain the incentive reward (Osmundsen et al., 2010).

In most cases incentives are related to cost in one way or another. Often the incentives should stimulate the contractor to reduce costs, but it can also stimulate the delivery of good service or quality which results in bonuses if the delivery is above the minimum performance (Dimitri et al., 2006). It is usually in the owners' advantage for the contractor to take a substantial cost responsibility and an appropriate share of the cost risk. If the final negotiated cost exceeds the price ceiling, the contractor absorbs the difference as a loss. Since the profit varies inversely with the cost, this contract type provides a positive, calculable profit incentive for the contractor to control costs (GSA et al., 2019).

The incentives should be related to parameters which are measurable, observable to both parties, within the contractors control and legally verifiable (Osmundsen et al., 2010). The incentives should be reasonable and attainable targets which have been clearly communicated to the contractor. They should motivate the contractors' performance that might not otherwise be emphasized. Incentives to avoid the contractors' inefficiency and waste can also be included in the contract (GSA et al., 2019). Activities that are not easy to measure with the incentive system, but are still important to the operator, can be monitored with regulation and control, such as health, safety and environment (HSE) (Osmundsen et al., 2010).

Designing the perfect incentives can be difficult and not always realistically possible. If the contractor shall hit the target, the incentives must be tied directly to parameters the contractor can control. If the contractor cannot affect the parameters, the performance improvement will be based on gambling and will not be an optimal solution for the owner (Osmundsen et al., 2010). Incentive contracts should be arranged in a way that motivates the contractor to strive for outstanding results in the incentive area. It may not be possible to achieve outstanding results in all of the incentive areas, it is therefore preferred to have multiple incentives in such

a way that ensures that the contract is executed in a satisfactory manner and according to the operators overall objectives (GSA et al., 2019). For complex projects, incentives can with benefit be based on smaller sub-tasks. If multiple incentives are included in the contract some incentives may be more attractive and easier to achieve than others. A consequence could be that the contractor spends more effort on attractive tasks to gain an easy profit. The incentives the contractor spend less effort on, may still be very important to the owner and the overall objective of the project may not be fulfilled in an optimal way for the owner (Dimitri et al., 2006).

Some challenges can arise when designing incentive contracts (Osmundsen et al., 2010):

1. **Asymmetric information** – The service company knows more about the actual drilling operation, while the operator is more knowledgeable about the reservoir.
2. **Renegotiation** – Renegotiation of incentives after signing the contract weaken the original incentives. Well construction is a complex operation and it is difficult to account for all possible outcomes prior to signing the contract.
3. **Distortion of the activity** – Poorly designed incentives can result in a non-optimal outcome for the project where the service company is more focused on less important factors in the project. A wide range of incentives covering all key performance dimensions should be included in the contract.

Well construction requires a high level of specialization from multiple disciplines. Discrete contracts involve participation from several service companies. Designing incentives such that all service companies are working towards a common goal can be a challenge, as a key parameter for incentive design is the controllability principle. Each service company does not control the entire operation, and therefore more specialized incentives based on technical performance should be applied. Standardized incentive design is more feasible with integrated contracts, where one service company is involved in a large part of the project. In addition, a section-based incentive system is preferred over a whole well incentive system. If the contractor suffers maximum penalty at an early stage in the well, then it is still possible to obtain incentive effects later in the project (Osmundsen et al., 2010). The section-based incentive system is also beneficial as the contractor personnel get an immediate reward, providing stronger incentives than rewards which lie further off in time. The downside with section-based incentives for the operator is if the well does not meet the overall objectives, for example if the reservoir does not produce as expected, the operator must still reward the

contractor for successful sections. On the other hand, incentives based on the complete well may result in no bonus for the contractor even if the contractor had an overall good performance and met several targets (Osmundsen et al., 2010).

For long term agreements and future contracts, renegotiation of the incentive system is common. For projects with excellent performance and high incentive payments, the operator may want to tighten the incentives as they may appear to generous or easy for the contractor to achieve. On the other hand, the contractor may foresee this change which weakens the incentives short-term (good performance is penalized in the next contract) (Osmundsen et al., 2010).

The usage of incentives and bonus systems is not only to secure higher dedication to the operator's projects, but it can also help the operator to obtain a favorable allocation of personnel and services. The operator with the most attractive incentives can theoretically receive the best personnel and services from the service company and get better price offers. However, research by Osmundsen et al. (2010) indicates that resource allocation by the service company is generally not a problem. Operators collaborate on several projects, and the service companies want to deliver good services to all operators in order to secure future work (Osmundsen et al., 2010).

For offshore well construction there are different types of incentives based on the contract model and scope of work. The most common incentives are related to cost or performance measurements.

5.2.5.1 Cost Incentive

Cost incentive contracts usually contains a profit or fee adjustment formula and are intended to motivate the contractor to efficiently manage costs. Incentive contracts include a target cost, a target profit or fee, and a profit or fee adjustment formula which (within the constraints of a price ceiling or minimum and maximum fee) provides that (GSA et al., 2019):

1. Actual cost that meets the target will result in the target profit
2. Actual cost that exceeds the target will result in downward adjustment of the target profit or a fee
3. Actual cost that is below the target will result in upward adjustment of target profit

5.2.5.2 Performance Incentive

Performance incentives are used when elements of the contractor's performance can be measured. For example, by time or product quality. Incentives should be designed to relate profit or fee to results achieved by the contractor, compared with specified targets. Both positive and negative incentives can be used when the quality of the performance is critical, and the incentives are likely to motivate the contractors' behavior (GSA et al., 2019). Penalties (negative incentive) can for example be activated if the contractor has problems which results in operational downtime (Osmundsen et al., 2010). The risk for penalties will keep the contractor focused on delivering a successful product and take measures to mitigate the risk for failure.

Drilling efficiency or payment per drilled meter is an example of a common performance incentive in well construction. The drilling contractor has direct control over the pace of drilling. However, the targets set by the operator must be reasonable and attainable. A well completed ahead of schedule, can result in substantial cost savings in terms of rig and equipment rental, and personnel cost. However, the geology in some sections may require a different operational approach. Instead of focusing on drilling and completing the section as fast as possible, the focus should be on drilling and completing it correctly which can take more time. If the section is completed incorrectly it can result in delays, reduced well quality or even well abandonment. The incentives should be adapted to the requirements of the individual well sections. The first stages of the well are transport stages, and drilling speed incentives can be used. Reservoir drilling incentives are usually treated separately, as the reservoir needs a different and potentially more time-consuming drilling approach (Osmundsen et al., 2010).

Penalties and rewards can be related to both the total well delivery and individual sections in the well. Benchmarks for each section gives the contractor incentive to deliver optimal performance on all sections, even if one section fails. Benchmarks in incentives should have an annual or regular review between the operator and the service company and should be agreed upon prior to starting a new project (Osmundsen et al., 2010).

5.2.5.3 Incentives and Risk Sharing

Project risk, or operational risk, can be defined as "An uncertain event or set of circumstances that, should it occur, will have an effect on the achievement of the project's objectives" (Simon, Hillson, & Newland, 1997). To handle risk involves a trade-off between cost and time, and one should aim for spreading the risk (Chapman & Ward, 2004). For example, in well construction projects the team must choose which mud system is most suitable for the well design and geology. The project can either choose an expensive high-performance mud system or a cheaper alternative mud system. The high-performance mud system can increase the probability of delivering a successful well section ahead of time and reduce risks for losses and well instability. If these risks occur it can be a costly operation to manage the situation. The cheaper mud system may meet the minimum requirements but are less able to mitigate potential wellbore risks. The high-performance mud system can be substantially more expensive than the cheap mud system. The operator must evaluate if the increased cost is worth the potential for completing a section quicker and mitigate the risk for losses and instability. A cheap mud system may be chosen if the time saved is small, or if the probability and consequence of losses and instability is minor.

Risks do not necessarily always come with negative effects; they can also have positive effects. E.g. by taking a risk and using new technology or equipment it can result in either equipment failure, equipment working as planned or even better than planned. Also, when the contractor prepares the bid for a contract, the cost of identified risks must be evaluated based on probability, consequences and the contractor's ability to control the risks. The cost of the risk should be priced into the contractors bid in such a way that makes it possible for the contractor to handle the risk without significant loss of profit. If the identified risk does not occur, then the added risk cost can turn into a profit for the contractor.

Designing a complete contract that covers all aspects and risks are normally not possible for well construction projects. It is impossible to specify all outcomes in advance and the contract can be exposed to renegotiation after the contract is signed due to unforeseen events. Principal-agent theory indicates that when a project is initiated, the owner and contractor are motivated to contribute to the project to the extent each of them bears the risks in a project (Müller & Turner, 2005). Contracts should be designed with optimum risk sharing. Normally the operator is more capable of carrying risk due to diversified and shared projects and contracts with other license partnerships. The operator also has future cash flow from

production wells, while the service company only gets a one-time payment after completing the project. With incentive contracts and integrated contracts, the risk is often higher for the service company. However, there is often an option for the operator to step in if the risk event is severe and/or outside the service company's' control.

Incentive contracts usually include a cost-sharing parameter or a profit adjustment formula. The more the contractor is responsible for cost overruns and the more the contractor benefits from cost reduction initiatives, the higher is the incentives for the contractor to reduce cost. However, the contractor must be careful not to accept a contract with risk for cost overruns that are too high for the contractor to handle. There are some factors that should be considered prior to determining the cost-sharing parameter (Dimitri et al., 2006):

1. The ability of the contractor to bear the procurement risk
2. The probability of unplanned events affecting the project cost
3. The actual effect of the contractors' cost-saving initiatives

The first factor depends on the contractor's ability to handle unexpectedly high project costs. If the contractor is sensitive to high costs, and thereby more risk averse, the cost sharing parameter should be small for the contractor on projects with high uncertainty regarding planned cost and actual cost. The contractor may accept higher risk if the project cost is small compared to the contractors' turnover and if the contractors' business activities are diversified (Dimitri et al., 2006).

The second factor depends on to what degree unplanned events can be predicted and how such events will affect the cost. If the probability is high for unplanned and costly events, then the contractor may be less willing to accept a high cost-sharing parameter (Dimitri et al., 2006). However, the contract can include an asymmetric incentive design, where the upside is greater than the downside for contractor, and with an absolute floor on the downside. Which makes contractors more willing to accept a higher risk (Osmundsen et al., 2008).

The third factor measures the return the contractor may expect from initiating and potentially investing in costly activities to reduce project costs. If the cost reducing activities has sufficient impact, the contractor may accept a higher cost-sharing parameter (Dimitri et al., 2006).

5.2.6 Integrated Contracts

In recent years it has become more common for operators to offer contracts with a high degree of integration in well construction projects, in order to keep the number of contracts and involved service companies to a minimum. Usually there are three main parties involved in integrated well construction projects: the operator, the rig company and one main service company.

Integrated contracts can be more complex to design, as the contract must be suitable for multiple disciplines. The more disciplines that are included in the contract the more likely there will be a mix different contract models in the contract (e.g. combination of lump sum and time and material). Incentives are often designed based on an overall project delivery, however as mentioned earlier, it can be beneficial to break the incentives into smaller measurable tasks depending on the project.

Integrated contracts can simplify the procurement and management process for the operator as one service company covers a wide range of activities. It is also easier to implement incentives, as the service company has greater control over the progress of the project. If the incentives are designed correctly, the incentives can trigger a beneficial behavior from the service company. Where the service company will give the operators project high focus in order to meet the incentive targets and deliver a project that meets the operator's objectives. The downside of integrated contracts is the reduced competition, as there are few service companies in Norway which can offer such a wide range of services (Osmundsen et al., 2010).

5.3 Contract Selection

Summarized, contract selection is greatly affected by the complexity of the project and how much uncertainty the project includes prior to signing the contract. The final selection of contract type depends on the owners' experience with project delivery methods, administration, time available for project delivery, available market competition etc.

Research done by Bogus et. al. (2010) indicates that using cost reimbursement contracts are more likely to meet the planned project schedule and cost, as compared to lump sum contracts. However, in this research it was shown that a lump sum contract is more often preferred. Most likely due to the administrative burden the owner must deal with in a discrete contract and a discrete payment. Lump sum also appears provides predictability of cost and schedule to the owner. However, this research also shows that the cost reimbursement contracts provided a better performance in terms of cost and schedule certainty (Bogus et al., 2010).

Research done by Suprapto et al. (2015) indicates that collaborative contracts and contractual incentives might influence project performance. Their results indicate that through better relational attitudes and teamwork quality, projects with a partnering or alliance contract are likely to perform better than those with lump-sum and reimbursable contracts. Also, projects with incentive contracts are likely to perform better than those without incentives through better relational attitudes and teamwork quality. There were no differences in project performance directly associated with different contract types and contractual incentives. Overall, a partnering or alliance contract and incentive contracts do not necessarily directly improve project performance but does so through relational attitudes and how they play out into actual teamworking behavior (Suprapto, Bakker, Mooi, & Hertogh, 2015).

Well construction projects require some degree of flexibility and control by the operator. Incentives should be designed to align the goals of the operator and the contractor. Based on formation data during drilling the operator may want to adjust the original plans. A simple way for the operator to have flexibility, it to use cost-plus payments, such as day rates when drilling the reservoir. If performance-based incentives are used, such as drilled meter per hour, these must usually be renegotiated (Osmundsen et al., 2010).

5.4 Successful Projects

There are numerous ways to define what a successful project is. It can be based on financial results, technical results, human factors etc. Project management literature suggests that the main evaluation criteria are often based on the project meeting the objectives below budget and ahead of schedule. The most important factor for evaluating the success of a project is to have defined the success criteria prior to starting on the project (Siles, 2018).

Research done by Willoughby (Willoughby, 1995) suggest that there are seven main prerequisites to achieve successful projects: (1) experience and confidence, (2) management skills, (3) good communication skills, (4) a comprehensive workplan, (5) a time-sensitive list of deliverables, (6) clearly defined division of responsibility and (7) a solid synergistic team. Willoughby did his research on projects working with lump sum contracts, but this is also highly relevant for the success of integrated contracts. The results in his research are also supported by more recent research (APM, 2015; Wellman, 2012).

The main prerequisites for successful projects described in Willoughby's paper are:

1. **Experience and confidence** are relevant in order to make solid plans and quickly resolve unforeseen events. If the same personnel have been working together this also enhances the teamwork and team synergy.
2. **Management skills** is essential to achieve a successful project. A project manager is needed to make sure all parts of the project is executed as planned and according to performance requirements.
3. **Good communication** is needed to make projects run smoothly. Plans must be clearly communicated, and experience must be shared. Feedback and lessons learned can improve the project performance quality. Due to the importance of good communication, it will be further elaborated in the next section.
4. **A detailed workplan** should be made to identify each task to be performed in the project. The detailed planning and experience can help identify potential bottlenecks and improvements.
5. **An overview of deliverables** is needed in order to monitor the progress of the project and to document the end-product for each phase of the project. The keeping track of the deliverables can also be used to check if the initial cost and time estimates has been reasonable.

6. Most projects are made up of multiple firms (or disciplines within one firm in integrated projects) and **responsibility and accountability** must be clearly defined. Accountable personnel are key to maintain schedule, budget and quality of the project. According to Willoughby, synergy implies that the whole is greater than its parts. By this he means that a team consisting of different individuals needs to be open minded and share their insights. All opinions should be valued.
7. **A synergistic team** will be more capable of delivering a successful project since they will be more focused on solutions and the effectiveness of the team may be enhanced (Willoughby, 1995).

Controlling cost and quality are important to successful projects. This can be achieved by (1) establishing standards, (2) monitoring performance and (3) taking corrective actions. In addition, contingency plans should be included if there are uncertainties regarding the project execution. Contingency options that are based on assumptions and are usually kept separately from the detailed project plan (Willoughby, 1995).

5.4.1 Communication in Projects

Communication is an essential part of project performance and can make or break a project. Good communication is needed both between the operator and the service company, and within the service company's' integrated team.

The communication structure between the owner and the contractor is influenced by the contract type. A high degree of cooperation and collaboration is considered beneficial for the success of a project. However, this can be limited by the operators need to control the project (Müller & Turner, 2005). Discrete contracts require a higher degree of control by the operator compared to integrated contracts. Since the operator has the main responsibility for planning and coordinating the execution of the project. The operator is also responsible for a large degree of the project risks when using discrete contracts.

Collaboration is important for high performance in projects (Müller, 2003). Mullers study suggest the collaboration between owner and contractor is determined by the clearness of the project and the relational norms between the parties. Relational norms include flexibility (willingness to make adaptations), solidarity (avoidance of behavior detrimental to the relationship) and information exchange (proactive, frequent sharing of information). In

addition, the communication is also dependent on the organization structure and clearness of the methodology in the project. According to Mullers study, high collaboration and medium structure is optimal for high performance in projects (Müller, 2003).

In addition to the contract type there are other factors which can affect the communication in projects. E.g. failing projects can lead to higher frequency reporting, due to loss of trust in the contractor. Working remotely can lead to falling collaboration. This can happen if one party loses interest in communication or if the project is on a remote site. Informal reporting can lead to misaligned objectives, such as using infrequent oral reporting (Müller & Turner, 2005). Bi-weekly meetings and status reports are recommended as a part of the organizational structure (Müller, 2003).

Mullers study indicates the higher interest and involvement on the side of the owner, the more likely it is possible to achieve high project performance. Written reports were found to decrease communication effectiveness, and personal communication at regular intervals increased effectiveness. (Müller & Turner, 2005).

Many risks such as misalignment of objectives and potential shortcuts for the contractor to increase profit can also be mitigated though communication. A combination of informal and formal regular meetings and reports has shown to be beneficial to align both parties' objectives (Müller & Turner, 2005).

6 Method

Due to the confidential nature of the content in contracts, the chosen research method for this thesis was interviews. There are large variations between the content in different contracts and an analytic quantitative approach can also be a complex task. By conducting interviews, it was possible to collect more generalized qualitative information and experiences. A qualitative approach is also appropriate, as the research question in this thesis is open for discussion and interpretations.

Interviews were conducted with the manager of contracts and proposals in the service company, who has more than 24 years of experience with discrete and integrated contracts and incentive models. The main interview was conducted as a one-hour semi-structured qualitative interview through Skype. Follow up questions and clarifications were communicated through email and phone calls afterwards. The interview questions were based on the literature search conducted during the first couple of months of the spring semester. The initial questions were designed to be open-ended or cover a broad topic area, to get the conversation going and capture general experiences. The open-ended questions were also used to encourage the interviewee to share experiences and discuss topics which may not have been captured in the literature search. As the interview progressed, the questions became more detailed oriented to focus on specific topics to get a deeper understanding.

The rest of the input to this thesis has been gathered by the authors own experience as an engineer in at least four discrete and three integrated contracts. In these projects there has been conversations with contract representatives and project managers regarding how the contracts are structured and how to deliver services according to requirements and incentives.

The experience collected was used to evaluate if integrated projects can be considered as a driver for more successful projects for the service company, compared to discrete contracts. Further, the experience collected was compared to the findings in the literature to evaluate if there were differences.

7 Discussion

7.1 Research Method

Conducting a semi-structured interview with open-ended questions and then narrowing the focus area, was a great way of collecting experience with the different contract models. It let the interviewee provide knowledge and experience based on the questions asked, but also opened for providing more insight and opinions on topics which were not directly covered by the questions. As the interview progressed it became apparent that there are major differences between contracts, and not all of them were suitable to include in the discussion regarding general experience. There are variations in both scope of work and compensation format. Therefore, the experience collected in this thesis focuses on contracts that are considered to have a more common design. Due to the confidential nature of some of the material in the interview, not all the material can be presented in this thesis.

A challenge with conducting the interview, was to avoid leading questions affected by the authors opinions formed by the authors personal experience and findings in the literature search. Another challenge was the risk of the author misinterpreting the answers given in the interview. This was solved by letting the interviewee review and approve material collected during the interview.

Reliability and validity are important factors when conducting qualitative research. It requires the material presented is from trustworthy and credible sources. The literature presented in this thesis has been collected from various sources, such as scientific articles, books, online news articles and press releases from credible sources.

7.2 Common Contract Types in the Service Company

The most common contract types between an operator and the service company are time and material contracts with occasional elements from lump sum contracts. The operator usually compensates the service company based on actual offshore work, material and equipment usage and inhouse planning. The cost of support services is normally included in these rates (for example, logistics, administration costs etc.). These contracts are either part of a discrete contract or an integrated contract. Often, but not always, these contracts include some type of incentives, to encourage the service company to provide an optimal performance and align its objectives with the operator's objectives.

7.2.1 Discrete Contracts

Up until a few years ago, discrete contracts were the standard solution for operators. Currently, the number of discrete contracts is declining. As previously mentioned, the operator will issue a tender for each service needed to construct a well and then choose the service company best suited for the specific tasks. The selection of service companies is usually based on cost and quality and perceived ability to perform the scope most cost efficiently. The benefit with discrete contracts is that the operator has a wider range of service companies to select from. From large companies that can provide almost everything to smaller companies that can provide a specific specialized service. Some projects, such as work with older wells, may require specialized service providers which must be handpicked according to the project requirement.

The compensation format in discrete contracts is normally time and material, based on what is directly used during the drilling operation. For example, it includes personnel labor hours, materials consumed and equipment to be run and installed in the well. Day rates for special rental equipment and run charges for some types of equipment are also common. Section based lump sum for standard equipment is occasionally used. For example, if there are multiple wells in the project and similar equipment will be used on the same sections. Lump sum reduces the time spent on preparing invoices and collecting payment from the operator. Incentives are not common in discrete contracts, and if they are present, they usually result in relatively small bonus payments. In order to make a profit on these contracts, the service

company must include a profit in the contract prices. This can result in a higher project cost for the operator when using discrete contracts.

Discrete contracts generally generate a higher workload on the operator, compared to integrated contracts. The operator must administrate and coordinate multiple contracts and service companies and getting all the service deliveries aligned with the project plans. The operator is responsible for following up all aspects of the project. From planning and executing project plans to solving logistical challenges and unforeseen events. The service companies are only the involved in parts of the project where they have responsibilities and can provide input and solution suggestions, however it is the operator who makes the final decisions. The benefit with discrete contracts is that it has been the standard way of working for years, and both the operator and service companies are familiar with the system and work routines. This contract model involves less risk for the service company, but also potentially a lower profit compared to integrated contracts.

7.2.2 Integrated Contracts

In the last four to five years there has been a considerable increase in integrated contracts between operators and service companies. Pilot testing has been ongoing for the last twenty years and the results have been promising. With these contracts the operator has higher expectations towards the service company, where it is expected that the service company has high focus on the delivery and cooperation within its organization. Cooperation is an important factor in integrated projects and is rewarded when the delivery is successful. For the service companies the benefit of integrated contracts are also the potential to increase its market share and profit.

With integrated contracts the operator has awarded one service company with most of the work for constructing one or several wells. Multiple disciplines can be included in the contract, where the drilling, mud and cement disciplines are normally always a part of a fully integrated contract. When choosing a service company for integrated contracts the operator must carefully select the most suitable company for the project. The different service companies have their strength and weaknesses, and the operator may not get the best solution on all aspects of the integrated project. For example, one service company may be the industry leader when it comes to drilling solutions but have less optimal solutions when it

comes to mud solutions. The operator must then choose which factors are most important to them, and potentially compromise on other factors.

In Norway there are mainly three service companies who can deliver fully integrated projects (Halliburton, Baker Hughes and Schlumberger). Although it does not provide the operators with a lot of choices, these service companies are global and solid companies who generate a competitive market. Several other service companies exist, but they are not able to compete for contracts with a high degree of integration. In the long run one may risk that smaller service companies disappear from the market. The option for these smaller companies is to either offer their services to one of the three large service companies or directly to the operator. There are specific services that the operator may choose to keep outside the integrated contract, and thereby opens for smaller companies to participate in the project. The large service companies can also benefit from including equipment or services from other companies into their integrated deliveries. It may be worth the cost of buying third-party equipment or services if can help the service company to achieve the incentive bonus (assuming the bonus is large enough to cover the cost).

The scope of a typical integrated contract usually covers the delivery on an entire well. From spud to completion. Integrated contracts are mainly used on new development wells and exploration drilling. As previously mentioned, older wells which requires work-over or sidetracks are more suitable for a discrete contract solution.

The compensation format in integrated contracts is comparable the compensation format in discrete contracts. Mainly time and material, or time and material combined with lump sum. The main difference is that incentives are also normally included in integrated contracts. A higher degree of lump sum can also be used for some integrated projects. For example, if the scope of work covers only one well, a lot of planning has usually been done prior to signing the contract, and reasonable cost estimates have been made based on planned work and the risk for unforeseen events. If the project has been evaluated to be of low complexity or have a highly predictable final outcome, then a lump sum compensation format may be preferred. As it provides the operator with a predictable final project cost.

The incentives included in integrated contracts can result in bonus payments of large and considerable sizes for the service company. When the service company prepares its bid for a tender it must evaluate the probability of achieving these incentive bonuses and what risks are present in the project. Based on the analysis the service company can adjust its prices for the

bid in such a way that the estimated final yield for the project will be satisfactory. For example, if a project has high probability of achieving a large incentive bonus and the cost of the potential risks are manageable, the service company may offer lower prices to the operator. If it can be challenging to achieve the incentive bonus or the cost of potential risks are high, then the offered prices will be higher. Compared to discrete contracts, integrated contracts with attractive incentive bonuses can result in lower well construction costs for the operator and a higher delivery focus from the service company. The operator must only pay the bonus if the project delivery is according to the minimum requirements.

7.3 Comparison of Discrete and Integrated Contracts

7.3.1 Contract Administration

Discrete contracts generally generate more administrative work for the operator. While there is less work for the service company. The operator must administrate several contracts and follow up on the delivery and payment from each service. As each service company may be finished with their part at different times in the project, the operator may receive invoices consecutively throughout the project. If there are contractual disputes, these must be handled with the individual service company at the time when it occurs.

According to literature, integrated contracts should theoretically mean less administrative work for the operator as the contract is with only one service company. Currently, it seems there is a similar workload for the operator due to the complexity and high demands included in integrated contracts. For the service company, the administrative work has increased due to the complexity of the integrated contracts. Integrated contracts are still relatively new, and when starting on a new contract there are often details and challenges that must be solved. The scope of work seldom changes, but it may be necessary to re-evaluate planned methods and chose new solutions. Experience show that both the operator and the service company are normally able to agree on such adjustments, however it is important that the operator's expectations are clearly communicated throughout this process.

With integrated projects, invoicing is often postponed to the end of sections or completion of the well. Each discipline is still responsible for invoicing their own work but must wait until the section is completed to evaluate if the incentives have been achieved and adjust their invoices accordingly. Incentive bonuses are normally paid at the completion of the well. When the project is completed, the service company's project manager and contract representatives together with operator management evaluate the section performances and overall well performance. If incentives are met, the bonus is calculated based on a formula included in the contract. If some targets are not met, penalties may reduce the bonus value. The incentive bonus is normally paid as one sum to the service company, and the bonus is then split internally to the different disciplines. If there are disputes regarding deliveries and payments, this is usually handled by the service company's project manager, where he can negotiate a solution based on the total delivery. This reduces the administrative burden for the operator, as they will have less to follow up with each individual discipline.

As integrated projects should be less demanding for the operator to follow up during project execution, one should expect the operator to reduce the number of personnel participating in the project. Currently, it seems like there are no significant change. The operator still has an extensive workload during the planning phase, but presumably less work to follow up once the project starts. For the service company there has been some changes to adapt to integrated projects, especially regarding personnel. The most important change is the hire of project managers. The project manager makes sure the integrated team in the service company is aligned with the contractual requirements and efficiently works together across disciplines and with the operator. Another change is the requirement for more dedicated personnel per project. In discrete projects, service company engineers were often able to follow up on multiple projects as the workload was less demanding. Integrated projects generate a higher workload on the engineers. They are often required to sit inhouse at the operator's office, which makes it challenging to have more than one project. Either due to the conflict of having to sit inhouse at two different operators' offices, or due to the ethical challenges of working on one operators project while siting inhouse at a competing operators office. The increase in required personnel is an increased cost for the service company. However, having personnel dedicated to one project may reduce the risk of human failures as the personnel will be more focused on their project. The personnel will also have more time to evaluate solutions and optimize the project, which can aid the process of achieving the incentive targets.

7.3.2 Teamwork and Communication

In integrated projects the one team attitude is a governing factor. Efforts are made to make sure everyone feels included and can provide their inputs to solutions. Currently, almost all the service company's integrated teams are working fulltime in the operator's office. When working in the operator's office, it is easier to have continuous communication both through formal meetings and informal conversations by the coffee machine. Information and updates are quickly shared with the entire project team. With discrete projects, it is not common to work inhouse at the operator's office. Communication is done through formal meetings or phone calls and email. If there is new information, the operator must call in for meetings or directly contact each discipline participating in the project. This can be quite time consuming for the operator. The service company engineers must also spend time traveling back and forth between offices and may experience delays in receiving information.

All projects have operational challenges which must be dealt with and some compromises on solutions must be expected. In integrated projects with good cooperation, there are open and rewarding discussions regarding risks and challenges between all involved companies. The team agrees on the best solution based on the risk evaluation and discussions. If it turns out that the solution was not optimal, the team sticks together and has no blame culture. In teams with poor cooperation, there may be one party who has a higher need to control the operation and dictates the way forward on which solutions to use. If the solution fails, a blame culture could arise which is destructive and contradictive to the ambitions and purpose of an integrated contract model. If the teamwork is poor, either between the service company and the operator, or internally in the service company, there is a risk that optimal project performance can become more challenging and result in a negative outcome. Worst case, it can result in well objectives and incentive targets are not met. Experience shows that poor teamwork is mainly a result of the personalities included in the project. There are cases where poor collaboration has resulted in a less optimal project delivery, and even loss of incentive bonuses. Experience also indicates that in most integrated projects the cooperation between the involved companies is normally satisfactory. It is important that everyone has the same incentives and objectives. The cooperation in discrete projects is also normally satisfactory. The difference is that the operator has the main responsibility for aligning all the involved companies' objectives in the project and makes the final decisions. However, in discrete projects it can be more challenging to make sure all companies have the same objectives, which can affect the project performance. For example, one service company may have the objective to perform their service quickly since more jobs provides the company with a higher profit. While another service company gets compensated by day rates and thereby does not have objectives to complete the project quickly.

The integrated team from the service company is often involved earlier in the project planning process and can provide valuable simulations and solution proposals. The earlier the integrated team is involved in a project, the more likely the team will be able to provide solutions which are optimal for the project. The service company can have valuable knowledge of the drilling process and technology. In discrete projects, the service company gets involved in a later stage. At this stage, methods and solutions may already have been selected by the operator. The operator is usually open for discussing alternatives, but it can be a time-consuming process to change plans. For the operator, it can mean that the drilling engineer must revise the plans, send the updates to all the involved disciplines, wait for

feedback and updated simulations. Based on the feedback, more changes may be necessary and a new round of evaluating more changes may be required. For the service companies it means a slower process of receiving updated information and finalizing their own delivery plans. In integrated contracts the operators drilling engineer can handle a larger scope of work in a shorter amount of time. The drilling engineer typically determines the main targets for the well, and then sends the information package to the whole integrated team. This way, all the disciplines gets involved early and can quickly evaluate if there are any issues with the current targets. If issues are found, then these will be discussed with the operator and adjustments to the targets are made until all disciplines confirms that the current plan is achievable and meets the requirements. The turnaround time for adjustments are rather quick in integrated projects, due to the team sitting together in the operator's offices.

During project execution, in is natural that some disciplines can have excellent performance while others have challenges and perform below requirements. On integrated projects, it is a one team philosophy. Poor performance from one discipline can potentially spoil the entire incentive bonus for the project. This is a considerable risk for the service company. Therefore, the service company has a high focus on good collaboration across disciplines and quick problem solving when challenges arise during the integrated project execution. If the problems can be solved, or the incentive targets are met due to excellent performance from other disciplines, the profit is not lost as it would have been in a discrete project. In discrete contracts only the struggling discipline may lose their profit or bonus.

7.3.3 Well Deliverables

In discrete projects the operator dictates what equipment and solutions should be used in the project. The decisions are made based on previous experiences or recommendations from the service companies. In these contracts the service companies have higher incentives to sell in additional or more high technology equipment, as their main profit is based on time and material deliveries. Incentive bonuses are not common in discrete contracts.

Integrated projects may also benefit from upgrading the equipment. However, in these projects the main profit is often based on the incentive bonuses. The time and material prices or lump sum prices included in the contract often contains small profit margins in order to win the contract. Therefore, the achieving incentive targets have high focus during the project

execution. If there are equipment or solutions that can help reach these targets, they will be evaluated and included in the project if it is considered beneficial. It is not guaranteed that the service company gets extra compensation for the additional equipment, but if the incentive bonus is large enough it can be worth investing in additional or alternative technology on its own initiative. When equipment and solutions are evaluated internally in the service company, it is beneficial to have an unbiased project manager who can facilitate collaboration across the company's disciplines and find the optimal solution for the total project delivery.

Prior to determining if equipment or solutions should be changed, the project team must evaluate all aspects. A product which may be beneficial for one discipline, may not be as beneficial for another and can eventually affect the operators well construction objectives or the service company's incentive targets. For example, using a non-standard casing shoe allows the casing to be run quicker into the well with less risk for damaging the casing shoe. This reduces the rig time spent on the operation and an intact casing shoe is critical for the cement job which is pumped after the casing has been placed in the well. However, the same non-standard casing shoe is tougher to drill out with a standard drill bit. One may spend more time drilling out the shoe, and risk damaging the bit. If the bit gets damaged, then a time-consuming bit trip is required. The project must evaluate if they should use a standard shoe and slowly run the casing into the well or if they should use a non-standard shoe and run in into the well quicker with the potential risk for spending more time in total. This evaluation must be made in both discrete contracts and integrated contracts. In a discrete contract model this risk assessment and decision has to be led by the operator, while in an integrated contract the operator will expect that the service company, who is responsible for all disciplines, leads this risk assessment and make a recommendation based on their knowledge, experience and expertise.

7.4 Incentives and Risk in Contracts

Incentives and the ability to control operational risk are important factors when the service company determines the cost of their services prior to bidding on contracts. It also affects how the service company behaves during project execution. The main difference between discrete contracts and integrated contracts are that the risk and incentives are either handled by the individual discipline in discrete contracts or by the entire team of disciplines in integrated contracts. In discrete contracts the risks and incentives are smaller, and the individual discipline is only responsible for the part of the project which it can control. Integrated contracts come with greater operational risks but also greater incentive rewards if the project meet or exceed expectations.

7.4.1 Incentives

7.4.1.1 Discrete Contract Incentives

Direct incentives are not commonly used in discrete contracts. There can be several service companies and disciplines present on the rig, and it can be challenging to design incentives which all of them can relate to. One important factor is the controllability principle. With many companies present on the rig there are multiple decisions and aspects of the project that are outside the control of the individual disciplines. If the operator chose to include incentives in the contract, these are based on measurable sub-tasks or related to the technical performance of individual disciplines. Resulting in multiple incentives that can be time consuming and demanding for the operator to follow up. The incentive payments in discrete contracts are usually a lot lower compared to integrated contracts. A risk for the operator is that if incentives are included in the discrete contracts and the total project fails, the service companies may still have delivered according to the incentive targets. The operator must then pay incentive bonuses for a failed project. For example, if a production well does not produce according to the minimum requirements, the operator may not gain any value from the well. But the operator still must pay incentive bonuses according to contract requirements. Another example can be a section that has been challenging to drill, either due to the formation or equipment issues. The issues may have delayed the project by several days. When the section has been drilled to the planned target, a casing is run into the well and cement is placed on the outside of the casing. If the running of casing and cement job met the incentive requirements,

the operator must compensate the responsible service companies. Even though the final delivery of the section was delayed and resulted in additional costs for the operator due to rental days for the rig and equipment.

Since it is not common with incentive bonuses in discrete contracts, the service company must include a profit margin on the prices when bidding on a contract. This results in increased prices for the operator for well construction projects. However, it can provide the operator with some degree of cost predictability as there is no need for additional bonus payments. Given there are no unforeseen costly events or significant delays in the operation.

Indirect incentives are present in discrete contracts. Even though it does not result in a bonus payment, good performance is rewarded in an indirect way. By delivering the service in an efficient way, the project can be completed quicker. When a well is completed, the rig normally moves on to the next well construction project. The more wells that are drilled, the more work is available for the service companies and they can increase the profit by the number of wellbores completed. Additionally, good performance can also be rewarded by building a good reputation and customer relationship which can secure future work for the service company.

7.4.1.2 Integrated Contract Incentives

One of the factors that stand out with integrated contracts is the incentive design. If the incentive targets are met, then the service company can expect a bonus payment of considerable size.

The main incentive for integrated projects is the total delivery of the well. There are variations regarding how the incentive targets are defined, but the main element is related to either time or cost measurements. Deliveries which are ahead of the target time results in a bonus, while deliveries behind the target time results in no bonus or a reduced rate. When measuring cost, the bonus is achieved if the cost of the delivery is below the target. If the cost of the delivery is above the target, the exceeded cost can be considered as a loss to the service company. The targets are usually set for the total well delivery and per section. It is also worth noticing that the cost measurement is also strongly connected to the time measurement. If the delivery is ahead of the target time, this can be a considerable cost saving factor, due to fewer rental days for the rig and equipment and fewer labor hours.

The incentive payment can be adjusted based on how much the delivery is above or below the targets. Adjustments are based on an agreed upon formula included in the contract, with a maximum value for bonus and a minimum value for payment if targets are not met. The maximum incentive bonus is usually of a considerable size and provides a strong incentive for the service company to reach this target.

The incentive targets are divided into total well delivery and section deliveries. The targets are set by the operator based on experience on similar wells or sections. Well construction can be challenging, and it may not be possible to reach the incentive targets on all sections. With individual incentive targets for each section it encourages the service company to strive for excellent performance throughout the entire project. The section bonuses are of a decent size, but it is the total well delivery bonus that is the main target as it is of a considerable size. The targets which are set by the operator is based on a theoretical perfect well delivery. This means that when using experience from other wells, non-productive and inefficient time is removed from the target time. For example, waiting on weather, equipment issues and wellbore issues are removed from the calculation. Therefore, the service company must put a lot of effort into the project in order to achieve maximum bonus payment.

There are different ways for the service company to work towards a perfect well delivery. The key factor is detailed planning and using available experience to look at all aspects of the project. As previously discussed, the mud system or type of casing shoe can be evaluated to save time and reduce the risk for failure. Other aspects can be pushing the limits on the drilling BHA to drill sections quicker or reduce the number of planned bit trips. Time spent on wellbore circulation can also be evaluated. Together with the operator, the service company determines what measures are needed in order to balance risks and upsides to maximize the chance of delivering the project ahead of time and according to requirements. Some risks may be worth taking, while others may have serious consequences and should be avoided.

Other options to work towards a perfect well is introducing new technology. New technology is either included as part of the package when the contract is signed or introduced later. If introduced later, the service company must make a solid case in order to get it included in the contract as it can result in additional cost for the operator. Occasionally, the operator will not agree to change the contract, but it may still allow the service company to use the new technology. The service company must then evaluate if providing the new technology without additional compensation is worth it in order to achieve the incentive targets.

There are some considerations to quick deliveries of wells and sections. Quick drilling speed are not always optimal. On some sections, such as the in reservoir, it is more important to drill correct, rather than quick, as the drilling speed can reduce the quality of the reservoir in both short and long term. Contracts usually deals with this challenge by adjusting the incentive targets according to the required drilling speed in the reservoir. If slower speed is required, then the target time will be increased. Fast operations may also increase the risk for personnel shortage due to running out of time (maximum overtime), exhausted personnel, and potential HSE incidents. It can also increase the risk of poor communication, resulting in incidents and non-productive time. Equipment failure is also a risk if focus is too narrowed on progress and not on the long-term impact of pushing or exceeding equipment specifications. For example, if the limits for the drilling BHA is pushed, it can result in BHA failure and the need for a time-consuming bit trip.

HSE incentives are normally included in integrated contracts in order to avoid HSE incidents. Depending on the severity, HSE incidents are penalized by either a solid reduction in the incentive bonus or no bonus at all. This provides strong incentive for avoiding HSE incidents and executing the project in a safe manner, even if it means slowing down and potentially not meeting the target for maximum bonus.

Literature indicates that it is common to renegotiate incentives in long term agreements and future contracts if the operator wants to tighten too generous incentive payments. Experience indicates that renegotiation of ongoing contracts is not common, while new contracts may have some adjustments based on previous experience. The process of adjusting the content of a contract after it is signed is time consuming for both the operator and service company and is not initiated without solid reasons. Contracts often contains a statement that the operator can adjust the incentives and pay level at its own request. It may seem tempting for the operator to keep the incentive bonuses small, but this violates the foundation of the incentive contracts. The purpose of these contracts is to reward good performance and deliveries. Large bonuses also provide the service company incentives to offer services at lower costs. What may seem like a large bonus for the service company, may not be as large as the value created for the operator. A successful well delivered quickly and safely, may save the operator costs during the project and can create added value in the long run.

7.4.2 Risk

All offshore projects are exposed to the risk of unforeseen events. Some risks are identified in the planning phase, while others are unknown. For the service company it can be split into three categories, events caused by the service company, events that are to some extent controllable by the service company and events outside the service company's control. Events that are caused by the service company, can be considered as a direct loss for the service company. Such as equipment delay or failure and personnel issues or shortages. The service company often has the main responsibility for risks that are fully or to some degree within their control. Especially in integrated contracts, where the service company has more impact on the choice operational solutions. Events that are outside the control of the service company are dealt with in different manners depending on the contract model. Uncontrollable risks can be non-optimal findings in the reservoir, challenging weather or failure of rig operated equipment. The sharing of risk in discrete and integrated contracts will be discussed separately in the next sections.

7.4.2.1 Discrete Contract Risk

In discrete contracts the operator has the main risk responsibility, especially when it comes to unforeseen events in well construction. Each service company is responsible for what is within their control, such as logistics, equipment functionality and personnel. The operator covers the cost related to unforeseen events, such as curing losses during drilling. If there are incidents caused by one service company, which affects the other service companies the operator usually pays the affected party full rate, while the other who was responsible gets a reduced rate or zero rate depending on the incident.

The downside of discrete contracts is that each discipline in the project is more vulnerable when it comes to controlling risks. Each discipline is responsible for its own equipment and personnel and delivering services according to contractual agreements. Beyond that the disciplines generally do not have much impact when it comes to operational decisions. They are at the mercy of the operator's decisions and the other disciplines operational progress (both success and failures). The service companies are often included in operational discussions and can recommend solutions, but the operator makes the final decision. Depending on the decision the discipline may not deliver what they consider to be the optimal

solution for the project, and risk facing a negative outcome when it comes to their performance and final payment. The controllability principle is an important factor that can affect the disciplines compensation level. If it is outside the disciplines control, it is more likely that the operator will carry the cost regardless of reason.

7.4.2.2 Integrated Contract Risk

Comparing the risk burden in discrete contracts versus integrated contracts, the overall risk for the service company is higher in integrated contracts. Instead of having the risks spread out on multiple service companies and the operator, the risks are now mainly on the service company providing the integrated service. The controllability principle is still an important factor when it comes to sharing risks between the operator and service company. The service company should only carry risks which are within their control. However, experience indicates that the service company must also often accept risks which are only partially controllable in integrated contracts. In integrated contracts there are risks which would be considered uncontrollable in discrete contracts, that are now partially or fully controllable by the service company. The service company gets involved at an earlier stage in the planning phase and has more impact on the selection of solutions and methods. Risks which are known prior to signing the contract are usually handled by the service company. Unknown risks are shared with the operator based on who is more capable of handling it.

One of the main risks of well construction and drilling is the geology. The geology can provide many challenges and the main risk responsibility usually lies with the operator. For example, if there are high risks of losses when drilling a well, the contractual agreement can be that the service company is responsible for the cost of trying to cure the first 100 m^3 of losses, if losses are beyond 100 m^3 the operator takes over the cost. This way the service company has incentives to avoid loss situations, but do not carry the entire risk if there are severe losses. Another example is if a sidestep is required. If it is a technical sidestep due to events caused by the service company, then the service company must cover the cost. If it is caused by something outside the service company's control, such as a technical sidestep caused by the rig or a geological sidestep, the service company will be partly or fully compensated depending on the case.

When taking on an integrated contract it is important that the service company does not take on more risks than it is capable of handling. The service company where this thesis is written, is an international service company with a solid foundation in Norway. It can spread its risks through multiple contracts and diversified work for several customers. With integrated projects the risks are more collected, and the cost of a failed project can have a significant impact on the company's financial results. However, the carrot for taking on such risks is the potential for substantial incentive bonus payments. An additional benefit with integrated projects is the one team philosophy, which means that the service company will have a greater impact on operational decisions and have more impact to control operational risks.

With integrated contracts, each discipline must still handle their individual and specific risks. But the final evaluation of performance and incentive payments are dependent on the total performance of the service company. With an integrated contract the service company is exposed to all the well risks combined and there is a greater risk of not achieving the incentives and bonus payments. An important success factor in integrated projects it that all companies who are involved in the project (the operator, the rig company and the service company) should have the same objectives and incentive targets. If the companies have misaligned objectives or different incentive targets, it can be a challenge for all parties to meet their objectives. For example, if the service company is rewarded for quick deliveries and the rig company is compensated based on day rates, it generates a conflict in work methods.

7.5 Successful Projects

A successful project to the service company is essentially a project that meets or exceeds the operator's expectations and objectives and results in a minimum amount of incentive payments providing the expected profit. Delivering successful projects brings the service company good financial results as well as reputation and references to secure future work and new opportunities.

Often it is the total delivery from the service company (or from a discipline if discrete contract) that dictates if the final project delivery can be considered successful for the service company. Projects normally comes with various challenges and a perfect delivery is not always achievable. The measurement of success if often evaluated based on different aspects, preferably it should be factors or targets which are measurable by both the service company and the operator. Examples of success factors can be reaching target times, no HSE incidents, no operational downtime, good cooperation etc. Cooperation is difficult to measure, but it plays an important role in the evaluation of success. The sum of these factors will normally indicate if the project delivery has been a success. Taking learnings from these factors are also important for the success of future projects. Note that what is considered successful for the service company may not always be considered successful for the operator, and vice versa. It all depends on what point of view the project delivery is looked at. For example, the service company may have an overall good performance, but the rig operator may have had significant issues which have affected the total delivery of the operator's project.

One important factor for success is good collaboration between the operator and the service company. This can include clear expectations for the project delivery and good communication between the different companies. Adaptive and flexible attitude if changes are needed, related to both the direct project execution and administrative contractual requirements. If the service company gets involved early in the planning phase it can provide its experience and recommendations for the method selection of the project. The service company can also present new and innovative solutions that can improve the efficiency of the project. Ideally these factors should aid the process of achieving a successful project. If the total project is not considered a success, for example if the reservoir does not produce as expected or there are sections which have been challenging, it can still be a success for the service company where its solutions have successfully been used.

7.5.1 Discrete Contract Success Evaluation

Discrete contracts have been the standard solution for years, and it provides a steady income for the service company. As the operators choosing this model usually requires the best of the best, it is a good way for individual disciplines to shine and deliver their best products and performance. However, the petroleum industry is now moving towards standardization of products and services in order to reduce costs. Resulting in fewer options to provide specialized services and thereby resulting in reduced profit.

A part of the success of discrete projects is relying on good cooperation between the participating companies. However, each company or discipline can have a higher self-focus on these projects. Since profit is often gained through number of jobs and opportunities to sell in additional equipment and services.

In discrete contracts it is the operator who is responsible for all the main decisions regarding the project. The service companies normally must comply with the operator's decisions and have less impact on the total project performance, and thereby less ability to control the outcome of the project. Discrete contracts have a contractual format that is familiar to the industry, and the involved parties normally work together to achieve successful projects. Compared to an integrated contract the service company may not collect as much prestige for the successfulness of a project, as they normally play a smaller part in the total delivery of the project. However, good performance by the service company is rewarded by securing income and potential for future work.

7.5.2 Integrated Contract Success Evaluation

Integrated contracts are still relatively new to the service companies and the operators. It provides a different work process where the service company gets involved at an earlier stage in the planning process. The integrated contract model has a higher focus on aligning the objectives of the operator and the service company compared to discrete contract models. With integrated contracts the operator has higher expectations to the service company. The operator expects the service company to participate in the method selection and provide thorough recommendations based on what is optimal for the well construction project. Since the service company has more impact on the operational decisions, it is also expected that the

service company accepts a higher responsibility for operational risks. Both controllable risks and risks that are partially or non-controllable by the service company. The non-controllable risks normally have a limit on how much of the cost the service company should carry before the operator takes over. The upside with the increased risk responsibility, is the size of the incentive bonuses. If the incentive targets are met, the service company can expect a substantial reward.

Experience indicates that the transition from discrete to integrated contracts has been a successful experience for the service company. The company has worked on the NCS for decades and has gained a wide range of experiences through the work of the different disciplines. With some adjustments in the work processes, such as higher focus on teamwork, collaboration across disciplines and hiring project managers, the performance of integrated projects has overall been a success. The integrated team has been able to meet the operator's objectives and provided solutions which have improved project deliveries. Resulting in several projects being completed ahead of the target time. However, not all integrated projects have been purely successful. Some projects have met the project objectives, but the process of getting there may have been a struggle. Either due to disagreements with the operator or due to equipment or personnel challenges. On the other hand, some projects may not have met the objectives due to challenging geology but can still be considered successful to the service company due to excellent performance. Not all projects result in the expected profit or minimum profit. However, the service company has a wide portfolio, where some projects are highly successful, and others are not. The important factor is that the total financial results for the service company are on the positive side, preferably with possibilities for further investments and growth for the company.

Experience also indicates that the collaboration between the service company and the operator has improved in integrated projects, compared to discrete projects. Integrated contracts are designed to motivate the involved parties to work towards the same objectives. Both the operator and the service company benefit from a successful project. It is therefore in both companies' interest to have an open dialogue and share the upsides and downsides. Collaboration across disciplines and with the operator has also improved after the integrated team started working inhouse at the operator's offices. Information and experiences are more easily and quickly shared when everyone is present in the same location.

A key aspect of evaluating the success of an integrated project is to define measurable targets prior to starting the project. Examples of targets can be the delivery time of a section or total well, zero non-productive time or zero HSE incidents. As previously mentioned, the operator normally sets targets based on historical data. It is important that these targets are not too easy or too difficult to achieve, in order to get a realistic evaluation of the project delivery. If the targets are too difficult to achieve; the service company may have a perfect delivery, but the project may still be considered a failure based on those specific targets. In some cases, the targets may be adjusted after the project has started in order to get a fair evaluation of the project. For example, the target time for drilling one well is 30 days. During drilling it becomes apparent that there are unforeseen geological challenges, which requires a different and more time-consuming drilling approach. Other equipment may also be needed, and it becomes impossible to reach the target time. The operator can then evaluate to extend the target time based on the experience on the current well. General experience indicates that project targets set by the operator are normally reasonable and are seldom adjusted during the project execution. The service company may not always be able to achieve the targets for various reasons. It is therefore important for the service company to have a wide portfolio of projects where some are successful and profitable, while others involve taking risks and only receive minimum compensation.

7.6 Findings Related to Literature

The experiences collected in this thesis are highly relatable to the literature presented in the theory section. The contracts in the service company are comparable to what is found in general contract theory regarding how they are structured, related to both benefits and challenges. Normally the service company's contracts are a mixture of lump sum, time and material and incentive contracts. This is the case for both discrete projects and integrated projects. Time and material contracts are most common with and without elements from lump sum contracts. Incentive models are more common in integrated projects.

One experience that did not relate to the literature is the reduced contractual and administrative work related to integrated contracts. The literature indicated that it should be less work and easier to follow up on these projects, especially for the operator. The experience indicates that due to the complexity of integrated contracts and since this contract model is still relatively new to the industry, it can be more demanding to follow up integrated contracts compared to discrete contracts for both companies.

The evaluation of the successfulness of integrated projects versus discrete projects all depends on one's point of view. The prerequisites described by Willoughby (Willoughby, 1995) is highly relevant for the service company's total project delivery. Controlling the technical and logistical part of an integrated project is important, but the key factor to a successful project is the collaboration across disciplines and companies. The project manager plays an important role in making sure that the disciplines are kept accountable for their deliveries and that the project is executed according to requirements.

The literature indicates that good collaboration and communication is important for high performance in projects. Higher interest and involvement from the operator side is also beneficial for the performance. Experience indicates that with integrated projects, the collaboration with the operator has improved. It is not always problem free, but there is more room for discussing options and solutions. A higher degree of collaboration across disciplines within the service company, allows information and experience exchange to flow more quickly and easily. The improved communication across disciplines makes the personnel more aware of challenges in the total project delivery and can encourage everyone to participate in the solution evaluation process. Experience has shown that when the personnel has a wider perspective on the project delivery, it is more likely that they will generate new ideas on how to improve the project delivery.

8 Conclusion

The objective of this thesis was to evaluate if integrated contracts are a driver for more successful projects compared to traditional discrete contracts from a service company's point of view. Based on the experience collected in one service company it is obvious that both contract models have their positive and negative aspects. Discrete contracts involve fewer risks but can also provide less profit compared to integrated contracts. The service company has less impact on the total delivery of the project. Integrated contracts have higher risks but also the potential to gain a significant profit based on the incentive model included in the contract. The operator has high expectations for the service company to be heavily involved in the planning and execution of the project and deliver services which meet or exceed the operator's objectives and expectations.

The integrated contracts have benefitted the service company towards becoming a more uniform company with improved collaborations across its disciplines and with the operator. The company can deliver a wide range of services for well construction projects and has successfully used its expertise and experience on multiple integrated projects to achieve the operator's objectives. Projects which have been challenging or less successful are mainly related to less optimal collaboration between the three main companies involved in the project (operator, rig company and service company) or due to the occurrence of severe events which had not been foreseen during the planning phase. The overall experience is that the integrated contracts are generally considered successful and the service company will continue to focus on winning these contracts.

9 Future Prospects

This thesis covers a topic that has multiple factors which can be investigated further to evaluate the successfulness of integrated projects. Some factors which can be evaluated is including more experience from the operator's point of view, or to directly evaluate the financial results of discrete versus integrated projects.

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11 Appendix

11.1 Interview Questions

The following questions were used as a basis for the interview. Additional follow-up questions were asked in order to elaborate on details and experiences.

1. When and why did the industry change to integrated contracts?
2. We still have discrete contracts today, is there a special reason why?
3. What is the typical scope of work for integrated and discrete contracts?
4. What is the typical compensation format of integrated and discrete contracts?
5. Has the service company needed to change in order to adapt to integrated contracts?
6. What are the up and down sides with integrated and discrete contracts?
7. What is considered as a successful project for the service company?
8. What is the most common incentive model and has it changed when transferring from discrete to integrated contracts?
9. How are risks and unpredictable events handled in contracts?