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RAPPORT
REPORT

After-Sales Services of Offshore Crane Technology

A case study of TTS' Business Model and their After-Sales Services

Ingrid Elisabeth Sørensen

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by

Ingrid Elisabeth Sørensen

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Ingrid Elisabeth Sørensen

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1 Introduction

1.1 Purpose

The purpose of this thesis is to explore the characteristics of TTS' business model, and how after-sales services provide value creation for their customers, and value capture for TTS. The study will explore how the new service model is better equipped at providing value-adding services for their customers.

TTS operates in the marine and offshore industry, and is divided into three divisions: Marine, Offshore & Heavy Lift, and Services. The Offshore and Heavy Lift division is especially focused on delivering heavy lift and offshore cranes, including active heave-compensated cranes, to their customers (TTS, 2014m). These are business critical equipment for shipowners operating at sea. This equipment has become more complex and more technology-based as the years have passed, leading shipowners to request more service from their suppliers.

TTS has traditionally been a supplier company, but over the years, they have increased their focus on service. The goal of the Services division is to provide worldwide service and after-sales support for the other two divisions (TTS, 2013a). Today, TTS has two service models to offer their customers. In addition, they recently initiated a pilot project for a third service model that is significantly different from the two others. TTS believes this service model will be value-adding not just for them, but for their customers as well.

This study aims to analyze TTS' business model, with focus on service and after-sales support for offshore cranes, in order to discover to what degree the different service models are equipped at satisfying customer needs.

1.1.1 The Offshore Crane Industry

This study will focus on the supplier and customer relationship within the offshore industry, more specifically within subsea operations. The subsea market is becoming an increasingly important market, and the subsea activity continues to grow. The increasing activity

continues to push technology forward and production of equipment keeps evolving, and becoming more advanced and more complex (Mazerov, 2014). Oil and gas companies are moving into deeper waters, and in order for suppliers to follow, they need to keep developing equipment that suits the customers' needs. The industry, in other words, have many requirements, and in order to fulfill these, the suppliers need to continue developing equipment that is advanced enough to meet these.

In this study, the effects that advanced equipment in the offshore industry has on service models will be analyzed by looking at the subsea market. Companies operating at sea lease offshore vessels from shipowners. These companies are typically oil and gas companies and subsea contractors who lease specialized vessels from shipowners. These vessels provide the necessary equipment for their customers to be able to perform their operations. This equipment is purchased from suppliers like TTS. The shipowners can be seen as providing a platform for their customers to operate on, and are in charge of the maintenance of the vessel (Rieber, 2014). Subsea contractors have a certain time period to finish their operations. This means that it is extremely important for them that everything is working properly, in order to avoid delays. Any kind of failure or incident that leads to off-hire will stop them from performing their job on time. Off-hire means that the vessel goes out of operation, and is unable to perform its tasks. This will lead to severe financial losses for the customer that has leased the vessel. Contractors are therefore extremely interested in the performance of the equipment, and in leasing a vessel with reliable equipment, in order to avoid any off-hire. This has therefore become an important focus for shipowners (TTS, 2014e). It has also led them to request more service from their suppliers, as the offshore technology has become more complex. This study will therefore focus on the equipment on board the vessel, more specifically the offshore subsea crane provided by the supplier, and look at how the supplier can help provide a reliable crane that performs at optimum level.

The offshore industry is a continuously growing market, with a large customer base all over the world. Important areas include the North Sea, Gulf of Mexico, and Brazil (TTS, 2014k). Because operations are being performed in vastly different parts of the world, the equipment on board needs to be able to handle the different environments, such as harsh weather (TTS, 2014l). Especially the lifting equipment, such as the offshore and heavy lift cranes need to be able to operate in any environment. The equipment needs to be sturdy and able to provide

precise operations. Over the years, the cranes on board the vessels have become increasingly more vital to the operations at sea. This has led to a greater focus on providing cranes that operate smoothly (TTS, 2014e).

Offshore cranes can be applied in many different operations. Subsea cranes and subsea vessels are used for operations on the seabed. This can include operations such as subsea load handling, pipe handling, and operation in harsh environments (TTS, 2014i). Subsea installations require precise load handling and control, especially in difficult weather. There are numerous problems that one can encounter during such installations. These typically include "uncontrollability of the load at the surface, excessive dynamic amplification of the load during lowering, instability when a vulnerable load approaches the seabed" (TTS, 2014c). Thus, the customers in the subsea market demand high precision when dealing with deep-water installations, and the crane is therefore a business critical part of the equipment on board the vessel. The quality and performance of these cranes are vital in order to reduce downtime (TTS, 2014e).

1.1.2 The case of TTS

TTS Group ASA (hereafter TTS) was established in 1966, and listed on the Oslo Stock Exchange in 1995. After several acquisitions, divestments and new companies, TTS has since then expanded and become one of the largest suppliers of equipment in their specialized market segments. The company is focused on designing, developing and supplying equipment within the marine and offshore industries (TTS, 2014a). This includes, among many other products, RoRo/cargo vessels, Pure Car and Truck Carriers, heavy lift and offshore cranes.

Offshore and subsea operations are a vital part of TTS' business. TTS Offshore Handling Equipment AS provides a wide range of lifting equipment for offshore vessels, including advanced active heave compensated (AHC) solutions. They also provide several types of offshore equipment, including knuckle boom cranes, straight boom cranes, AHC winches and A-frames. TTS' cranes can be fitted with many different types of winches, ranging from small winches to large AHC winches. In addition, the AHC winch can be mounted below deck to improve stability or accessibility for maintenance (TTS, 2014i). TTS Offshore

Handling Equipment in Bergen delivers the AHC subsea cranes. All of TTS' cranes are custom-made to meet their customers' specifications, and due to their standardized building blocks, they can be configured in many different ways (TTS, 2013a).

TTS has developed an AHC system that has become one of the most advanced systems in the market. The system's design is based on high precision, stability, efficiency and safety (TTS, 2013a). The AHC system is especially designed for underwater operations. It has a motion reference unit that provides data they can use to compensate for the vessel's movements. In other words, the system makes precise load handling possible in situations where it is necessary – such as when mating subsea units or suction anchors on the seabed, and especially in difficult weather. The system "is operated from a tailor-made control system installed on the bridge" (TTS, 2010). AHC cranes is one of TTS' hallmark solutions (TTS Group ASA, 2012).

Increased use of advanced technology, such as the AHC system has not only improved load handling, it has also made the operations more complex, which is part of the reason TTS is now looking to improve their service models.

Figure 1: One of the subsea cranes that TTS offers – a knuckle boom crane (TTS, 2014d)

1.1.2.1 Typical service operations

The increased complexity and importance of the subsea cranes have led to an increased focus on service from suppliers. TTS' customers – the shipowners – call them for several types of missions, including modification of their equipment, strictly service missions, and maintenance missions. The last few years, several customers have also requested conversions of existing cranes, in order to increase the opportunities for their cranes. Their customers might have received an assignment that necessitates an increase in wire length, the size of the cranes and dimensions. This process can last for up to a year. While this is costly for their customers, they benefit from it, because it allows them to move into a new market segment (TTS, 2014k).

The seabed operations are also experiencing change; customers are going from shallow operations at 1 500–1 600 meters to 3 000 meters, when lowering load down to the seabed. This requires either a renewal of the equipment, or a conversion, in order to manage the new depths. The conversion also requires changes to the winch and the pump. The process takes approximately twelve months - steel is to be made and several hundred hours of engineering is required. Conversion of a crane costs around two thirds of the price of a new crane, and takes shorter time to finish. A new crane will take eighteen months to build, while a conversion takes twelve (TTS, 2014k).

1.2 Research question

Offshore heavy lift cranes are business critical equipment for shipowners, and servicing the crane in order to ensure the vessel stays on hire becomes a necessity. For suppliers, this means increased focus on providing service for the shipowners. How the supplier plans to satisfy customer needs poses an interesting case to study. TTS has two different service models currently available for their customers, and has recently initiated a pilot project in collaboration with shipowner GC Rieber. This project shows a typical supplier company making a more proactive transition in to the service market. It involves a service model that is new to the marine and offshore industry, and can thus be regarded as a business model innovation. This new service model is an interesting case to study, as it changes the dynamics between the supplier and the customer. The purpose of this study is to gain a better understanding of TTS' business model, and the service provided in the after-sales support.

This thesis will explore how the different service models are equipped at meeting customer needs.

The technology used within the marine and offshore industry is continuously increasing and becoming more advanced. This in turn means that business critical equipment needs to receive more attention. I will therefore focus on service concerning business critical equipment, and see how TTS plans to consider this increased complexity in their service models. Thus, the research question is:

'What characterizes the business model TTS has employed to create and capture value from the subsea crane technology, and how will the new service model affect this business model?'

1.3 Literature Review

The main literature used in this study is the business model literatures, as proposed by David Teece (2009) in 'Business Models, Business Strategy and Innovation'. This article states how a company's business model needs to focus on value creation, value delivery and value capture.

In dealing with these three concepts, I have mainly used theoretical reasoning developed by Porter (1985) and Magretta (2011). Value creation, as explained by Magretta (2011) in 'Understanding Porter', consists of a value proposition that focuses on customers, their needs and the relative price of the service.

In value delivery, I have used Porter's generic value chain, as laid out in Michael Porter's (1985) 'Competitive Advantage'. This value chain needs to be tailored to the company's value proposition, in order to properly deliver value. The main focus of the value chain in this study, concerns the 'Service' and 'Marketing and Sales' activities.

Value capture focuses on the appropriability regime and the bargaining power of the companies. It uses theory from both Teece's (1986) article 'Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy', as well as the vertical axis of Porter's Five Forces, relating to supplier and buyer power. The bargaining power is presented in the book 'Economics of Strategy' by Besanko et al. (2010).

Transaction Cost Economics is used to analyze the shift in dynamics that the new service model will cause between TTS and its customers. The theory is posed by Oliver E. Williamson (1981) in 'The Economics of Organization: The Transaction Cost Approach'. This approach discusses how contractual governance affects transaction costs dependent on relationship specific assets.

Business model innovation is a relatively new term that especially grew during the information technology boom during the late 1990's. Santos, Spector and Vand Der Heyden (2009) have posted a working paper gathering the information surrounding business models and business model innovation, and have come up with a definition that incorporates the different information available. Amit & Zott (2012) also talk about business model innovation in their article 'Creating Value Through Business Model Innovation'. This article focuses on the different ways a business model innovation can occur, by reconfiguring the activities in the company and their linkages.

1.4 Structure

Below, each section of the paper is presented along with a short description of its content.

Section 1 introduced and stated the purpose of this paper. It explains why this is an interesting case to study, provides background information about the industry and TTS, and presented the research question. Lastly, it gives an overview of the literature used and the structure of the paper.

Section 2 explains and presents the theoretical background of the study. The notions used were meant as a way of identifying concepts to consider further in the study. The theory in this section relates to business models, and can be divided into three main sections – value creation, value delivery and value capture. Transaction Cost Economics provides insight than can help design better business models, especially in terms of which governance structure to use.

Section 3 elaborates on the choice of methodology. It presents the research approach, research design, data collection and data analysis, as well as provide an explanation for the choices made. It also presents important factors to consider when evaluating the research.

Section 4 presents the empirical data collected through interviews and written documentation. This section is also divided into value creation, value delivery and value capture, and presents information and events related to the research question.

Section 5 analyzes the case and the empirical data collected and presented in section 4, in order to discover the strength and weaknesses of the different service models. The purpose of this section is to answer the research question.

Section 6 sums up the main findings from the analysis, and answers the research question. Recommendations for the new service model is also provided.

2 Theory

2.1 Business models

In 2009, David Teece wrote an article called "Business Models, Business Strategy and Innovation". In the article, he states that "a business model defines how the enterprise creates and delivers value to customers, and then converts payments received to profits". In other words, a business model looks at value creation, value delivery and value capture. It sketches how the business plans to make a profit, after discovering that a profit is possible, and then how it plans to proceed establishing itself in a market (Teece, 2009).

In the article, Teece states that the concept of business models is non-existing in economics or business studies. Mainly, this has to do with standard economic theory assuming away the challenges one might face in a market; a new innovation or product is assumed to create value by simply being, patents are assumed to hold, and markets for the new innovation or product is assumed to exist, thus value capture is achieved by merely selling output. In the real world, these assumptions cannot be made. That is what Teece's article is all about – how one can design a company's business model in order to meet all the necessary requirements to succeed.

According to Teece, the business model is concerned with customers and their changing needs, the revenue and cost structures, supplier behavior and competitor responses. In other words, it focuses on both internal and external factors. The business model concept appears to be especially concerned with their customers and what they want, which according to Teece, is "solutions to their perceived needs". This means that companies have to find solutions that create value for their customers (Teece, 2009).

2.1.1 Business Model Innovation

Product and process innovations are often expensive and time-consuming. They require heavy investment upfront, and future returns are always uncertain. Many companies have therefore turned to business model innovation as an alternative. Business model innovations might be more difficult for competitors to imitate, as they would have to replicate an entire new activity system, and not just a single product. This means that it might lead to a sustainable performance advantage. Amit and Zott (2012) view the business model as an activity system of interconnected and interdependent activities that affect how a company does business and focus on how the activities are linked to each other. The activities are conducted in order to "satisfy the perceived needs of the market" (Amit & Zott, 2012).

According to Amit and Zott (2012), business model innovations often represent an "underutilized source of future value". Business model innovation can be defined as "a reconfiguration of activities in the existing business model of a firm that is new to the product/service market in which the firm competes" (Santos, Spector, & Heyden, 2009, p. 14). This definition emphasizes that the innovation is new to the product/service market that the firm competes in. Many business model innovations have come from importing a business model from another industry. For example, Southwest Airlines borrowed their business model from interstate bus transportation, and McDonald's imported their business from the traditional assembly line and applied it in the fast food business (Santos, Spector, & Heyden, 2009). The definition also implies that it is not only a new innovation or a new product that can generate profit. A business model innovation can in itself create competitive advantage. In some cases, the creation of a new business model can lead to the creation of new industries (Teece, Business Models, Business Strategy and Innovation, 2009), and in

other cases it can lead to a company creating and exploiting new opportunities in existing markets (Amit & Zott, 2012).

A business model innovation usually occurs when novel activities are added, when activities are linked in a new way, or when the parties that perform the activities change. These three design elements are sometimes referred to as content, structure and governance. They characterize a company's business model, and by changing one or more of them, you also change the business model. An interesting example of a content change is when IBM decided to change focus – The company had been a supplier for several decades, but after a financial crisis in the 1990's, they became a service provider. This shift in focus was possible due to the know-how they had acquired over the years. They were able to introduce new activities within services, such as consulting and IT maintenance (Amit & Zott, 2012). This can be compared to what TTS did when they started increasing their focus on service. Because of the experience as a marine and offshore supplier, the company had extensive knowledge about their equipment, and was therefore capable of providing service for their customers. Now that the customers are requesting even more service, TTS is looking at new ways that they might be able to provide this.

2.2 Value Creation

According to Magretta (2002), a good business model focuses on the customers; who are they, and what do they value? Value creation refers to what kind of value the company will offer its customers. This is the core of competing to be unique. Competitive advantage is essential is in this case, and can be defined as "a difference in relative price or relative costs that arises because of differences in the activities being performed" (Magretta, 2011, p. 95). This essentially means that either a company is performing better by satisfying different needs as competitors in the same market, or by satisfying the same needs at a lower cost than its competitors are. In order to achieve a competitive advantage, it is essential that the company's value chain is tailored to its value proposition.

2.2.1 Value proposition

The value proposition is a reflection of choices a company makes in regards to what type of value they will offer. The proposition can be configured in several different ways in the same

industry. According to Porter, there are three questions that need to be answered in order to discover the value proposition of a company: "which customers are you going to serve? Which needs are you going to meet? What relative price will provide acceptable value for customers and acceptable profitability for the company?" (Magretta, 2011, p. 96).

These questions can be summed up in a triangle:

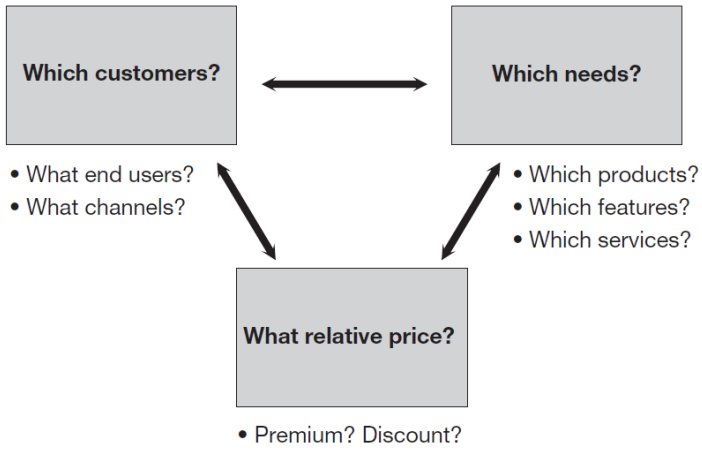

Figure 2: The value proposition (Magretta, 2011, p. 96)

2.2.1.1 Customers

Choosing which customers to serve is an important part of any good business model. Customer segmentation helps the company position itself in the market, and discover which factors are important to focus on for that particular customer group. The essential aspect is to find a distinctive way to make the customer segment you choose profitable (Magretta, 2011).

In the offshore and subsea industry, important customers are shipowners operating in deep waters. The shipowners have vessels that operate in different environments and perform different operations. Because each vessel performs differently, they will be in need of lifting equipment that is tailored to their vessel (TTS, 2014e). TTS has therefore focused on providing specialized solutions for shipowners.

2.2.1.2 Needs

Choosing which needs to serve is often the most important part of the value triangle. It focuses on which products, features and services the company should provide. The ability to provide a specific need often arises from these elements (Magretta, 2011).

In the offshore industry, the crane is one of the most important assets on board the vessel. Quality offshore cranes that reduce the probability of off-hire is extremely important. Oil and gas companies that lease vessels from shipowners operate at a relatively high level of risk, because they have a job to finish by a certain date. Any kind of failure that leads to off-hire will stop them from performing their job on time. Oil and gas companies are therefore especially concerned with keeping off-hire and downtime to a minimum, and this has therefore become an important element for shipowners as well. Downtime can result in profound profit loss for the entire period the vessel is off-hire. Becoming operational as quickly as possible therefore becomes a crucial aspect for the shipowners as well. Hence, the main concern for shipowners is preventing downtime for their vessels to the greatest extent possible, as well as reducing the response time when downtime does occurs. By reducing the response time, the length of the downtime will be reduced as well (TTS, 2014j).

Reliability in the equipment is therefore a key aspect. According to GC Rieber's respondent "If they have a breakdown, they want it fixed yesterday". In other words, oil and gas companies are not very accepting of breakdowns and failures. This is why building vessel assurance is so important for shipowners, and why preventive maintenance becomes crucial (Rieber, 2014).

2.2.1.3 Relative Price

When it comes to price, value propositions can target either customers who are overserved and overpriced, or customers that are underserved and thus underpriced. Companies targeting customers who are overserved, can often eliminate unnecessary costs and meet 'just enough' of their customers' needs, leading to a lower relative price. When customers are underserved however, they might be willing to pay more. For example, Bang & Olufsen combines quality sound with unique design, because their customers are willing to pay more for the design. In value propositions like these, it is typical that the dominant leg of the triangle is the unmet need, and the extra costs incurred to meet this need are supported by the higher relative price (Magretta, 2011).

The subsea industry appears to be an industry that is underserved. Because shipowners are in need of a reliable crane that will reduce downtime, it is likely that they are be willing to pay more in order to ensure the performance of the crane. Value-adding services can therefore

generate a higher income for suppliers that are able to ensure smoother operations of the crane. Having a vessel off-hire leads to huge financial losses for a shipowner, and many shipowners may therefore be willing to pay extra in order to avoid it.

2.3 Value Delivery

In order for the value proposition to become meaningful, it is detrimental to look at the set of activities that are to deliver it. According to Porter, the best set of activities is different from the activities performed by rivals or performed differently than their rivals. While it is important to know the customers' needs, it is not sufficient. The company must also tailor their value chain to their value proposition, in order to be able to deliver value (Magretta, 2011).

2.3.1 Porter's value chain

A value chain can be described as "the sequence of activities your company performs to design, produce, sell, deliver, and support its products" (Magretta, 2011, p. 74). According to Porter (1985) the value chain divides a company into sets of activities, so as to better understand the costs and differentiation opportunities within the company. The company's activities need to be seen in light of the industry the company is in. Different companies in the same industry, will often have very different value chains, and may even focus on different customer segments within that industry. This means that the activities in the value chain may vary a great deal from company to company (Porter, 1985).

Magretta (2011) describes activities as "discrete economic functions or processes, such as managing a supply chain, operating a sales force, developing products, or delivering them to the customer. An activity is usually a mix of people, technology, fixed assets, sometimes working capital, and various types of information". The value activities are the foundation on which a company creates value to its customers (Porter, 1985). The value chain is part of a greater value system. The value system can be seen as a larger set of activities that help create value for the end user, regardless of who performs the activities. The choices a company makes within the value system, determine how vertically integrated it wants to be. It is important to look at the connections between your activities, and those of your suppliers,

customers and distribution channels, because how they perform their activities, will affect the cost and price of yours, as well as the other way around (Magretta, 2011).

The value activities of a firm can be separated into two parts – primary activities and support activities. The former includes everything connected to the "physical creation of the product and its sale and transfer to the buyer as well as after-sale assistance" (Porter, 1985, p. 38), and can be divided into five categories. The latter provides support for the primary activities and each other, and can be divided into four categories (Porter, 1985). Porter's value chain framework can be seen in figure 3

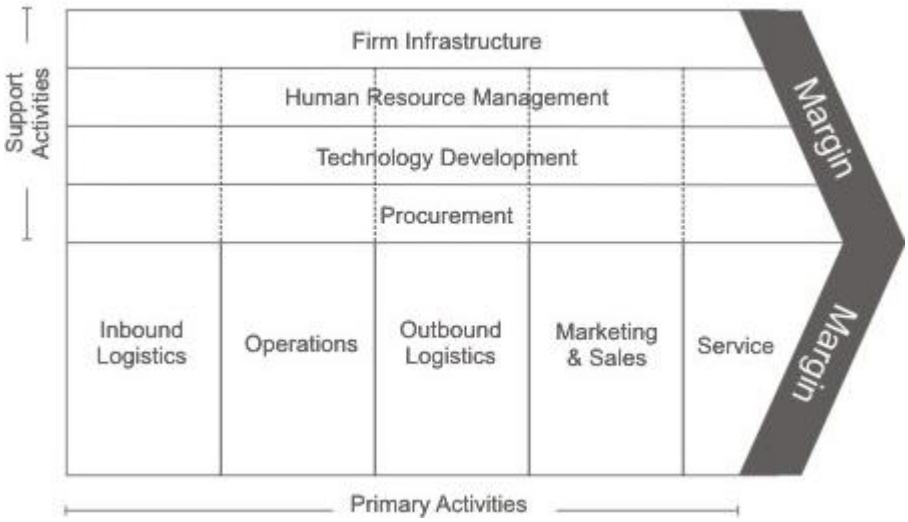

Figure 3: The generic value chain (Mindtools, 2014)

The dotted line in the figure illustrates that three of the support activities – Human Resource Management, Technology Development and Procurement can be connected with both primary activities and the entire chain. The fourth one, Firm Infrastructure, while it supports the entire chain, is not associated with particular primary activities (Porter, 1985).

Primary activities

Inbound logistics refers to activities connected to receiving, storing and distributing inputs to the product. Examples include material handling and inventory control (Porter, 1985).

Operations concerns the activities that help transform inputs into the final product, and can include activities such as machining, assembly, equipment maintenance and facility operations (Porter, 1985).

Outbound logistics has to do with the activities connected to the storing and distribution of the product. This can include everything from finished goods warehousing to delivery vehicle operation (Porter, 1985).

Marketing and Sales relates to the activities that help get the product to the market. These activities help create a way for buyers to purchase the product, as well as encourage them to do so. Activities include advertising, channel selection and pricing (Porter, 1985).

Service refers to the activities that contributes to increasing or maintaining the value of the product. This ranges everything from installation, to parts supply, and to product adjustment (Porter, 1985). In this study, service concerns the after sales services.

Each category will have different value for the company, depending on the industry. A restaurant or a retailer, i.e. a service firm with a specific location, might not even need outbound logistics, but instead might depend on the operations category. A distributor on the other hand, might be more concerned with inbound and outbound logistics (Porter, 1985).

The first three activities in the value chain, 'inbound logistics', 'operations' and 'outbound logistics' refer mainly to the development and distribution of the physical product. However, because this study is looking at the service that supplier companies are providing their customers, the focus will be on the two last primary activities – 'Marketing and Sales' and 'Service', as these are the activities that relate to the after-sales support and service models. These activities will be viewed in relation to the advanced equipment sold.

Two of the support activities 'Technology Development' and 'Human Resource Management' will also become applicable, as support activities for 'Service'.

Support activities

Technology Development refers to the technology of the activities, and can include know-how, procedures and technology in for example process equipment. It includes various

activities that all have the purpose of improving the product and the process (Magretta, 2011)

Human Resource Management involves activities relating to "recruiting, hiring, training, development, and compensation of all types of personnel" (Porter, 1985, p. 42). Human Resource Management determines the skills and motivation of employees, as well as cost of hiring and training. It therefore affects the competitive advantage in every firm (Porter, 1985).

2.4 Value Capture

A business model helps define the overall value created, which is important when determining the value capture for the company. In a way, the total value created can be seen as the maximum potential for value capture. The more value created through the business model innovation, and the more bargaining power the company has, the more value it can capture (Amit & Zott, 2012).

2.4.1 Appropriability regime

David J. Teece talks about regimes of appropriability in his article 'Profiting from Technological Innovation' (1986). He defines this as the "environmental factors, excluding firm and marked structure, that govern an innovator's ability to capture the profits generated by an innovation". Two of the most important aspects of the appropriability regime, are the nature of the technology, and the efficacy of legal mechanisms of protection. The nature of the technology mainly refers to the product itself, the process of innovation and whether or not the knowledge in the organization is tacit or codified.

2.4.1.1 Knowledge

Whether or not the knowledge is tacit or codified, can affect the probability of imitation. When knowledge is codified, it is easier to communicate and obtain it, and has increased risk of experiencing actions such as industrial espionage. Tacit knowledge however, cannot easily be expressed, which makes it harder to transfer. In many instances with tacit

knowledge, one is dependent on someone with the know-how to show others how it is done (Teece, 1986). Tacit knowledge will, in other words, increase the difficulty of imitation.

2.4.1.2 Legal mechanisms of protection

Legal mechanisms of protection is the other important dimension of the appropriability regime, and can include such aspects as patents, copyrights and trade secrets.

While patents may seem perfect on paper, in practice it is difficult to fully achieve appropriability by using them. Patents often offer little protection, because they can often be "invented around", and the costs of the legal requirements of upholding a patent are high. Especially process innovations are difficult to patent. Trade secrets can sometimes be an alternative to patents, especially if the innovation is embedded in the process. If a firm is able to show its product to the public and still keep the underlying technology secret, it is possible with trade secret protection.

2.4.2 Bargaining power

Porter's five forces is a framework that explores the economic factors that affect the profitability of an industry. The framework classifies the economic factors into five forces that comprehend the vertical chain and market competition. In the case of bargaining power, it is only relevant to look at the vertical chain, which encompass the supplier and buyer power (Besanko, Dranove, Shanley, & Schaefer, 2010).

2.4.2.1 Supplier power

Supplier power refers to the ability that a supplier in an industry has to affect prices of input. Suppliers in a competitive upstream market can have indirect power, as they have the opportunity to sell to the highest bidder. The price will depend on the supply and demand in the market. However, suppliers can also have direct power. This can occur in events where the suppliers are concentrated or when customers are locked into relationships due to relationship-specific investments. When a supplier has direct power, it has the ability to increase prices when the target market is doing well, leading the supplier to capture some of the customer's value. It can also lower prices if the market is doing poorly (Besanko, Dranove, Shanley, & Schaefer, 2010).

2.4.2.2 Buyer power

Buyer power refers to the ability that a customer has to negotiate prices that will extract profits from the supplier. It is equivalent to the supplier power. In competitive markets, buyers have indirect power and the price they pay will depend on the supply and demand in the market. When there are few buyers, or suppliers have made relationship-specific investments, buyers have the ability to use direct power (Besanko, Dranove, Shanley, & Schaefer, 2010).

There are many important factors to consider when assessing supplier and buyer power. These are listed below in terms of supplier power relative to the appropriate downstream industry. These factors are analogous to the buyer power.

- The competitiveness of the input market.
- The size and concentration of the relevant industry.
- The purchase volume of downstream firms.
- Availability of substitutes.
- Relationship-specific investments by the industry and its suppliers.
- Threat of forward integration by suppliers.
- Price discrimination possibilities.

Supplier and buyer power in short indicate the industry's ability to capture value from other industries (Besanko, Dranove, Shanley, & Schaefer, 2010).

2.5 Transaction Cost Economics

Transaction Cost Economics (TCE) examines the comparative costs of "planning, adapting, and monitoring task completion under alternative governance structures" (Williamson, 1981, p. 553). Williamson defines a transaction as a good or service that is being transferred across a technologically separable interface. The basic unit of analysis in TCE is the transaction itself. Transactions can occur across markets or within organizations, and is allocated based on cost minimization. Transaction cost economics is based on two assumptions; bounded rationality and opportunism. Whether a transaction will have high or low transaction costs depend on the critical dimensions of that specific transaction (Douma & Schreuder, 2008).

2.5.1 Assumptions

TCE is based on two behavioral assumptions – bounded rationality and opportunism (Williamson, 1981). Bounded rationality refers to humans' limited capacity to formulate and solve complex problems (Douma & Schreuder, 2008). This means that contracts can never truly be complete, especially in cases characterized by high uncertainty or complexity (Gregory, 2011). Opportunism, according to Williamson, refers to the fact that sometimes human beings display opportunistic behavior. According to Williamson, opportunism can be described as "self interest seeking with guile". In other words, it means trying to exploit a situation for your own benefit (Douma & Schreuder, 2008).

2.5.2 Three dimensions for characterizing transactions

The three critical dimensions, by which transactions are described, are uncertainty, frequency and asset-specificity (Williamson, 1981). Uncertainty refers to the unknown variables in a transaction. Bounded rationality is only a problem for transactions that have a high degree of uncertainty or complexity (Douma & Schreuder, 2008). Frequency refers to how often a transaction recurs (Williamson, 1981).

Asset specificity refers to the degree to which transaction-specific assets are necessary for the transaction. Transaction-specific asset means that the asset cannot be utilized in an alternative way, without significantly reducing the value of the asset (Douma & Schreuder, 2008). In the offshore industry, the offshore crane can be seen as a transaction-specific asset. When a shipowner has purchased an offshore crane from a supplier, they become 'locked in' to that supplier. The shipowner cannot find another company that can provide the same level of service and maintenance that the supplier can. In other words, once the investment is made, the relationship between the supplier and the shipowner becomes bilateral for a certain period (Williamson, 1981). The value of the crane will be reduced if proper service is not provided.

2.5.3 Governance structure

TCE focuses on a company's internal and external coordination and control costs, and uses this to discover how to structure a transaction in an optimal way. This structure is usually defined somewhere in between the regulated, hierarchical structure on one end, and the open,

market-driven behavior on the other (Gregory, 2011). Asset specificity is crucial when deciding on which governance structure to use. When uncertainty is held constant, classical market contracting will be preferred with nonspecific assets, and bilateral or obligational market contracting when assets are semi-specific, and finally internal organization will be ideal when assets are highly specific (Williamson, 1981). Figure 4 illustrates when which transaction governance typically is preferred.

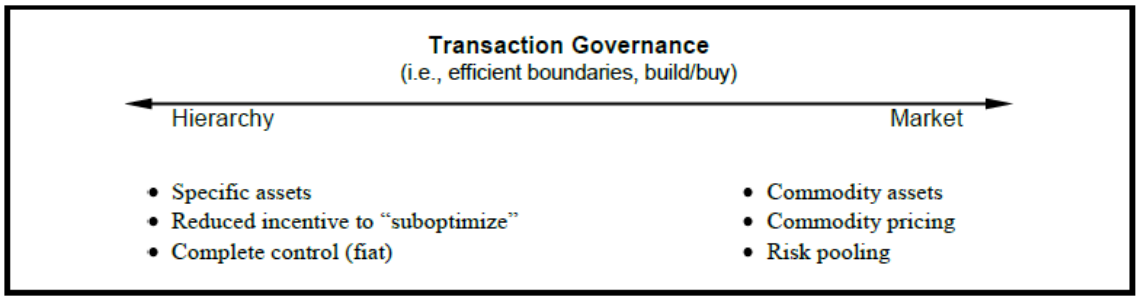

Figure 4: Graphical depiction of TCE (Gregory, 2011, p. 74)

2.5.3.1 Hybrid organizational forms

Markets and organizations/hierarchies are not the only two possible governance structures in a transaction. There are many hybrid organizational forms in the real world, such as joint ventures and franchises. According to Williamson (1981), hybrid organizational forms occur for intermediate levels of asset specificity, and he views them as intermediate forms between markets and organizations.

Hybrid forms are founded on the need to come together in order to achieve something. While there are many different hybrid forms, they share two similarities – in order to achieve something, they need to *pool their resources*, which in turn often leads to *joint planning*, as well as sharing the benefits of the collaboration. (Douma & Schreuder, 2008).

3 Methodology

3.1 Research Approach

The research approach in this thesis is an inductive one. With an inductive approach, one goes from data to theory (Olsen, 2013a). An inductive research approach is common when there is little pre-existing research on a topic (Saunders et al, 2012). Business model and business model innovation are relatively new terms, and it was first around the late 1990's, along with the information technology boom, that the concepts grew in interest (Santos, Spector, & Heyden, 2009). Business model theory has no established theoretical grounding in economics or business (Teece, 2009), and business model innovation is still a new concept. Research on these topics, especially within service models in the subsea market, appears to be limited. The purpose of this research is therefore to increase our understanding of business model innovation in the subsea market.

With an inductive approach, the research begins with collecting data. This data is then processed and used to identify patterns and relationships that can increase our understanding (Saunders et al, 2012). In my thesis, I tried to gain insight about TTS' business model and discover how the company intends to improve its profitability by increasing customer satisfaction.

3.2 Research Design

As the purpose of this thesis is to gain insight about TTS' business model and after-sales support, the nature of the research design is exploratory. With an exploratory design, one is able to ask open questions to gain an understanding of the situation. This type of research is highly flexible and appropriate when the situation is unclear. It is adaptable to change, which means that as more information of the topic is obtained, one can change direction and narrow down the subject of study. In other words, one start with a wide focus, which becomes more and more specific as one goes along (Saunders et al, 2012). This was also the case for my thesis; after initial, broad discussions with TTS about their general business model and the background for their service models, it was revealed that TTS was planning a pilot project.

This pilot project then proved to be quite different from their previous service models, and this information made it possible for me to narrow my research and focus especially on this new service model.

Other elements in the research design include the choices of methodology, research strategy and time horizon for the study (Saunders et al, 2012). I will now go through these different elements.

3.2.1 Methodological Choice

This study used qualitative data, collected by using interviews, as well as written information. Qualitative data is data collected that consists of non-numeric data, and is often used along with inductive approaches (Saunders et al, 2012). Because the pilot project consisted of a new service model that was unfamiliar to the industry, qualitative data was necessary in order to obtain the needed information and increase understanding. Interviewing central employees within TTS and GC Rieber helped provide a thorough understanding of the purposes behind TTS' service model.

3.2.2 Research Strategy

This thesis is a single case study, and the purpose was to identify main characteristics of TTS' business model, in order to determine the best way to structure the new service model in order for it to be successful. A case study researches a specific situation at a specific time, by obtaining information from different sources (Saunders et al, 2012). In this case, the research concerns the characteristics of TTS' business model and how the new service model will affect it. The empirical data consists mainly of interviews with central employees within TTS and their partner in the pilot project, GC Rieber. The information received through interviews were compared to each other, as well as available written information, in order to verify their statements.

In single case studies, an important aspect is defining the actual case (Saunders et al, 2012), which is what I have done by gaining insight into TTS' business model. One can also consider the case to be unique, as the service model is a model that has not previously been available in the subsea market.

The purpose of a case study is to study a given situation at a given time, and gain information about it (Saunders et al, 2012). This means that a case study is not representative, nor is it meant to be. It is meant to provide information and understanding of a specific case at a specific time. In this thesis, the case study provides insight into TTS' current business model characteristics and the goals of the new service model. The case study findings should also not be generalized. However, it might be possible to conduct a more generalizable study once knowledge around business model innovation and service models increase, and more case studies have been conducted.

3.2.3 Time Horizon

Case studies are normally longitudinal, meaning they have the opportunity to study change and development. Due to the time constraints however, this case study is cross-sectional, as it looks at a specific situation at a specific time, and consists of interviews conducted over a short period of time (Saunders et al, 2012).

3.3 Data Collection

The empirical data in this study mainly consists of interviews with central employees in both TTS and GC Rieber. This primary data was collected by the use of semi-structured interviews. In order to obtain the information required, I used a non-probability volunteer sampling technique. The sample size depends on both the research question and objective. Semi-structured interviews should usually have a minimum sample size of 5-25 (Saunders et al, 2012). In this study, I interviewed four people. Though this might seem like a low number, there was no need to interview more, as the interviewees were the ones who worked with the pilot project and had the necessary knowledge. I was able to perform several interviews with the same interviewees, in order to obtain the information I needed.

Semi-structured interviews were an appropriate data collection technique in this study, as it provided flexibility during the interviews, by having both structured and unstructured sections. When interviewing, I had prepared questions to cover, but was not constricted to the interview guide. I had the opportunity to move away from the guide if necessary, in order to explore an interesting topic more thoroughly. I was also able to skip questions, for example if they were covered by another question. Being flexible in an interview is

important when exploring a topic, in order to gain a more in-depth knowledge of the situation. Semi-structured interviews can also help establish a personal contact with the interviewee, which can prove to be advantageous (Saunders et al, 2012).

The interviews were both one on one, and with two people at a time. This was due to the fact that they were the two that were most involved in the pilot project, and therefore had the most knowledge concerning it. In a way, this helped me gain more extensive knowledge, as the two people combined were able to provide in-depth information about the topic, and complemented each other. After making sure that the interviewees were comfortable with it, I audio-recorded the interviews, in order to transcribe them later.

The first interviews conducted were more like discussions, in order to narrow in on a specific topic. In the beginning, I focused on asking open questions, so that the interviewees could answer more extensively about their products and plans for the different service models (Sverdrup, 2013a). One example of an open question was "What challenges can this service model lead to?" Eventually, when the topic and main purpose of the thesis became clear, the questions became more detailed. Because I needed specific knowledge about the pilot project, the questions became narrower, and I focused more on the details, such as the pricing and costs of the service.

While this thesis does not contain sensitive information about the people interviewed, it is still important to ensure the interviewees of their anonymity and explain how the interview data will be used (Sverdrup, 2013a). In the beginning of each interview, I therefore informed the interviewees that they would be anonymous, in order for them to feel safe, relaxed, and perhaps more willing to share their information (Saunders et al, 2012).

As the study had a limited time frame, it was important to be prepared before each interview. I interviewed the same people several times, as I gained knowledge and increased my understanding of the topic. For me, it therefore became important to show that my understanding had increased as the interviews progressed. This meant having prepared good questions and follow-up questions, in order to show credibility when interviewing. To make sure that I addressed all the relevant topics, I made an interview guide to bring with me. I also sent this interview guide to the interviewees beforehand, in order for them to understand what kind of information I was interested in (Saunders et al, 2012).

3.4 Data Analysis

After having collected the data, I needed to get an overview of the information. This is a strenuous process that involves trying to understand and give meaning to the qualitative data. First, in order to prepare the data for analysis, I had to transcribe the interviews. This was time consuming, but also increased my knowledge of the data. Second, I chose to use template analysis to analyze the data. A template analysis is the "process of organizing and analyzing textual data according to themes" (Sverdrup, 2013b). This means that information obtained from the interviews are divided into categories and codes, in order to explore specific themes and relationships (Saunders et al, 2012).

One can divide the different steps in a template analysis in four. The first step consists of reading the transcript and taking notes, in order to get a good overview of the information. The second step is coding and creating concepts in order to find meaning in the text. The goal is to find connections to the research question. This can be done by using a software program, but I chose to do it myself, in order to familiarize myself properly with the information. When going through the interviews, I tried to organize the data and find patterns to help gain insight. For example, one concept that arose many times during the interviews were the responsibilities of the crane operator. I therefore added a code called "responsibilities" whenever there were statements regarding the responsibilities of the crane operator. The third step is condensation. After having applied codes to the interviews, I focused on the codes that gave meaning to the study. Several important themes emerged. For example, the importance of having a reliable crane in order to create value, and the lack of ownership from agency crane operators, causing financial losses. The goal with this step is to reduce the number of codes, which can be achieved by developing categories and themes for similar codes. The fourth and last step is to compare the concepts of the interviews and identify patterns that were not clear before, in order to gain understanding. To present the findings, I have mainly used a "show and tell" technique, meaning that I first provide a statement from one of the interviewees, before explaining what this signifies (Sverdrup, 2013b).

3.5 Evaluation of Research

As this study is qualitative, I will look at important factors such as reliability, validity, interviewer and interviewee bias, as well as ethical considerations, when evaluating the research.

3.5.1 Reliability

Reliability concerns the results and whether these would be consistent if the study was conducted by other researchers who used the same data collection techniques and analytical procedures. Alternatively, reliability also refers to if the results would be the same if the study was performed on another occasion (Saunders et al, 2012). However, in a case study, findings will reflect the reality at a given time, so findings are not necessarily meant to be repeated. The situation may be subject to change, making it difficult to repeat at a later time (Saunders et al, 2012).

3.5.2 Validity

Validity, in terms of qualitative interviews, refers to the capability of the researcher to understand what the interviewee actually means. To ensure validity during the interviews, I focused on clarifying questions and rephrasing their answers if something was unclear (Sverdrup, 2013a). In addition, because I had the opportunity to interview the same people over again, I was able to reduce the probability of misunderstandings, and repeat questions that might have provided an unclear answer. As earlier stated, case studies are not meant to be generalized, and external validity is therefore not relevant for this study.

3.5.3 Interviewer and interviewee bias

Interviewer bias can occur if the interviewer acts in a way that may affect the interviewee's responses. For example, as an interviewer, comments or body language can affect the answers. In addition, interviewee bias may reduce the quality of the research. This is caused by perceptions that the interviewee has of the interviewer. For example, if the interviewee expects that the interviewer wants a certain answer, he or she may provide it whether or not

it is accurate. Therefore, in order to reduce any potential bias, I focused on avoiding any kind of behavior that could affect the answers (Saunders et al, 2012). The questions asked were open ended and objective, in order for the interviewee's to provide answers without any form of bias.

3.5.4 Ethical considerations

Research design in general should not expose interviewees to any kind of embarrassment, pain or significant inconveniences (Saunders et al, 2012). This study protects the interviewees' anonymity by not mentioning any names, and before the interviews they were informed about the research topic and that their participation was voluntary. In addition, when analyzing the data collected, sources are always provided for the information given, and findings are reported accurately (Saunders et al, 2012).

4 Empirical data

TTS is one of the largest suppliers of equipment in their specialized market segments (TTS, 2014a). The offshore and subsea operations are an important part of their business. They offer all types of cranes, with special focus on offshore and heavy lift cranes (TTS, 2014m). They also offer advanced active-heave compensated solutions. These cranes have become a mission critical part of the operations. Shipowners are looking for cranes that are stable and reliable. If they experience a failure on their crane, they cannot complete their operations, and risk huge financial losses. In other words, the goal for the shipowners is to reduce downtime as much as possible.

For TTS, this has led to increased focus on service. Service operations include modification of equipment, service and maintenance missions. After the introduction of a new Services division in 2013, the focus on service has become more proactive. The goal was to shift the company's focus from a reactive model, where the company sends out an engineer on request from the customer, to a more proactive model. Instead of waiting for a problem to

arise, TTS started to focus their capabilities on building a service that is preventive, in order to be more in tune with their customers' needs (TTS, 2013b).

4.1 The Services Division

TTS is focused on working closely with their customers, in order to improve productivity, quality and system capacities. While they design, assemble and test the equipment, most of their production is outsourced to subcontractors (TTS, 2014a).

The Services division became a separate division in 2013. The plans for a Services division had been in the works for 3-4 years before that. Before the Services division was established, the Marine Division had a business unit for Services. However, TTS soon realized that it was not sufficient to have service only in the Marine division, and decided to lift this business unit and create a separate division for it. They had 25 companies from which they picked resources that had been working with service in each unit and united them – gathered them under one management and created a strategy. TTS is, in its very culture, an equipment supplier. According to one of TTS' respondents, this poses one major challenge (see figure 5); a vessel's lifespan can last up to maybe 25-30 years. The vessel is built within the first couple of years, and this is where TTS has always had its focus. Here, their margin is around 6-8 percent. However, the rest of the vessel's lifespan, the extra 23-28 years, have not been a focus of TTS. This is potential service years, with margins of 15-20 percent. This is where TTS' focus now has shifted to, and what they have been working on for the last 3-4 years (TTS, 2014j). TTS is slowly moving towards becoming a more service-oriented company.

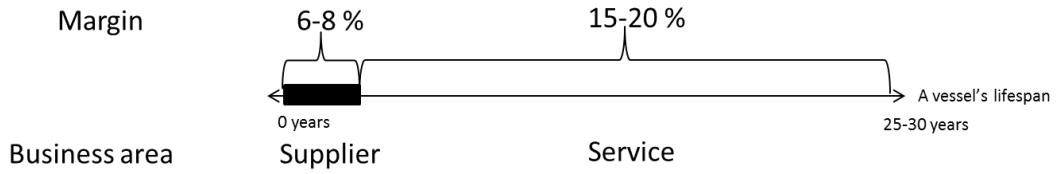

Figure 5: The lifespan of a vessel (TTS, 2014j)

4.2 The Service Models

TTS strive for closeness with their customers, and value creation occurs by providing value-adding services for their customers. For customers, nothing is more important than having a stable and reliable crane. Off-hire leads to serious financial losses, and the longer it takes to get the crane back on hire, the greater these losses. Therefore, for customers, reducing downtime and having a quick response time is essential.

With their upcoming pilot project, TTS will soon be able to provide their customers with three different service models. In the following, these service models, and how they create, deliver and capture value are presented.

4.2.1 The Reactive Model

The reactive model is the traditional way of handling service in the offshore industry. The customer calls when a failure occurs, and TTS sends a service engineer to the vessel in question. It is mainly based on an ad-hoc approach. TTS refer to this service model as "The Rapid Response Service".

4.2.1.1 Value Creation

Reducing off-hire and downtime are important concerns for the customers. This model enables customers to receive help as quickly as possible, but it is only relevant *after* a failure occurs. It does not provide any preventive maintenance, only an annual inspection.

4.2.1.2 Value Delivery

With the Rapid Response Service, the customers call TTS' helpdesk facility in a breakdown situation. TTS then sends help to wherever the customer is (TTS, 2014f). Due to geographical distances, the time from the first call until a service engineer is readily available at the vessel, varies greatly. This is because the service engineers that handle offshore cranes mainly are sent from Norway, where TTS Offshore Handling Equipment AS is located.

In addition, if a new component is required, it is important to take into consideration the time it will take to have a new component available as well. The time lapse from a breakdown situation until the final resolution can therefore take up to several weeks. For the customer, this can mean weeks of downtime and costly off-hire periods.

It is difficult to plan anything when it comes to the equipment on board a vessel. While the vessels have certain planned stops and dockings for technical maintenance, most of the service provided in regards to service and maintenance has mainly been based on the ad-hoc approach (TTS, 2014k).

According to one of TTS' respondents, this model will always be around. The industry can never fully predict everything that might happen to an offshore crane, and so this model will always be necessary (TTS, 2014b). The important thing for TTS is therefore to make it as efficient as possible. TTS has therefore come up with a strategy of creating new service stations around the world, and they are in the process of implementing this now. This 'hub strategy' involves creating a global footprint that will increase their presence and close the gap between them and their customers (TTS, 2013a).

4.2.1.3 Value Capture

This model, while providing the customer relatively low after-sales service costs, can lead to high downtime and potentially severe financial losses from off-hire periods. The model does not provide any preventive maintenance, other than the annual inspection and survey. For TTS, the value capture consists of time-based pricing for the work of the service engineers, and fixed inspection prices.

4.2.2 The Preventive Model

The second service model is more focused on providing preventive maintenance, in order to reduce the downtime of the vessels. Over the last couple of years, technology has had an increased importance in the offshore industry, and has affected the way TTS performs service. For TTS, technology has led them to be able to monitor cranes on board vessels anywhere around the globe. A special computer makes it possible for TTS to perform remote

fault diagnostics that potentially can prevent downtime. TTS refer to this as “The Remote Access Service”.

4.2.2.1 Value Creation

The preventive model provides the customer with remote fault diagnostics and problem solving through the internet. It lets the customer know what is wrong and what needs to be done. The Remote Access Service can reduce downtime and off-hire for the customer, by having monthly connection tests that can prepare the customer for future maintenance. This provides stability and reliability for the customer. The work is preventive, which may lead to reduced downtime as the shipowner may receive information ahead of a potential failure and be able to fix it before the problem occurs. In addition, surveillance like this leads to quicker response time, if the problem can be solved remotely (TTS, 2014k).

4.2.2.2 Value delivery

Technology has led TTS to be able to monitor cranes on board vessels anywhere around the globe, by a special computer. The Remote Access Service provides the customer with technology that can “troubleshoot equipment and identify faulty components immediately”. The service provides remote diagnostics, faultfinding and problem solving via Internet. By accessing the vessel’s data TTS can, within a couple of minutes, offer support and help solve the problem. Their Remote Access Center is always open, with senior engineers constantly available (TTS, 2014g).

The Remote Access Service is sold to a specific crane, and contains a special computer that is connected to the crane on board the vessel. The computer is used for communication between the crane and TTS. This model is commonly used by offshore vessels, as they often operate in different time zones and appreciate the availability it provides. The computer allows TTS to connect to the control system on board the vessel, in order to receive a complete overview of everything that is happening to the crane (TTS, 2014k).

The Remote Access Service has monthly connection tests. On newer cranes, TTS has installed “blackboxes” that monitor the cranes 24-7, and where they can pull log data and historical data. A blackbox is in other words a logging system that can monitor the crane’s actions. It can show who pressed a button when, what speed the crane has had, how many

meters they have driven the wire up and down, what positions the crane has had, as well as the different temperatures. Today, TTS has around 30 cranes that are using this blackbox. As long as they have an internet connection, service technicians can sit on a computer anywhere in the world and log on to the crane's control system and look for anything they want (TTS, 2014k). This allows TTS to look into certain events. For example, they are able to look at how many rotations the drum unit on the winch has made. If the life expectancy of the drum unit is 6 000 hours, and it has now been 5 000 hours, perhaps it is time to consider service on it. Especially if there is a long delivery on spare parts, for example, this model allows the customer to be prepared. What this also means, is that instead of sending personnel from Norway to Australia for example, to look at a problem, TTS can instead view it on a screen. This provides the customer with cost savings, as the service technicians might be able to fix the problem from afar (TTS, 2014k).

Part of the idea of the blackbox logging system is that TTS becomes more autonomous – they do not have to bother their customer with questions that they might not be able to answer, and can instead retrieve the information on their own, and thus create a service program that suits the customer. Instead of using the standard maintenance program, if a drum unit has only had 200 rotations because the vessel has been off-hire somewhere, it does not need to be changed, simply because it is a certain amount of years old. That is why it is important to retrieve correct information about the customers' use of the equipment. Each customer uses the crane differently. By using the blackbox system, TTS can also log in whenever, and discover if something is about to happen. This is their selling point – that they might be able to predict an event that might occur in six months, thus leaving the customer more prepared and capable of preventing downtime (TTS, 2014k).

When a customer calls TTS with a problem, they can log on to the system of the crane and discover the potential problem themselves. In some cases, the problem can be as simple as a switch being turned off, or a loose wire. Instead of using three days to send a service engineer to the vessel simply to turn on a switch or tighten a wire – an operation that can cost up to 200 000 NOK alone, TTS can discover the problem from afar and save the customer time and money. By using the Remote Access Service, the shipowner can also receive information about equipment that needs servicing, and can receive remote fault diagnostics. By being preventive, and servicing or changing equipment before a failure

occurs, the customer will be able to reduce downtime. This may lead to reduced financial losses, at somewhat higher after-sales costs than the reactive service model.

When a breakdown does occur, this model may not be sufficient. TTS might not always be able to fix a problem from afar, and may in some cases need to send a service engineer to the vessel regardless. Especially if there are parts that need changing or servicing. However, they might be able to do a bypass, allowing the customer to operate the crane until a service engineer arrives and fixes the failure. TTS has redundancy on their systems, allowing them to switch to a slave unit, in order to prevent downtime (TTS, 2014b).

4.2.2.3 Value capture

The Remote Access Service is based on a subscription, where the customer pays an annual fee, regardless of what happens to the crane. With this model, TTS will be able to capture value from the subscription to the service model, as well as a time-based pricing for when service engineers need to be sent to the vessel.

4.2.3 The Proactive Model

The third service model is a new model that TTS is planning. It is expected to drastically reduce downtime of the crane. In this model, TTS will send two of their own service engineers to work as crane operators on board their customer's vessel. The service engineers will become part of the crew on board, and follow the ship crew rotations (TTS, 2014h). They will be in charge of operating the crane, as well as providing preventive maintenance and perform service when necessary. This model is still in its early phases, and has not yet been tried in the market. The information below is therefore based on TTS' plans for the pilot project with GC Rieber.

4.2.3.1 Background for the proactive model

In the following, the background for the proactive model, and how it came to life is discussed. The development of the model was based on an experience that GC Rieber had during the summer of 2013.

4.2.3.1.1 GC Rieber

One of TTS' customers within the offshore market is GC Rieber Shipping. The company recently agreed to a pilot project with TTS, where TTS will supply two crane operators to one of GC Rieber's vessels.

GC Rieber's operations in the offshore industry includes high quality marine ship management and project development within the subsea, ice/support and marine seismic segments. They are currently operating 14 specialized vessels within their defined segments. GC Rieber's headquarter is located in Bergen, Norway, and the company is listed on the Oslo Stock Exchange (GC Rieber, 2014).

Within the subsea market, GC Rieber Shipping currently owns four vessels, as well as having the ship management responsibility for two additional vessels. Their vessels' operations mainly consist of inspection, maintenance and repair of subsea installations. Two of GC Rieber's vessels, the Polar King and the Polar Queen, both have knuckle boom cranes from TTS. The Polar King is on charter to Reef Subsea until May 2014, and the Polar Queen is chartered to subsea contractor BOA Marine Services until April 2015 (GC Rieber, 2014).

In the beginning of 2014, HitecVision acquired GC Rieber's shares in Reef Subsea. Reef Subsea was established in 2010 in a joint venture between HitecVision and GC Rieber Shipping (Halvorsen, 2014), and the company focuses on offering innovative solutions for the protection of subsea installations (Reef Subsea, 2014). The sale of Reef Subsea will not affect the current contracts GC Rieber has with the company.

4.2.3.1.2 The summer of 2013

In the summer of 2013, GC Rieber sustained a major off-hire with the Polar Queen vessel. According to a respondent at GC Rieber, the failure was "a catastrophic failure of a major component on the crane". This led to the vessel being off-hire for nearly six weeks, leading to huge financial losses for both the shipowner and the client - losses of excessive 13,5 million dollars. The vessel was working in the US, in Gulf of Mexico, when the failure occurred. At that time, TTS had no coverage for offshore cranes in the US, they only had coverage for hatches and other hydraulic systems, which was in Florida. Because this was during the summer, it was difficult to achieve support from Norway; there was a lack of resources and long lead-time on spare parts. The lack of support from TTS led the

superintendent of the vessel at that time to fix the crane himself, along with another colleague. TTS could only provide them with a software service engineer, whom they had to compensate for giving up his summer holiday. After this, they managed to do a partial repair, and the vessel went offshore again. Then the vessel had three unrelated, consecutive failures that were all related to the crane. This led GC Rieber's client to demobilize the vessel and find another one (Rieber, 2014).

GC Rieber then had to try to fix the vessel. Because they were in America, and TTS was understaffed during the summer in Norway, they encountered some problems. In addition, the major component part that had failed, came from a supplier in Denmark. However, there were difficulties in finding people to help from there as well, so it became problematic to acquire that specific part (Rieber, 2014). The vessel also had an electrical component fail. This part was supplied by TTS, but was actually a Bosch Rexroth plant. This was available in America, but because GC Rieber was a Norwegian company, they would not supply to them. In other words, the supply logistics chain and the resource support was complicated. The vessel was eventually repaired and went back on hire, but the experience led to discussions around what could have been done differently (Rieber, 2014).

4.2.3.1.3 The pilot project

The pilot project started taking place for the first time during a conversation in September 2013. This was not a meeting between two companies, but more a conversation outside of a meeting, between two colleagues in their respective companies. GC Rieber's representative mentioned to TTS' representative that what they ideally would prefer was if TTS was able to supply a service engineer and crane operator in one. Initially this was just an "off the cuff remark", but TTS realized that this was something that they might actually be able to offer GC Rieber (Rieber, 2014). They started discussing what the crane operators would do, and soon TTS came with a proposal – the proactive service model.

4.2.3.2 Value Creation

The goal is that the proactive service model will severely reduce downtime, and provide the customer with a reliable and stable crane. Having a service engineer constantly on board, will provide the shipowner with regular maintenance and service for the crane. Though there can be no guarantees, the hope is that regular maintenance cycles will prevent downtime

altogether. Even if this cannot be guaranteed, the availability of a service engineer will at least drastically reduce the probability of downtime, as well as lead to quick response when it does occur.

4.2.3.3 Value Delivery

TTS will provide the customer with two experienced service engineers that will work on board the vessel as part of the crew, and answer to the chief engineer. The service engineers in the pilot project both have eight years of experience from TTS and Norlift equipment, and their expertise comes from years of training and education, as well as working experience on a wide range of TTS products. According to TTS, this has led them to become independent and solution-oriented (TTS, 2014h). In principal, the crane operator will be employed by TTS, and he will work with the rotation of the vessel and the marine crew. In other words, he will be completely integrated into the crew. His primary role on board the vessel will be as a crane operator, but he will have the electrical and mechanical skillsets of a service engineer as well (Rieber, 2014). In short, TTS' service engineers will be in charge of operating the crane, as well as providing preventive maintenance and perform service when necessary.

TTS will develop a simplified service tool tablet for the service engineers on board, that they can use to conduct minor software tasks or upgrades. The shipowner will be responsible for making sure that the crane operators have the proper tools and spare parts, in order to be able to maintain the highest possible operational time. A condition for this service model is that all spare parts are acquired from within the TTS system. The service engineer will be able to advise on recommended spare parts that the vessel should have on board (TTS, 2014h).

The service engineers will be experienced, and have knowledge on other equipment as well. They have knowledge regarding hatch and covers systems on board the vessel, and can assist in mechanical work in the engine room. They will also have B1 DNV certificates, and be able perform recertification on all lifting appliances and loose gears (TTS, 2014h).

In addition they will be able to provide training for other crewmembers in maintenance, and "troubleshooting on electrical and hydraulic issues on lifting applications on board". They are also certified davits surveyors, and they can perform yearly inspections. In addition, the

service engineers will have a direct link to remote access software specialists if needed (TTS, 2014h).

These are all elements that TTS has listed as advantages of the proactive service model, and they explain the responsibilities and tasks that the service engineers are expected to perform when on the vessel.

4.2.3.4 Value Capture

All the responsibilities, advantages and work tasks listed under value delivery are thought to provide cost savings for the customer, while at the same time preventing downtime. In the pilot project, TTS and the customer has agreed on a fixed sum per man per year of 2,5 million NOK. The price is based, among other things, on the potential cost savings and advantages that the customer will receive. For TTS, value capture will therefore come from a fixed price contract.

4.3 Summary

Below you will find a summary of the three different service models that TTS has to offer.

	Service Models		
	Reactive (Rapid Response +)	Preventive (Remote Access ++)	Proactive (Crane Operator)
Value Creation	**high downtime** (relatively large revenue loss from off-hire periods at relatively low after-sales service costs)	**medium downtime** (medium revenue loss from off-hire periods at somewhat higher after-sales service costs)	**low downtime** (small revenue loss from off-hire periods at relatively low after-sales service costs)
Value Delivery	*"Rapid Response Service"* provide service engineers in the shortest possible time, supported by a 24-hour helpdesk facility accessible via telephone or e-mail plus (*Annual Inspection and Survey*)	*"Remote Access Service"* provides remote diagnostics, fault finding and problem solving via Internet plus ("*Rapid Response Service"*) plus ("*Annual Inspection and Survey"*)	*"Crane Operator Service"* provides combined service engineer & crane operator, hired as crew members by customers plus *("Remote Access Service")* plus *Annual Inspection and Survey*
Value Capture	time-based pricing + fixed inspection price	subscription + time-based pricing	fixed price contract

Table: Classification of the service models provided by TTS

As we can see from the table, each service model is expected to reduce downtime more than the previous. The reactive model, while providing the customer relatively low after-sales service costs, can lead to severe revenue loss in off-hire periods. The model does not provide any preventive maintenance, other than the annual inspection and survey. For TTS, the value capture consists of time-based pricing and fixed inspection prices.

The next service model is more preventive – it provides the customer with fault finding and problem solving via the internet. Remote diagnostics can also let the customer know when equipment might need maintenance or service. This model has the potential to reduce downtime and the costs that follow, at somewhat higher after-sales costs than the first service model. The Remote Access Service is based on a subscription with an annual fee. This, as well as a time-based pricing for when service engineers need to be sent to the vessel, are the main points of value capture for TTS with this model.

The proactive service model will ideally keep the downtime to a minimum, while at the same time keeping the after-sales costs at a relatively low level. This model will have two service engineers from TTS working on board the vessel as crane operators, while at the same time providing preventive maintenance. In this case, TTS will capture value from a fixed priced contract.

5 Analysis

The three service models are significantly different from one another, and are all executed in their own way. The different models allow customers to choose which one is most suited for their needs. The proactive model however, is not yet available for all the customers as it is still a pilot project, and as it will be difficult to provide service engineers/crane operators for every customer. TTS will need to backfill their service engineers if the model proves to be a success, in order to be able to offer service engineers to other potential customers as well.

5.1 Value Creation

5.1.1 Customers

A prerequisite for the service models is that the customer operates with a TTS crane. TTS does not perform maintenance on other suppliers' equipment. Customers who have bought TTS equipment are free to go wherever they choose for their service. However, according to one of TTS' respondents, when it comes to advanced and complex offshore cranes, most of their customers return in order to have the service done by TTS (TTS, 2014k).

The service models are becoming more and more tailored to the specific customer and the specific product, and as the models progress they appear to be applicable for customers with higher risk aversion. The reactive model provides relatively low after-sales costs, as the main purpose of the model is to offer quick response. The shipowner will only have to pay when a service engineer is sent. If a shipowner is confident in its crane and believes that it will not suffer a breakdown, then this model will be appealing, because of the low costs.

If the customer has a slightly higher risk aversion, he will be willing to pay more in order to reduce the probability of downtime. The preventive model will therefore be more tempting than the reactive model, as it provides an insurance through its remote access surveillance. If the service engineers discover that a part will need changing in six months, they can prepare their customer, and thus change the part before the crane breaks down. In addition, in some cases downtime or failures are caused by events that TTS can fix from afar, through their systems. This can provide cost-savings for the customer as it will lead to less downtime for

the vessel. In addition, the remote problem solving will lead to a quick recovery of the crane. While this model is more costly than the reactive service model, it provides the shipowner with a higher degree of security.

The proactive service model can be seen as a service model for those with even higher risk aversion. Having a service engineer on board at all times, providing constant service and maintenance, will provide the customer with an even higher sense of security, as they have the necessary competence available at all times. Most likely, shipowners with a crane that has been operating for a few years, will see the appeal in this model, as they most likely will have experienced some difficulties with the crane already.

According to one of TTS' respondents, the relevant customers for the proactive model are shipowners with a crane that is at least a few years old. According to the respondent, this model will not appeal to shipowners with newer cranes. This is because shipowners who have recently bought a new crane expect everything to be in order. They have not yet experienced any failures or malfunctions, and so do not see the need for this service model. TTS' respondent believes that in order for the service model to be interesting for shipowners with new cranes, they might have to reduce the price as much as 50 per cent. This makes it difficult for TTS to sell their model to newer cranes, and the respondent emphasizes the importance of finding the right customers (TTS, 2014b).

The probability of a crane breaking down will always be present. It therefore becomes important to look at what is being done when it occurs. Below I have looked at the crucial factors of downtime and response time in relation to the different service models.

5.1.1.1 Downtime

Downtime is the essential customer need that the company has to consider. Minimum downtime is achieved by having a stable and reliable crane. Regular maintenance and service of the crane can provide this.

While we can see that the three different service models, to a certain degree, are all focused on meeting the customers' needs, each model is more defined than the next. The first one is focused on quick response time, the second on being preventive by providing information, and the third one by being proactive and present. The common thread here is that TTS is

working closer and closer with its customers. Compared to both the reactive and the preventive service model, the proactive model fulfills the customers' needs in a much bigger sense.

The reactive model does not provide any preventive maintenance. The model provides annual inspections and surveys, but does not consider any preventive work that might minimize the probability of downtime. This model can only offer quick response after a failure occurs, and thus cannot be said to be properly tailored to the value proposition and needs of the customer.

The preventive model has increased focus on preventive maintenance. While it provides remote fault finding, it also provides a logging system, where TTS can retrieve information about the equipment and find out when different parts are in need of service or change. TTS can then create a specialized service program that suits the customer. The information provided, along with the specialized service program can in other words help prevent downtime. In some cases, the preventive model will be able to solve a problem remotely. However, with severe failures or changing of necessary components, TTS will still need to send a service engineer. This after-sales service is more costly than the service provided with the reactive model.

With the proactive model, the vessel will have the constant presence of a service engineer, and it will no longer need to contact TTS when maintenance is due. This will not only save time, it will also significantly reduce costs. Compared to the other service models, the proactive model is able to provide both reduced downtime and relatively low after-sales cost for the customers, at the same time.

5.1.1.2 Response time

The length of the downtime after it does occur is also an important factor for the customers. This will often depend on factors such as travel time for service engineers, visa requirements and lead-time on spare parts.

Say a crane experiences a breakdown, for example in Ghana, in Africa. If the customer uses the reactive service model, TTS will send a service engineer to fix it. This service engineer will most likely be sent from TTS Offshore Handling Equipment AS, which is located in

Bergen, Norway. This leads to costs in travel time. In addition, if none of the service engineers at TTS has a visa to Ghana, acquiring this can take several days. Also, the customer might need to change a part. If they do not already have a spare part available, they risk waiting even more days. Lead-time on spare parts can vary greatly depending on the part that needs changing. During the time it takes for a service engineer and spare parts to arrive, the vessel will be off-hire and losing approximately 45-55 000 dollars a day (Rieber, 2014).

With the preventive model, when a breakdown occurs, TTS can provide remote fault finding and possibly problem solving remotely. However, in a severe breakdown situation, they will still need to send a service engineer down to fix the crane, leading to the same problems as with the reactive model concerning travel time and visa requirements. However, because of the redundancy on the equipment, TTS may be able to do a bypass and switch to a slave unit, allowing the crane to stay on hire until the service engineer arrives. The logging system can better prepare the customer of maintenance that needs to be done. If an equipment needs to be changed in five months, TTS can let the customer know, and give him time to prepare for this change, as well as for ordering new parts. In some breakdown instances, it is therefore possible that the necessary spare part needed during a breakdown is already available. However, this will of course depend on the breakdown that occurs (TTS, 2014k).

The proactive model will avoid the problems with travel time and visa requirements all together, as the service engineer will already be on board. Ideally, having a service engineer on board performing regular maintenance on the crane, could prevent downtime altogether. However, this cannot be guaranteed. Nevertheless, when a downtime then does occur, the service engineer on board will be able to fix the problem quickly. The only element that might increase the length of the downtime is having to order a new part. However, during the time it takes for the part to arrive, the service engineer can prepare for the maintenance work that lies ahead. The service engineer also has the capacity to advise on recommended spare parts necessary on board the vessel. It is therefore possible that due to the service engineer's competence and knowledge of the crane, the necessary part will already be on board. In other words, the proactive model will have provided cost savings in travel days and visa requirements alone, and if no new part needs ordering, the downtime will be even less.

5.2 Value delivery

The activities discussed below all relate to the 'Service' and 'Marketing and Sales' activities in Porter's value chain.

5.2.1 Reduced use of third party companies

When it comes to operating the crane, the shipowners have traditionally had two options: do it themselves, or hire externally, by using agency crane operators. GC Rieber has usually had a mix of these two alternatives – having two internal crane operators and two agency crane operators (Rieber, 2014). A vessel is required to have four crane operators on board at all times (TTS, 2014b).

The agency crane operators are predominantly crane operators – they do not have the skillsets of a service engineer. If something goes wrong with the crane, they do not have the necessary competency to fix it. They are only hired to operate the crane, which means that with the reactive and the preventive model, the costs of sending a service engineer to fix the crane will come as an addition to the crane operator costs (Rieber, 2014). However, if the crane operator is a service engineer as well, like in the proactive model, the shipowner can reduce the costs of having to send a service engineer to the vessel.

According to a respondent at GC Rieber, agency crane operators are "realizing their worth", and can charge as much as up to 6 150 NOK a day. If the shipowner needs someone on short notice, the costs are even higher – up to 90–100 000 NOK for a crane operator for a short period. Their own crane operators cost them around 4 000 NOK a day, meaning that utilizing their own staff as opposed to agency crane operators poses an important cost saving aspect. TTS can offer two crane operators for 2,5 million NOK per year per man. According to the respondent at GC Rieber, the crane operators from TTS and the crane operators from an agency will cost almost the same per year (Rieber, 2014).

GC Rieber is interested in reducing their dependency on agency crane operators, and has in fact initiated their own project, where they are hiring and training people to become crane operators for their ships. They are increasing their own portfolio of crane operators. By putting their own crane operators on their ships, they will be able to remove the agency crane

operators, drive down their costs, and bring continuity in their permanent staff, according to the respondent at GC Rieber (Rieber, 2014). Having their own crane operators on board also provides control and assurance of the competency of the crane operators.

Both TTS' and GC Rieber's respondents mentioned a challenge when it came to agency crane operators – their lack of ownership. Agency crane operators are concerned mainly with their job – operating the crane. They have no ownership of the crane, and thus lack interest in its performance. This lack of ownership has in the past proved to be costly for shipowners. One of TTS' respondents illustrated this with an event that happened in 2013: "We had a breakdown last year, and the feedback from the shipowner was that the crane operator had heard a noise at the beginning of the breakdown. If the crane operator had stopped upon hearing the noise, instead of losing 10 million, they might have lost one million". A trained service engineer would have stopped immediately to try to discover what the noise was, while this crane operator had continued for several minutes, causing the damage to become much more severe (TTS, 2014k). Ownership and understanding of the equipment that is being handled therefore becomes crucial, as the equipment they are dealing with has great value.

Improving the sense of ownership can therefore lead to empowered employees who feel responsible for the crane. According to GC Rieber's respondent, ownership will lead to improvement of the crane and advance the vessel's employability in the market (Rieber, 2014). This also corresponds with TTS' beliefs – that a service engineer/crane operator will provide maintenance, increased uptime, and have ownership – all which will lead to continuous, stable and predictable operations (TTS, 2014k). It is reasonable to believe that a crane operator from TTS will have a higher degree of ownership of the crane than an agency crane operator. A TTS crane operator will be more invested in the crane, because he is responsible for both the service and the operations. In other words, ownership and a sense of responsibility towards the crane appear to be important factors for the new proactive service model.

By hiring crane operators from TTS, shipowners can reduce their costs from third party companies, such as the agency crane operators (TTS, 2014h). In addition, they will receive value-adding services that the agency crane operators cannot provide. This value-adding

service will be provided based on the competence and knowledge of the service engineers. In other words, with the proactive model, the customers receive additional service and increased maintenance for no extra costs. With the reactive and preventive service models, the cost of these services will come in addition to the cost of the models in general. The additional services that the proactive model can provide is discussed below.

5.2.2 Additional services

5.2.2.1 Recertification and inspections

The service engineers from TTS have B1 DNV certificates and are certified davits surveyors. They are able to perform recertification on all lifting appliances and loose gears, and can perform yearly inspections (TTS, 2014h). These elements can contribute to preventing off-hire periods for their customers. The additional certificates mean that the shipowner can reduce the use of crane inspectors to perform this type of work, as the service engineer on board can perform them instead. This leads to increased on hire periods for the vessel, as it will be easier to plan for inspections. For example, the service engineer can perform an inspection during a 24-hour transit period.

The service engineers will also a direct link to remote access software specialists if needed (TTS, 2014h). This means that the proactive model actually incorporates elements of the preventive model's remote access service. Most likely, it will also expedite the use of remote access service, as the service engineer is familiar with the crane and its control systems.

5.2.2.2 Experience with additional equipment

The knowledge and experience that the service engineers have gained over the years, are not only limited to subsea cranes. They also have knowledge concerning the hatch and cover systems on board. TTS' crane operators will have competency and skills concerning the other hydraulic and electrical equipment on board as well. GC Rieber does not only have TTS cranes on their vessels, they also have moon pool hatches and ROV hangar door hatches, as well as the last system for the launch and recovery for the ROV. The service engineer can also assist in other mechanical work in the engine room, as well as advise on necessary spare parts the vessel should have on board (TTS, 2014h). With extensive

knowledge on other components on board, the service engineer can also provide assistance in the fault diagnosis of these components, which will expedite the time of repair.

The proactive model gives the service engineer on board significantly more responsibility than a service engineer that is sent to fix an offshore crane. The onboard service engineer will be able to provide assistance on other equipment than the crane as well – which in turn will help reduce costs for the shipowner. If there is a problem with a moon pool hatch, the onboard service engineer can provide assistance, and the shipowner may not have to call for a service engineer to be sent to the vessel. In short, the onboard service engineer will be able to help the shipowner on a daily basis with small problems that might occur with the equipment. For the customer, these incremental cost savings may turn out to be extensive once combined. The reactive model does no such thing. The preventive model however, though it does not offer a permanent service engineer, it does provide the customer with a logging system, where TTS can pull historical data and discover when components are due for a change. Nonetheless, the preventive model can only discover potential maintenance work, it cannot actually perform it.

5.2.2.3 Training of crew members

TTS' crane operators can also provide training for the other crewmembers - improving their skills, competencies and knowledge. The TTS crane operator can train them in maintenance and troubleshooting, and in electrical and hydraulic issues on lifting applications on board (TTS, 2014h). For the shipowner this means increased competency and skills for its internal crewmembers, and according to GC Rieber's respondent, this will improve the serviceability and maintainability of the crane (Rieber, 2014). The TTS crane operator's main function will be *operating* the crane. In some cases, this may lead him to sit in the crane for 12 hours, and not be available for any maintenance work during his work period. By training other crewmembers, the workload will be dispersed, because the internal crane operators will be capable of performing some of the maintenance tasks themselves (Rieber, 2014). For the customer, this may lead to more efficient operations on board. Not only will they have TTS crane operators to perform maintenance, they will also have their own crew be capable of this. It will increase the competence and skillsets of their own employees. This is something that neither the reactive nor the preventive service model can provide in any way.

5.2.3 Cost Savings

According to GC Rieber's respondent, the price of the proactive model and the price of agency crane operators amount to almost the same price per anno. However, while an agency crane operator only operates the crane for this price, a TTS crane operator provides service as well. An average service engineer charges around 1 500 NOK per hour (Rieber, 2014). In other words, the cost saving potential is significant. Even during the times when the TTS crane operator simply is a crane operator, for example when the crane is fully functional, the shipowner will still have cost savings by hiring a TTS crane operator instead of an agency crane operator.

However, properly calculating the savings of having a service engineer on board is impossible until an actual breakdown occurs. In some cases, an off-hire might not even occur during a certain period. However, when the off-hire does occur, having that service engineer on board just might save a whole year's salary (Rieber, 2014).

In addition, having a service engineer on board can lead to a tight preventive maintenance system that eventually can lead to a cycle of replacing components prior to any failures. By looking at the components expectant lifespan, they can figure out at what point the component is due for replacement. In addition, because they already have a TTS employee on board, GC Rieber does not have to contact TTS to arrange for a service engineer to come to the ship to perform the replacement. Say for example that the vessel is in a 24-hour transit period. During this period, they can take the crane out of operation, and perform necessary maintenance, for example changing a slewing motor. The service engineer can have planned this in advance so that the necessary parts are already on board. He then replaces the slewing motor, and the crane goes straight back on to operations again. The old slewing motor then goes away for maintenance (Rieber, 2014). By having the service engineer readily available on board maintenance can in other words start immediately, and the shipowner will have saved costs.

According to TTS, the proactive model will provide cost savings for both them and their customers. As TTS explains, while their customers are paying a certain price for this service, what they can do is push their costs further on to their customers again. Because this model

can be seen as raising the competence level of the service the shipowners are providing, they can sell this to their customers by stating that using this proactive model, and having service engineers on board their vessel will provide a more stable crane and reduce the probability of downtime (TTS, 2014b). In other words, the model is value adding for the shipowners, as well as their customers.

The main costs for TTS in relation to the proactive model are related to having hired personnel, such as labor costs, social costs, insurance etc., according to one of TTS' respondent. The pricing of the crane operators has been based on the perceived advantages that the customer will receive by using this service model. For example, GC Rieber will have crane operators that can perform recertification on lifting appliances and loose gears on board the vessel. This means that they will not have to pull vessels out of an assignment in order to perform recertification, as this can be done at sea. Reduced docking will lead to cost savings as well (TTS, 2014b). TTS has therefore evaluated the perceived benefits a customer may achieve from the proactive model, and created a fixed price contract based on this.

All these cost saving elements that the proactive model can provide, is caused by the high customization of the model. The 'service' activities in the proactive model are in other words tailored specifically to the value proposition, and is thus likely to increase value creation.

5.2.4 Marketing and Sales

As stated earlier, shipowners are very interested in mitigating the risk. If a failure occurs, the risk is much bigger for them, as it stops them from performing their job on time. Oil and gas companies are therefore looking for assurance, and have difficulties with accepting off-hire when it occurs (Rieber, 2014).

For GC Rieber, the proactive model provides them with serviceability, maintainability, and assurance. GC Rieber believes that by having a skilled, competent man on board, they can improve their preventive maintenance, which in turn will allow them to offer their customers a reliable subsea crane (Rieber, 2014). The assurance that shipowners can provide their customers is brought on by having a service engineer on board the vessel at all times. This is a value-adding service and a compelling selling point that the shipowners in turn can charge extra for.

Another aspect for the shipowner is self-promotion. If the proactive service model leads to the crane hardly ever having a breakdown, due to constant preventive maintenance, then the shipowner might benefit from this in the market. The market might notice that the crane rarely has a breakdown and that they have a decent maintenance regime. The shipowner might increase its reputation, and become a sought-after supplier of vessels in their market (Rieber, 2014).

5.3 Value Capture

As the equipment on board vessels have become more advanced, there appears to have been a shift in the bargaining power. The traditional relationship between a supplier and a customer depends on many different factors. One of them is the size and concentration of the industries. If there are many suppliers that can provide the same equipment, the bargaining power of the customer will increase, as it has many offers to choose from. However, if there are many customers, but only a limited amount of suppliers, then the suppliers will have increased power, and be able to charge a higher price (Besanko, Dranove, Shanley, & Schaefer, 2010). Traditionally, the relationship between a supplier and a customer in the offshore industry was short lived – the supplier provided the equipment, the customer paid for it. As the equipment became more and more advanced, this relationship started to change. The customer requested more service from the suppliers, as they were the ones with extensive knowledge on the equipment. The relationship became more interrelated, and the customers became more dependent on the supplier, than the other way around. This has also led to reduced significance of patents, when it comes to the service models. As the customer will be dependent on the supplier, it will not matter if the service models are imitated by competitors, because they will not have the necessary knowledge about the specific equipment.

5.3.1 Bargaining power

Due to the complex nature of offshore and subsea cranes, customers are becoming increasingly more dependent on their suppliers for service. Suppliers will be better equipped at providing the necessary competence required for servicing the crane, because they are the ones that have designed and developed them. Current agency crane operators and internal

crane operators that customers are using today do not have the necessary requirements to perform service or maintenance on the cranes.

This means that once a customer company buys a crane, it is in fact already locked to the supplier company, due to the complexity and advanced technology used on the crane. Other supplier companies cannot offer services on TTS' equipment, and TTS will not provide service on other supplier companies' equipment. There are many varying specifications on equipment from different suppliers, and working on other companies' equipment may be costly and lead to poor performance of the crane. The supplier of the equipment is in other words the only company that can provide the best service for the crane. This puts the supplier in a position of power, and may lead them to raise the price they charge.

The proactive model therefore contains relationship-specific investments for the customer. The customer cannot acquire service engineers with that degree of experience and knowledge of the cranes anywhere else. This increases the supplier's bargaining power. In return, TTS offers up two service engineers that will only work on one specific vessel and that will receive crane operator training. In a way, this can be viewed as a bilateral relation, where the customer provides the crane, and the supplier provides the competence. Because the supplier offers tacit knowledge that is difficult to measure, customers might be reluctant to accept the proactive model.

The proactive model brings along a shift in the dynamics of the supplier-customer relationship that is further discussed in the next section.

5.4 Transaction Cost Economics

Transaction costs will influence a company's decision to integrate (Besanko, Dranove, Shanley, & Schaefer, 2010). With the new proactive model, the supplier and customer will experience a shift in their relationship, leading them to work more closely together than previously. The transaction cost approach will enable TTS to discover the governance structure that will be most effective and that will lead to cost minimization. In the following, I will discuss the different elements of the transaction cost economics in the subsea industry,

and how they will affect what governance structure that TTS should choose when introducing the new service model.

5.4.1 The Transaction

The service models have increasingly tried to incorporate the supplier's tacit knowledge into the models. The reactive model by sending a competent service engineer to fix the problem, the preventive by remote faultfinding and problem solving, and the proactive by offering a TTS employee to become part of the crew. As we can see, the main element in the service models is the use of the supplier's internal knowledge on a customer's equipment. The models are in varying degrees trying to incorporate the tacit knowledge of the supplier company. The transaction in these service models are in other words the competence and tacit knowledge that TTS has. The customers cannot acquire this knowledge themselves, and are therefore dependent on the market, in this case the supplier, to provide the necessary level of competence. The tacit knowledge is difficult, if not impossible to transfer. TTS has acquired this specific know-how over several years, and have an in-depth understanding of the advanced technology used on the crane. This makes it necessary for a shipowner to demand service from them, as they cannot perform it themselves.

In the service models, this tacit knowledge is being exploited in different ways. The reactive model solely provides a service upon request. The preventive model uses the supplier's knowledge to remotely assess the crane and its operations, in order to provide more preventive maintenance. The proactive model however affects how the customer performs its business. The service will no longer be provided through making plans with TTS and having regular contact. It will now be provided by a crew member, hired by the supplier. The vessel will become more independent, and less reliant on regular contact with the supplier.

5.4.2 Transaction costs

The relative costs of the after-sales service of the different models are summarized in the table in section 4. As we recall, the reactive and the proactive model led to relatively low after-sales costs, compared to the preventive, that led to relatively high costs. The increased costs are caused both by the subscription fee, and the planning and coordination necessary between the companies. The costs of the reactive model is relatively low, because the

customer would only interact with the supplier during a failure. On the other hand, this model has the potential of high revenue loss during a breakdown. The proactive model however has several cost saving aspects that will lead to relatively low after-sales costs combined. Because the vessel will become more independent from the supplier, less planning and coordination will be necessary. The structure of the proactive model appears to perform the transaction of competence in a more optimal way. The selling point of the proactive model, is that the competence is delivered as a person working on board the vessel. The advanced technology has made customers more dependent on the services of their suppliers, and this model will allow the customers access to this competence and knowledge whenever necessary.

5.4.3 Increased dependency

With the proactive model, the customer will have full ownership of the crane, and TTS will provide the competence to handle the crane. In other words, the proactive model will lead to increased responsibility for TTS. They will be in charge of the operations and services of the crane, while the customer's responsibilities will be reduced. TTS will be in charge of making sure that the crane is working at optimum level. They will provide a service for the shipowner on board the vessel. This service will affect the shipowner's operations and its core activity in the subsea market. Without an operational crane, the shipowner risks severe revenue loss. Leaving the responsibility of the crane to the supplier therefore means that the shipowner increases its dependency on the supplier even more. The customer will depend on TTS to deliver a functional and operational crane, and if TTS for some reason does not deliver, the customer risks severe financial losses.

5.4.4 The critical dimensions

As earlier stated, the customer has already invested in equipment that leads to high asset specificity – the crane. Because the company has already bought the crane, if they want to receive the highest possible service, they are dependent on the supplier. The customer is therefore in a vulnerable position, because of the investment made. Williamson refers to this investment as "the fundamental transformation", as it changes the relationship of the parties from a "large numbers" bargaining situation to a "small numbers" bargaining situation (Besanko, Dranove, Shanley, & Schaefer, 2010).

The bargaining power that TTS has, gives it the opportunity to act opportunistically. Dependency can therefore cause uncertainty for the customer, especially when it has limited bargaining power. The customer is at risk of the supplier trying to exploit the situation for its own gain. For example, TTS may use its bargaining power to raise the price of the service. For the customer to feel secure, and certain that TTS will not take advantage of the situation, the customer will need guarantees from TTS. There are several different ways that the companies can achieve the security necessary to make a deal. The next section discusses the possibilities of contracts and joint venture.

5.4.5 Governance structure

5.4.5.1 Contract

Writing a contract can be both time-consuming and costly. Contracts become necessary when an exchange occurs, and defines the conditions of the exchange. They are used to define the responsibilities and tasks of each contracting party. They also outline what will happen if one of the parties does not fulfill their responsibilities. Contracts are written because of the risk of opportunistic behavior. A complete contract would eliminate all opportunistic behavior, because everything that could possibly happen and the responses would be stated in the contract. However, because of bounded rationality, most contracts are incomplete. Incomplete contracts means that there are certain situations under which the roles and responsibilities of either party is unclear. In addition, difficulties specifying or measuring performance may also lead a contract to be incomplete (Besanko, Dranove, Shanley, & Schaefer, 2010). While the proactive model is anticipated to provide a highly operational crane, it may be difficult to measure if the fact the crane is operational actually is due to the service engineer/crane operator. The crane can have long periods of on hire even without the proactive model, leading it to be difficult to measure its exact performance and benefits.

Contracts that are carefully tailored to a specific transaction, may often become complicated and lengthy (Besanko, Dranove, Shanley, & Schaefer, 2010). In this case, as there are difficulties measuring performance, a relation-specific asset and many uncertainties involved, writing a contract for the proactive model, may prove to be too comprehensive.

As discussed, the customers cannot acquire the necessary competence themselves. In addition, we see that market contracting is also likely to be too complicated to pursue. However, there are several organizational forms in-between these two extremes. These are often referred to as hybrid forms. One of these hybrid forms is joint venture. This is an organizing mode that TTS can consider using in order to reduce the uncertainty that customers may be feeling.

The crane has a high degree of asset specificity, and the degree of uncertainty and complexity is high. Ideally, in a situation like this, the theory states that the best solution would be organizational coordination. However, in the real world, companies often choose outside suppliers. In this case, the shipowner chooses to go outside the company because of the lack of competence. The shipowner does not have the necessary skills to satisfy customer needs alone, and is therefore seeking out to the market to satisfy the need for a reliable crane, as that is a vital part of the value creation on board the vessel.

5.4.5.2 Joint venture

In the pilot project between TTS and GC Rieber, the plan is to have two TTS service engineers work offshore for 18-20 months. This is a long period. A joint venture will ensure that both companies' interests are taken care of. Joint ventures are a preferred mode of organizing when a business opportunity requires two companies to pool their resources, when it is almost impossible to trade these resources, and if when one company buys the other, it will acquire many unnecessary resources that it does not need (Douma & Schreuder, 2008). As already explained, the transfer of intangible assets, such as tacit knowledge, is often impossible to achieve. In addition, both the supplier and the customer needs to be willing to collaborate and to take advantage of their resources together. The supplier provides the competence and skillsets in the form of a service engineer, while the shipowner provides the crane. A joint venture will provide assurance for the customer, and may therefore increase the probability of a customer accepting the proactive model. In other words, the respective companies can both achieve advantages and cost savings by forming a joint venture.

By entering a joint venture, the shipowner will have guarantees that the supplier is not trying to exploit the situation. In a joint venture the gains of the proactive model will be shared

between the respective parties. This will minimize the risk of opportunistic behavior from either party, because they both will benefit from the result.

Even after a joint venture has been formed, assessing the exact contribution of intangible assets is still difficult. That is why a certain degree of mutual trust is necessary for joint venture to become successful (Douma & Schreuder, 2008). In addition, reputation is a crucial factor in the offshore industry. As GC Rieber's respondent puts it, "The market is so small, somebody coughs and you know, a shipping company could catch a cold by it". This also applies for the supplier – if they deliver a subpar performance, or exploit their relationships with the customers, it is likely that their reputation will deteriorate, and their actions will lead to decreased sales. Opportunistic behavior therefore appears less likely.

5.4.5.2.1 Value capture potential

Currently, the plans for the proactive model involves a fixed price contract. This means that regardless of the outcome of the model, TTS will receive a fixed amount. This may lead to opportunistic behavior from the supplier. The incentives to help create value on board may be reduced, because the profit outcome will remain the same regardless of the results. However, TTS will have long-term benefits to gain by performing their best.

In joint ventures, the parties share the gains resulting from the collaboration. With a fixed price contract, the additional value created will only accrue the customer. In other words, TTS should consider implementing value-based pricing to their new service model, as this might lead to increased value creation and value capture. Value-based pricing can be defined as pricing a product or service based on its value to individual customers (Magloff, 2014).

However, the fixed price model is currently based on the perceived values it will provide the customers, as well as the expected cost savings. It therefore has some similarities with the value-based pricing model, as they both focus on the customer's perceived value of the potential cost savings. Because the proactive model is new, TTS does not have concrete numbers regarding the cost savings potential. This may lead the fixed price contract to be beneficial in the pilot project, because it secures a fixed income regardless of the result. As the model gains foothold in the market, and the cost savings can be specified, TTS may consider changing to another pricing model in order to capture more value from the model.

5.4.6 Ex-post behavior

Opportunistic behavior can also occur ex-post, which is why mutual trust is an important factor regardless of what organizational form the companies choose. However, important factors of the cooperation still need to be considered, and possible challenges of the proactive model still needs to be addressed.

Cooperation between a supplier and its customer demands clarification of the different responsibilities of the parties. Important aspects that need to be discussed are the cost of training, the responsibility of the crane operator, potential substitutes, the contractual agreements that the customer in turn has with its own customers, and skill fade.

5.4.6.1 Cost of training

In order for the proactive service model to work, TTS has to invest in a person – the service model is extremely people-oriented and the most important part of this model is the employees that are being deployed. In order for the model to be a success, the TTS crane operators need to be skilled. Not only as service engineers, but as crane operators as well. They need to have sufficient training in order to become competent crane operators. This is where the collaboration aspect becomes important – in order for the TTS employees to become certified crane operators, they need to receive G5 training and go offshore to consolidate hours. TTS and GC Rieber will therefore need to decide how the costs of the training will be divided between the two companies.

5.4.6.2 Responsibility of the crane operator

According to TTS, in addition to receiving a crane operator that can also service the crane, the TTS crane operator will be able to assist in other cases as well. The service engineer can assist in other mechanical work in the engine room, he has knowledge regarding electrical and hydraulic equipment as well, and can assist in operations regarding the hatch and cover systems on board (TTS, 2014h). This means that the TTS crane operators can operate in other areas than the crane. However, it is important to define the scope of the crane operators' responsibilities. If not, they risk that the crew on board the vessel pushes too much responsibility onto the crane operators from TTS. It is important that the crew realizes that while the new crane operator may be able to advise on certain equipment, they have not gotten a new mechanic on board, at that certain things are outside of the TTS crane

operator's responsibility. If not, they risk the crane operator to grow tired of the situation, according to one of TTS' respondents (TTS, 2014b). However, both companies appear to be aware of this possible challenge.

5.4.6.3 Substitutes

One of GC Rieber's concerns is what will happen if one of the crane operators from TTS no longer can attend his job. This can happen if the employee becomes sick or has other compassionate reasons keeping him home. TTS will then have to provide an adequate substitute. As this pilot project is in its early phases, TTS does not at the current moment have a pool of other combined service engineers and crane operators. This may lead TTS to hire a crane operator from an agency, because of the requirements of having four crane operators on board at all times. The agency crane operator will naturally not have the competency of a service engineer, and it is therefore likely that this situation will affect TTS' business model, and in turn their profits. So for TTS, having their own employees on board the vessel increases their responsibilities towards their customers, and this is therefore an important aspect to consider.

5.4.6.4 Shipowner's contractual agreements with their own customers

GC Rieber's customers have the right to ask for anyone on board the vessel to be removed. This means that if GC Rieber's customers are not satisfied with the performance of one of TTS' crane operators, they can remove them. Due to the terms and agreements between GC Rieber and their customers, they therefore have to honor the customers' decisions (Rieber, 2014). This and other contractual agreements need to be considered when entering a collaboration.

5.4.6.5 Skill fade

The service engineers have over eight years of experience, and have traveled the world and worked on many different equipment over the years. This is what has led to their expertise and heavy knowledge concerning TTS' equipment.

One concern with having crane operators working solely on one vessel is that their skillset might deteriorate. The essential part of the proactive service model, is that it is people-focused. Knowledge and proper skills therefore become crucial. An important aspect is therefore to make sure that the competencies and skills of the crane operators are maintained.

When they become a crane operator in addition to a service engineer, they can go weeks or even an entire trip without having faults and without having to do fault finding. Also, because they operate on the same crane and the same equipment constantly, they might neglect to notice when certain things change. GC Rieber therefore worries that there might be skill fade. Service engineers that are constantly traveling around the world, fixing various defects on various cranes, will have heightened skills, and will be more competent than a service engineer that is only looking at one system. However, as GC Rieber points out, the skill fade that might appear can be addressed by TTS by encouraging CPD – Continued Professional Development.

According to GC Rieber's respondent, another aspect that might reduce the skill fade is if the customers have several vessels using the proactive service model. Say for example that GC Rieber sometime in the future add a third TTS crane to their fleet. Then they can begin to move the TTS service engineers around the different vessels in order to improve not only skills, but flexibility and adaptability as well (Rieber, 2014).

5.5 Business model innovation

Amit and Zott (2012) explained that activities in a business model are conducted in order to satisfy a perceived need. In the subsea market, this specific need was the reliability of offshore cranes. This need was the main background for the development of the proactive model, after the failures that GC Rieber experienced with their crane. Once implemented, the model will lead to a change in the activities of the business model.

A business model innovation could be described as a reconfiguration of activities within a business model, that had not previously been seen in the market (Santos, Spector, & Heyden, 2009). Within TTS' business model, the main activities studied was the 'service' and 'marketing and sales' activities. The proactive model is leading to changes within these activities. The service engineer's responsibilities will increase, as he will also be in charge of operating the crane. In other words, TTS is adding new activities to their business model, in order to satisfy customer needs. This new activity also affects the governance structure. Amit and Zott (2012) explained that governance activities refer to when the parties that perform the activities change. TTS is, by boarding the vessel on a permanent basis, changing the

governance structure because it will be performing a new activity on board the vessel. The increased responsibility that TTS is taking upon itself by being in charge of all the activities relating to the crane, leads to a change in the relationship between TTS and its customers. These elements will alter the current business model that TTS has in relation to the proactive model. These changes are new to the industry, as no other company has done anything similar before, and can therefore be seen as a business model innovation. It will lead the supplier to become closer to the core activities of the shipowner, instead of having the arm's length interaction that is most common today. The supplier will have a different role than it has today, as it will become an important part of the service on board the vessel.

5.6 Future

Future plans for the proactive model involves even more cooperation between TTS and its customers. Their ambition is to become the customer's dedicated deck provider, meaning that they will not only be in charge of the offshore cranes, but other equipment, such as hatches and davits, as well (TTS, 2014h). They wish to develop the concept of a combined service engineer and crane operator, and take it one step further.

They have plans of starting the cooperation between them and their customers at an earlier stage. Today, they are selling the proactive service model to customers with cranes that are at least a few years old. However, in the future, they plan on being able to start the cooperation even sooner. The idea is that the service engineer/crane operator will be part of the process from the beginning – they will participate in the building and testing phase, and thereby have complete knowledge and ownership of the equipment on board. TTS believes that this will benefit both parties, as TTS will have the operational knowledge, and the customer will receive a maximum operational crane (TTS, 2014h). In other words, the service engineer/crane operator will be part of the process from the start, and acquire immense knowledge about the equipment on board and how to service it.

For smaller shipping companies, like GC Rieber, if the proactive model proves to be a success, this model may lead to TTS locking the customer into buying TTS cranes in the future. According to GC Rieber's respondent, past successes with the proactive model may lead a customer to choose TTS for new subsea vessels as well (Rieber, 2014). In other

words, the proactive model may lead to increased sales for TTS. Shipowners with previous experience of the service model, who are planning to build a new vessel, might be more likely to choose a TTS crane because of the proactive service model. It might then become a package deal, where the subsea crane and the service model both are vital for the operations. This will be beneficial for TTS, as it will tie their customers in to buying their cranes. In the case of a returning customer, looking to build a new subsea vessel, he may request a specific service engineer/crane operator to serve as project engineer when building a new crane, based on prior experience. This crane operator will then be able to follow the crane project from the very beginning and oversee everything about that specific crane. The crane operator will then have a vested interest in the crane, because he is not only going to be the operator, he is also going to be the service engineer of that crane (Rieber, 2014). This will increase the crane operator's ownership.

It is likely that agency crane operators will feel threatened by the opportunity for shipowners to have crane operators from the supplier, as this in the long run might lead them to become obsolete. Especially since customers, such as GC Rieber, already are trying to minimize their use of agency crane operators. Even if the agency crane operators become more focused on service and maintenance, the supplier will still have the advantage. A supplier crane operator will appear more attractive than an agency crane operator due to his extensive knowledge and experience with the specific equipment.

With the proactive model, TTS will go from providing maintenance and service, to becoming a full-on service provider on board the vessel. They will be in charge of operating the crane, servicing it and making sure that its performance is on top. In the future, they may become in charge of even more of the equipment on board the vessel, leading to even closer cooperation between supplier and customer.

6 Conclusion

'What characterizes the business model TTS has employed to create and capture value from the subsea crane technology, and how will the new service model affect this business model?'

The purpose of this thesis was to explore the characteristics of TTS' business model, and how it would be affected by the new service model.

The value creation for customers in the offshore crane industry, comes from having a reliable crane, with minimum probability of downtime and off-hire. For the value creation to be delivered, suppliers have increased their focus on preventive maintenance and service. The offshore industry in general is characterized by increased complexity and advanced technology on the business critical equipment on board. This is why the service provided by suppliers have increased over the years, as they have the necessary competence to deal with this complexity.

From previous analysis, it becomes clear that the reactive and preventive service model are not properly tailored to the value proposition; the reactive model does not provide any preventive maintenance, and can thus be regarded as a "bare minimum" model, as the main purpose is to provide quick response *after* a failure occurs. It does not increase the value creation, and does not satisfy the customers' needs properly. The preventive model offers preventive maintenance up to a certain point. While it can provide information about parts that may need changing, as well as perform remote fault diagnostics and problem solving, it cannot physically perform the service required, and it will still be necessary to send a service engineer. Depending on where the vessel is located during the breakdown, travel time will vary greatly. Sending a service engineer will increase the costs of the shipowner, as well as increase the downtime period. The preventive model considers the customer's need for reliability by offering preventive maintenance, and therefore provides increased value creation compared to the reactive service model. It is therefore better tailored to the value proposition. However, when a service engineer does need to be sent to the vessel, the same problem occurs as with the reactive model.

The proactive model, on the other hand, provides a combined service engineer and crane operator. This is expected to lead to both reduced downtime and response time, and highly improve the reliability of the crane. The service engineer/crane operator will be available at all times, and provide constant service of the crane. The value chain of the proactive model therefore seems to be properly tailored to the value proposition, as it satisfies the customers' need. This model will increase value creation for both the customer and TTS.

The proactive model puts more responsibility onto the supplier, as they will be in charge of both operations and maintenance. The proactive model changes the relationship dynamic between the supplier and customer, and leads to a closer cooperation than with the previous models. In the proactive model, the companies will pool their resources together in order to enhance the service. This leads to an interrelated relationship, and it becomes important to create a relationship that induces trust and reliability between the parties. The customer becomes very dependent on the supplier, increasing the supplier's bargaining power. This increased dependency on and strong bargaining power of suppliers may lead to insecurities among the customers. TTS therefore needs to show potential customers that they do not intend to exploit the situation, in order for this model to become attractive in the market. Recommendations on how to do so is discussed in the next section, along with a proposal on how to increase value capture.

6.1 Recommendations

The transaction cost approach showed that potential uncertainties within the proactive model can be reduced, or even eliminated, by entering a joint venture. Joint venture will lead to joint planning and risk sharing. Opportunistic behavior will be reduced, as both companies will benefit from the success of the model. The importance of the supplier's reputation will also reduce the likelihood of opportunistic behavior. However, mutual trust is a vital aspect to making the model work. Because the transaction relates to tacit knowledge, discovering actual enhanced performance due to the model will be difficult. In fact, it may not be possible to measure before an actual breakdown occurs. However, being able to provide potential customers with explicit cost savings will increase the proactive model's value and attractiveness in the market. TTS should therefore focus on determining the exact cost

savings potential of the proactive model. This will help to highlight the model's value creating aspect.

Joint venture can also increase the supplier's ability to capture value. The increased independency of the vessel, will lead to less contact with TTS during events on board, as these will be taken care of internally. The model will therefore lead to several incremental cost savings, amounting to potentially great cost savings combined. These potential cost savings are a factor that TTS currently is not taking full advantage of. When implementing the pilot project with GC Rieber, TTS will use a fixed price contract. This means that the potential added value that the model will induce, will solely benefit the customer. Because the exact cost savings are unclear in this early phase, the fixed price contract may be appropriate to use.

However, joint ventures can lead to increased value capture by incorporating gain-sharing agreements. Gain-sharing agreements are a way to improve and share the financial results of continuous improvement. These agreements provide both parties with incentives to continue to enhance their business relationship (Trecha & Byrd, 2002). This means that the combined efforts of TTS and its customer will lead to greater financial results, and therefore greater value creation. This improved value creation will be shared by both parties. For TTS, having a gain-sharing agreement may also increase the willingness of potential customers to implement the proactive model. Gain-sharing will lead to reduced risk for the shipowners, because both parties will have incentives to increase the profit.

With the proactive model, TTS will become a service provider, and not just an equipment supplier. While they have increased their focus on service for several years, this model is taking it one step further, and has a high chance of changing the industry's way of providing service.

6.2 Implications

The majority of the findings in this paper can be explained by the business model literature. This literature theory provided explanations on several issues relating to TTS' service models. In terms of value delivery, the literature especially made it clear that the first two

service models were not properly tailored to the value proposition, leading the customer's needs to not be completely fulfilled.

However, in order to realize the proper value delivery of the proactive model, the transaction cost approach provided useful information in terms of which governance structure to use. The governance structure will affect the value delivery of the business model, and therefore provides valuable insight to business model innovations. The transaction cost approach therefore proved to be a valuable supplement to the business model literature.

6.3 Further Research

The purpose of this paper was to explore TTS' business model and how the new service model would affect it. As it is a case study, the findings are not generalizable.

Future research may include the study of similar service models of business critical equipment in other industries. Observations in this case may then serve as a basis for comparison. In addition it would be interesting to see the effects of the new service model in the offshore industry, as well as discovering the actual cost savings of the proactive model.

Another interesting perspective is the concept of business model innovation. This is a relatively new concept, and there are therefore many possibilities relating to research in this field.

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Appendices

Interview guide 1

Value creation:

Om selve produktet:

1. Hvordan blir kranene vanligvis brukt av kundene? (Hva gjør kranen det mulig for båten å gjøre?)

2. Hvordan utvikles og produseres kranen?

3. Hvordan er vedlikeholdet av kranen? Hvor omfattende? Hva kreves?

Om tjenesteleveransen:

Den reaktive modellen:

4. Hvordan er kostnadene til TTS i forbindelse med denne modellen?

5. Hvordan tar dere betalt? For en «pakke» med alt samlet (subsea crane, AHC system, after-sale service, osv.) eller for hver enkelt tjeneste separat?

Den preventive modellen:

6. Hvordan påvirker den preventive modellen kostnadene til TTS?

7. Hvordan priser dere? (abonnement, pluss timebasert?)

Den proaktive modellen:

8. Er dette tilfellet? Er det slik at en kranfører om bord vil føre til reduserte ettersalgskostnader for TTS? I så fall, hvorfor?

9. Hvordan priser dere?

10. Finnes det noe tilsvarende denne modellen i bransjen allerede?

Value delivery:

Reaktive modellen:

11. Kan du fortelle litt om verdikjeden deres per i dag: rekkefølgen de gjøres i, hvordan dere har organisert dere (produsere selv eller outsource), hvor viktig hvert element er, hvor mye tid og ressurser som brukes på hvert element.

12. Kan du fortelle litt om service sentrene deres? (hva de inneholder, er alle like? Hub?)

Preventive modellen:

13. Hvordan blir verdikjeden påvirket av denne modellen? (kan f.eks. sørge for å ha deler klar til å bli sendt?)

Proaktive modellen:

14. Hvilke utfordringer kan denne modellen medføre?

15. HR management: Kranoperatører ombord i kundenes fartøy vil kreve kompetanse og opplæring. Hvordan vil dette påvirke kontraktene deres med de ansatte? Hvordan er disse kontraktene i dag?

Generelt/For alle:

16. Hvordan er samarbeidet med kunden før, underveis og etterpå?

17. Kan du fortelle om sammenhengen mellom design og service? (TTS designer i henhold til kundenes behov?)

Value capture:

Den reaktive modellen:

18. Hvordan organiseres avtalene med eksterne aktører? Hva slags type kontrakter bruker dere?

19. Hvordan er markedsposisjonen til TTS? (Internasjonal/Global bransje).

Den preventive modellen:

20. Er det stor fare for imitasjon?

Den proaktive modellen:

21. Kan det være en ulempe å ha en kranoperatør ombord? Er det fare for at kompetansen/kunnskapen kranoperatøren har opparbeidet seg hos TTS etter hvert kan bli overført til kunden?

22. Hvem vil betale for kranen og kranoperatøren?

23. Hvem vil betale for opplæringen av operatøren?

Interview guide 2

Questions:

Value creation:

1. What type of cranes have you purchased from TTS?

2. What type of operations are they used for?

3. What kind of service deal have you had with TTS so far (in relation to these cranes)?

4. How often do you encounter downtime?

5. What is the normal response time for service?

Value Delivery

6. Why did GC Rieber agree to partake in a pilot project with TTS?

7. How have your experience with TTS' earlier service been?

8. How will the crane operator model be beneficial for GC Rieber? What advantages might it lead to?

Value Capture

9. Who are your customers?

10. How will this be value-adding for your customers?

11. Are there any downsides to this model?

12. If the project is a success, can you in the future see the company purchasing equipment from TTS based on their service model (i.e. crane operator model)?

This master's thesis is a case study concerning after-sales services in the offshore crane industry. The case in question looks at the different service models that TTS Group ASA offers their customers. This company has recently developed a new service model and initiated a pilot project with one of their customers.

TTS is a global supplier company with a strong position in the offshore market that over the last couple of years has increased its focus on service. Due to high complexity within offshore equipment, customers have become more dependent on suppliers. They require more service from them, and the new service model is believed to improve service of the offshore cranes. This model will provide the customer with two service engineers from TTS that will operate as crane operators and become part of the crew on board the vessel.

The theory related to this study is literature concerning the concepts of business models in terms of value creation, value delivery and value capture. This literature was used as a backdrop for discovering concepts for further study in the research. The Transaction Cost Economics is used to analyse which governance structure will be most suitable for the new service model. The empirical data was collected through interviews with employees vital to the pilot project both at TTS and at GC Rieber. TTS' websites and publications, as well as written documentation provided by TTS, supported the data collected through interviews.

Findings of the study are related to the characteristics of the current business model, as well as the expectations and challenges of the new service model. Important factors for the new service model are increasing the reliability of the offshore crane, and ideally preventing downtime, as well as profiting from the competence and skills of their employees. The new service model requires greater cooperation between supplier and customer, than previous models. This cooperation can cause frictions if the roles and responsibilities from each party is not clarified. In addition, TTS needs to provide potential customers with a proper measurement for potential cost savings in order to attract customers to the model. A collaboration in the form of a joint venture is therefore recommended, in order to secure both parties from potential opportunistic behaviour and increase the total value creation.

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