Norwegian School of Economics
Bergen, Fall 2014

Comparing OSV operations in Brazil with Norway

- Qualitative benchmark study of the cost drivers using interviews

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Master Thesis within the Master of Science

Major: Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Abstract

The objective of this thesis is to map the main drivers behind the operational and capital expenditures related to offshore support vessels in Brazil and in the North Sea. We compare the two regions using the North Sea as the benchmark.

Our study is qualitative and the data is gathered using semi-structured interviews with Norwegian offshore shipping companies, both in Brazil (Rio de Janeiro) and in Norway. Our findings are mainly based on information gathered in these interviews, but reports from shipbrokers and other financial institutions, together with interviews with other actors in the offshore shipping industry, are used to get a different perspective on the topic.

In the first part of our thesis, the external environment in the offshore shipping industry is analyzed. Three different analyses are performed assessing: the drivers behind the demand for offshore vessels, the attractiveness of the offshore shipping industry and how it is to do business for Norwegian shipowners in Brazil compared to Norway. In the second part, the company specific factors, OPEX and CAPEX, are analyzed. An investment case, evaluating whether to invest in a vessel in Norway or Brazil is presented at the end of this part.

Based on our analysis of the external environment in the offshore shipping industry, we find out that; the demand for offshore vessels is stagnating due to lower E&P spending, the attractiveness of the offshore shipping industry is low, and the difference between Norway and Brazil in terms of doing business is large.

Based on our analysis in the second part of our thesis, we conclude that both the OPEX and the CAPEX (Docking and Shipbuilding) related to the operation of a vessel is higher in Brazil than in the North Sea. The higher OPEX is mainly driven by higher crew and technical costs, and increased costs due to a challenging client. The higher docking cost is mainly driven by a lack of dry-docks, and issues related to the importation of equipment. The higher shipbuilding cost is driven by a low supply of commercial yards, delays in the shipbuilding process, and issues related to the importation of equipment.

In the investment case at the end of part two, our recommendation is that shipowners should invest in Norway rather than Brazil.

Preface

This thesis is the last step to complete our Master of Science in Financial Economics at Norwegian School of Economics (NHH), and our CEMS-degree in International Management.

Through our studies at NHH we have developed an increasing interest for the shipping industry and especially the operation of offshore support vessels. Both of us have worked part-time in shipping companies during our Bachelors at NHH, and we have participated in shipping related activities offered by NHH's Shipping and Logistics Group (STG).

The offshore shipping industry is at different maturity stages around the globe. The North Sea is the most mature market in the world, with a sophisticated spot-market for offshore support vessels. The market in Brazil is rather immature, without any real spot-market, where most of the offshore vessels are on long contracts, between 4 and 8 years excluding options. The cost of operating vessels in Brazil has increased substantially the last decade, making it harder for shipowners to earn good profits. However, the growth prospects look very promising.

For the Norwegian economy, the offshore- and shipping industry is essential both in terms of value creation and employment. Several Norwegian shipowners are major players in the business globally, and the Norwegian fleet is one of the most modern and advanced in the world, thus making it interesting to compare Norway to other regions.

Throughout the process of writing this thesis we have gained substantial knowledge about the offshore shipping industry in the North Sea and Brazil. The process of writing the thesis has been tough, and we will like to thank Siri Pettersen Strandenes for the valuable discussions we have had with her. We would also like to thank the Norwegian Shipowners Association's representative in Brazil (ABRAN) and DOF ASA for the help they provided during our stay in Brazil.

Bergen, 19.desember 2014

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Introduction and research questions

We will in this study highlight the differences between operating offshore support vessels in Norway and Brazil, with main focus on operating expenses, shipbuilding and docking costs.

The Norwegian market for offshore support vessels (OSV) was established together with the discovery of oil on the Norwegian continental shelf. The first orders of OSVs by Norwegian shipowners were done in 1969 (Norwegian Shipowners' Association, 2011). The Brazilian market for OSVs was established around the same time, but it was not before the discoveries made in the beginning of the 2000s that the industry really started to develop. (Abeam, 2013)

To gather data and understand the differences between the two regions, we have conducted interviews with top managers in Norwegian offshore shipping companies in Rio de Janeiro, and in cities along the coast of Norway. Together these companies control about 237 OSVs[1]. 80 of these vessels are operating in Brazil, while about 100 operate in the North Sea. As a result, Norwegian shipowners control more than 20% total fleet in Brazil, and the same shipowners about ⅓ of the fleet in Norway. (RS Platou 2014). In addition, several interviews have been conducted with other actors in the industry, like banks, insurance companies, yards and shipbrokers.

Among the Norwegian offshore shipping companies that operate in Brazil, DOF is the largest player with a total of 25 vessels, followed by Farstad with 18 vessels and Siem Offshore with 13 vessels (Abeam, 2014). Farstad, Siem Offshore, Havila Shipping, Olympic Shipping, Deep Sea Supply and K-line are mainly operating in the anchor handling tug supply (AHTS) and platform support vessel (PSV) segment, while DOF and Solstad are major players in the subsea segment, as well as PSV and AHTS.

Through interviews with key players from the offshore shipping industry and comprehensive study of relevant theory we have aimed to answer the following questions:

- What are the main drivers for operational and capital expenditures related to operation of PSVs, AHTS' and CSVs in Brazil and how do they differ compared to the North Sea?

[1] The fleet number is derived from annual reports (DOF ASA, 2014a, Havila Shipping, 2014, Olympic Shipping, 2014, Siem Offshore, 2014, Solstad ASA , 2014, K-Line Offshore, 2014)

- Where should Norwegian Shipowners invest in their next OSV?

We answer these questions through an analysis divided into two parts. The first part is an analysis of the external environment where we look at the external factors that influence the demand for OSVs, the attractiveness of the offshore shipping market in Brazil and Norway, and the differences between Norway and Brazil when it comes to doing business. The second part of the study is an analysis of company specific factors. We focus on the costs related to operating OSVs and the associated cost drivers. Norway and Brazil are compared throughout the study in order to highlight the main differences in cost levels and cost drivers. We have grouped the costs in several sub groups, and analyzed each group separately in order to draw interesting conclusions. The second part is ended with an investment case where we look at where a Norwegian shipowner should build and operate a newly built offshore vessel.

1 Scope of study and definitions

1.1 Definition of terms and concepts

Vessels and offshore units

OSV - Offshore support vessel, general term for all vessels supporting the oil companies

PSV - Platform supply vessel

AHTS - Anchor handling tug supply vessel

CSV - Construction support vessel

PLSV - Pipe lay support vessel

DSV - Diving support vessel

FPSO - Floating production, storage and offloading unit

ROV - Remotely operated vehicle

FPU - Floating production unit

Flags

BRL-flagged vessel - Vessel flying under the Brazilian flag

INT-flagged vessel - Vessel flying under an International flag

REB-flagged vessel - Vessel flying under the special Brazilian flag

NIS-flagged vessel - Vessel flying under the Norwegian International Ship Register flag

NOR-flagged vessel - Vessel flying under the Norwegian flag

Other

IOC - International oil companies

CAPEX - Capital Expenditure

OPEX - Operational Expenditure

EBN - Brazilian Shipping Company

NCS - Norwegian Continental shelf

BCS – Brazilian Continental shelf

Institutions and Associations

ANTAQ - National Agency of Waterway Transportation in Brazil

IBAMA - Brazilian Institute for the Environment and Natural Resources

ABRAN - Brazilian Association of Norwegian Shipowners

ABEAM - Brazilian Association of Offshore Support Companies

ANP - National Petroleum Agency in Brazil

NSA - Norwegian Shipowners Association

FMM - Marine Merchant Fund - Giving financing to BRL-built vessels

BNDES - The Brazilian development bank - Giving out the loans on behalf of FMM

Import

REPETRO - Brazilian special customs regime

Tax

ISS - Tax on services

ICMS - Tax on circulation of goods and services

CPRB - Social Security Contribution on Gross Revenue

PIS - Contribution to the Social Integration Program

COFINS - Contribution to Social Security Financing

Labor agreements

CLT - Consolidation of Labor Laws

CBA - Collective Bargaining Agreement

Offshore regions

Norwegian offshore shipping market - The North Sea, both UK and NCS

Brazilian offshore shipping market - The Brazilian Continental Shelf

Offshore shipping

Charterer - The company (Statoil/Petrobras) hiring the vessel from the shipowner

Shipowner - The company owning the vessels. In this paper also used when talking about managers of Norwegian subsidiaries in Brazil

Operator/Manager - The company in charge of the vessels, could be the shipowner

Bunkers - Fuel used for the vessel's engines.

Pilot - Person being onboard the vessel when the vessel goes to port. ("Los" - Norwegian)

Inspection - Companies like Det Norske Veritas GL (DNV GL), giving certificates to vessels

Thrusters - Propellers on the side of the vessel, making it go sideways and spin

DP system - Dynamic positioning system, positioning the vessel in the correct spot

Winch - Equipment used during anchor handling operations

Classification - All vessels are classified by DNV GL or similar institutions. Otherwise they cannot operate.

Chief engineer - The person in charge of the machinery onboard of the vessel (engine room)

Deck Cadet - People working on the deck of the vessel

Dry-docking - Process where the vessel is taken out of the sea, in order to do maintenance.

Financial expressions

CF - Cash Flow

NPV - Net present value

EMARK - Market premium

IRR - Internal rate of return

Rf - Risk free rate

Re - Required return on equity

E - Equity

D - Debt

EBITDA - Earnings before interest, taxes, depreciation and amortization.

CAPM - Capital Asset Pricing Model

1.2 Definition of Industry

1.2.1 Menon's definition of offshore shipping

Menon's definition of *offshore shipping* (Norwegian Shipowners' Association, 2012): All enterprises that is owning, operating, designing, building, supplying equipment or specialized services to all types of ships and other floating units.

Offshore shipowner: Owners and operators of supply vessels, anchor handling vessels, construction vessels, seismic- and other offshore related special vessels, including subsea entrepreneurs.

1.2.2 Our definition of offshore support vessels

In the *offshore support industry* we include PSV (Platform supply vessels), AHTS (Anchor Handling Tug Support Vessel) and CSV (Construction Support Vessel). When we refer to the OSV (Offshore Support Vessels) market this is the market for PSVs, AHTS' and CSVs. Several people would argue that the OSV market only consist of PSVs and AHTS' (Offshore supply vessels), and that CSV are considered to be subsea vessels. We argue that all the different vessel-types perform support services for the offshore industry; hence all of them are part of the common term offshore support vessels (OSV).

1.2.3 The vessel types

The main categories of offshore vessels are Platform Supply vessels (PSV), Anchor Handling Tug Supply Vessels (AHTS) and Construction Support Vessels (CSV). The two first groups are normally categorized based on their size, engine power and technical equipment on board. CSVs are more specialized and cannot be categorized in a similar way. The CSVs are primarily used for subsea operations. These vessels are more advanced and different vessels with different equipment are used depending on the type of project. A more detailed explanation of the three types of vessels follows underneath.

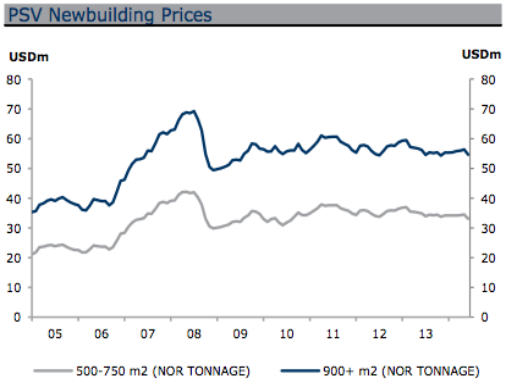
Platform Supply Vessel (PSV)

The PSV's are specially designed to supply oil platforms offshore. The length of a PSV can vary from 20m to a 100m. The main purpose of the vessel is to transport cargo or crew to oil platforms or other offshore installations. The cargo transported to the platforms is pulverized cement, fuel, drinking water, chemicals used in the drilling process, pipelines, food and other equipment. Returning from the platforms the PSV bring drilling mud, and other disposable products that are handled onshore. (Norwegian Shipping Association, 2012)

The PSVs have tanks underneath the deck where they can carry liquid substances, while containers and other equipment can be carried on top of the deck. The technical equipment installed on a PSV can distinguish it from another vessel. Some PSVs have been designed, or converted, to perform a specific task. An example is DOF ASA's vessel Skandi HAV who has been converted from a PSV to a Pipe-lay support vessel (PLSV) to be able to support in pipe laying activities. Some of the PSVs carry equipment for extinguishing or fighting fires on platforms (Norwegian Shipowners' Association, 2012), and other PSVs have Remotely Operated Vehicle (ROV) equipment onboard or oil spill recovery equipment. The extra equipment are qualities that can lead to higher day rates for the vessels, or at least make them able to bid on more tenders.

The PSVs are normally grouped based on their size (length), their deck area or the deadweight ton (dwt) capacity. In the table showing newbuilding activity underneath the vessels are categorized by deck area (m2).

Figure 1: Development in PSV newbuilding prices 2004-2014



(RS Platou, 2014)

The development in newbuilding prices for a PSV is shown in the graph above. There was a large increase in prices before the financial crises, followed by a dip and stabilization in prices afterwards. The largest PSVs with deck space of over 899 m2 cost about $55 million today.

The current PSV fleet is about 1369 vessels. As seen in the table underneath, the newbuilding activity for PSVs is high.

Table 1: Orderbook PSV 2014-2016

Platform Supply Vessel

	Total	2014	2015	2016+
PSV<500 m2	85	49	24	12
PSV 500-749 m2	120	50	57	13
PSV 750-899 m2	134	58	58	18
PSV 900+ m2	133	70	45	18
PSV Total	**472**	**227**	**184**	**61**

(RS Platou, 2014)

There will be built about 227 new PSVs in 2014, which corresponds to 16,5% of the current fleet. Some vessels might be scrapped during 2014, reducing the fleet growth, but many shipowners and investors believe that the growth in supply is so large that it won't be absorbed by the demand from the offshore oil companies. The balance between supply and demand is the main driver of the dayrates that the shipowners receive.

Anchor Handling Tug Supply Vessel (AHTS)

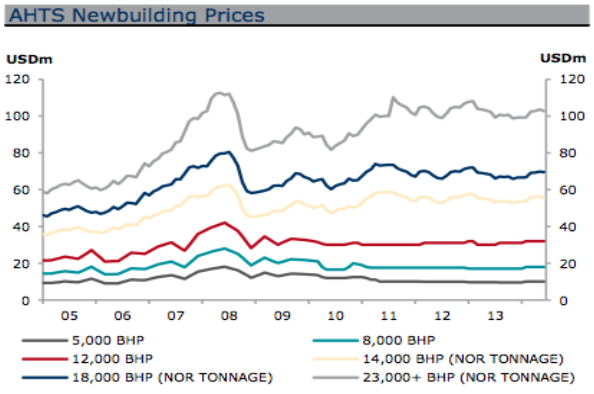
Anchor Handling Tug Supply Vessels' main purpose is towing the oil rigs from one well (field) to another and anchor them to the seabed. These vessels are also able to supply the platforms the same way as the PSVs, but their deck capacity is usually much smaller. They

differ from PSVs in that they are equipped with winches for towing and anchor-handling operations. They also have open sterns to allow anchors to be raised onboard (Norwegian Shipowners' Association, 2012). In addition to winches for towing, AHTS' are sometimes equipped with large cranes, and ROV systems. DOF's Skandi Skansen is an AHTS with both cranes and a ROV installed, making it a versatile vessel, able to conduct both anchor handling and construction support activities (DOF ASA, 2014b).

The AHTS' can fix anchors at new locations, and make the seabed ready for jack-up rigs. The demand for the vessels is very dependent on the amount of rigs working at a specific time (Pareto E&P Survey, 2014). Compared to PSVs, AHTS' have much more engine power, which is natural because it is needed when handling heavy anchors and towing extremely heavy platforms. Larger anchor handlers have the ability to support larger rigs and to perform more steady and safe towing work. To remove a rig, 4 AHTS' are normally required.

As seen on the graphic on the next page, the development in newbuilding prices has been similar for AHT'S and PSVs the last 10 years. The prices increased before the financial crisis, followed by a drop and then stabilization. Very large AHTS is however an exception, where the prices have increased with 20-30% from 2008/09 until today. This could be driven by the increasing demand for larger vessels as oil drilling move from shallow water to more deep-water operations. The largest AHTS' costs around $105 million today, while medium sized AHTS' cost $70 million on average (RS Platou 2014).

Figure 2: Development in AHTS newbuilding prices 2004-2014



(RS Platou, 2014)

When categorizing the different AHTS', the engine power is the main criteria. This is seen in the table underneath showing the newbuilding activity for AHTS in the coming years.

Table 2: Orderbook AHTS 2014-2016

Anchor Handling Tug Support

	Total	2014	2015	2016+
AHTS 4-7,999 BHP	121	66	46	9
AHTS 8-9,999 BHP	15	9	5	1
AHTS 10-15,999 BHP	47	19	24	4
AHTS 16-19,999BHP	10	6	4	0
AHTS 20,000 + BHP	16	12	3	1
AHTS Total	**209**	**112**	**82**	**15**

(RS Platou 2014)

The vessels are sorted after Break Horse Power (BHP). The total AHTS fleet today is about 1938 vessels. There will be built about 112 new AHTS in 2014, which corresponds to 6% of the current fleet. Thus, the newbuilding activity is moderate in the AHTS segment.

Construction Support Vessel (CSV)

The CSV segment comprises all vessels that carry out construction support and subsea operations. The CSV fleet includes: Diving support Vessels, ROV support Vessels, Multi-purpose Support Vessels, Pipe Laying Support Vessels and others (Norwegian Shipowners' Association, 2014). Different activities, from smaller survey and inspection projects to more comprehensive installation and pipe laying projects, requires vessels with different size and equipment, leading to a big difference among the CSVs. The investment cost varies a lot from small to big CSVs (Solstad ASA, 2014). There are examples of CSVs costing around 2 BNOK (300-350M$) like the LEWEK Connector, a ultra-deep-water multipurpose construction vessels, while other CSVs, like DOF's Skandi Bergen, cost around 6-700 MNOK (110M$) (Clarksons, 2014).

CSVs are typically equipped with large cranes, helideck, ROV, and Dynamic Positioning (DP) systems. (Havila Shipping ASA, 2014). The DP system helps the vessel maintain its position using its own propellers and thrusters (Kongsberg Maritime, 2014). This is an important feature of the CSV's equipment. When divers and ROV are doing work on the seabed it's important that the vessel manages to stay in position.

The CSV segment is newer and consists of fewer vessels than the AHTS and the PSV segment. It's about 581 CSVs working in different regions around the world today. This

number is expected to grow with 35 (6%) vessels in 2015 and 27(4,5%) in 2016 (DNB Markets, 2014). The two biggest segments are ROV support and Pipe-lay support vessels representing more than half of the newbuildings. The prices can, as already mention, vary depending on the type of vessel that is purchased.

1.3 The offshore shipping industry in Brazil and Norway

1.3.1 The North Sea

History and development

The North Sea comprises of Norwegian and British continental shelf. The offshore shipping industry in Norway started with the discovery of oil on the Norwegian continental shelf (NCS) in 1969. The first offshore supply vessels used on the NCS was converted fishing vessels. The fish boat companies had great competitive advantage when operating on the NCS because they were used the heavy waves and the dark and cold environment. These tough conditions also required ships and equipment of high quality, which put pressure on the local shipyards, naval architects and equipment manufactures to develop robust, durable and innovative solutions (Norwegian Shipowners' Association, 2011). On British side gas was first discovered in 1965. In 1968 oil was still not found on British side and the oil companies lost interest in further exploration in the British sector. The situation changed when oil was discovered on Norwegian side in 1969, and in 1970 BP discovered oil in the Forties Oil Field (Bamberg, 2000).

Alongside a rapidly growing oil industry the offshore shipping industry has evolved fast, and today there are more than 600 offshore vessels in the North Sea. (RS Platou, 2014). From the very beginning the North Sea has been open for international players. Even though the Norwegian government in 1972 decided that Statoil should control 50% of all new extraction permissions and that the corporate tax should be set to 80%, the Norwegian continental shelf has always been strongly influenced by international players. With the competitive advantage the Norwegians had from fishing, the Norwegian offshore shipping industry grew to be the most modern and advanced in the world. Several innovative solutions have been developed in Norway, and the most advanced vessels are still being built in Norway. During the development of the offshore shipping industry in Norway a

unique cluster of shipowners, shipbuilders, equipment suppliers have arisen along the west coast of Norway. (Olje- og Energidepartementet, 2013)

Characteristics of the market

The North Sea is today the only place in the world where there is a well functioning spot market. This means that instead of hiring vessels on long-term contracts, the charterer can hire a vessel only for the period they need it. The period could be from a few days up to several months. The main reason why a well-functioning spot market exists in the North Sea is that the North Sea market is very open, with few regulations from the governments. International players are allowed into the North Sea market on the same terms as the Norwegian and British companies.

Due to the tough conditions in North Sea the oil companies require advanced vessels with modern technology. Larger vessels are often equipped with several backup solutions in case something should break down. Today the development in the North Sea is moving towards drilling at deeper waters, which also create a demand for larger vessels. A third factor leading to larger vessels in the exploration of oil and gas in the arctic environment. This is an even rougher climate than the North Sea, and the distance from shore is even longer.

1.3.2 The Brazilian continental shelf

History and development 345

The development of the Brazilian OSV industry started with the first oil discoveries between 1968 and 1975. At that time 13 vessels were imported to work for Petrobras. By 1981 there were 43 Brazilian offshore vessels operating in Brazil and by 1989 the number of vessels had reached 110 (Abeam, 2014). The number of proven reserves in Brazil has grown steadily since the first discoveries in 1975, with discoveries mainly on the Campos Basin and the Santos Basin. However, it was not before 2007, with the discoveries of the Pre-salt fields outside Rio de Janeiro that the oil and gas industry really boomed. In 2007 there were about 168 offshore vessels working on the BCS, both international and Brazilian vessels. By 2013 this number had grown to 450, where of 50% had Brazilian flag. Petrobras forecast that they will need another 200 vessels on the Pre-salt field in the next 5-6 years until 2020 (ABRAN FGV Seminar, 2014).

Petrobras or “Petróleo Brasileiro S/A” is the world’s 3rd largest oil company and the largest industry conglomerate in South-America. The company controls about 90% of the oilfields in Brazil, giving them tremendous power. Even though the Brazilian market was opened to foreign oil companies in 1997, Petrobras has retained its position as monopolist. This monopoly situation is making operations challenging both for domestic and international shipowners. Strict regulations, a complex tax system and a country only speaking Portuguese makes the operations challenging. As for the future, more international oil companies should appear. But Petrobras is supposed to be the sole operator, and owner of at least 30%, of all the Pre-salt fields being developed in the next coming years, slowing down the production as foreign players are not let in a 100%.

Characteristics of the market

The Brazilian oilfields are mainly located at ultra deep waters (1000-3000m) with a long distance from shore. The ultra-deepwater fields require different oil production units. Floating Production Storage and Offloading (FPSO) units are used rather than the Jack-up rigs that often are used at shallow waters. The FPSO require a different service from the OSVs than rigs working at shallower water. FPSOs can normally move around from one oil field to another without the help of an anchor handler, but they normally get support from anchor handlers when offloading oil to oil tankers. Because of the long distance from shore to the oilfields, larger PSV are required in order to transport more goods to and from the FPSOs. The AHTS are also larger in Brazil, both in terms of size and engine power. Today most AHTS’ in Brazil have more than 16 000 BHP (Break Horse Power), and the engine power will likely increase in the future as operations move to even deeper waters. The power is necessary in order to pull heavy anchors at extreme water depths, while ensuring a safe operation.

As of today, there is not really a functioning spot market in Brazil; most contracts are very long, between 2 and 10 years. A typical contract with Petrobras last for 8 years, where the shipowner have a certain 4-year contract + an option to continue for 4 years. The long contracts look attractive for the banks financing the vessels, but history has shown that inflation and high cost-increases have led to several contracts being unprofitable over time.

2 Method

In this chapter we will describe the methods we have used to answer our research questions. The data gathering in our thesis has mainly been done through interviews with top management in offshore shipping companies, located both in Brazil and in Norway. We will in this chapter discuss our choice of research method, how we have collected the data, the validity and reliability of the data, the data sample and how we have analyzed the data.

2.1 Choice of research method

Qualitative vs. quantitative research methods

Research methods refer to the systematic, focused and orderly collection of data for the purpose of obtaining information from it and to solve our research questions. The methods are different depending on the techniques used for data collection and procedure. In qualitative research, findings are not obtained by statistical methods or other procedures of quantification. Qualitative research requires a different toolset from the researcher where the findings are based on rational, intuition and exploratory abilities, rather than quantitative models (Ghauri & Grønhaug, 2010).

Qualitative research is characterized by its aims, which relate to understanding some aspect of social life, and its methods that in general generate words, rather than numbers, as data for analysis. Qualitative methods seek to answer questions about the 'what', 'how' or 'why' of a phenomenon rather than 'how many' or 'how much', which are answered by quantitative methods.

Criticism of qualitative research:

- Samples are small and not necessarily representative of the broader population, making it difficult to know how far we can generalize the results
- The findings lack rigor
- Difficult to tell how far the findings are biased by the researcher's own opinions

(Bricki, 2007)

Choice of study type

It can be argued that structured and quantitative methods are more "scientific" and thereby better than qualitative research methods. We argue that the quality of a study and the

appropriate use of methods depend on the research question and the available information, meaning that qualitative studies could be just as good. Albert Einstein put it this way: *"Not everything that can be counted counts, and not everything that counts can be counted"*

The purpose of our master thesis is to analyze the offshore support industry, and especially how the operations of OSVs are different in Brazil and Norway. The choice of study method mainly depends on the type of data that is available and the formulated research question. In our research it is not possible to collect quantitative data, because the shipowners potentially could break competition law when sharing their financial information, thus a qualitative approach, with the focus on the drivers behind the different costs was more suitable for our study.

More about qualitative research, citation of Denzin and Lincoln (2000):

"Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them"

2.2 Data gathering

Primary data vs secondary data

For the purpose of analysis two types of data have been collected, primary- and secondary data. Secondary data is data that have already been collected for some other purpose. Secondary data could be published summaries or books. Market reports from shipbrokers are an example of secondary data used in this study. The main advantage with secondary data is that you save resources using less time to collect information, while the disadvantage could be that the data is not collected for the same purpose as your study, and that you do not have control of the data quality (Saunders, et al., 2009).

Throughout our study we have collected primary data through interviews with several companies in the offshore shipping industry. The gathering of primary data does normally

strengthen the study, because it gives firsthand information and valuable insights. There are however some disadvantages:

1. The process of gathering enough data is long
2. Access to target persons that are willing to be interviewed is limited
3. Researcher cannot control unforeseen responses/events
4. The data quality depends on the cooperation from the target persons (companies)

For our study we have used interviews to collect primary data.

3 types of interviews

According to Punch 2004 there are three types of interviews that can be conducted in a research paper:

1. Structured interviews:

These types of questionnaires are usually based on a standardized or identical set of questions. Saunders et al. 2009 refers to the method as interviewer-administered questionnaires. Questions in these types of interviews usually have pre-coded answers that make it easier to analyze the results later on. Structured interviews are often used to collect quantifiable data.

2. Semi-structured interviews

In semi-structured interviews the researcher uses an interview guide consisting of topics with related questions. Each interview does not need to be exactly the same and the topics and questions raised could differ depending on the interview object. The order of questions may also vary depending on the flow of the conversation. The advantage of semi-structured interviews is that the researcher allows the interview object to talk more freely. On the other hand, the structure of the interview guide could lead to topics being undiscovered.

3. Unstructured interviews

Unstructured interviews are the most informal form of interviews and should be conducted almost like a normal dialog. These types of interviews are used to get in depth information about a general area, which is of your interest. There is not a predetermined list of questions in these interviews. Instead the interview object is given the opportunity to speak freely. The advantage with this type of interview is that the researcher gets all the information the interview object wants to share, while in more structured interviews the

researcher might not manage to ask all the “right” questions. Unstructured interviews could be challenging to analyze.

Choice of interview type

Structured interviews are normally conducted to collect data that will be used in a quantitative analysis, while non-structured interviews are used to gather data that will be analyzed qualitatively. The choice of interview type depends on the purpose of the research paper. As this master thesis’ main focus is on the cost drivers behind capital and operational expenditures for OSVs in Norway and Brazil, we have found it most convenient to conduct semi-structured interviews. This will help us to figure out how the cost-groups differ in the two regions, what the drivers behind the different cost-groups are and why the cost-level is different in Brazil compared to Norway. Using semi-structured interviews does not completely narrow down the responses received from the interview participant, thus widening the potential findings in the study.

The making of the interview guide

In order to create an appropriate interview guide, that covered the most important issues within the offshore support industry, we read all the annual reports from the Norwegian shipowners operating in Brazil, in addition to reports from shipbrokers and banks covering the offshore support industry. This gave us a good picture of the topics that had to be discussed. We discussed the interview guide with representatives from both ABRAN and DOF ASA to ensure that we had covered the most interesting topics. Throughout our thesis, the interview guide was evaluated and edited after each interview, without changing the core content. All interviews were based on the same main questions. The interviewee did not receive the interview guide, it was just used as a starting point for the interview, and more specific follow up question were asked. The interview guide can be found in the appendix.

2.3 Power of results

In qualitative research reliability and validity is used as a measure of the quality of the research. The validity of the data explains to which extent the data collection method accurately measures what they were intended to measure and to which extent research findings are really about what they intended to explain. The reliability of the data explains to

which extent the data collection technique yields consistent findings and if similar observations and conclusions would be made by other researchers (Punch, 2004).

Validity

There are 2 types of validity in exploratory studies, construct validity and external validity. Construct validity is whether our empirical data measure what it is supposed to measure (Yin, 2009). To fulfil this requirement we have used several information sources. We have read reports from both the offshore shipping companies and shipbrokers, talked with people from different part of the industry and used relevant theory about the industry. We have also tried to talk with people with first-hand information about the topic under investigation, e.g. yards when the topic has been shipbuilding and ship owners when the topic has been OPEX on OSVs. We have also used a lot of time to gain knowledge about the offshore shipping industry to be able to conduct accurate interviews.

External validity is whether the results can be generalized. In our study this means whether the results are valid for other companies within the industry (Yin, 2009). In general it is difficult to generalize information based on few observations. To maintain the external validity we have chosen to focus on Norwegian offshore shipping companies present in both Norway and Brazil, and within this group we have been able to conduct interviews with all of the players, thus retaining a high external validity.

Reliability

It can be hard to fulfill the reliability requirements in qualitative studies, because the data is not gathered with the exact same structure. Further, it would be difficult for other researchers to get the same observation and conclusions due to information being gathered in different contexts and by researchers with different knowledge and experience. These factors all lead to a different interpretation of the data (Johannessen et al., 2011). This is also the case in our research. First of all, since the interviews we conducted were semi-structured they would not be identical if conducted again. Interviews with different people would result in different answers, because of different interpretation and opinions. Secondly, the business environment in the offshore shipping industry is rapidly changing and the same interview would likely give different results on a later stage. Lastly, our experience and knowledge influences the way we interpret the information and this interpretation would likely be different for other researchers.

We have tried to maintain the reliability in our research by explaining the goal of our study, our choice of sample and by attaching the interview guide.

Choice of sample

Sampling means saving work by examining the sample instead of the whole population. The sample size is the number of participant within a specific study. Increased sample size will, in general improve the quality of the results (Ghauri og Grønhaug, 2010). Our master thesis was a result of a project initiated by DOF ASA and ABRAN, where they wanted to compare the operation of offshore support vessels in Brazil with Norway. The scope was originally limited to the companies that were members of ABRAN (about 7 offshore shipping companies), but we have conducted interviews with shipbrokers, shipyards, banks and insurance companies to increase the sample and to get a different perspective on the OSV-industry.

The sample of shipowners is however limited to offshore shipping companies owned and controlled by Norwegians. In Norway, both public companies (on the Stock Exchange) and fully private companies have been included in the scope. In Brazil, both shipowners having their own EBN (Brazilian shipping company) and shipowners working through a third party (a Brazilian company) are part of the study. Interviews have in several cases been conducted with the same company both in Brazil and in Norway. The interview objects have usually been top managers (CEO, CFO, COO) within the companies, but sometimes also people at lower levels in the organization.

In terms of vessels type and vessel flag, the focus has been on companies that have PSVs, AHTS' or CSVs, with international, Brazilian or Norwegian flag. This has resulted in a wide scope, which we believe will give a correct picture of the industry, and how it is to operate as a Norwegian shipowner in the North Sea and Brazil respectively. We have conducted just over 20 interviews, had several visits to offshore support vessels and visited shipyards both in Norway and Brazil.

2.4 Analysis method

Qualitative research creates diverse and complex information, and one of the big challenges is to structure the information for further analysis (Punch, 2004). Data analysis of qualitative information requires decomposing and organization of the data and presentation of the

information with use of figures, tables and discussions (Creswell, 2007). There are a variety of methods used to analyze qualitative data, and the diversity among the methods implies that there is no correct way of data analysis (Johannessen et al., 2011).

Four steps of analysis

According to Miles and Huberman (1994) the process of analyzing qualitative data consists of three processes.

1. **Data reduction** includes summarizing and simplifying the data collected. The aim of the process is to make the data easier to handle. This can be done through interview summaries, coding and categorizing of the data.

2. **Data display** is a process of displaying the data true matrices, diagrams and graphs. Qualitative data collection produces hours of audio recorded interviews with additional notes. This information is usually comprehensive and poorly ordered. Miles and Huberman (1994) argue that displaying the data with the use of matrices, diagrams and graphs will make the analysis process easier.

3. **Drawing and verifying conclusions** is made easier by using data display. In this way you can make comparison between the data and identify relationships, key themes, patterns and trends. The conclusions cannot be drawn before all data is gathered and analyzed. Before drawing the conclusions it is important that the data is verified.

We recorded all of our interviews and took key notes during each one. After each interview, we listened to the recording and took more comprehensive notes. To make sure that vital information was not left out, we listened to the audio recordings for a second time while taking detailed notes. We then grouped the information into categories based on the interview guide and its topics. This gave us a better overview of what each interview object had answered.

After this we sorted the answers from the different interview objects based on different criteria. This gave us a better overview of the interview objects opinion of the different matters. We compared the answers from all the interviews and tried to find patterns, trends, similarities and disagreements. After having consolidated and analyzed the findings we were able to start drawing conclusions and answer our research questions.

The numerical information we got during the interviews where gathered in Excel to get an overview of similarities and differences between the different companies. We used average numbers to make comparisons between Brazilian and Norwegian vessels. The information is presented in graphs and diagrams throughout this paper.

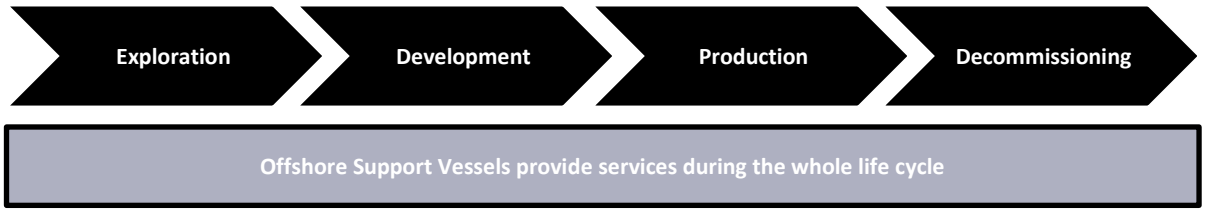
PART 1: Analysis of the external environment

In this part of our thesis we conduct 3 different analyses. In the first one we elaborate shortly on the drivers behind the demand for offshore vessels. In the second analysis we evaluate the attractiveness of the offshore shipping industry, and in the third analysis we show the differences of operating a company in Brazil compared to Norway.

3 Drivers of demand for offshore support vessels

The main task for OSVs is to support oil companies in their operations, thus the demand for offshore support vessels is dependent on the activity in the oil and gas sector. The OSVs support the oil companies at different stages in the life-cycle of oilfields, as shown in the illustration underneath.

Figure 3: Offshore Support services along the life-cycle of an oil field



(Yeo & Øy, 2010)

The exploration and production (E&P) activity can be a good overall indicator of the demand for offshore support vessel. But as explained under the chapter “types of vessels”, PSVs, AHTS and CSV have different purposes, which means that each segment has different drivers of demand.

The exploration and production activity is driven, to a large extent, by the oil price. As seen lately (October 2014) in the Norwegian newspapers, analysts and experts on the oil and gas industry are afraid that the investment level on the Norwegian continental shelf will decrease substantially if the oil price decrease to a level lower than $80, showing how the E&P activities is correlated with oil price (E24, 2014). The current oil price is $65, and most companies in the oil and gas industry are expecting a challenging time going forward. We

will now briefly explain the drivers behind the demand for the three different types of offshore vessels.

3.1.1 PSV

PSV vessels mainly do three types of jobs. 50-60 % of the demand is related to production support, both for fixed and floating units, 30-40% of the demand come from rig support and around 10% of the demand is related to construction support. This means that the demand for PSV vessels is mostly influenced by the numbers of fields in production. Offshore production is long lasting processes and it will be a constant demand for PSV vessels even though the E&P spending decline. PSV vessels supporting drilling rigs are exposed to a bigger change in demand as the drilling activity is influenced by the oil price. The construction support demand also varies with the oil price and the market situation. Oil companies do more maintenance on subsea equipment and installation of new equipment when the oil price is high and they have good cash flows, which will lead to a higher demand for construction support during good times.

The future demand for PSVs is difficult to anticipate, because it is hard to know what the oil companies will do regarding exploration of new fields. If the oil price is low the oil companies tend to delay projects and it is therefore difficult to know when projects will start. Even though most of the PSVs are operating for producing units, a decreasing activity in the exploration of new fields will lead to a lover demand for PSVs. However, today's rigs are bigger, they drill at deeper water and use more fuel due to DP3 systems, all leading to an increasing demand for PSV vessels. The supply of PSVs on the other side is huge. At the moment, the order book is 40% of the existing fleet. The huge supply of new vessels will cover any increasing demand from the oil companies; therefore the dayrates for PSVs are predicted to remain low going forward (DNB Markets, 2014).

3.1.2 AHTS

The main task for anchor handlers is to tow rigs from one oilfield to another, pre-lay anchors and anchor rigs and other offshore installations, like floating production units (FPU), to the seabed. As a result, the demand of AHTS is mainly driven by the rig activity offshore. The offshore drilling fleet has grown significantly over the past decade and is expected to grow by 10% in 2015e and 6% in 2016e (DNB Markets, 2014). A good indicator of the balance in the AHTS market is the amount of AHTS/rig or FPU, that is the number of AHTS per working

rig or FPU. If this relationship (fraction) remains constant, the work for AHTS should remain quite stable. The last decade, the number of AHTS per rig has increased. Because many new projects are in deeper water with harsh environments, larger rigs are required, which in turn increases the demand for large vessels. The fact that new rigs are built with dynamic positioning systems somewhat reduce this increase in demand. In terms of the market going forward, we believe that the rates and utilization will remain the same as today's level, as the growth in the number of AHTS is about 6%, while the growth in number of rigs is 10% (DNB Markets, 2014). This stable outlook could however change if the oil companies continue to decrease their investment activities as a result of a persistent low (decreasing) oil price.

3.1.3 CSV

The construction vessels do a variety of different tasks, but the biggest driver for the CSV demand is the number of subsea trees being installed and the meters of cables (pipes) being laid. With increased number of deep-water fields, subsea constructions are more and more common. These leads to an increased demand for CSVs because new subsea constructions need to be installed and old constructions need maintenance. Anticipating the demand for CSVs in a longer run is difficult because of the uncertainty related to when the oil companies will start their projects. The number of subsea trees ordered will drop by 12% to around 500 subsea trees in 2014 compared to 2013, but it will be a quick rebound in 2015 with more than 600 subsea trees ordered. The rates and utilization are predicted to remain on the same level as they are today.

3.1.4 Overall outlook

The outlook for all three types of vessels look stable and the rates will remain on the same level as today. We could however see a decrease in dayrates if the fall in oil price continues. The AHTS segment is the segment mostly influenced by the E&P spending, and thus the oil price. A persistent low oil price can therefore lead to lower rates for AHTS. The PSVs and CSVs rates are not that strongly influenced by the oil price in the short run, as many of these vessels are needed on already started long term projects. In the longer run however, a decline in E&P spending will influence the rates negatively for these vessels as well, as future projects can be delayed or cancelled.

4 Strategic Profitability Analysis

Porter's Five Forces approach considers how the company's performance depends on conditions within the given industry (Peng, 2009). According to Porter (2008), the industry structure, manifested in the five competitive forces, sets industry profitability in the medium and long run. Understanding the competitive forces, and their underlying causes, reveals the roots of an industry's current profitability while providing a framework for anticipating and influencing competition (and profitability) over time (Porter, 2008). To determine the attractiveness of an industry, not only the competition among the industry rivals is taken into account, but also the threat of new entrants, the threat of substitutes, supplier power and customer power.

We will in this section describe the characteristics of the OSV-industry in Brazil and Norway, using the five forces framework. By understanding the competitive situation in the industry and how the different players affect the industry profitability, it becomes easier for companies to figure out what measures they can take to succeed. The five forces framework is also helpful in understanding the drivers behind OPEX and CAPEX in Brazil and Norway.

4.1 Rivalry among competitors

The intensity of the competition within the industry is determined by the degree of rivalry among existing companies. In industries with intense rivalry it is harder for a company to achieve a substantial profit margin. The following factors drive the competition in the OSV industry:

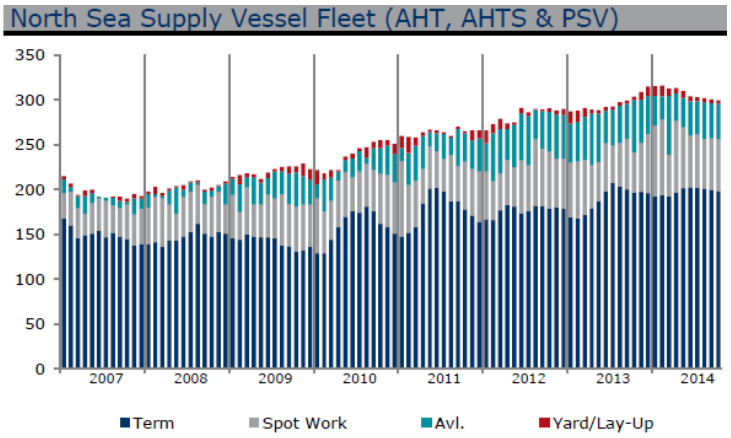
1. Growth in the industry
2. Exit barriers
3. Absence of strong market leaders
4. Differentiation

Industry growth

Low growth in the industry will increase the rivalry among existing companies, because they would try to capture market shares from each other. The OSV industry has grown rapidly the last 30 years due to high activity in the oil and gas industry, driven by an increasing oil price. Lately the growth in Norway has declined and the fight for market shares has increased. The reduction in the fleet (AHTS, PSV) is shown in the graphic underneath. The

development of Johan Sverdrup should however lead to an increased demand for OSVs (Statoil, 2014).

Figure 4: Overview of the North Sea supply fleet 2007-2014 (Term, Spot, Available and Yard/Lay-Up)



(RS Platou, 2014)

In Brazil the demand for OSVs is driven by Petrobras' activity, which has currently slowed down due to internal problems and political issues. The government has decided that Petrobras needs to be the sole operator on all the Pre-salt fields, which has delayed exploration and development. Because Brazil is not yet oil self-sufficient, Petrobras has experienced liquidity problems because they have had to buy oil on the international market and sell it at a lower price in Brazil, so that the government manages to keep the fuel prices low. Despite these problems Petrobras says that they will double the production of oil by 2020 and this will create a demand of 200 new OSVs. The growth is therefore anticipated to be large in Brazil.

In good times, when growth forecasts are positive, shipowners tend to order vessels to increase their market share. When competitors see that one shipowner is trying to capture market shares, they often start ordering new vessels to secure their own position. This eventually leads to an oversupply of vessels, which in turn decreases that rate and the companies' profitability. Thus, the growth in the industry does not necessarily lead to higher profits for the shipowning companies due to the fight for market share.

Exit barriers

High exit barriers increase the competition, because it becomes difficult for companies to leave the industry. The OSV industry has quite low exit barriers because it exists a quite

liquid market for sale and purchase of vessels. Due to the cyclical fluctuations in the OSV market the vessels prices vary, it is therefore not given that you are able to get a good enough price for your vessel when you want to exit the market.

Brazilian built vessels are less tradable than international built vessels because of their high building cost. It can therefore be more difficult to exit the Brazilian market, which again can lead to increased competition in this market.

Concentration among competitors

A low concentration among competitors will lead to increased rivalry because no one is able to control the market. The total fleet of OSV vessels consists of approximately 1400 PSVs, 1400 AHTS and 700 CSVs. The market share of the 10 biggest companies is around 30% in all the three segments. This means that the OSV industry is very fragmented, which imply a high degree of competition.

The concentration varies in different geographical regions. In the Norwegian and Brazilian market there is no sole dominant player in any segment. The absence of an industry leader makes it difficult for any company to lobby for industry interest. This is partly solved with companies forming alliances like ABEAM and ABRAN in Brazil, and NSA in Norway.

Differentiation

The services offered by the different OSV companies are very similar. The differentiation is low, especially within the PSV market. As long as a vessel meets the technical requirements in a tender, the price offered to the charterer is without doubt the most important factor deciding who will win the contract. However, fuel consumption, safety records and previous performances also impact the decision. In Brazil, Petrobras have an excellence program that rewards companies with good safety records, commitment to doing business in Brazil and good previous achievements. Companies with good rankings in this program receive better rates than other companies. In Norway, Statoil has similar audit programs where they rank their suppliers based on similar type of criteria. Companies try to differentiate themself through minor measure. Solstad offshore has for example started a “green operation” program where they save fuel on their vessels, and thereby decrease the total cost for the charterer. This could give them a benefit in a tendering process.

Within the more advanced vessel segments the vessels are more customized for special geographical areas and operations, and therefore somewhat easier to differentiate from other players.

Overall, we consider the rivalry among companies in the OSV market to be medium to high. The market is very fragmented, and it is difficult to differentiate from others. The growth in the market do to some extent compensate for these factors.

4.2 Threats of substitutes

A substitute, according to Porter (2008), is a product which performs the same or similar function as an industry's product, only by different means. Substitutes represent a threat to the established company if there is high enough incentive for customers to switch. This usually occurs if:

- Substitutes have superior quality than existing products.
- Substitute products have sufficient price-performance trade-off
- Buyers face low switching cost.

Historically, the OSV industry has not had any immediate substitutes threatening the operation of offshore support vessels. This has however changed during the last years, as more and more deep-water rigs have been equipped with dynamic positioning (DP) systems. DP systems are used to position vessels/rigs in the correct place in relation to the seabed and have made it possible for rigs to move from one oil field to another by it self. Originally, rigs have been moved using AHTS, and they still are today. But with the new rigs having their own DP systems, they are able to maneuver the rig without help from an AHTS, thus the rig itself could be a substitute for the AHTS.

The DP systems are a bigger substitute to AHTS in Brazil. For the DP system to work the water depth need to be more than 1000 meter. Only a few places in the North Sea have such water depths, while it is more common in Brazil. Using the DP system to move the rig or keep the rig in position is in some cases not profitable because of the large consumption of fuel. If a rig is meant to drill at specific location for a long time, it is usually better that it uses anchors instead of its own DP system to stay in position.

For PSVs, there are not any substitutes. The rigs will always need supplies for their operations offshore and the PSVs are the cheapest mode of transport as of today.

Some of the CSVs' operations, like installing subsea trees could also be done by rigs, but it is cheaper for the oil companies to use a CSV, the rigs are not a real substitute.

In conclusion, the threat from substitutes are present to a certain degree for AHTS, but inexistent for PSV and CSV.

4.3 Threats from new entrants

New entrants in an industry increases the supply, and their desire to gain market share puts pressure on the existing players, which may result in price wars and cost pressure. Especially large multinational companies adding a new country to their portfolio can easily leverage developed resources and therefore increase the rivalry and add new know-how which might reduce the profit of existing companies (Peng, 2009). The threat of new entrants is defined by the entry barriers in the industry, including:

- Economies of scale and scope
- Capex requirements (Sunk cost)
- Knowledge/experience
- First mover advantage
- Regulation restriction
- Access to distribution channels
- High exit cost for current players
- High fixed costs and existing players' ability to cut prices to keep up volume
- High switching cost for customers

We have observed that the Economies of scale/scope, CAPEX requirement, the knowledge and experience and the regulation restrictions are the most important factors defining the threat of new entrants.

Economies of Scale/Scope

Having several vessels is an advantage for the shipowners because they can divide the administration cost like accounting, vessel management, etc. on several vessels. Have a bucket of crew and a bucket of vessels (a fleet) is easing the operation, because of the possibility to move crew from one place to another when needed.

A wide range of vessels could also be an advantage for shipowners because it makes it possible for them to provide a full range of services to the oil companies. When the oil companies have good experience using a company's PSV, it is easier to use the same company's AHTS, rather than screening the market for a new supplier. However, in practice we see that companies do not get any advantages for providing a full range of services.

CAPEX requirement

The shipping industry is a capital-intensive industry where investments in expensive vessels are necessary in order to operate. A new PSV could cost around 55 M $ in Norway and as much as 75 M $ in Brazil. As long as the investments are profitable it should not be a problem to get funding in an efficient capital market, but due to the risk related to the investment, not everyone can start an offshore shipping company tomorrow. The fact that the shipping industry is a cyclical industry makes it more risky, thus harder to raise capital. The high capital investment is a large barrier for potential new entrants.

For companies that are already established in one region (country) with a large fleet, wanting to enter into new regions, raising capital is easier. These companies often have financial muscles, and they can leverage their already existing resources. This means that there will always be a high threat of new entrants from existing players that are located in other regions.

Knowledge and Experience

The complexity of the operation conducted by offshore support vessels varies from the PSV segment to the CSV segment. PSV-operations are pretty simple, as one are only supplying the oil rigs with different type of goods. PSVs could be seen as the truck of the sea, and are by the oil-companies often looked at as a commodity (standardized product). AHTS perform more complex operations like anchor handling and towing, thus requiring more specialized knowledge. The CSV segment is even more complex, different knowledge is required on a diving support vessel than on a pipe lay support vessel.

The knowledge and experience needed to be able to operate these vessels in a safe and efficient way is a large entry barrier for investors that want to start a greenfield operation. Several investors, especially private equity firms have been attracted by high margins in the shipping industry during good times, and have invested a lot of money, especially in PSVs,

because of its “simple” operation. The knowledge barrier can be avoided by being a “tonnage provider”, meaning that you purchase the vessel, before renting it out to another shipowner who operates it for you.

Nevertheless, to be able to establish a shipowning company, that not only will own the vessels but operate them as well, knowledge and experience is essential.

Regulation restrictions

Even though the Brazilian market has seen companies entering after the Pre-Salt discoveries in 2007, there are several regulations making it hard for foreigners to establish a company in Brazil. First of all, to be able to operate as a shipping company and enter into contracts with oil companies in Brazil the shipowner must have an EBN, explained later in chapter 6.2.1. Secondly, a certain % of Brazilian crew is required depending on how long your vessel operate in Brazilian waters (according to RN72). In addition, there are environmental regulations that need to be followed and several other requirements from Petrobras. These regulations make it a challenge to enter into the Brazilian market.

In the North Sea there are not many entry barriers. Everyone can enter the market regardless of the flag the vessel is flying and the nationality of the crew. If the vessel is going to operate on NCS most of the charterers do require the crew to speak a Scandinavian language. The charterers in the Norway also requires vessels with high redundancy and high technical standards, often with special equipment like fire fighting and oil spill recovery systems, making it harder to enter this region.

In summary, the threat of new entrants is higher in the less complicated PSV-segment, where the capital investment and the knowledge requirements are lower, while it is lower in the AHTS and CSV segment. Regulations are reducing the threat of entrants in Brazil. Overall the threat from new entrants is high.

4.4 Bargaining power of suppliers

High bargaining power of suppliers allows them to get better deals, which decreases the profit margin of the counterparty or makes the operations of the latter harder because of dependence on the supplier (Peng, 2009). Porter (2008) provides several drivers of high supplier power:

- Supplier concentration is higher than that of supplied industry
- Supplier's ability to serve several industries with equal importance for the sales
- High switching costs in supplied industry and low switching costs for the supplier
- Ability of suppliers to integrate forward
- Lack of substitutes

In the following section we focus on how the supplier concentration leads to power over the shipowners, and how the power relationship is affected by the market situation. We have not focused on other drivers that could lead to high supplier power. It is however worth mentioning that several shipyards are able to supply more than one industry, which could make them less dependent on the OSV industry. As an example, Vard Niteroi is producing oil tankers for Petrobras in addition to the AHTS and PSV they produce for the OSV companies.

The most important suppliers for the shipowners are labor force, that is the crew needed onboard of the vessels, and the shipyards, both shipyards building ships and the shipyards providing dry-dock facilities.

Concentration in the industry of suppliers

The supplier concentration varies depending on which region the shipowner is operating in. In the North Sea, there are many reliable shipyards and dry-dock facilities leading to a low concentration among the suppliers and good balance between supply and demand. In Brazil however, there are only a few commercial shipyards that are able to produce high-end, medium to large-sized offshore support vessels, thus it becomes easier for the shipyards to gain market power and charge premium prices.

There are about 10 shipyards building OSVs in Brazil, where the four main ones are Vard and Alianca in Rio de Janeiro, Navship in Santa Catarina, and Wilson Sons in Sao Paulo. The problem is however that many of these shipyards are owned by shipowners that only (mainly) build for their own use. Navship is building for the American company Edison Chouest, while Alianca and Wilson Sons are building ships for the Brazilian companies CBO and Wilson Sons respectively. This means that the only commercial yard that is able to build medium and large vessels with international standards is Vard Niteroi/Vard Promar. There are other shipyards that are able to build AHTS, like Keppel Singmarine and Mac Laren, but they are however more focused on offshore equipment and semi-submersible platforms.

Thus, the concentration of shipyards within the offshore support industry is quite high in Brazil, giving them some power over the shipowners (Banco Itau, 2014).

In terms of docking-slots in Brazil, the supply is even worse than for the shipyards. There are only 2-4 docs that could be used for medium to large support vessels in the Rio de Janeiro area, Renave, Maua and Dockshore (floating dock) located in Niteroi, being the most reliable ones. All the shipowners that we have talked to in Rio emphasize that there is a lack of good dry-docks, which causes a huge imbalance between the supply and the demand.

When it comes to the labor force, the marine and offshore crew has had high bargaining power in many parts of the world the last years, especially in Brazil. Brazil has had a lack of qualified, well-educated workers, leading to high salaries and competition among the shipowners and rigs to get the best seafarers. In Norway the supply of qualified crew has been much better than in Brazil. The Norwegian companies are able to recruit the people they need without problems.

Market situation - Demand from Shipowners

Higher supplier concentration than that of the supplied industry is an important driver of a suppliers' power. Nevertheless, the suppliers' power depends on the market situation (where in the cycle the OSV-industry is at a specific time). During good times, every shipowner wants to build vessels because the day rates are high, thus the shipyards can charge a higher price. But during a downtime in the cycle the demand is lower, and shipyards are willing to build ships at lower prices, not even covering all their costs. In good times, not all shipyards will take whatever price they want, they are careful not to exploit their power to much, as it could potentially destroy a good relationships with the shipowner. High prices would also increase the attractiveness of the shipyard industry, and could lead to entrance of new players, which would lead to more competition and lower prices.

In summary, the market power of the suppliers is higher in Brazil than in Norway, and is mainly driven by the lack of commercial shipyards and dry-docks, in addition to the lack of qualified professional workers. Viewed in isolation, this leads to a high supplier power, especially in Brazil, but because the suppliers' power is dependent on the market situation in the OSV industry the power relationship can vary over time.

4.5 Bargaining power of buyers

Buyers with high bargaining power can have a negative influence on the markets profitability. Buyers can reduce industry profitability by demanding better or more services for the same price, by demanding lower prices or by inducing price wars between service vendors. The most important factors that can indicate high bargaining power in the OSV industry are:

1. Few and large buyers with large volumes of purchases
2. Price sensitivity and switching cost
3. Information availability

Buyer concentration

The concentration of buyers is high within the OSV industry, especially in the Brazilian market where Petrobras is operating between 80 and 90% of the oilfields. This gives them huge power when bargaining with the OSV companies who have a much lower concentration. One single OSV company has little possibility to put pressure on Petrobras because Petrobras have so many other alternatives, and is such an important customer for all the players in the industry. To be able to do business in the Brazilian market the OSV companies have to follow Petrobras' rules. Other big oil companies like Shell, Exxon Mobile, Statoil and Chevron have only minor market shares in Brazil.

In the North Sea the market concentration among the oil companies is lower than in Brazil. On the NCS the largest player, Statoil, have about 70% (Store Norske Leksikon, 2014) market share. On the British continental shelf however the market is fragmented, with no dominant player. This means that Statoil does not have a dominant position in the North Sea. Thus, the OSV companies have several alternative customers to whom they may charter their vessels. However, the concentration among OSV companies is even smaller than that of the oil companies. In the end, the buyers have more power, at least under normal market conditions.

Price sensitivity and switching cost

The cost for oil companies related to services done by OSVs are low compared with the total cost of their projects. The rigs can have dayrates around 500' USD per day, while the day rates for OSVs normally are between 30' and 100' USD per day. The cost of OSV services

represent as little as 6% of the oil companies' total cost. Because of this the price sensitivity towards the OSV companies is low. If they need an OSV to proceed with a project they will pay a high price if that is necessary. In Norway, where a large part of the market is based on spot contracts, this can lead to very high day rates when there is a shortage of vessels. In Brazil, the market is mainly based on long term contracts, and it is therefore not common for oil companies to suddenly need a vessel. On the other hand this leads to an oversupply of vessels for the charterers in low activity periods.

Most OSVs are standardized and vessels from different companies can do the same tasks. The PSV segment is the most standardized; PSVs can almost be seen as a commodity. Because of this the switching cost for the oil companies is low. This puts pressure on the prices when several vessels are available. More specialized vessels, like large AHTS and CSVs, are less standardized. The switching costs become higher, because it is more difficult to find another vessel that can perform the same work.

Even though the OSVs are crucial for the oil companies operations, it has historically not been in their interest to build their own vessels. Lately several oil companies have due to increased costs decided to build their own rigs, but they have not yet started to build their own OSVs, at least not to a big extent. This can be because of the unique skills needed to operate the most advanced OSV, and because there has been no super profit[2] within the less specialized vessels.

Information availability

Shipbrokers all over the world have constant information about the available vessels, and what day rates the chartered vessels receive. This is information the customer can get hold of by talking to the shipbrokers. The oil companies know which rates they can expect for different vessels and can push the prices down if they know that more vessels are available. The shipowners also have access to the shipbrokers' information, and they use this to bid below each other.

To summarize, we consider the bargaining power of buyers in the Brazilian market to be high, mostly because one player have a huge market share. In the North Sea, there are more buyers and none of them have the same market share as Petrobras, thus we conclude that

[2] Based on financial statments from annual reports. (Deep Sea Supply, 2014, DOF ASA, 2014a, Havila Shipping, 2014, Olympic Shipping, 2014, Siem Offshore, 2014, Solstad ASA , 2014, K-Line Offshore, 2014)

the bargaining power of buyers in the North Sea is medium to high. Overall the bargaining power of buyers is medium to high.

4.6 Summary

The offshore shipping industry in Norway and Brazil is characterized by high competition among the players; this is to some extent reduced because of growth in the industry. The threat from new entrants is high, even though there are some entry barriers, especially in Brazil. The threats from substitutes have historically been non-existing, but rigs with new DP systems can pose a threat for the AHTS segment. The bargaining power of suppliers is high in Brazil because of low concentration among suppliers. In the North Sea the bargaining power of suppliers is lower due to a more developed supplier market. The bargaining power of buyers is high in both markets, because the concentration among OSV companies is low compared to the concentration among buyers. Ove all, based on Porter's framework, the offshore support vessel industry does not look very attractive. But several of the factors are related to cycles within the industry, and the framework does not give an accurate picture of the profitability in the industry. A further growth in the industry will for example lead to higher attractiveness.

5 Country analysis - Norway and Brazil

The CAGE framework is developed by Pankaj Ghemawat (2007) and emphasizes to illustrate the differences between a target country and a home country. The framework helps making distances visible for managers and could be used to assess whether it is a good strategic fit for a company to enter into the target country. The framework is divided into differences in cultural-, administrative-, geographic-, and economic distance. Greater differences are usually associated with greater costs (Carpenter & Sanjyot, 2012).

We will in this section focus on the differences between Norway (home country) and Brazil (target country). We will use the framework to illustrate the differences between the countries, and highlight the most important factors Norwegian companies need to consider before entering the Brazilian market.

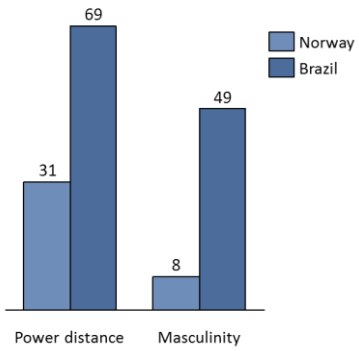
5.1 Cultural distance

Cultural distance includes differences in language, norms, values, trustworthiness and religion. Some of the factors like language and religion are easy to observe, but differences in norms and values are harder to identify. Hofstede's (2001) 5 dimensions of culture can be helpful to understand the cultural differences between Norway and Brazil. We will also base some of our statements about cultural differences on information we got through the interviews.

The most obvious cultural difference between Norway and Brazil is the language difference. In Norway, Norwegian is used both in the daily life and in the business environment, while Portuguese is the dominant language in Brazil. In both countries English is the second language and could be a way to communicate, but in many situations the English level among Brazilians is not high enough for this to be possible (EF, 2014).

Differences in norms and values and lack of trust are harder to identify. If we look at Hofstede's (2001) study we see that the power distance is higher in Brazil. This means that Brazilians are more acceptant of strict hierarchy and they do as they are told, even though they do not agree with the decision. This is important for leaders to understand when working with Brazilians. On the dimension masculinity Brazilians have a much higher score, meaning that they appreciate achievements and material rewards more than in Norway. An example is that Brazilians tend to switch jobs if they get marginally higher salaries. Another cultural difference several interview objects point out is that many Brazilians often try to find the easiest way to solve a task. In shipbuilding and ship repair accuracy is important, and what seems to be the easiest solution at the time can lead to problems and increased work in the future. The differences pointed out by Hofstede are shown in the graphic underneath.

Figure 5: Hofstede(2001) dimensions - Power distance and masculinity



(Hofstede, 2001)

5.2 Administrative distance

The administrative distance consists of differences in laws, government policies, currencies, or trade activities. Especially in industries that are considered vital for a country, government intervention may be a crucial factor (Carpenter & Sanjyot, 2013). Differences in bureaucracy and corruption can increase the cost of operating in a foreign country. Administrative distances can be measured by indices such as “Doing business” created by the World Bank, indicating administrative barriers in several countries.

The administrative distance in Brazil is substantial compared to Norway. Looking at the “doing business index”, Brazil ranked 120 out of 189 countries, while Norway was ranked number 6 (The World Bank, 2013a). As seen in the table underneath, Brazil ranks worse than Norway in all aspects. The complexity of the tax system is especially challenging for shipowners expanding their operation to Brazil. For a mid-sized Brazilian firm, it takes 2,600 hours to prepare the annual tax return; almost ten times the global average (The Economist, 2013a). Several representatives from the shipowning companies we interviewed emphasized the complexity of the tax systems. Even the Brazilians do not understand it. Brazil ranks 123 (Norway 24) on “trading across borders”. This reflects a big issue for Norwegian shipowners in Brazil. Brazil is a protectionist country, and has high import taxes to protect their own industry. Because of a low presence of European and Norwegian suppliers in Brazil, the shipowners are forced to import a lot of spare parts and equipment for vessels, driving up the costs. Furthermore, Brazil is still regarded as a corrupt country, ranking 72 (Norway 7) out of 177 areas and economies (Transparency International, 2013).

The table underneath summarizes some of the rankings provided by Transparency International.

Table 3: The World Bank rankings - ease of doing business in Norway and Brazil

Economy	Starting a business	Dealing with Construction Permits	Registering Property	Paying taxes	Trading Across Borders	Enforcing Contracts
Brazil	167	174	138	177	123	118
Norway	22	27	5	15	24	8

(The World Bank, 2013a)

All the rankings mentioned show that there is a big administrative distance between Norway and Brazil. Offshore Shipping companies must expect higher costs related to dealing with these challenges. The administrative staff in offshore shipping companies in Brazil will definitely be larger than in Norway, driven mainly by more work related to tax issues and paperwork requirement from the main charterer. The oil industry is important for the Brazilian economy, thus the government has taken actions in order to protect and favor local workforce and industry. The industry will likely have more interventions from the government in the future. Petrobras, the main charterer of vessels in Brazil is controlled by the Brazilian government, making it easy for politicians to intervene in the oil and gas industry.

5.3 Geographical distance

The geographical distance is defined as physical distance, difference in size and climate, absence of country borders and time zones. Geographical distances can make business more difficult as well as more costly. A typical example is travel costs associated with meetings. Another major challenge is cooperation and communication between the office in Brazil and the office in Norway, because of differences in time zones.

The physical distance between Norway and Brazil is considerable; it is more than 10 000 km between the two countries and the travel time is on average 20 hours. This makes it difficult for people to commute between the two countries, and it is therefore hard to have direct control of the business in Brazil from Norway. Norway and Brazil are in different time zones, with Brazil being 5 hours behind Norway for most of the year. This means that the work day

in Norway ends before lunch in Brazil, and cooperation between the two countries must be done in the morning Brazilian time.

For offshore shipping companies the possibility to move your vessels from one region to another is important because this makes it possible to take advantage of good times in specific regions. However, the sailing time from Norway to Brazil is about 1 month, which means that vessels operating in Brazil are not easily moved to Norway.

5.4 Economic distance

The most important differences between Norway and Brazil that could create challenges for the Norwegian shipowners are the differences in cost or quality of information and knowledge, human resources and infrastructure.

Brazil, as opposed to Norway, has had a rapidly growing economy with a GDP growth above the world average since 2005, though with a decline in the years subsequent the financial crisis. While Norway is considered a well-developed country, Brazil is still considered to be an emerging market.

The most obvious source of economic distance in Brazil is related to human resources and knowledge. Brazil has over the last years had a lack of professional workers and seafarers, making it tough and expensive for the shipowners to recruit the right people for the jobs, both on the vessels and onshore. In terms of infrastructure in Brazil, this was ranked 114th out of 148 countries by World Economic Forum (The Economist, 2013b). The naval infrastructure is insufficient, there is a big lack of dry-docks for the offshore vessels, and some ports in Macae[3] are not deep enough for the largest vessels, forcing them to sail to Rio to change crew.

However, the outlook for the oil and gas industry in Brazil is looking good. Petrobras forecasts a doubling of the production (activity) in Brazil within 2020, which should create a huge demand for offshore support vessels (ABRAN FGV Seminar, 2014).

[3] Macae is a port North of Rio de Janeiro. Convenient to use for crew change because of its location.

5.5 Summary

There are several major differences between Norway and Brazil. The cultural differences are considerable, both because of different languages and several differences in norms and values. Big administrative differences related to dealing with tax issues and government regulations are important to acknowledge. The geographical distance between Norway and Brazil is also big, mostly because of the physical distance, but also the time zone difference plays an important role. The most important differences for offshore shipping companies are related to economical differences. The lack of skilled workforce has been (and still is to a certain extent) large in Brazil, and inefficient infrastructure is causing logistical issues along the value chain. In order to succeed when entering Brazil, Norwegian shipowners have to keep these factors in mind.

Part 2: Analysis of company specific factors

In this part we will analyze the drivers behind the operational and capital expenditures related to operation of OSVs in Norway and Brazil. We start by analyzing the OPEX followed by the CAPEX, with Norway as benchmark in both cases. Thereafter, a brief presentation of tax regimes and issues related to foreign currency is presented. We end this part with an investment case where we compare two scenarios, building and operating an AHTS in Brazil or building and operating an AHTS in Norway.

Throughout our interviews with the shipowners the main focus has been on the operational expenditures and the capital expenditures related to OSV-operations. We have had less focus on costs related to tax and currency even though these topics have been discussed. The reason why we have had this approach is because we believed it would be easier, both for us and the interview objects, to talk about the costs related to the operation of the vessels, and that we would receive more interesting information.

In the section about OPEX, our main focus has been on the costs directly related to the operation of the vessels. This comprises costs related to crewing, technical, insurance, breakdown, inspection, bunkers, port fees and pilot fees. Costs related to the management of the vessels and its crew, and administration costs related to other support functions onshore like HR, procurement, legal, accounting, etc. have not been prioritized. The reason for this choice is mainly that we do not have the capacity to cover everything, but also the complexity in relating these costs to specific vessels.

In the section about CAPEX, the main focus has been on costs related to building vessels and periodic maintenance (docking) of the vessels.

6 OPEX

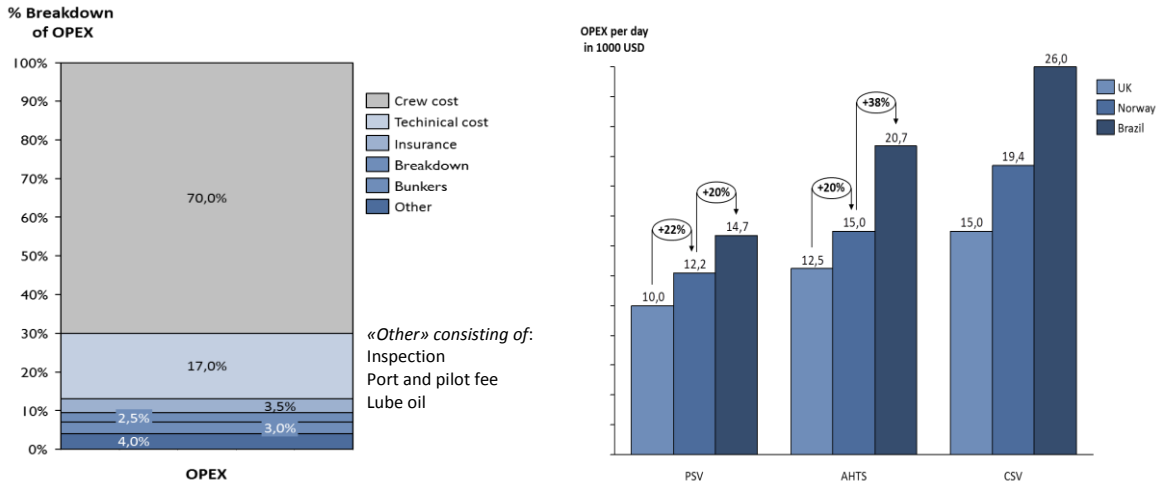
In the following chapter we will discuss in detail the different drivers of the operational expenditure (OPEX) for OSVs in Brazil and Norway (The North Sea). The North Sea is the

benchmark and will be presented first. If nothing else is stated, the analysis is based on information from interviews.

We have divided the OPEX into several groups; crew, technical, insurance, breakdown, bunkers and lube oil, port and pilot fess, inspection and other. We will discuss the different cost groups and the associated cost drivers separately, starting with the most important first. The graph on the left shows a breakdown of the OPEX for an OSV vessel. These are average numbers based on the interviews we have conducted, and vary from shipowner to shipowner. They do however give a good picture of the main cost group. The graph on the right shows the average total OPEX for vessels operating in Brazil, Norway and UK for different vessel segments (PSV, AHTS, CSV).

Figure 6: Average breakdown of OPEX for supply vessels in the North Sea and Brazil

Figure 7: Average daily OPEX (1000 USD) for PSV, AHTS and CSV



6.1 OPEX - Norway

The North Sea is mainly divided into 2 regions, the UK side (British continental shelf) and the Norwegian side (Norwegian continental shelf). We will refer to the two regions as UK and NCS. The North Sea is the most developed offshore region in the world; everything is set for the shipowners to engage their business effectively. There are no specific challenges that lead to a higher OPEX in the North Sea compared to other regions; it's rather the price and prosperity level in Western Europe that drives the operational costs. The OPEX is about 20% higher in Norway compared to UK, which is exclusively due to difference in crew cost. The higher crew cost arises because vessels on the NCS fly the NOR-flag and follow Norwegian wage-tariffs.

We will in the following section go into detail on the different operational costs in the North Sea and the key drivers behind the costs. As one can see in the breakdown of OPEX graphic above, the crew cost and the technical cost are the 2 most important costs; this is true both for the North Sea and Brazil. These costs are always covered by the shipowner himself. Insurance, breakdown and inspection costs are also covered by the shipowner, but represent a much smaller part of the total OPEX. Bunkers, lube oil[4], port and pilot fees is covered by the charterer when the vessel is on a contract (Norwegian Shipowners' Association, 2014).

6.1.1 Crew

The crew cost accounts for 65-70% of the OPEX on OSVs working in the North Sea. With crew cost we include wages, cost related to training of crew, travel expenses, different types of social costs as well as food. The main drivers of the crew costs in Norway and UK are wage tariffs which is driven by the choice of flag, the number of people onboard the vessels and the shift system. Social benefits, inflation and the supply of professional workers also have an effect on the crew cost, but not in an extraordinary way.

Cost drivers

Flag regimes and wage tariffs

There is no flag requirement from the Norwegian government when operating on the NCS. Shipowners could use Norwegian (NOR) flag, Norwegian International Ship Register (NIS) flag or any international (INT) flag. The advantage with NIS/INT is that you do not have to follow Norwegian wage tariffs, but the disadvantage is that you are not under the net wage regime in Norway, and with NIS flag you cannot operate between two Norwegian ports. Most clients on the NCS require Scandinavian speaking crew, thus most shipowners have NOR-flagged vessels. Flying NOR-flagged vessels makes it easier to recruit Scandinavians. Statoil, who has more than 70% market share on the NCS has a Scandinavian language requirement. They will choose a NOR-flagged vessel over an INT-flagged vessel if they can. The reason for this is that Statoil want to eliminate any risks related to communication problems between the rigs and the vessels, ensuring a safe operation. Thus, all shipowners emphasize that they need NOR-flag when operating on the NCS, especially for PSVs and AHTS. For vessels in the spot market and for CSVs working on shorter contracts (projects)

[4] Lube oil could an expense covered by the shipowner as well.

there are exceptions, these often have international flags. At the end of the day, the oil companies in Norway will actually take whatever tonnage is available in the market if they really need a vessel, even if that means chartering an international vessel. There are currently 200 vessels with NOR-flag in the North Sea and about 310 vessels with NIS or INT-flag. Most of the vessels without NOR-flag are working on the UK-side of the North Sea.

The NOR-flagged vessels must follow Norwegian wage tariffs, which are higher than the comparable tariffs in UK. Comparing two sister vessels (PSVs), operating in UK would cost around 50-55 thousand NOK per day, while operating in Norway costs around 70-75 thousand NOK per day. The difference of 15-20 NOK is exclusively related to differences in crew costs. The high wage tariffs are the main driver of the crew cost in Norway.

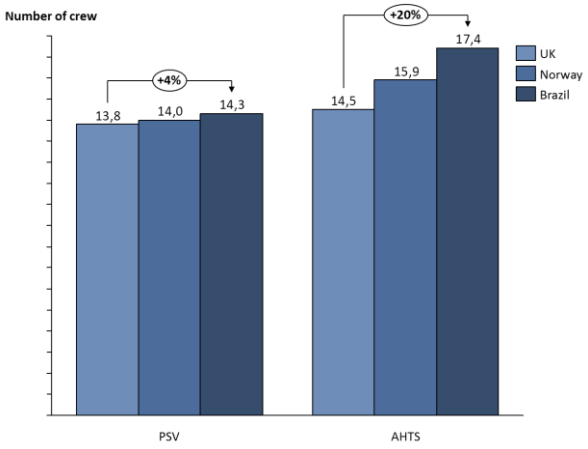
The crew salary level does not change substantially from one vessel segment to another, but the salaries are a little higher on more advanced and complex vessels. Nor is there a big difference between high ranked officers and low ranked officers. A captain normally earns from 800 000 to 1 million NOK, while a newly educated able seaman earn around 500 000 NOK. This is different from Brazil where the salary level change quite substantially from one segment to another and from low ranked positions to high ranked positions. Comparing UK with Norway, we see that the salary level for captains are pretty similar, but that the salary level for low ranked officers are much lower in UK, as shipowners are using Filipinos, Poles and other foreign workers to a larger extent.

Number of seafarers

The number of crew needed onboard a vessel is first of all dependent on the vessel type. CSVs have a much larger crew than AHTS and PSVs, leading to higher crew cost on more advanced vessels. Further, the size of the crew can vary from project to project and is normally specified in the contract. You need more people during an anchor handling operations than during a rig move. In addition to contract requirements, there are safe manning requirements, but these do not drive the crew costs as vessels always fulfill the minimum requirement. Most shipowners also have cadets onboard increasing the size of the crew. This is an extra cost for the shipowners, but they receive compensation from the Norwegian government for the training of the cadets.

Comparing UK with Norway we see that there are 1-2 more people on the vessels in Norway. This is driven by strict safety requirements from the charterers on the NCS. The number of people onboard different vessel varies from time to time, both in UK and on the NCS. In general, there are 12-15 people on a PSV, 12-19 on an AHTS and 20-35 on a CSV. The graph underneath show average numbers from the interviews we conducted with Norwegian shipowners, both in Brazil and Norway. We have decided to exclude number of crew on CSVs from the graph, since the size of crew varies a lot from the different types of CSVs.

Figure 8: Average number of crew on PSV and AHTS



(Interviews)

Shift systems

The shift systems on NOR flagged vessels is 4 weeks on and 4 weeks off. This is different in UK, because vessels in UK fly under different flag regimes. For international flagged vessels the shift system can vary from person to person. Filipinos for example, are normally offshore for a longer period than they are onshore. Overall, international flagged vessels change crew less frequently. The logistical costs related to going into port, changing crew and getting the crew to their homes becomes higher for vessels with more frequent crew changes. This leads to a higher crew costs on NOR-flagged vessels compared to other INT-flagged vessels. One issue in Norway is the costs that occur if the shipowner has to change the crew one day earlier or one day later than the original plan. In these cases the crew gets much higher wages, and it could cost as much as 100-130 thousand NOK, which is almost twice the daily OPEX for a PSV.

Supply of workers

There is a good and stable balance between the demand and supply of seafarers in the North Sea. The supply of seafarers, both Norwegian and international, vary from time to time, but the shipowners manage to get the manpower they need, and have thereby been avoiding abnormal salary increases way above inflation levels. There is however some competition for the labor from rig companies. The labor market for seafarers becomes tighter during booming times in the rig market. However, over the last few years, the development in seafarer salary has been healthy. One problem though, is a quite high turnover among the seafarers leading to high training costs for the shipowners. In addition, some shipowners see that the Norwegians have a tendency to have more sick leave than other nationalities.

Labor unions and social benefits

The labor unions for marine crew in Norway are divided into three associations; the "Offisersforbundet" for officers, "Maskinistforbundet" for engineers/electricians, and "Sjømannsforbundet" for able seafarers. The unions in Norway do not have any extraordinary power over the shipowners. They have the right to strike, but issues are usually dealt with before a strike becomes necessary.

The social benefits in Norway are normally 30-40% of the gross salary (Kunnskapssenteret, 2014). But due to the net wage regime used in Norway, Norwegian shipowners get income tax, employer payroll tax and social contribution benefit tax reimbursed from the government. The max reimbursement is 198 000 NOK per employee. The crew cost including benefits on INT-flagged vessels in UK is lower than on NOR-flagged vessel, even though they are not under the net wage regime.

Inflation

The average monthly inflation (Consumer price index) in Norway has been 1,95% the last 10 years (Norges Bank, 2014a) and will according to predictions from the Central Bank stay at this level, or a little above going forward. The Norwegian monetary and fiscal policy is built around the goal of achieving a yearly inflation of 2,5% for the entire economy (Norges Bank, 2014b). The part of the day-rate that is related to crewing is escalated every year according to inflation estimates provided by NSA. The increase in salary, in accordance to inflation, is not an issue for the shipowners at the moment.

6.1.2 Technical

Technical cost is the second biggest cost group of OPEX on OSVs. According to the different shipowners this cost group represents between 15 and 30% of the OPEX. The reason for this big interval is that different owners have different definitions of their technical cost. We define technical cost as all costs related to maintenance and repairs including the cost of importing consumables and spare parts. Lube oil is by some companies included in technical costs, making technical costs a higher share of the total OPEX. The lube oil cost represents about 2% of the total OPEX.

Like crew cost, technical cost in the North Sea is mainly driven by a general high price level. The supply of service engineers and support from suppliers is good, and there are no issues related to import of goods and services. The last three are big problems in Brazil and will be discussed later.

Cost drivers

The North Sea is surrounded by well developed countries with a high price level. The high price level means that procurement of spare parts and equipment becomes expensive. In addition to the high price level, the complexity of the vessel is somewhat driving the technical cost as well. More complex vessels, like diving support vessels or anchor handlers, have much more equipment, which increases the daily maintenance costs compared to smaller PSVs without much equipment.

By industry standard the shipowners have maintenance days in their contracts. Usually it is 0,5-1 day every month (the days can be accumulated over the year) that could be used for maintenance without losing the dayrate. In addition to this, the charterers in the North Sea normally let the shipowners do daily maintenance when the vessel is in port, when it is moving from A to B, or when it is waiting for its next task/project/operation. With these paid maintenance days during the year, and the ability to do daily maintenance when the vessel isn't operating helps the shipowners avoid extraordinary costs related to maintenance and repairs.

Norwegian seaman culture has historically been one of the best in the world, leading to good maintenance of the vessels, decreasing the chance of breakdowns during operation. There has however been a trend that Norwegians are becoming less dutiful, forcing

shipowners to hire a third party to do the repairs and maintenance, increasing the technical cost. This is however not a big problem in Norway (yet).

On the supplier side, the service given to the shipowners is good. There are normally docks and service engineers available when the vessels need support. Issues with import of goods and services, and customs clearance are not present. This is very different from Brazil where hiring service engineers could be expensive because of their inexistence (almost) in the country. Import issues arise often because of a complex tax regime and logistical inefficiencies. We will get back to this later.

6.1.3 Insurance

Insurance represent about 4% of the total OPEX. Ship insurance consist of two different insurances, marine insurance and protection & indemnity insurance (P&I). Marine insurance typically covers damage on the vessel, while P&I insurance covers damages the vessel causes the environment, such as pollution, fines due to pollution and removal of wracks. Commercial insurers offer the marine insurance, while the P&I insurance is offered by P&I clubs. A P&I clubs is a group of shipping companies that have agreed on covering each other's claims when they arise (Gard, 2014).

Cost drivers

The main driver of the insurance premium is the value and size of the fleet, in addition to the company's track record. The premium is somewhat affected by damage statistics for the industry as a whole, but companies are normally not penalized as a result of their competitors' injuries/damages. Other factors that influence the insurance premium on each individual vessel is: vessel age, vessel type, owner, operator, flag of vessel, composition of crew and contract terms. We will not go in detail on all of these, but only mention them to show that several factors influence the final premium. Shipowners get better premiums when they insure a large fleet, instead of only a single vessel. The insurance is normally administered centrally from Norway.

6.1.4 Breakdown

With breakdown we refer both to the costs related to failures of engines, thrusters or other severe equipment causing a 100% off-hire, and penalties received as a result of malfunction of equipment, however not leading to a 100% off-hire. Receiving penalties, for good or bad

reasons is typical for Brazil, and we will get back to that in the section about Brazil. In the North Sea however, shipowners do not receive penalties from the charterers. If one of the VHF (Very-High-Frequency) communication systems is down, this does not have any consequence on the up-time (utilization) of the vessel. In Brazil, this could lead to a certain percentage downtime, even though the operation continues as normal. Offshore shipping companies working in the North Sea, only get downtime if something severe happen that forces them to stop their operation completely. In these cases the emergency is normally dealt with in a fast and efficient way with support from service engineers that are easily available. Depending on the size of the accident, some of the costs related to breakdowns could be covered by insurance companies. Breakdown costs are not a big issue in the North Sea.

6.1.5 Bunkers and lube oil

Like port and pilot fees, bunkers is a cost that is covered by the charterer when the vessel is on a contract, both spot and term contracts. When vessels are working in the spot market the shipowner has to pay for fuel between spot contracts. The shipowners sell the stock of fuel they have onboard to the charterer when they start a contract, and buy back what is left when the contract is over. The charterer in general also covers fuel expenses when the vessel is doing periodic maintenance or dry-docking. This is different from Brazil, where Petrobras tries to push the fuel expenses over on the shipowner whenever they can. In the North Sea, the bunkers cost represents a small part of the total OPEX, on average around 3%.

The lube oil represents 2% of total OPEX. The lube oil usage is dependent on the complexity of the vessel; larger vessels with more equipment consume more lube oil than smaller less complicated vessels. The lube oil expenses are in some cases covered by the charterer but in other cases covered by the shipowner, depending on the contract terms. The shipowners normally have a deal with one supplier of lube oil for their entire fleet, where the price could vary from region to region.

6.1.6 Port and pilot fees

In the North Sea, the charterer covers port and pilot fees as long as the vessels are on term contracts. However, when vessels operate in the spot market the shipowner has to pay these expenses. The price of harbor and pilot fees represent an insignificant amount of the

OPEX for offshore support vessels. One port call in Norway costs a couple thousand NOK, and represents less than 1 % of the OPEX in Norway.

6.1.7 Inspection

Inspection cost in this sense is the cost related to classification of the vessel and the vessel's certificates. The cost of the classification could vary between the different classification companies, and it varies depending on which class the vessel is in. This is a minor cost for the owners and we have therefore not put any focus on this. This classification cost varies little between regions and are a bit higher in Brazil than in Norway.

6.2 OPEX - Brazil

The Brazilian continental shelf is not as mature as the North Sea, but one of the oil and gas regions in the world with the highest growth forecast. Because Brazil's oil industry and oil service industry is less developed than the North Sea industry, several challenges arise in the daily operation increasing the OPEX of the vessels. In general, the OPEX is 20% higher in Brazil, driven by a lack of qualified workers, taxation and importation issues and a challenging client.

Before starting the analysis of the drivers behind OPEX we will shortly describe some factors that are specific for the Brazilian market. All dimensions affect the operation of OSVs in Brazil.

6.2.1 Specific characteristics with the Brazilian market

"EBN" - Empresa brasileira de navegação (Brazilian Shipping Company)

Law 9432/1997, "Brazilian Shipping act" created restrictions to foreign owners and vessels to operate in Brazil. To be able to operate a vessel in Brazilian waters, companies must be registered with the National Regulatory Agency for Water Transportation ("ANTAQ" - *Agência nacional de transportes aquaviários*) as a Brazilian Shipping Company ("EBN"). The purpose of law 9432 is to assure that the Brazilian industry develops, so that Petrobras avoids dependency on to many foreign vessels (Jacobsen, 2014). There are several ways to get an EBN, one of them is building a ship in Brazil, while another is to buy a Brazilian flagged vessel. A third option is to enter into a bareboat agreement where you charter a Brazilian flagged vessel. The process of preparing the necessary paperwork takes between 3 and 6 months. Most Norwegian shipowners have their own EBN in Brazil, but there are

companies that go through third parties to charter their vessels to Petrobras. Havila Shipping and K-Line are examples of companies without an EBN, tendering their vessels through local Brazilian shipping companies like Asso Maritima or Bravante. Going through a third party is a way for the shipowners to "test out the waters", and to learn how the market works, before investing long term in the region.

Import regime - REPETRO

The REPETRO regime is an import tax regime that makes it possible for international vessels to import goods without paying import tax. The import regime also allows the shipowners to bring vessels to Brazil without paying import tax (high tax of 30-60%). International flagged vessels need to pay an import fee of 3% of the vessel's value when entering Brazil. This fee is called the state tax on circulation of goods and services (ICMS). There are currently discussions between shipowners and the government whether or not this fee needs to be paid every time the international vessel enters into a new contract. The law is difficult to interpret, so the decision is brought to court in several cases. After the vessel has paid the ICMS the vessel flies under the REPETRO tax regime.

There are several criteria that have to be met in order to fulfill the REPETRO requirements. This means that not all spare parts can be imported under the regime. The most important requirement is that the price of the spare part must exceed 25 000 dollars and it must be possible to identify the item, e.g. it needs a serial number. For goods that are not imported under the REPETRO regime the import tax is between 60% and 90% depending on the product. Brazilian flagged vessels do not have the opportunity to fly under the REPETRO regime and must pay import tax on all imported goods. The import tax for the Brazilian flagged vessels varies from 18% to 30% depending on the imported product and which state it is imported to.

Environmental regulations - IBAMA

IBAMA is the Brazilian Institute for the Environment and Natural Resources. Under the Brazilian law, the installation of an enterprise or activity potentially harmful to the environment must undertake environmental licensing beforehand. IBAMA operates mainly in the licensing of large infrastructure projects involving impacts in more than one state and activities of oil and gas on the Brazilian continental shelf, but inspections of offshore support vessels is part of their scope (The Brazil Business, 2014). IBAMA can deny vessel's entry into

Brazil if they do not fulfill the environmental requirements specified by IBAMA. There are 3 basic requirements that have to be followed:

1. Education program for the crew: Crew need to be trained in environmental legislations (certain number of hours)
2. Pollution system onboard - Need to document that waste onboard the vessel end up in the right place.
3. Pollution system for waste going into the sea - Need to document that the system for waste filtering is working correctly.

IBAMA is giving several shipowners a hard time. In a worst case scenario the start of an operation could be delayed because the environmental inspector argues that you have the wrong color on your trashcan.

PEOTRAM

PEOTRAM is an excellence program that involves all Petrobras' maritime suppliers. In the program the suppliers are assessed on a comprehensive scope of audits across offices, operational bases and vessels. Good HSEQ records and commitment of doing business in Brazil are awarded. The companies are ranked on a scale from 0-100%, where 100% is the best. If a supplier receives a score lower than 40% they are not allowed to join tenders. With a score between 85 and 90% the supplier will have a 1% advantage on the daily rates offered in the tenders. Suppliers with scores higher than 90% will have a 2% advantage on the daily rate offered in the tenders (DOF Brasil, 2014).

Flag regimes in Brazil

There are three different flag regimes in Brazil, Brazilian flag (BRL), special Brazilian flag (REB) and international flag (INT). To be able to fly under the Brazilian flag the vessel must be built in Brazil. Vessels flying under the REB flag are vessels imported to Brazil. To be able import vessels under the REB regime you need to have 2 Brazilian flagged vessels per REB vessel. If you are building a vessel in Brazil you are able to have two international vessels flying the REB flag during the construction process. International flagged vessels are vessels flying under all other flags. Both INT-flagged vessels and REB-flagged vessel can operate under the REPETRO regime.

We will now go into detail on the different operational costs in Brazil and the key drivers behind the costs. As in Norway, crew costs and technical costs are the largest cost groups. Brazil is different from Norway due to the fact that Petrobras has a monopoly, and is therefore trying to push as much costs as possible over on the shipowners. They manage to do so in some cases, port and pilot fees being one example.

6.2.2 Crew

As in Norway, crew cost in Brazil represents the largest share of the total OPEX, accounting for 60-70%. The crew cost in Brazil is on average higher than in Norway.

Cost drivers

RN72

On October 10, 2006 the Brazilian ministry of labor introduced the normative resolution nr. 72 (RN72). This law regulates the employment of foreign professionals working on foreign flagged vessels or platforms. For OSVs the law states that after ninety days of operation ⅓ of the crew must be Brazilians. After 180 days of operation half of the crew must be Brazilian and after 360 days of operation ⅔ of the crew must be Brazilian. It is possible to postpone the process of finding Brazilian crew by applying for a waiver. These waivers are obtained individually by each company through an application to ANTAQ. Even though the waivers are obtained, Petrobras could give penalties to owners because they are not compliant with RN 72. Penalties reach as high as 30M$(Westshore Shipbrokers, 2014). For Brazilian flagged vessels, there is no exception and they need to have 100% Brazilian crew

In Brazil, different government bodies interpret laws and legislations differently depending on where in the country you are and who processes your application. Most offshore companies interpret that RN 72 states that a share of the entire crew needs to be Brazilian, while the government tend to interpret the law as stating that a share of the crew on each section (department) of the vessel needs to be Brazilian. This means that vessels need Brazilians on the bridge, on deck and in the engine, and cannot run the operation solely with international officers as many do today.

The introduction of RN 72 in 2006, lead to a high demand for Brazilian seafarers. The demand for Brazilian Seafarers is still high today. When the demand from the market is

higher than the supply of labor, it becomes easier for the seafarers to negotiate higher salaries and better salary-benefits.

Inflation

The inflation in the Brazilian economy has been, and is still high (6%) (World Bank, 2013) compared to other regions. This leads to continuous increasing costs. Increase in crew salaries in the OSV market is driven, not only by the general inflation in the Brazilian economy, but also by competition among the different shipowners trying to attract the best qualified crew. This means that the actual inflation in crew salaries in some years has been more than double that of the Brazilian economy.

In Brazil, only the Navy can educate seafarers, and they have not been able to meet the growing demand for seafarers and officers from the OSV market. This has reinforced the increase in the seafarers' salary. In 2011 the inflation in crew salaries reached a top of 17% (Tradewinds, 2011), while the average increase in the Consumer Price Index (CPI) in Brazil that year was 6,5% (Inflation, 2014). Since 2013, the increase in crew salary has however started to stabilize. This year (2014), the increase in salaries negotiated through the unions was 7,2% (CPI+ 1,2%). There are several reasons for the current stabilization in crew salaries. First of all, in 2012 the Brazilian Association of Offshore Support Companies (ABEAM) started bargaining with the unions on behalf of all the offshore shipping companies in Brazil. This made it possible to obtain better deals for the shipowners. Secondly, the Navy started to educate more people, especially low ranked seafarers, after pressure from the offshore industry. One interview object explained the situation like this: "ABEAM made statistics where they showed the number of seafarers they planned to educate and the number of seafarers the industry would need. Then they understood that they had to educate more people." A last reason for the stabilization is the decreasing activity among the oil companies, leading to lower need for the offshore shipping companies and thereby lower pressure to recruit new crew.

Recruiting officers

Despite the stabilization seen in the labor market for crew today, the demand for well-educated officers in the Brazilian OSV industry is still higher than the supply. Many of the educated officers do not end up offshore and the quality of the ones who do is not high. Several OSV companies has pointed out that the education system in Brazil is not good

enough to educate high ranked officers. The reason why people do not end up offshore even though they have education from the Navy is that they have little “seafarer culture” in Brazil. People that are studying to be officers have actually never been on the sea and have no intention of working on a vessel. In Brazil, family is especially important and it is hard to combine family life with working shifts on an offshore vessel.

Another reason for the lack of well-trained officers is the hard competition from the rig companies to attract the best talents. The rigs typically pay 20% higher salaries than the OSV companies, and are offering better shift systems (14 days on and 14 days off instead of 28 days on and 28 days off). The OSV companies are therefore sometimes reluctant to provide their officers with enough training for them to be able to work on the rigs, which mean that not enough officers get sufficient job training to operate the most sophisticated vessels. Due to the difficulties of recruiting officers the wages for these positions have increased more than the wages for other seafarers.

The minimum wage for the crew on the different types of OSV is decided through a Collective Bargaining Agreement (CBA). The agreement is negotiated between ABEAM and the Seafarers’ Labor Union (SINDMAR). The minimum wage for low ranked seafarer is around 4500 R$ (1800$) per month, while for high ranked officers, like captains, it is around 25 000 R$ (10 000$) per month. For low ranked seafarers the actual salary they receive is close to the minimum wage, due to a sufficient supply of low ranked seafarers. The officers often have much higher salaries because they are in a better position when bargaining with the employer. The wages also differ among the officers depending on the size and the type of vessel they are operating. In the CBA, the officers are divided into four groups based on the size and complexity of the vessel, where each group has different terms and conditions. The difference is around 8-10% between each group.

Unions

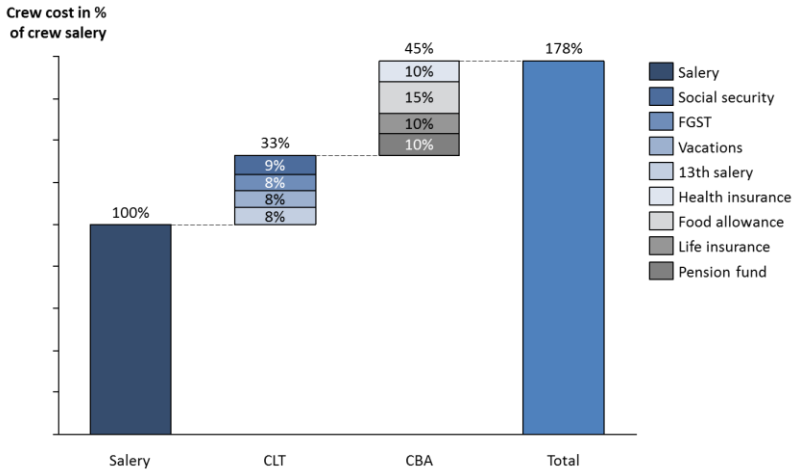
The Brazilian unions have a strong position in Brazil, and they have been able to negotiate high wages and several benefits for their members. According to several OSV companies the cost for the employer is 60-100% higher than the salary for the employee, caused by social benefits for Brazilian workers. The benefits are divided into the Consolidation of Labor Laws (CLT) and the Collective bargaining agreements (CBA). CLT benefits are determined by the

government and are calculated as a proportion of the base salary. There are four different benefits in the CLT.

1. The employee has to pay 9% of the salary in social security cost.
2. Each month the employer needs to pay 8% of the employee's salary into a fund. The money is locked to this fund until the employee either is dismissed or retires.
3. Each employee receive a 13th salary, which is a month extra salary, usually paid out in November as a kind of Christmas bonus.
4. Offshore workers also get 1 month extra salary as vacation money. This is compensation because they work on a shift system, and do not have normal holidays. If you get fired you will get your outstanding vacation money plus an additional 30%.

In addition to the CLT, the Brazilian workers get benefits through the CBA. Examples are food allowance, health care and dental insurance, life insurance and money the employer set aside in private pension funds. The CLT and the CBA decides what will be the minimum benefit for the crew. Companies can however offer more benefits if they wish in order to attract the best people (The Brazilian Business, 2014). The graphic underneath show how CLT and CBA agreements increase the cost of one employee, compared to base salary.

Figure 9: Breakdown of social benefits on top of crew salary in Brazil



Shift systems

Crew onboard OSVs work a 28 days on, 28 days off (28/28) shift system. It was possible to use a 35/35 days system before, but after negotiation with the labor unions this is not possible anymore. The Brazilian shift systems lead to more crew changes than in other parts

of the world, where the crew is onboard for a longer period of time. Since Brazil is a big country the crew changes implies transporting the crew over long distances, often by plane. This is costly, in particular when the crew needs to fly to the north of Brazil where there is little competition in the airline market. Plane tickets to the north of Brazil can cost up to 3000 Real (1150$) for a round trip. The OSV companies we interviewed, estimated the average logistics cost to be around 500$ per employee per crew change. If you have a crew of 15 people, changing it would then cost around 15 000$ (15*2*500$), which is about the same as the daily OPEX on a PSV.

Number of seafarers

More people are needed on vessels operating in Brazil than in other parts of the world. The Brazilian labor union is pushing to create more jobs, thus vessels operating in Brazil are sometimes forced to have more people on deck, in the kitchen and in the engine room. Vessels operating in Brazil conduct their operations differently than in the North Sea, driving up the need for crew. In the North Sea, where there is a well-developed spot market, vessels typically do one operation before they return to the harbor. In Brazil on the other hand, the vessels often do another operation directly after the first one without going back to the harbor (AHTS doing several rig moves in a row for example). To be able to have a safe operation and fulfill requirements from unions, more people are needed when several tasks are done consecutively. Strict requirements from Petrobras are another factor leading to more people on vessels operating in Brazil. Petrobras wants to increase the size of the crew to ensure a safe operation. A last reason for the crew being larger is that Brazilians are more inefficient than seafarers from other nationalities, creating a need for more people on the vessels. *Quote Chief Engineer: "If you see a chair you can be sure that it is occupied by a Brazilian"*

Not all shipowners agree that there are more people onboard vessels in Brazil than in other parts of the world. This might be because some shipowners have more skilled Brazilian crew then others. Another possibility can be that the Brazilian shipowners do not want to admit that there are more people on the vessels in Brazil, because this would be admitting that Brazilians are less efficient than international seafarers.

On Brazilian PSVs the average number of crew is between 13 and 16, and on AHTS' the average is between 18 and 20. There are however examples of AHTS with only 14 people, and with as much as 25 people. The reason for the big differences is that the vessels vary a lot in size, and the type of operation performed requires different amount of crew. Large vessels with very complicated operations need more people than smaller AHTS doing less complicated tasks (could be used as PSV). In Norway the size of the crew on a PSV is normally about 12-16, and on AHTS it is between 12 and 19 people.

Food

The general price level in Brazil is high compared to other parts of the world. This is also the case for food prices. The prices for food are therefore an additional driver for the crew cost in Brazil. The clients in Brazil also have more people onboard then what is typical in the North Sea, increasing the food cost and the need for people in the kitchen.

6.2.3 Technical

Technical cost is one of the most challenging costs in Brazil. Because of high importation taxes and difficulties with customs, the technical cost in Brazil is higher than in Norway and also harder to predict. The technical cost in Brazil represents between 15 and 25% of the total OPEX.

Cost drivers

Lack of suppliers leading to costs related to import of goods

Due to a very limited international supplier network and no international companies with spare-part stocks in Brazil a lot of the equipment needed to do maintenance and repairs is imported. Brazilian suppliers can be used, but the quality of the products you find in Brazil is worse than in Norway and can in some cases not be used. One interview object stated: "We have bought brand new filters here in Brazil, but the quality was so bad that the chief engineer threw them away." In addition, to fulfill warranty requirements new vessels often need to use original spare parts which cannot be found in Brazil. All these factors leads to increased costs for the companies due to high import tax, transportation costs and extra time spent in customs and elsewhere along the importation process. Suppliers have tried to set up warehouses in Brazil, but without any success. The suppliers are forced to pay full import tax, and are therefore not competitive on price compared to international vessels that can import goods under REPETRO.

When importing goods to Brazil customs clearance can be a major problem. One interview object put it this way: “If Petrobras is a problem, then customs are our nightmare.” The time used to get things through customs can be long, which is unfortunate when a vessel has a breakdown and spare parts are needed fast. Storing the products in customs is expensive; the storage is paid in advance, 10 days at the time. A good relation with an experienced customs agent is important in order to minimize risk related to imports. The OSV companies emphasize that a good customs agent can significantly reduce the risk of having problems declaring goods.

A few shipowners have said that they have lower technical cost on BRL-flagged vessels than on INT-flagged vessels because they do not import consumables, spares and other equipment, but purchase it locally, thereby reducing technical cost. This has again led to lower OPEX on the BRL-flagged vessels than on the INT-flagged vessels. Most companies do however argue that the quality on the local products is insufficient.

Unskilled labor driving maintenance cost

A key driver for the technical cost in Brazil, is the lack of maintenance done by the crew. This means that the companies need to use third party companies to do the maintenance when the vessel is in harbor, which increases the cost. This problem is especially big on vessels with 100% Brazilian crew. There are several reasons for this:

- The education of Brazilian seafarers is poor, and they do not get enough training and education before they start working on the vessel.
- Brazilians do not have any “seafarer culture”, thus they do not know how to take good care of a vessel and they do not see it as their responsibility to do maintenance on the vessel. On interview object stated: “The Brazilian chief engineer is often the guy with the cleanest work outfit.”
- Some shipowners have experienced that Petrobras deny the crew to do maintenance during operations. This is particularly true for large AHTS and CSV where Petrobras always have an inspector on board. For vessels that are in constant operation for a month at the time the risk of breakdown increases when you do not have the opportunity to do daily maintenance. Some years back, it was normal to

have a few “credit days” in the contract where the shipowner could do maintenance without losing the day-rate, like in Norway. This condition has been removed.

For international vessels with partial international crew the maintenance problem is smaller. International crew often has more experience and a culture where they take care of the vessel. They therefore do more maintenance than the crew on a vessel with 100% Brazilians. Several companies send Brazilian crew to Norway and other regions, so that they can gain more experience and learn more about seaman culture, before they come back to Brazil and start working on Brazilian flagged vessels. This can be quite expensive since Brazilian seafarers earn a lot more than e.g. Asians and the travel costs increase dramatically if they start working in the North Sea instead of the Brazilian continental shelf. Despite this, several OSV companies think it can be beneficial in the long run because the Brazilian crew gain important knowledge that could lead to a better operation of vessels in Brazil in the future.

Some of the shipowners we have talked to do not agree that Brazilian seafarers do less maintenance. A reason for this can be that some shipowners have a better-educated crew, that do more maintenance than other Brazilians, or that they don’t want to blame Brazilians for doing less maintenance.

Lack of good service engineers

Another driver of the technical cost is the lack of good service engineers/technicians in Brazil. This is caused by a weak education system, with low education quality and not enough people being educated. The quality of the service done by Brazilian engineers is often poor. One interview object stated: “We have experienced that the vessel is in worse condition after the service than it was before.” As a result, service engineers often need to be brought in from Europe. This is expensive because of the travel expenses, and it also takes longer time which can be crucial if it’s an emergency service. Due to Brazilian laws and regulation it can be problematic for the service engineers to get visas and it could take about 30 days to receive the visa. In addition, keeping the visa for more than one year is quite hard. The service companies therefore always need to have people with Brazilian visas, and the possibility to rotate these people. To be able to support the crew when technical support is needed some shipowners have their own onshore technicians. This increases the onshore staff, and wouldn’t be necessary if the vendor’s technical support was available (ABRAN FGV Seminar, 2014).

Climate challenges

The warm climate in Brazil leads to increased maintenance and repair costs. The warm and salty water combined with high humidity, exposes different parts of the vessel to rust. The rust can lead to breakdowns of equipment and harm the hull of the vessel. The rust can be prevented by buying good paint system. Marine growth on the hull is another problem that occurs because of the climate. If it first starts growing, the growths spread quickly. This can slow the vessel down and harm the vessel's hull. Good anti fouling paint can however prevent this from happening. One interview object stated: "The best investment you do here in Brazil is to buy the most expensive paint and anti fouling systems."

6.2.4 Insurance

Insurance represent approximately 2-5% of the total OPEX in Brazil. As mentioned before, there are two types of insurances, P&I insurance and marine insurance. The P&I insurance is done outside of Brazil, both for INT-flagged vessels and BRL-flagged vessels. For the marine insurance Brazilian flagged vessels are obligated to insure at least 40% of the vessel through a Brazilian insurance company. Thus, this insurance is written partly in Brazil and partly outside Brazil, where the conditions normally are better. The cost drivers in Brazil are the same as in Norway.

The insurance premium you pay is usually higher for vessels that operate in Brazil, both for the marine insurance and the P&I insurance. This is mainly because of the higher breakdown costs you have in Brazil and the penalties you face if you have an accident that harms the environment. In some cases, vessels that only caused minor damage to the environment, still received large fines from the Brazilian government. The crew composition could be another reason for a higher insurance premium in Brazil than in Norway. The Brazilian crew is not always as experienced and well educated as other international crew, thus the insurance companies look at this as a risk.

6.2.5 Breakdown

Breakdown costs occur when something on the vessel is not working according to the specification outlined by the charterer of the vessel. The breakdown cost is calculated as a percentage of the daily rate. If the vessel is not able to operate at all due to severe problems with equipment the vessel will get a 100% downtime. It is also possible to get smaller breakdowns while the vessel is under operation, e.g. if some equipment that is not in use do

not work. This is often called penalties. The main client in Brazil gives a lot of penalties to the shipowners, both with and without a legitimate reason, e.g. wrong type of milk in the fridge could for example lead to a certain % downtime. One shipowner put it like this: “It seems like giving penalties is the inspector’s hobby.” The breakdown cost for the companies we interviewed varied from 1-5% of the daily rate.

Cost drivers

Lack of maintenance, longer breakdowns

An important driver for the breakdown cost is the lack of maintenance done by the crew, as well as low quality on the services done by third party companies. The fact that vessels in Brazil usually are on long term contracts and do not have any maintenance days in the contract makes it difficult to do maintenance and repairs. The biggest problem however, is that a breakdown usually lasts much longer in Brazil than in the North Sea. The import of spare-parts, needed to repair the vessel, often takes a long time. In some cases service engineers from Europe is sent to help, which prolongs the process even more.

Petrobras

Petrobras is another reason for the high breakdown cost in Brazil. Since Petrobras mainly has vessels on long term contracts, the only way they can reduce their cost is by reducing the day rates. This is achieved by giving penalties to the shipowners. Several shipowners mentioned that Petrobras gives them penalties if not everything on the vessel is according to the contract, even if the vessel is operating perfectly. One interview object stated: “Petrobras can give you penalties if a winch is not working, even if they have no intention of using it. We had 100% utilization last year on vessels not operating with Petrobras, and to put it this way, we are not doing a better job on those vessels.” Reducing the day rate on the vessels through penalties is a way for Petrobras to save costs. Another interview object stated: “With a fleet of 450 vessels, 5% downtime is a big cost reduction for Petrobras.” A good relationship with the inspectors from Petrobras is important; you have to cooperate with them to be able to get as few penalties as possible. According to the shipowners the inspectors give more penalties now compared to only a few years back. Several of the inspectors are new in the job (the experienced people retired), and have little experience with the operation of offshore vessels.

The breakdown costs vary a lot among the different shipowners. The shipowners with less breakdown cost have pointed out several factors for this. First of all, modern vessels with a lot of redundancy systems tend to have fewer breakdowns than older vessels. Secondly, having a good relation with the inspectors from Petrobras could help reducing the level of breakdowns. A last reason can be that some shipowners have crew that take better care of the vessel, e.g. do more maintenance and other preventive work.

6.2.6 Bunkers and lube oil

Bunkers, like port and pilot fees, represent a small part of the total OPEX, normally 2-3%. The bunkers is covered by the charterer in all contracts, this is a standard within the industry. However, the shipowners have to pay for bunkers when the vessel is off hire, or when it is in docking. This is different from the North Sea where the charterer often pays the bunkers during both downtime and docking. Because most vessels in Brazil are on long term contracts with high utilization, the bunker cost is small for the shipowners.

The cost of lube oil in Brazil is usually covered by the shipowner, like in Norway. Some shipowners emphasize that they use a little bit more lube oil in Brazil, and that it could be caused by slightly higher prices or a slightly higher consumptions due to more salt in the water driving the need for more lube oil.

6.2.7 Port and pilot fees

The port and pilot fees is higher in Brazil than in Norway, but still only represent 2-5% of the total OPEX. Port fees are covered by the charterer in most contracts. But Petrobras is forcing the shipowners to pay this cost in new contracts, especially for CSV vessels. In order to include the port fees in the budget it is crucial for the shipowner to know how often they will have a port call. For international vessels it is also mandatory to have a pilot onboard, Brazilian vessels can avoid this. As for port fees, pilot fees are normally paid covered by the charterer. Pilot fees are high in Brazil because pilots have, as a result of a monopoly situation, managed to push their salaries sky high (Safe Seas, 2009). With active lobbying they have retained the monopoly without any disturbance from the government. One interview object stated: “Pilots live in Miami and come by helicopter to the vessel, takes a cup of coffee and flies back to Miami!” A pilot can easily earn up to 80 000 R$ (30 770 $) per month. Port fees including pilot cost approximately 20 000 R$ (7 600$) for each port call.

6.2.8 Inspection

See OPEX Norway

6.2.9 Other costs

EBN management fee

Companies that do not have their own EBN, must as previously mentioned use a third party, who has EBN status, to be able to operate their vessels in Brazilian water. This third party will charge a fee for this service, which could lead to higher OPEX for the shipowner.

Administrative Cost

The administrative costs are significantly higher in Brazil compared to Norway. There will in general be more onshore personnel per vessel in Brazil than in Norway. The higher administration cost is mainly driven by a complex tax system in Brazil and several documentation and paperwork requirements from Petrobras. To fulfill requirements from Petrobras many monthly reports are necessary: crew payment evidences, medical care evidences, fiscal obligations evidences, fuel consumptions controls, hazard evaluations and accident reports. The office teams must be large to cope with these bureaucratic client demands, complex and unstable fiscal scenario, complex labor regulations, logistics difficulties and importation processes. These are kind of hidden costs that the companies might not expect when they decide to enter the Brazilian market (ABRAN FGV Seminar, 2014).

6.3 Comparison and summary of OPEX

The OPEX is on average higher in Brazil than in the North Sea. This is mainly due to higher crew and technical costs. The crew cost is driven by more crew onboard the vessels in Brazil, especially on AHTS, and a higher average cost for each crew member, because of high officer salaries and high social benefits. The technical cost is driven by the lack of suppliers leading to importation of equipment. This increases the cost due to import tax and other costs related to the import process. A last factor increasing the OPEX in Brazil is demanding requirements from Petrobras, and frequent penalties received for good and bad reasons.

The OPEX in the North Sea is higher for NOR-flagged vessels than for INT-flagged vessels. This is solely due to higher crew cost on NOR-flagged vessels, mainly because these vessels

have to follow Norwegian wage tariffs, but also because vessels with INT-flag on average have less crew onboard than NOR-flagged vessels.

The OPEX in Brazil is also different based on which flag the vessel is flying. Because BRL-flagged vessels need 100% Brazilian crew, the OPEX is often higher for these vessels. However, we do not have numerical evidence supporting this; it is solely based on information received through interviews. Technical cost will also vary from INT-flagged vessels and BRL-flagged vessels, because they fly under different import regimes. It is ambiguous for whom this is an advantage.

7 CAPEX

In the following chapter we will discuss the cost drivers behind the capital expenditures (CAPEX) related to offshore support vessels in the North Sea and Brazil. We will first present the North Sea market and use this as a benchmark when analyzing the Brazilian market. If nothing else is stated, the analysis is based on information from the interviews.

We have divided the CAPEX into two groups; cost related to shipbuilding and cost related to periodic maintenance (hereafter referred to as docking). Even though dry docking costs occur continuously during the lifetime of the vessel, the costs are capitalized and therefore determined CAPEX.

7.1 CAPEX - Norway

We will first elaborate on the cost drivers of docking vessels in the North Sea. Thereafter, we present the cost drivers behind shipbuilding in Norway, as well as the advantages and disadvantages of building vessels in Norway. In the first part about dry docking, we look at the entire North Sea market, as the shipowners use the best available docking facility regardless of which country it is located in. In part two about shipbuilding, we solely focus on shipbuilding in Norway, as this is by far where most of the OSV shipyards in the North Sea are located and has been the focus in our interviews.

7.1.1 Docking

Description

A dry dock is a structured area wherein construction, repairs and maintenance of merchant vessels and boats are carried out. The unique construction allows water to be filled up in

that area, so that vessels can be maneuvered in and out of the dock. Once the vessel enters the dry dock, the gates are closed and the seawater is drained out so that hull and other areas of the ship which have been exposed to seawater for a long time are available for carrying out maintenance and repair works (Marine Insight, 2010). Dry docks could either be onshore or floating (in water). According to the International Convention for the Safety of Life at Sea (SOLAS) vessels must be dry-docked at least twice every 5th year, this is a requirement from the International Maritime Organization (IMO), and if these standards are not followed the vessel could lose its classification (IMO, 2014). Almost all vessels are classed by a classification society like the Norwegian company DNV GL. Without classification, the vessels could be uninsurable and might not be able to sail. Vessels are *in class* when their machinery, hull, structures and equipment correspond with the IMO standards.

In addition to the 5-year classification docks, dry docking is normally carried out before a vessel is sold or if an accident occurs. Shipowners are also required to do interim dockings. These are normally conducted every 2,5 (36 months) year, and does not necessarily need to be in a dry-dock (Marine Insight, 2010). It could simply be an inspection done in the port by divers, where they do smaller maintenance on the hull of the vessel. Reasons why some interim dockings are conducted in dry docks are that the vessel is old and needs maintenance more frequently, or that the shipowner wants to do an interim dry docking in order to have less maintenance to do during the 5-year classification dry dock.

The price of a dry-dock vary depending on whether the company is doing an interim docking or a 5 year classification dry dock. The 5 year dry dock service has a larger scope and is therefore more expensive than the interim docking. In addition to scheduled dockings, shipowners sometimes have emergency dockings because of equipment that break down on the vessel. This is unfortunate as the shipowner's costs increase and the company loses its day-rate because of downtime. The cost of an emergency dock varies depending on the scope of the breakdown and the availability of docks.

Docking in the North Sea

There are several docking facilities in the North Sea, both in Norway, Denmark, Netherland and in the UK. Which yard the shipowner decides to use varies depending on the location of

the vessel and the relationship they have to the different yards. However, since the sailing time no matter where you are in the North Sea is less than a day, the location of the vessel is not crucial when deciding where to do the docking.

Because of the Danish yards' good reputation, docking in Denmark is becoming more and more popular among the shipowners. Even though the sailing time might be a little longer compared to Norwegian yards the price for a docking in Denmark is lower. The quality is better and the time used to perform the docking is shorter in the Danish shipyards. Most of the workers at Danish yards are Danish with long experience docking vessels. This is different from Norwegian yards, where most of the workers are foreigners with less experience. Another reason why shipowners do the docking abroad is that an increasing number of Norwegian yards have switched focus from docking ships to docking rigs where the margins have been higher. Due to increasing newbuilding orders for vessels, several Norwegian yards, which earlier performed dockings, have refocused their business to do more shipbuilding. This has led to a drop of docking knowledge and services in Norway.

The price of docking a vessel in the North Sea varies a lot depending on several factors. First of all, the type of vessel is an important factor influencing the price of the docking. Vessels with more equipment have higher docking costs, PSVs being the cheapest and CSVs the most expensive. A five-year dock for a PSV normally cost from NOK 5-7 million (0,8-1,2M$) , for a AHTS the price could be up to NOK 15 million (2,5M$) while the price for a CSV docking could exceed NOK 20 million (3,3M$).

Secondly the age of the vessel has a strong influence on the docking price. Older vessels typically have a higher docking cost, because there is more work that needs to be done. A 15 year classification dock for a PSV cost around NOK 20 million (3,3M$) which is significantly higher than the price of a 5 year classification dock.

Mainly two factors are driving the cost of docking in the North Sea, the price of equipment and the price of labor.

Cost drivers

Equipment

Highly specialized parts are needed when doing maintenance on machinery like engines, thrusters and other equipment onboard the vessels. These parts are often made in industrialized countries like Norway where the production cost is high, driving up the cost of the docking. More advanced vessels have more equipment to maintain, and need more new parts in the docking process. This is the reason why the docking is more expensive for these vessels. Older vessels also require more new parts which partly explain the difference in docking cost between new and old vessels.

Labor force

The labor hours used in the planning process of the docking and during the docking process are expensive. Countries like Norway, Denmark, Netherlands and the UK are all industrialized countries with high living standard and high salaries. Much of the work that is done in a docking process needs to be done by professional workers with salaries much higher than the minimum salary in these countries. Even though the workers on North European yards are efficient compared to for example Brazilians the total labor cost is high.

The docking process takes from 2-3 weeks mainly depending on the age of the vessel. A 5 years classification dock usually takes around 2 weeks, while a 10 and 15 year classification dock takes around 3 weeks. The tasks done in a 10 and 15 year docking process are more time consuming, like pulling the shaft and maintaining the engines. The fact that the docking process is longer for older vessels is another reason why the docking cost increases with the age of the vessel. The docking process takes more time for more advanced vessels, which can be another explanation why the docking cost increases for more advanced vessels.

7.1.2 Shipbuilding

Shipbuilding status in Norway

The total fleet in the North Sea consists of around 510 vessels, and has been increasing steadily over the last decades (DNB, 2014). A major part of these vessels are controlled by Norwegian shipowners and around 200 of them fly the Norwegian flag (Norwegian Shipowners' Association, 2014).

There are between 15 and 18 shipyards in Norway building offshore support vessels, delivering from 20-25 vessels each year. The biggest player in the Norwegian shipbuilding industry is Vard with the total of 5 shipyards in Norway. Other companies like Kleven, Ulstein and Havyard are also delivering high quality vessels to the offshore industry.

Cost of building ships

The cost of building offshore support vessels in Norway is high compared to other regions. The price for a PSV built in Norway is between NOK 250 and 350 million (40-60$M) depending on the size of the vessels. The price for an AHTS varies from NOK 500-800 million (80-125$M), also depending on size, but most of the vessels built in Norway are in the upper segment and the price for these types of vessels are between NOK 700 and 800 million (115-125$M). The price for CSVs can vary from NOK 600 million (100M$) and up to NOK 2 billion (335M$) depending on size and complexity.

A big part of the vessel delivered from Norwegian yards is actually built outside Norway. The steel work and much of the pipe work is done in Eastern Europe in countries like Romania. The trend in the shipbuilding industry in Norway is that more and more of the work is done outside the country. To build an offshore support vessel usually takes about 2 years. The first 15 months of this period takes place in Eastern Europe, before the vessel is towed to Norway. The last 9 months is spent in Norway installing specialized equipment and ensuring that the vessel operates like it should.

Cost drivers

Labor cost

The most important cost driver related to shipbuilding in Norway is the cost of labor. To build an offshore vessel in Norway approximately 500 FTEs are needed. Norway has one of the highest average wages in the world which highly influence the price of building vessels (Statista, 2014). Especially educated people like electricians and engineers are expensive in Norway. These people are required in the finalization process of the vessels, driving up the labor cost. Even though a lot of the labor-intensive work is done before the vessel arrives in Norway, several work hours still remains, thus driving up the shipbuilding cost.

7.1.3 Advantages and disadvantages of building vessels in Norway

Advantages

The two biggest advantages of building vessels in Norway emphasized by all shipowners are that you will get a vessel with high quality delivered on time. The Norwegian shipyards are known for delivering advanced offshore support vessels with high standards. There are normally no problems with the vessels after delivery, and they manage to operate as promised. Norwegian yards are known for being the best in the world to build offshore support vessels, especially advanced vessels like large AHTS and CSVs. Building these vessels requires a great deal of experience and mistakes are not tolerable. The high quality of the vessels built in Norway makes the second hand value of the vessel high, potential buyers know that the vessel will last for a long period of time.

The advantage of having the vessel delivered on time is an important factor. If the shipowner is building the vessel based on a contract with an oil company, the shipowner will be forced to pay penalties to the charterer if the vessel is delayed. Even if shipowners build vessels on speculation a delay is costly, both because the financing costs are running and because a peak in the market can be missed.

Other advantages of building vessels in Norway are that the shipowners are close to the yards making it easier and cheaper to supervise the building process. There are examples of companies building vessels in China sending up to 40 people to supervise the process. This is an extra cost of building outside of Norway. The actual price for a vessel built in Norway is normally the same as the budget price presented when the contract was signed, creating less uncertainty.

Another advantage by building in Norway is the financing you get from GIEK and Export Credit Norway. With loans from Export Credit the down payment period can be up to 12 years, and the interest rates as low as 5%. Institutions like Export Credit are not unique for Norway. Several countries have similar institutions, and Brazil has a state of the art financing scheme.

Disadvantages

The biggest disadvantage of building vessels in Norway is the price of the vessel. The contractual building price for a PSV in Norway can be twice as high as in China. This is before

adding the extra costs that historically have occurred when building in China, e.g. delays and extra costs related to huge supervision teams needed during the building period. In the end the price difference can be as little as 10%, and the vessels have lower quality and usually also lower specifications than comparable Norwegian built vessels.

For more advanced vessels it is more difficult to compare the price, because the vessels built in China are less advanced than the one being built in Norway. But according to shipowners some yards in Vietnam and South Korea do manage to build vessels with similar specifications as in Norway with prices around 10% lower. If the vessel is built for operations in the North Sea the mobilization cost is high because it takes a long time to transport it from Asia. It normally costs 1-2 M$ to get the vessel back to Norway, which is something the shipowners have to pay. This extra cost will reduce the cost advantages of building in the Far East. If you, on the other hand, plan to operate the vessels in the Far East or in Australia, the mobilization cost will be lower if the vessel is built in the Far East.

7.2 CAPEX - Brazil

We will in the following chapter discuss the drivers behind CAPEX related to operating vessels in Brazil. We will start by presenting the drivers behind the docking costs. Then we will discuss the cost drivers behind shipbuilding and the advantages and disadvantages of building vessels in Brazil.

7.2.1 Dry Docking

Cost of docking

According to the Norwegian OSV-companies in Brazil, a 5 year dry-docking could cost 30-50% more than in Norway. However, to determine an average price is difficult as it will depend on the vessel type, the vessel size, equipment onboard and the scope of the dry-docking. The cost of the interim docking is normally half of the 5 year-docking. All OSV-companies in Brazil emphasized that it is mainly two things that make the dry-docking more expensive, the first one being the rent of the dock and the second the cost of importing the necessary equipment. The cost of renting a dock in Brazil depends on the size of the dry dock. Lack of dry docks has led to high prices. The Norwegian shipowning companies in Brazil normally have medium and large OSVs. The rent of docks for these vessels could range from 20-30 000 dollars/day compared to only 5000 dollars/day in Denmark. One of

the shipowners put it this way when talking about dry dock prices: “Dock owners can take whatever price they want; it’s the only girl in town”. There are however several other factors leading to high dry docking prices in Brazil, these drivers will be explained in detail in the following section.

One of the shipowner summarizes the dry dock situation like this: “*Lack of shipyards, shipyards are very old and they have not been updated. So if you see a vessel dock in Norway, the way they treat the hull and paint the hull, if you see this in Brazil we are 30 years in difference; in performance, in equipment and technology. Takes longer, more costly….”*

Cost drivers

Access to the docks

The main driver of the dry docking cost in Brazil is the access to docks (docking capacity). Because there are only a few docks in Rio de Janeiro (“Rio”), it is not enough to cover the demand from the shipowners. As mentioned in the strategic profitability analysis earlier, there are only 2-4 docs that could be used for medium to large support vessels in the Rio de Janeiro area, Renave, Maua and Dockshore (floating dock) located in Niteroi, being the most reliable ones. The number of useable docks in Rio (and Brazil as a whole) depends on what risk you want to take. One shipowner considered only one dock in Rio to be 75% reliable, meaning that the quality of these docks is questionable. There are numerous other docking facilities, but these are either too small or lack the qualified people, equipment or technology to do the work in a reliable way. As mentioned earlier there are almost 500 OSVs in Brazil. With vessels needing a classification dry-docking every 5th year, it means that there could be around 100 classification dockings every year. In addition to this, several emergency dockings occur causing an even higher demand for docking capacity. To get an idea of the number of emergency dockings that occur every year, one shipowner said he had about 0,5 emergency dockings per vessel last year. In summary, the demand is much higher than the offer from the market, causing rent-prices for the dry docks to skyrocket.

In the future this might be better as new companies are entering the dry-docking service industry. As far as we know, there is currently one onshore dry dock and one floating dry

dock being built in Niteroi/Rio area by Embradock and Dockshore. Shipowners believe the prices will go down as the supply increases.

Time of docking process - delays

The time it takes to conduct a dry dock in Brazil is another important driver of the docking cost. A 5 year classification docking should normally take around 20-25 days. There are however several examples of dockings that took 30 and even 40 days. In Norway, it does not take more than 12-21 days when the dry-docking goes without problems. One factor prolonging the process of docking is unreliable shipyards. Yards could confirm to the shipowner that a space is available in the dock, thus the shipowner takes his vessel out of contract, but when the vessel arrives at the yard she does not necessarily get access to the dock right away. The total time of the docking process increase and potential revenues are lost.

Shipowners emphasize that it is important to plan the docking thoroughly to make sure that all the equipment and parts needed are in place when the maintenance starts. If a surprise occurs, a lot of time will be lost due to a slow import process. For example if an imported spare part arrive at the customs clearing warehouse on a Thursday, you might not get it before 4-5 days later because of lack of capacity and productivity in the customs office. In Møre and Romsdal in Norway you would probably be able to get this same part within hours. In Brazil, an undeveloped supplier industry, with a lack of qualified equipment leads to a lot of importations; this takes time if not planned properly.

Longer time in the dock means more days of dry dock rent payments, increasing the price of the docking substantially compared to Norway. The dry docking in Norway is not only faster, but the price of renting the dock is also lower.

Low quality leading to import of goods and services

Another important driver behind the dry-docking prices is the tax related to import of equipment and services from abroad. This issue is similar to what is explained as a driver of the technical cost (maintenance, repairs, etc.), in the section about OPEX in Brazil. In both cases, tax on import, transportation costs and the cost of the extra time spent is increasing the total cost of the docking.

Import of equipment and the use of technical teams from Europe to manage and conduct the dry-docking, is done by many OSV-companies. Lack of competence among Brazilian workers and lack of quality in Brazilian equipment lead to these importations. The extra cost related to the "import" of the "docking-team" is not substantial, but the cost related to the import of equipment could be big, especially when something unforeseen happens. If a repair that was not planned as part of the initial scope has to be done, it takes extra time due to the long importation process. The price of the equipment will be higher because the company does not have time to get the item(s) under REPETRO.

If one decides to use local services, another problem that can occur is that they are not doing the entire scope of the docking, forcing the company to make a new dry-docking after 2,5 years, or that they do maintenance that is outside of the scope increasing the cost of the docking. The lack of well trained and experienced engineers in combination with a lack of state of the art equipment and suppliers in Brazil is a big challenge for the shipowners.

Climate

As for technical cost, the climate in Brazil is also a driver of the docking cost. The warm and humid weather, in combination with very salty and warm water is a factor that increases the need of maintenance on the vessels. The Brazilian climate leads to corrosion and a faster formation of algae, tearing down both the vessel's hull and the moving parts like propellers and thrusters. To avoid too much wear and tear shipowners need to spend more money on state of the art fouling and painting. The climate could lead to more frequent visits to the docks, especially for old vessels, increasing the maintenance (docking) cost for the fleet.

Alternatives to docking in Brazil:

Docking abroad can be an alternative to docking in Brazil. The attractiveness of this depends on whether the vessel has international or Brazilian flag, and also on the scope of the docking. The advantage of docking abroad is bigger for more complex and advanced dockings, e.g. if reconstructions and new installments on the vessel are necessary before the start of a new project. Abroad, the docking team will most likely be more competent and use better equipment and technology.

In terms of the cost, the price of dry-docking an AHTS in Brazil could be 5M$ while it is only 3M$ on Las Palmas in the Canary Islands. Shipowners have tried to dock both BRL-flagged

vessels and INT-flagged vessels abroad, and the two cases differ. Independent on flag, vessels needs to be exported from Brazil in order to do the docking and then imported again afterwards. For the BRL-flagged vessels, the Brazilian shipping company has to pay about 40% tax on the services done in the dry-docking when receiving the invoice from the shipyard, eating up much of the price difference between Europe and Brazil. For vessels flying under an international flag the invoice can be sent to the vessels home country, avoiding this import-tax. The risk in this scenario is that the shipowner can be forced to pay the 3% tax (ICMS) on the vessels value when it is re-imported into the Brazilian waters. Some shipowners say it is possible to avoid this while other are not willing to take the risk.

Another downside for both Brazilian and internationally flagged vessels is that it takes more time to sail to a docking facility that is located abroad. Sailing to Las Palmas for example, takes 10-12 days, depending on the speed, leading to more days off-hire. Lastly, the shipyards in Brazil are also aware of the costs related to docking abroad and can therefore price their own docks accordingly, making sure that it is hard for the shipowners to take advantage of any arbitrage opportunities. The price of docking abroad is however helping to put a roof on the price of dockings in Brazil.

7.2.2 Shipbuilding

Shipbuilding status in Brazil

The fleet in Brazil has grown dramatically during the last 5-10 years. The first 5 years of this century less than 200 vessels were operating in Brazil. According to a report published by ABEAM (Brazilian Association of Offshore Support Companies) in June 2014, there were 492 OSVs operating in Brazil during the first half of 2014. 233 (47,4%) of these were flying under the Brazilian flag (BRL) while 259 (52,6%) where flying an international flag (INT). Looking at the different segments we see that the composition of Brazilian vs. international flag varies. For PSV there are 108 INT flagged vessels and 97 BRL-flagged vessels. For AHTS it is however only 20 BRL-flagged vessels while there are 78 INT-flagged vessels. The CSV-segment is dominated by international vessels (40 vs. 11) (Abeam, 2014).

According to Petrobras another 200 vessels will be needed within 2020 (ABRAN FGV Seminar, 2014). It will not be possible to build all of these vessels in Brazil, which means that if Petrobras manages to develop their fields as fast as they say, there will be a demand for

international vessels. Shipbrokers and shipowners we have talked with said that around 7-10 PSV will be built in Brazil every year going forward, and 10-12 AHTS will be built until 2019. The main companies ordering PSV are CBO and Edison Choest, who are building at their own shipyards. As mentioned already, this is not enough to cover the expected demand from Petrobras creating a room for international vessels.

Cost of Shipbuilding

The cost of building a vessel depends mainly on the type of vessel being built and where it is constructed and commissioned. It is cheaper to build vessels in Norway than in Brazil, and it is even cheaper to build vessels in China. Building a high-end PSV- 4,500 dwt with Norwegian standards in Brazil could cost 60-80M $, while it would only cost 40-60M $ in Norway, and as little as 30-35M $ in China. The quality of the vessel and the time of construction could also vary depending on geographical region. The shipyards in Brazil are unfortunately known for being less reliable both in term of on-time delivery, and in term of the quality delivered.

Even though the price of building vessels in Brazil is currently at an all-time high, this has not always been the case. Between 2000 and 2010, the shipbuilding prices in Brazil were similar to what you would find in Norway. Shipowners say that the cost of building a PSV in 2002-2003 was 16-20 M$, but that the prices have increased dramatically since then, especially between 2010 and 2013. According to shipyards the reason for this is that the vessels being built in Brazil today are more advanced and bigger than 10 years ago. The Brazilian yards are not dimensioned for such big vessels, and the workers do not have the skills required to build such advanced vessels. This has led to delays which is an important cost driver for the shipbuilding process.

For similar reasons as dry-docking, shipbuilding in Brazil is more expensive than in Norway. The cost drivers are explained shortly in the next section.

Cost drivers

Access to yards

A lack of slots in good shipyards makes it expensive to build ships in Brazil because the yards can charge premium prices when there is a high demand. This is similar to the case of dry docks. There are not enough slots in the shipyards making an imbalance between what the

shipowners demand and what the shipyards can supply. As discussed in the strategic profitability analysis, Brazil does not have many commercial yards.

Importation of equipment/undeveloped supplier industry

The supplier industry in Brazil is quite undeveloped, forcing shipowners to import a big share of their equipment from abroad in order to get the quality they want. When building vessels in Brazil it is quite normal that equipment like engines, winches, thrusters or cranes are imported. There is no law or regulation forcing the shipowner to have a certain amount of local content. All vessel built in Brazil can fly the Brazilian flag, independent on the amount of local content used under construction. The shipowners might however have a local content requirement in their contract with Petrobras. It is normal that 30-60% of the vessels value is related to equipment imported from abroad, on which a large amount of taxes are paid, causing an increase in the price of the vessel. It is possible to avoid this tax if the shipyard is able to document that similar type of equipment is unavailable in Brazil. But even though this is the case, you will still have to deal with transportation and logistics costs, customs and extra time spent during the importation process.

Time of construction - delays

The construction of a vessel in a Brazilian shipyard could easily take 30 months instead of 18, which is how fast it can be done under optimal circumstances. If the shipowner already has a contract with Petrobras, the delay could be very expensive. First of all, the shipowner would lose its day-rate. In addition, the shipowner has to pay a penalty of 50% of the day-rate each day the vessel is delayed. If the vessel is one year late the cost of the vessel is suddenly much higher than forecasted. Depending on the contract agreement between the yard and the owner, some of the costs related to the delay could be charged to the shipyard.

Lack of quality in labor force

Because qualified labor is a scarce resource in Brazil it is hard for the yards to get a well-educated workforce, especially good engineers. This low supply leads to high labor costs. In many cases, both the competence and the productivity of the Brazilians are worse than for comparable workers in other oil and gas regions, like the North Sea or Australia.

Having shortly described the drivers behind the shipbuilding cost in Brazil the question now is whether shipowners should build vessels in Brazil or not…?

7.2.3 Advantages and disadvantages of building vessels in Brazil

Most shipowners and brokers in Rio have said that there are few or **no advantages** related to building ships in Brazil. It's more costly, it takes more time and the quality is worse than in Norway. There are however some companies building, thus some advantages do exist. Siem Offshore got delivery of Siem Atlas in 2013 and will receive Siem Giant in 2014, both PSV 4,700 dwt. Deep Sea Supply got delivery of the PSV 4,700 dwt Sea Brazil in 2012/13, and DOF is building 2 PLSV and 2 AHTS with scheduled delivery between 2016-2017 and 2014-2015 respectively. DOF Brasil (Norskan + DOF Subsea) is the Norwegian shipowner with the largest amount of Brazilian flagged vessels, many of them built between 2003 and 2010. Few shipowners have plans of building vessels the next couple of years.

We will now take one step back, and evaluate the advantages and disadvantages of building vessels in Brazil with an objective perspective.

Advantages

The advantages related to building ships in Brazil are not measurable, thus it is hard to rank them. The impression we have from the shipowners is that the priority of the Brazilian flag, the financing and the ability to get higher rates because of local content are the 3 most important advantages.

Priority of BRL-flagged vessels and blocking opportunity

The priority of the Brazilian flag is based on rules made by ANTAQ - The National Agency of Waterway Transportation in Brazil (Westshore Shipbrokers, 2013). ANTAQ has created rules forcing all contracts between oil-companies and INT-flagged vessels to be circulated in the market every 12 month. This makes it possible for BRL-flagged vessels, with the same specifications, to block the contracts, and potentially steal it from the international vessels.

When a contract is blocked, the INT-flagged vessel must stop its operations until the blockage is removed. As long as the BRL flagged vessel complies with the specifications in the contract, it can block any INT-flagged vessel. This means that one vessel can potentially block an unlimited amount of vessels, causing a complete stop in Petrobras' operation. The shipowner blocking the contract forces Petrobras into direct negotiations. The shipowner with a BRL flagged vessel will normally not accept the same dayrate as the INT-flagged vessel had in the contract, as it is not enough to break-even because of the high CAPEX related to building in Brazil. But Petrobras does not take local content (Brazilian flag) at any

price, and will in some cases rather take a fight with ANP (Agência Nacional do Petróleo) who is the authority in these processes, and risk getting a fine instead of accepting a higher rate for a BRL-flagged vessel. Usually, Petrobras ends up with a solution where both the company blocking and the company getting blocked get a contract. It has, in fact, never happened that an INT-flagged vessel has lost its contract due to a blocking. The main reason for this is that Petrobras has needed all the vessels and because ending a contract with an INT-flagged vessel sends out a negative signal to the market. If an INT-flagged vessel loses its contract it would seem more risky for the foreign owners to bring their international vessel to Brazil and this could potentially reduce the competition among the shipowners.

Even though Petrobras have rejected BRL-flagged vessels because of their high dayrate requirements, the priority of the Brazilian flag and the ability to block gives the shipowners insurance that they will always have a contract. It is however not sure whether they will get a premium as a result of the local content provided by them to Petrobras. Some companies say that INT- and BRL-flagged vessel get the same dayrate, while other say that they get as much as a 20% premium and that Petrobras understands that a BRL-flagged vessel has a higher OPEX and a higher CAPEX compared to internationally built vessels. Whether the company receives a premium or not, also depends on the segment. In the AHTS and CSV segments competition is lower with few Brazilian flagged vessels making it possible to obtain good rates, especially for the high-end subsea vessels. The PSV-segment on the other hand, has been particularly difficult for the Norwegian shipowners. Several Norwegian shipowners have built expensive (75-80M$) high-end PSVs with international specifications, while companies like Edison Chouest[5] have built, and are building less complex and cheaper vessels adapted only to the Brazilian market and Petrobras' requirements. The strategy behind the Norwegians choice of vessel is that they want to build a vessel that potentially could operate in a different region. By building a vessel with high specifications this becomes easier. For Edison Chouest, who is building vessels for Petrobras specifically, it might be harder to move the vessel to another region. Both types of vessels have BRL-flag, but the Norwegian companies cannot compete on price with the vessels supplied by Edison Chouest. When owners with advanced features on their vessels require higher rates from the charterer (Petrobras), the charterer answers that they did not ask them to build a Ferrari

[5] Edison Cheoust (BRAM) – One of world's largest OSV companies. American orgin, but operate globally.

instead of a Volkswagen Golf. This makes it difficult for the Norwegian companies with expensive PSVs to obtain good day-rates. And an owner could risk not getting a contract on the BRL-flagged vessel, regardless of the flag priority. The value of the blocking ability is hard to price, but it should (in theory) be a guarantee for the shipowner that he will always have a contract.

Financing

The financing of vessels built in Brazil normally consist of financing from several institutions. The local content can be financed through a Brazilian bank like BNDES (The Brazilian development bank), using funds from FMM - Maritime Marine Fund. The company ordering the vessel must provide a bank guarantee from for example DNB to get the loan from BNDES, a corporate guarantee from the mother company is normally also provided. The international content of the vessel could be financed by Export Credit Norway or another financial institution. In the case of Export Credit Norway a bank guarantee from GIEK (Guaranty Institute Export Credit) and another bank like DNB must be provided as well (DNB Finance Seminar Rio Oil & Gas, 2014).

The shipowners in Brazil emphasize that the financing from FMM is world class. The cheap and long maturity loans from FMM are definitely a benefit of building ships in Brazil. For local content, FMM can provide loans covering 90% of the investment, with maturity up to 20 years and interest rate as low as 3%. This is very competitive compared to conditions offered by other financial institutions. As an example, the repayment period for loans with normal commercial banks is 6-10 years while it is 12 years with Export Credit/GIEK. However, some of the shipowners we interviewed in Norway, pointed out that FMM had given out a lot of lucrative loans through BNDES the last 10 years, and that this had caused the terms and conditions on new loans to be worse than before, because of less capital left in the fund.

Local content

The protection and priority of the local content by ANTAQ described above is a measure to stimulate the development of the Brazilian shipbuilding industry. Oil companies in Brazil have requirements from ANP in terms of the amount of local content used in their projects. Over the years ANP has had 11 auctions of oil licenses. The last auctions had strict minimum requirements on local content, and the bidders were preferred if they used more local

content. As a consequence, some fields have local content requirement as high as 60-70%. These requirements make the BRL-flagged vessels more attractive than the INT-flagged vessels that have 0% local content. The cost for oil companies related to chartering OSVs is a quite small part of their total cost, but it is still an important way for the oil companies to satisfy their local content requirements. Especially for OSVs operating for international oil companies (IOC) that use international rigs without local content. Since the rate on offshore oil rigs is much higher than that of the OSVs, hiring Brazilian rigs is however a better way to cover the local content requirement. Lastly, we do want to stress that the day-rates are more dependent on the market situation, rather than the %-rate of local content in the vessel.

Easier to recruit qualified people

As mentioned earlier, finding the right crew is not easy in Brazil. There has been a lack of well-educated and trained officers leading to a big increase in salaries the last 10 years. Having a large BRL-flagged fleet gives an advantage to the shipowners in the recruiting process. On BRL-flagged vessels 100% Brazilian crew is required, meaning that not only the able seamen are Brazilian but the chief engineer and the captain too. The chance of becoming an officer in a company with a large BRL-fleet is much higher than in a company with only INT-flagged vessels. On INT-flagged vessels up to 67% BRL crew required (RN72), but the officers are often foreign. The fact that the chance of becoming a captain is higher on a BRL-flagged vessel attracts people, and gives the company a better opportunity to get the best qualified crew. This could potentially also put less pressure on crew salaries.

Ability to get EBN

As mentioned earlier a Norwegian shipowner must have an EBN to be able to enter into contract agreements with oil-companies in Brazil. With their own EBN the international shipping company avoids going through a third party. Building a vessel in Brazil is one of the ways to be recognized as an EBN.

No import cost on vessel

The INT-flagged vessels are imported to Brazil under the REPETRO regime. Under this regime the shipowners are obliged to pay 3% of the vessels value in tax (ICMS) to the Brazilian government. BRL-flagged vessels avoid this, but they do however pay higher taxes related to revenues and income, we will come back to this under disadvantages.

Showing signal of commitment to Brazil

This is probably more important than one might think. When a vessel is built in Brazil, it is built to operate in Brazil, otherwise it would have been better to build it elsewhere, with lower price and probably higher quality. This geographical inflexibility is in itself a disadvantage. But this means that companies building ships in Brazil show the Brazilian government (and Petrobras) that they are committed to their business in Brazil, and that they have a long-term perspective. Petrobras prefers doing business with companies that are committed to the industry. It means something for the Brazilians if companies will stay not only for years, but also for generations. Relations are important in the Brazilian culture, and is something that could make them value that companies are committed to their work and presence in their country.

Brazilian vessels use Brazilian equipment

A few shipowners have mentioned that it could be advantageous to have a BRL-flagged vessel rather than an INT-flagged vessel because of the high taxes related to import of goods and services on INT-flagged vessels. These shipowners say that their OPEX for the BRL-flagged vessels is lower than for the INT-flagged vessels because the technical cost for the INT-flagged vessel is high due to import of equipment and spares from abroad. The Brazilian vessels avoid this because they can use domestic suppliers. The reason why the INT-flagged vessels are forced to import could be company procedures or simply that they must do it for warranty reasons, or to make sure they get the same quality. The OPEX being lower on BRL-flagged vessels, like in this scenario, is nevertheless the exception rather than the rule.

Disadvantages

High CAPEX

As mentioned, the cost of building a high-end PSV in Brazil is between 60 and 80M$ while it costs from 50-60M$ (30-40% lower) in Norway. The building cost in Brazil could be more than twice as expensive as building in the Far East. In isolation, this is as an argument against building vessels in Brazil. Higher initial investment means that the company needs higher day-rates to break even. A world class financing from FMM/BNDES could, to a certain degree, compensate for the high CAPEX, but it is still not enough to justify the purchase of a vessel.

Time - Risk of construction delays

Most shipowners say that it is unpredictable to build vessels in Brazil; you have to expect delays. Some companies said the time could be exceeded by 50%. Normally, it should take about 2 years to build a vessel. In Brazil however, it could easily take closer to 3 years to finalize a vessel. DOFs financial report for Q1 2013 illustrates the issue of delays in Brazil. DOF had delays on all of their 3 AHTS under construction in Brazil at that time. Another example is Deep Sea Supply's Sea Brazil (PSV 4700 dwt) that was delayed about 9 months (Tradewinds, 2012). The construction delays increases the cost of building the vessel, and the companies also risk receiving penalties from Petrobras. If the vessel was supposed to start a contract with Petrobras the 1st of January but was not delivered on time, Petrobras penalize the shipowner with 50% of the day-rate every day that the vessel is late. Some of this could maybe be charged to the shipyard, depending on contract terms, but doing that is also a risk, because it could make the shipyard go bankrupt. Lately (2014), the shipyard EISA, where the Brazilian Shipping Company Astro Maritima is building vessels, closed down for several months showing how risky it can be to build vessels in Brazil (Hellenic Shipping News, 2014).

Quality

Initially one cannot say that the quality of a vessel built in Brazil is worse than on a Norwegian built vessel. Equipment like, generators, thrusters, engines and propellers (40-50% of vessel value) is normally imported from well-known suppliers like, Rolls Royce, Wartsila, Man, NOV, etc. The commissioning of the vessels' hull and its equipment is however not as good as in vessels built in Norway, and it is normal that shipowners experience problems with their vessels after delivery from the yard because of bad commissioning. The skills of the workers in Brazil are not world class, there is a lack of productivity and they lack the state of the art technology in order to commission and build the vessels in the same way as in Europe (Hellenic shipping news, 2014).

Increased OPEX

In general, Brazilian flagged vessels have higher OPEX than INT-flagged vessels. This means that the shipowner needs a higher day rate for his BRL-flagged vessels to break even, not only because of high CAPEX, but because of a higher OPEX. As this is already elaborated on earlier in the OPEX section, the details will not be discussed here.

Revenue tax and corporate tax

It is a disadvantage to have BRL-flagged vessels for tax purposes. As a Brazilian shipping company you have to pay tax on the revenues and on the net income of the company. For INT-flagged vessels up to 80% of the contract's value (the charter part) could be sent back to Norway without revenue and corporate tax. BRL-flagged vessels require a higher day rate to compensate for the tax, making it more expensive for Petrobras (and other IOC) to charter them. We will go more in detail on the tax system in Brazil in the next section.

In summary the most important advantages are the flag priority, blocking opportunity, financing conditions from FMM and the ability to recruit Brazilian officers. The most important disadvantages are the cost of the vessel, potential delays and quality. An investment case comparing a vessel bought in Norway and a vessel bought in Brazil is presented in chapter 9.

7.3 Comparison and summary of CAPEX

Both dry docking and shipbuilding is more expensive in Brazil than in the North Sea. The drivers behind the high dry dock prices in Brazil is mainly the lack of docking slots and the lack of professional workers, the cost related to importation of equipment, and the delays in the docking process. In North Sea on the other hand, the supply of docks and professional workers is high, and the dock owners are reliable. The docking process goes smoothly, without issues related to importation or getting a slot in the dock.

The main drivers behind the shipbuilding costs in Brazil is the lack of commercial yards, the lack of professional workers and the delays that often (always) occur when building vessels in Brazil. There is however some advantages related to building vessels in Brazil. Compared to Norway there are regulatory benefit given to the shipowner when building in Brazil, like the priority of the Brazilian flag, and the financing provided from FMM. But the price you pay for the vessel is high, the vessel is often not delivered on time, and you might not get the same quality as you would in Norway, where the world's leading builders of advanced offshore shipping vessels are located.

8 Tax and foreign exchange costs

8.1 Tax

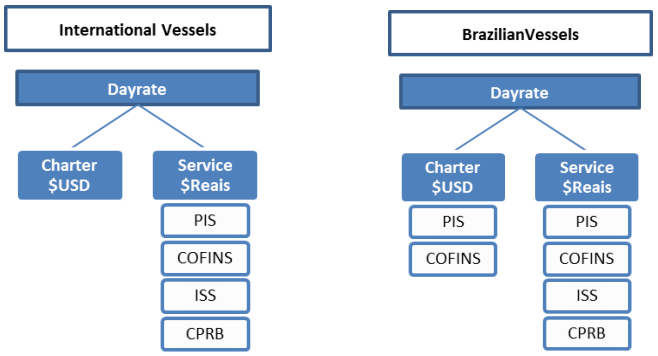
The Brazilian tax system is so complex that not even the Brazilians understand it. OSV companies in Brazil have just as many working with tax issues as they have in accounting, making the administrative staff larger than in Norway. Preparing a tax return in Brazil takes 2600 hours according to the World Bank, this is the worst of all the countries on their list, and it is 10 times as much as the average (World Bank, 2013b). The shipowners say that it is sometimes hard to know both what to pay and whom to pay to.

We will in the following section explain the contract structure between shipowners and oil companies and what type of tax is paid by the shipowner.

Contracts in Brazil are different for INT-flagged vessels compared to BRL-flagged vessels. The current structures are illustrated underneath, and will be explained in the following paragraphs.

Figure 10a: Contract structure and revenue tax for International vessels in Brazil

Figure 10b: Contract structure and revenue tax for Brazilian vessels in Brazil



In both cases the contract is divided in two, a charter part, and a service part. For both BRL-flagged and INT-flagged vessels, the charter is paid in USD, while the service is paid in Real. The split between charter and service is normally 70/30, but the charter part could be as much as 80%. For INT-flagged vessels the charter part goes directly to Norway without any tax, while the service part goes to the Brazilian Shipping Company (EBN), where a lot of taxes are paid. It could be tempting to put as much as possible of the contract as charter hire, so that you send more money to Norway, where the company is not paying taxes. But using this strategy, the shipowner risks having insufficient amount of money to cover its'

operational costs in Brazil. Having a deficit in Brazil several consecutive years could also lead to problems with the government. Some companies have been punished because the government believes they have been doing tax evasion (sending too much money home, high charter %). Each year, the contracts are escalated using the consumer price index in Brazil. It is only the service part of the contract that is escalated over the years. This escalation has been lower than the inflation rate causing operational margins to decrease over the years.

For the revenues paid to the Brazilian Shipping Company, there are 4 main taxes that could occur: PIS[6], COFINS[7], ISS[8] and CPRB[9].

PIS and COFINS are taxes paid both on the charter and the service contract. PIS, is 7,60% of gross revenue, while COFINS is 1,65% of gross revenue. In addition to PIS and COFINS, ISS and CPRB is also paid on the service part of the contract. ISS is a city tax and should be paid to the city where the service is performed. For the OSV-companies that are operating on the whole Brazilian continental shelf, one solution is to pay to the city where you have your headquarters. The ISS tax varies depending on the city it is paid to and what type of service that is conducted. ROV service has a different tax-rate than PSV-service for example. The rate is normally somewhere between 2,5% and 5% of gross revenues. The last tax is the CPRB, which is 1 or 2% of gross revenues. The CPRB tax is replacing a former tax on salaries, thus this change is beneficial for companies that have a lot of workers. OSV-companies profit from this change. Overall, more revenue tax is paid for the Brazilian vessels, than for the international vessels. The Brazilian flagged vessels pay between 10 and 15% on the service part and 9,25% on the charter part. The INT flagged vessels pay 10-15% on the service part and 0% on the charter part.

Petrobras has introduced a new contract structure for new Brazilian tenders. INT-flagged vessel are not affected by this, thus they have the same contract structure as before. The proposed contract structure for the BRL-flagged vessels is that there is only one contract

[6] Contribution to the Social Integration Program (PIS)

[7] Contribution to Social Security Financing (COFINS)

[8] Tax on services (ISS)

[9] Social Security Contribution on Gross Revenue (CPRB)

(Brazilian TC). Both service and charter is paid together in USD, where the taxes paid are only PIS, COFINS and CPRB, thereby avoiding the payment of ISS. This contract is designed by Petrobras, but is still involving some risk. The government could come after the OSV-companies at a later stage and require them to pay the service tax (ISS). The difference in tax payment as a result of this newly proposed contract structure is small.

Shipping companies in Brazil are also paying corporate tax of 34%, giving an incentive to Norwegian shipowners to have a lower surplus in Brazil and a higher one in Norway where the corporate tax for shipowning companies is almost 0% (only tonnage tax for shipowning companies).

8.2 Financial Cost - Currency - FX risk

The currency issue in Brazil is an important factor. Income received by the shipowners in Brazil is split between USD and Real as explained in the previous chapter. The OPEX is mostly paid in Real, especially for the Brazilian flagged vessels, where 100% of the crew is Brazilian and thereby receive their salaries in Real. Part of the CAPEX related to dry-docking is also paid in Real. This means that the company has a risk related to fluctuations in the exchange rate.

As earlier mentioned the contract is split in two parts. Since the service part is set in Real and the charter part in USD, the total USD dayrate will vary based on the USD/Real exchange rate. If the company is not able to cover all the Real cost with the service contract, dollars from the charter contract must be used to cover the extra cost.

The Real has been strong compared to the dollar the last couple of years, especially before 2012. Companies that are not able to cover their Real cost with the service part of the contract must cover the extra cost by exchanging the dollar part of the contracts to Real. Since the Real has been strong the dollar amount used to cover these extra costs has been high. A strong Real is thus driving the cost in Brazil. This is true both for operational costs and capital expenditures.

As seen in the graphic below, the USD/Real exchange rate has increased the last couple of years, meaning that the Real is weaker against the dollar. A weaker Real (increase in USD/Real exchange rate) has been good for the shipowners. A weaker Real makes the

salaries for the employees less expensive for the shipowners. Several shipowners believe that the Real should be even weaker in the future.

Figure 11: Development in USD/Real exchange rate last 3 years

(Bloomberg, 2014)

9 Investment case: Brazil vs. Norway

In this chapter, a comparison between two different business cases is done using the Net Present Value method. The question we are asking is: "Where should Norwegian offshore shipping companies invest in their next vessel, Norway or Brazil?

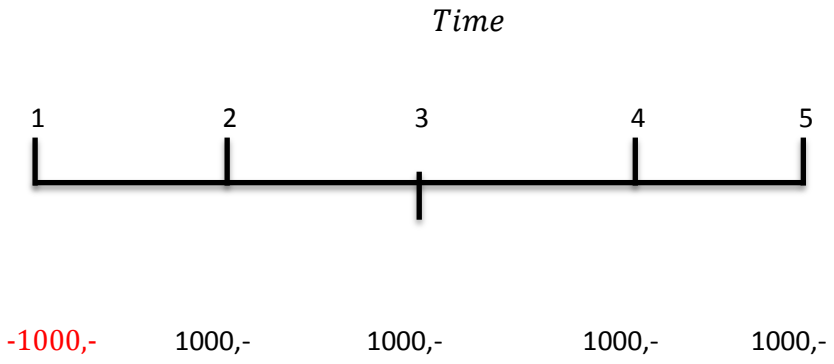
Thus, the first case is an investment in a Norwegian built vessel, meant to operate on an 8-year term contract in Norway, before it is sold in year 8. The second case is an investment in a Brazilian built vessel, meant to operate on an 8 year term contract in Brazil, before it is sold in year 8. The methods and assumptions used in the valuation of the two cases are presented first. Then the result is analyzed with the help of sensitivity analysis.

9.1 Methodology

To create an understanding of the methodology behind the valuation of the two investment cases, we will shortly describe the principles of valuation. This chapter is based on Berk and DeMarzos "Corporate Finance" (2011) unless otherwise stated.

Time Value of Money

A project that runs over a period of time will both receive payments and pay invoices. Since this inflow and outflow of cash will happen at different points of time during the project, we create a cash flow to gain the necessary overview. The stream of cash is presented over a timeline, as in the following example.



The cash flow above is an example, and every project will have a different timeline and cash flow structure. To be able to compare different projects we need an equal measurement at the same point in time. To move the cash flows back to the same period is known as compounding, and by doing this we will find the present value of the cash flow.

$$Present\ value = CF_0 + \frac{CF_1}{(1+r)} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_T}{(1+r)^T}$$

"CF" denotes the cash flow, "r" the discount rate and "T" represents the time. To find the present value, the rate could simply be the inflation of the currency of the cash flow. The rate however should incorporate all the risks and uncertainties of the project.

Internal Rate of Return

The internal rate of return (IRR) is the interest rate of which the present value of a cash flow is equal to 0. This measurement can be useful to find the expected total yield on the investment.

$$0 = CF_0 \sum_{T-1}^{N} \frac{CF_T}{(1+IRR)^T}$$

It is important to note that different projects cannot be compared against each other based on the IRR. The method does not take into account the risks, the size of investments and the size of the cash flows.

Net Present Value

The two different projects that are under evaluation will not only vary in the aspects of time and cash flows, but also in various other areas. This can be related to regulations, operations, and markets. Even with the wide variety of elements in a project, it is still necessary to evaluate them on the same basis to make an informed decision.

These different elements of the project are accounted for in the discount rate. The discount rate should therefore be an expression for the return required for the firm to accept a project, based on its risk profile.

The traditional way of computing the required rate of return is with the Capital Asset Pricing Model (CAPM). If you can find a stock with the similar descriptions and risk profile as the project, you can use the market information to find the required return.

$$r = rf + \beta_i \times (E[R_{MRK}])$$

Where rf is the risk free rate, $\beta_i$is a measure of the risk relative to the market, and $E[R_{MRK}]$ is the expected excess return from the market.

To value the two projects we discount the free cash flow to equity (FCFE). The FCFE = Net income - Net CAPEX - Change in Net Working Capital + New Debt - Debt Repayments. Different discount rates will be used in the two investment cases, reflecting the risk related to the two projects.

As the investor in this scenario is a Norwegian shipowner the risk free rate used is the interest rate on a 10-year Norwegian government bond which is 2% (Trading Economics, 2014a). The risk free rate is reflecting the opportunity cost for the investors. One could argue that all investors could invest in any market and that it would make more sense to use a global risk free rate, like a 10 year US government bond. We have however decided to use the rate on Norwegian government bonds as most Norwegian shipowners are based in Norway. This is also in line with the study conducted by PwC and the Norwegian Society of Financial Analysts (NFF), where 50% of the participants said that they use 10 year

government bonds as the risk free rate (PWC, 2014). For investments with a short horizon 3-month NIBOR rate can be used as the risk free rate, but as the horizon of investment under evaluation is 8 years we argue that the 10-year Norwegian government bond rate better reflect the risk free rate.

Further, β_i is calculated using the average unlevered beta for all Norwegian offshore shipping companies on Oslo Stock Exchange. As we do not have any target capital structure, the levered beta is calculated using the average leverage ratio for the offshore shipping companies in the sample, resulting in a levered beta of 1,8. The market premium is 5% and is based on the study conducted by PwC and NFF (PWC, 2014). By using CAPM, this gives a required return on equity of 11% in Norway.

We argue that the investment in Brazil is related with more risk. This view is based on the analysis we have done throughout the thesis, where we have found several reasons why operating in Brazil is more risky. A challenging client could result in loss of hire due to more downtime. Delays in the docking process would also affect the utilization for the vessel. These factors are already accounted for in the cash flow. However, there are other country specific factors that increases the risk in Brazil compared to Norway. As an example, Brazil ranks a lot worse than Norway on the ease of doing business index. This is discussed more in detail in the CAGE-analysis in chapter 5. As a consequence of the additional risk in Brazil, a risk premium should be added to the discount rate.

By looking at Norway and Brazils credit ratings presented by Fitch, the credit rating for Norway is AAA while the credit rating for Brazil is BBB (Trading Economics, 2014b). This rating is measuring countries default risk, which is affected by many of the same reasons that drive the equity risk, for instance its currency, budget and trade balance and political stability (Damodaran, 2014). The difference in credit rating supports our decision of adding a country risk premium for Brazil.

For the investment in Brazil, we have decided to add a country risk premium of 2% to the discount rate used when valuing the project in Norway. This results in a required return on equity of 13%. In order to check the effect different discount rates have on the value of the project, we conduct a sensitivity analysis.

9.2 Assumptions

Some simplifications are done in the valuation of the two investments. The financial structure for investments like these is more complicated than what we explain, so is the escalation in dayrates and OPEX. The assumptions we take do however give a good picture of the reality and should thus be reasonable.

Net income

- The dayrates are averages calculated based on information from shipbrokers, while utilization and OPEX is based on information from interviews and financial statements. Sales, general and administration cost is excluded in the valuation of the investment case.
- The growth in the dayrates and OPEX is based on inflation. In Norway, only the dayrate related to OPEX is escalated, while the dayrate related to financial costs (depreciation + interest) and operating margin is not. The OPEX is escalated using an inflation of 2,5%, as this is the target inflation for the Norwegian Central Bank (Norges Bank, 2014a).
- In Brazil, 100% of the dayrate is escalated using inflation estimates. The long-term inflation forecast for Brazil is 4,6% (Inflation, 2014). The growth in dayrates have historically been a little under the inflation, thus 4% is used. The growth in OPEX however, has historically been above the inflation thus inflation + 1,0% is used.

CAPEX and depreciation

- The newbuildprice is an average number calculated based on information from shipbrokers. The price for the AHTS in Norway is 107$M, while it is 125$M in Brazil.
- Depreciation is calculated using a lifetime of 20 years; this is common in the industry. In both cases, 100% of the payment is done when the vessel is delivered. In reality, 20% is often paid when the contract is signed and 80% on delivery.
- The docking costs are based on information collected in interviews. Docking cost in Brazil is assumed to be 40% higher than in Norway.

- The second hand value of the vessel used in year 8 is the market value today of an eight year old vessel ($85 500 000). In Norway the book value of the vessel in year 8 is $64 200 000 while it is $75 000 000 in Brazil due to higher purchasing price. Both book values are lower than the estimated market value of the vessel. The use of the market value instead of the book values in the valuation is still reasonable since this is the price you will receive in the market today. We have not escalated the sale price using an inflation index, even though the global price level, and thus the price of the vessel, most likely will increase in the future.

Financial Cash flows

- Financial cash flows are based on information provided by Export Credit and DNB.
- In Brazil, Export Credit normally finances the foreign content, while local content is financed by BNDES. For loans given from BNDES the financial terms depend on the vessel's local content. We assume that 60% of the vessel's total value is local content, thus 60% of the financing is done through BNDES and the rest (40%) is done by Export Credit. As a result, BNDES will be able to provide a finance program with 80% leverage, 16,5 years maturity, with interest rate of 4,5%. For the Norwegian content, Export Credit provides financing, with 70% leverage, 12 years maturity, with interest rate of 5,2% (Interest rate Export credit + Guarantee GIEK/BANK + fees) (Export Credit, 2014).
- In Norway the financing is normally done by Export Credit. We assume that 100% of the financing is done by Export Credit with the same terms as for Brazil, 70% leverage, 12 years maturity, with interest rate of 5,2%.
- The loans are paid back when the vessel is sold.

Other

- We have assumed no change in working capital during the project.

9.3 Analysis

See appendix for detailed valuation.

Case 1: Norway

Table 4: Valuation assumption Norway

Description	Data	Referecne
Newbuild price ($USD)	107 000 000	RS Platou
Salesprice estimate year 8 ($USD)	85 500 000	RS Platou
Day rates ($USD)	55 000	RS Platou
Utalization	95 %	
OPEX ($USD)	16 000	RS Platou/Interviews
Growth in Dayrate	1,7 %	
Growth in OPEX	2,5 %	
Financing cost	5,2 %	Export Credit
Levarage	70 %	Export Credit
Maturity (yr)	12	Export Credit

Table 5: Valuation result Norway

Valuation	
Required return on equity	11 %
Net present value ($USD)	4 873 572
Internal rate of retrun	13,6 %

The FCFE method gives a positive net present value of +4,87M$. This means that the shipowner should invest in the vessel in Norway as it creates value for the shareholders. The internal rate of return is 13,6%, which is higher than the required return on equity.

We believe that the parameters that most likely could change from the original scenario are the second hand value of the vessel and the growth in dayrates. Both of these depend on the market situation, and can change a lot from good to bad times. We have conducted two sensitivity analyses where these two parameters are changed, at the same time as the discount rate varies. The matrixes are shown in the appendix.

If we increase (decrease) the secondhand value of the vessel by 5 M$, while the discount rate is kept constant at 11%, the NPV increase (decrease) by 2 M$. If the vessel is sold at book value, the investment does not create value for the shareholders. Assuming that the vessel is sold for 85,5M$ the discount rate must increase to 14% for the NPV to be negative.

With a discount rate of 11% the NPV is positive even with 0% growth in dayrates. At 1,7% growth in dayrates the NPV is positive as long as the discount rate is lower than 14%.

Case 2: Brazil

Table 6: Valuation assumptions Brazil

Description	Data	Referecne
Newbuild price ($USD)	125 000 000	RS Platou
Salesprice estimate year 8 ($USD)	85 500 000	RS Platou
Day rates ($USD)	65 000	RS Platou
Utalization	90 %	
OPEX ($USD)	20 000	RS Platou/Interviews
Growth in Dayrate	4,0 %	
Growth in OPEX	6,1 %	
Financing cost BNDES	4,5 %	DNB
Levarage BNDES	80 %	DNB
Maturity (yr) BNDES	17	DNB
Financing cost ExportCredit	5 %	Export Credit
Levarage ExportCredit	70 %	Export Credit
Maturity (yr) ExportCredit	12	Export Credit

Table 7: Valuation result Brazil

Valuation	
Required return on equity	13 %
Net present value ($USD)	- 13 239 284
Internal rate of retrun	3,8 %

The FCFE method gives a negative net present value of -13,2M$. This means that the shipowner should not invest in the vessel in Brazil as it destroys value for the shareholders. The internal rate of return is 3,8%, which is lower than the required return on equity.

We have conducted the same sensitivity analyzes as for the investment in Norway. The matrixes are shown in the appendix.

At 11% discount rate, the vessel would need to be sold for 115,5M$ for the investment to be profitable. This price is pretty unrealistic as it is almost 35% higher than the current market value for 8 year old AHTS.

In the sensitivity analysis where the growth in dayrates and the discount rate is changed, the growth rate needs to increase a lot to get a positive NPV. With a discount rate of 13% the growth rate has to be 10% for the NPV to be positive. If we reduce the discount rate to 11% the growth rate still has to be 9% to give a positive NPV. Some investors might think this is a likely scenario, as Brazil and Petrobras is expecting a huge growth in the oil production the next 5-8 years.

There are several reasons why the investment in Brazil is not profitable. The three main reasons are the higher newbuild price, the higher cost of docking and the tax paid both on revenues and net income. The EBITDA margin in Brazil is decreasing quite a lot over the projects lifetime due to OPEX increasing more than the dayrate.

9.4 Recommendation

Based on the investment case, Norwegian offshore shipping companies should invest in an AHTS in Norway. The valuation result of the investment in Norway is mainly driven by the assumed secondhand value and the high utilization. The market situation in offshore shipping can change quickly which would have a strong impact on our assumptions and the profitability of the case.

It is harder to see how the project in Brazil could lead to value creation for the equity holders. This result is in compliance with what we have learned throughout our research both the acquisition and the operation of vessels are more expensive in Brazil. The shipowners are not always compensated in the dayrates even though the vessel flies the Brazilian flag and provide local content for the charterer. However, a boom in the Brazilian oil and gas industry could lead to a more attractive market and a different conclusion. Even though a booming market would increase the dayrates, it would also attract vessels from other regions and thereby increase the supply and push dayrates down again.

Part 3: Conclusion and further research

10 Conclusion

This study investigates the main drivers for operational and capital expenditures related to operation of PSVs, AHTS' and CSVs in Brazil and how this differs from the North Sea. The study also assesses where Norwegian shipowners should invest in their next OSV. Our analysis is based on interviews with 9 different shipowners, industry and annual reports as well as interviews with other key actors in the offshore shipping industry.

To better understand the cost drivers within the OSV industry, we have in the first part of our study analyzed the external environment offshore shipping companies are facing in Norway and Brazil. The result indicates that the outlook for the offshore shipping industry is challenging. The future demand for OSVs is uncertain due to predictions of low oil price and thereby reduced E&P spending and lower rig activity. Based on the strategic profitability analysis the industry does not look very attractive and there is no sign of "super profit" in the current market landscape. This is mainly because of high rivalry among the OSV companies, low entry barriers for new players and high bargaining power of buyers and suppliers. The country analysis revealed large differences between Brazil and Norway, which is something Norwegian shipowners have to acknowledge before deciding to enter the Brazilian market.

In the second part of the study, we perform an analysis of the drivers behind OPEX and CAPEX for offshore support vessel, and the differences between Brazil and the North Sea. Based on our analysis we conclude that both OPEX and CAPEX are higher in Brazil than in the North Sea.

The differences in OPEX are mainly related to crew and technical cost, which are the two major parts of the OPEX. The difference in technical cost is driven by costs related to importation of goods in Brazil. The difference in crew cost is mainly driven by governmental regulations in Brazil. Shipowners are forced to have a certain amount of Brazilians onboard their vessels and the crew cost is almost twice as high as the base salary because of social benefits. The lack of well-educated professionals both onboard the vessels and in technical

positions onshore, drives up the cost of the crew. Breakdown cost is an additional cost driving up the OPEX for vessels in Brazil. This cost has arisen due to strict rules created by Petrobras. The difference in OPEX between Brazil and UK is larger than the difference between Brazil and the Norwegian Continental Shelf (NCS). The difference between NCS and the UK is solely due to Norwegian wage tariffs on vessels flying the NOR-flag.

In terms of CAPEX, the cost related to both dry-docking and shipbuilding is higher in Brazil. Differences in dry-docking cost is mainly driven by the lack of dry-docks, but also by costs related to importation of goods needed in the docking process. The differences in shipbuilding cost are driven by few commercial yards present in Brazil, lack of professional workers, as well as big delays in the building process mainly due to little experience among the Brazilian shipbuilders.

The result of our study indicates that operation of offshore support vessels in Brazil is both more challenging and more expensive than in the North Sea. Based on the investment case we conducted in the end of our study we see that shipowners should not invest in a new vessel in Brazil, which supports our findings and shows that the dayrates received in Brazil are not high enough to cover the extra costs. By looking at the investment case, investing in a vessel in Norway looks quite attractive given our assumption. A change in the market situation can however change these assumptions substantially. At the moment we see rough waters ahead for offshore shipping companies.

11 Limitations of the study and further research

Limitations

The scope of our study was defined in the beginning of our thesis. A lack of resources and time meant that we would not be able to perform an analysis on a global level. To simplify the task, we decided to focus only on two regions within the oil and gas industry, the North Sea and Brazil. Further, the scope was limited only to Norwegian offshore shipping companies that provided offshore support services to oil companies.

Including companies from other countries than Norway would add value to the study, but would also require more time and resources. Because of our focus only on Norwegian controlled companies our sample of shipowners becomes small (9), and we cannot

necessarily use this study to draw conclusions about offshore shipping companies originating from other countries than Norway.

Our analysis of OPEX and CAPEX was performed using a qualitative approach. It was based on semi structured interviews with shipowning companies, and other players within the offshore shipping industry. This means that we have little or no quantitative data backing up our findings, only some average numbers provided by the interview objects, and industry experts.

In the analysis of OPEX the main focus was on the costs directly related to the operation of the vessels. Costs related to administration and management, in addition to tax and foreign exchange costs had less attention. This limitation means that we might not have been able to cover “the whole picture”.

Further research

There are several studies in this area that could be interesting to carry out in the future. The same study, as we currently have completed, could be carried out with a larger scope, including companies originating from different countries, or with a focus on different regions.

Further, the same type of study could be conducted using a quantitative approach. A quantitative study would make it possible to test the findings in our study, while mapping the average cost level in the industry and for the industry peers. The study would generate additional value for the shipowners, as it makes them aware of their own performance compared to the rest of the industry and the industry peers. A quantitative benchmark study would require certain participation from the shipowning companies, for the results to remain anonymous, and a professional clearinghouse would be needed in order to conduct the study in a proper way, as no company specific information can be shared across the participating companies.

Lastly, because the “rules of the game” in the offshore shipping industry change frequently, especially in Brazil, a study similar to this one could be conducted again in 2-4 years with different results.

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13 Appendix

Appendix 1: Interview guide

Interview subject

Name:

Company:

Position:

Age:

Sex:

Introduction

Purpose/parts of the interview

1. Analyze the cost structure for PSVs, AHTS' and CSVs in Brazil and the related cost drivers, and how the costs differ from Norway.

2. Market outlook

Define scope

In our study we will focus on PSV, AHTS, CSV.

The focus is mainly on the operational costs, costs related to docking and shipbuilding, tax and finance costs.

1. Cost Structure

Part 1: Cost groups and drivers

- What is the average daily OPEX in Brazil per vessel type? (PSV, AHTS, CSV)

1) <u>Crewing.</u>

a) Approximately how much does crewing represent of the total OPEX Brazil, and is this portion different from Norway?
b) How many people are there on average on each vessel type?
c) What are the main drivers for crewing cost, and are they different in Norway?
d) How does the crewing cost differ for the different vessel types, and is this different in Norway?

2) Technical costs.
   a) Approximately how much of the total OPEX is related to technical cost in Brazil, and is this portion different in Norway?
   b) What are the main drivers for technical cost, and are they different in Norway?
   c) How does the technical cost differ for the different vessel types, and is this different in Norway?

3) Insurance
   a) Approximately how much of the total OPEX is related to insurance cost in Brazil, and is this proportion different in Norway?
   b) What are the main drivers for insurance cost, and are they different in Norway?
   c) Do you have the same insurance on the entire fleet or do you have different insurance in each region.

4) Breakdown.
   a) What type of breakdown cost do you have and approximately how much of the total OPEX is related to breakdown in Brazil, and is this proportion different in Norway?
   b) What are the main drivers for breakdown cost and are they different in Norway?
   c) Is it normal to have breakdown more often on some vessels than others

5) Port and pilot fees, lube oil, bunkers and inspection,
   a) Approximately how much of the total OPEX is related to port and pilot fees, lube oil, bunkers and inspection cost in Brazil? Is this proportion different in Norway?
   b) What are the main drivers for port and pilot fees, lube oil, bunkers and inspection cost, and are they different in Norway?
   c) How do the port and pilot fees, lube oil, bunkers and inspection cost differ for the different vessel types? Is this different in Norway?

CAPEX

1) Dry dock
    a. How much does it cost for a 5-year dry dock service for the different vessel types in Brazil and is this different from Norway?
    b. What are the main drivers for a dry dock, and are they different in Norway?

2) Shipbuilding: What are the advantages and disadvantage of building ships in Brazil, and what do you see as the best option, building in Brazil or Internationally?

Other cost groups we want to discuss

3) Tax:
    a) How does tax affect the decisions one are taking as a shipowner in Brazil?
    b) How does the tax system affect the profitability of the business in Brazil, and what do you do to minimize the taxes?

4) Currency:
    a) How are you affected if there are big changes between REAL and USD?

2 MARKET OUTLOOK

OSV Market now and going forward (Not all the questions were asked in all interviews)

1. How has the type of oil fields and production units are used in Brazil/North Sea changed over the years?

2. How has development for OSV in Brazil/North Sea been the last decades?

3. Who are the main players (Shipowners) in the Brazilian/North Sea market today? And what is the competition like in the different segment? (High, medium, low)

4. How do the entry barriers differ for PSVs, AHTS, and CSVs? (High, medium, low)

5. Is it a competitive advantage to be able to provide the whole specter of OSV, instead of e.g. just PSV?

6. How is the relationship/power between the shipowners and the suppliers (yards and equipment suppliers)? (High, medium, low)

7. How is the relationship/power between the shipowners and the customers? (High, medium, low)

8. Is there any backward integration in the industry? E.g. shipowners buying yards, or oil companies buying offshore shipping companies.

9. What will drive the demand for offshore support vessel in the short and long term? Do you see any differences between Brazilian and international flagged vessels?

10. Do you see a change in the demand for AHTS, after the introduction of rigs with DP-systems?

11. How do old vessels differ from new vessels in terms of safety, capacity, fuel efficiency, reliability? How does this impact the attractiveness of the vessel in a tendering process?

12. What will happen to the supply of vessels? Are shipowners building more or less vessels than before in Brazil/Norway?

13. How has the average utilization of the vessels developed over the years in your company, do you see a better or worse future?
    - Is this common for the whole industry?

14. What are key challenges going forward in the offshore support industry?

Appendix 2: Valuation Norway

Numbers in $USD

Year	0	1	2	3	4	5	6	7	8
Investment cost	107 000 000								
Loans Export Credit	74 900 000	68 658 333	62 416 667	56 175 000	49 933 333	43 691 667	37 450 000	31 208 333	-
Dayrates (Revenue)		19 071 250	19 402 031	19 738 550	20 080 905	20 429 198	20 783 532	21 144 012	21 510 745
OPEX		5 840 000	5 986 000	6 135 650	6 289 041	6 446 267	6 607 424	6 772 610	6 941 925
EBITDA		13 231 250	13 416 031	13 602 900	13 791 864	13 982 931	14 176 108	14 371 403	14 568 820
EBITDA - margin (%)		69 %	69 %	69 %	69 %	68 %	68 %	68 %	68 %
Depreciation		5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000
EBIT		7 881 250	8 066 031	8 252 900	8 441 864	8 632 931	8 826 108	9 021 403	9 218 820
Interest expense Export Credit		3 718 161	3 394 843	3 071 524	2 748 206	2 424 888	2 101 569	1 778 251	808 296
Net Income before tax		4 163 089	4 671 189	5 181 376	5 693 658	6 208 043	6 724 539	7 243 152	8 410 524
Net income after tax		4 163 089	4 671 189	5 181 376	5 693 658	6 208 043	6 724 539	7 243 152	8 410 524
Change in debt									
New debt Export Credit	74 900 000								
Repayment Export Credit	-	6 241 667 -	6 241 667 -	6 241 667 -	6 241 667 -	6 241 667 -	6 241 667 -	6 241 667 -	31 208 333
CAPEX									
Add back depreciation		5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000	5 350 000
Interim/Classification docking			-	5 000 000	-	12 000 000	-	6 000 000	
Sales price yr 8									85 500 000
CF to equity	- 32 100 000	3 271 423	3 779 522 -	710 291	4 801 991 -	6 683 623	5 832 873	351 485	68 052 191

NPV year 0	**4 873 572,24**

IRR 13,6 %

Appendix 3: Sensitivity analysis discount rate and secondhand value Norway

NPV year 0 (M$)		**Second hand value**						
	4,87	**65 500 000**	**70 500 000**	**75 500 000**	**80 500 000**	**85 500 000**	**90 500 000**	**95 500 000**
Re	**4%**	12	16	19	23	26	30	33
	5%	9	12	16	19	22	25	29
	6%	7	10	13	16	18	21	24
	7%	4	7	10	13	15	18	21
	8%	2	5	7	10	12	15	17
	9%	0	3	5	7	10	12	14
	10%	-1	1	3	5	7	9	11
	11%	-3	-1	1	3	5	7	9
	12%	-4	-3	-1	1	3	5	6
	13%	-6	-4	-2	-1	1	3	4
	14%	-7	-5	-4	-2	-1	1	2
	15%	-8	-6	-5	-4	-2	-1	1

Appendix 4: Sensitivity analysis discount rate and growth in dayrates Norway

NPV year 0 (M$)		**Growth in dayrate**						
	4,87	**0,0%**	**0,5%**	**1,0%**	**1,5%**	**2,0%**	**2,5%**	**3,0%**
Re	**4%**	19	21	23	25	27	29	32
	5%	15	17	19	21	23	25	27
	6%	12	14	16	18	20	21	23
	7%	9	11	13	14	16	18	20
	8%	7	8	10	11	13	15	17
	9%	4	6	7	9	10	12	14
	10%	2	4	5	6	8	9	11
	11%	0	2	3	4	6	7	8
	12%	-2	-0	1	2	4	5	6
	13%	-3	-2	-1	0	2	3	4
	14%	-5	-3	-2	-1	-0	1	2
	15%	-6	-5	-4	-3	-2	-1	1

Appendix 5: Valuation Brazil

Numbers in $USD									
Year	0	1	2	3	4	5	6	7	8
Investment cost	125 000 000								
Loans BNDS	60 000 000	56 363 636	52 727 273	49 090 909	45 454 545	41 818 182	38 181 818	34 545 455	-
Loans Export Credit	35 000 000	32 083 333	29 166 667	26 250 000	23 333 333	20 416 667	17 500 000	14 583 333	-
Dayrates (Revenue)		21 352 500	22 206 600	23 094 864	24 018 659	24 979 405	25 978 581	27 017 724	28 098 433
Revenue after tax		19 163 869	19 930 424	20 727 640	21 556 746	22 419 016	23 315 777	24 248 408	25 218 344
OPEX		7 300 000	7 741 650	8 210 020	8 706 726	9 233 483	9 792 109	10 384 531	11 012 795
EBITDA		14 052 500	14 464 950	14 884 844	15 311 933	15 745 922	16 186 472	16 633 193	17 085 638
EBITDA - margin (%)		*66 %*	*65 %*	*64 %*	*64 %*	*63 %*	*62 %*	*62 %*	*61 %*
Depreciation		6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000
EBIT		7 802 500	8 214 950	8 634 844	9 061 933	9 495 922	9 936 472	10 383 193	10 835 638
Interest expense BENDS		2 618 182	2 454 545	2 290 909	2 127 273	1 963 636	1 800 000	1 636 364	777 273
Interest expense Export Credit		1 737 458	1 586 375	1 435 292	1 284 208	1 133 125	982 042	830 958	377 708
Net income before tax		3 446 860	4 174 030	4 908 643	5 650 451	6 399 161	7 154 431	7 915 871	9 680 657
Net income after tax		2 274 928	2 754 860	3 239 705	3 729 298	4 223 446	4 721 924	5 224 475	6 389 234
Change in Debt									
New loans	95 000 000								
Repayment BNDS	-	3 636 364 -	3 636 364 -	3 636 364 -	3 636 364 -	3 636 364 -	3 636 364 -	3 636 364 -	34 545 455
Repayment Export Credit	-	2 916 667 -	2 916 667 -	2 916 667 -	2 916 667 -	2 916 667 -	2 916 667 -	2 916 667 -	14 583 333
CAPEX									
Add back depreciation		6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000	6 250 000
Interim/Classification docking			-	7 000 000	-	16 800 000	-	8 400 000	
Sales price yr 8									85 500 000
CF Equity	- 30 000 000	1 971 897	2 451 829 -	4 063 326	3 426 268 -	12 879 584	4 418 894 -	3 478 555	49 010 446

NPV year 1	-	**13 239 284**

IRR 3,8 %

Appendix 6: Sensitivity analysis discount rate and secondhand value Brazil

NPV year 0 (M$)		**Second hand value**						
-13,24		**95 500 000**	**100 500 000**	**105 500 000**	**110 500 000**	**115 500 000**	**120 500 000**	**125 500 000**
Re	**4%**	7	10	14	17	21	24	28
	5%	4	7	10	14	17	20	23
	6%	1	4	7	10	13	16	19
	7%	-1	2	5	7	10	13	16
	8%	-3	-0	2	5	7	10	12
	9%	-4	-2	0	2	5	7	9
	10%	-6	-4	-2	0	2	5	7
	11%	-7	-6	-4	-2	0	2	4
	12%	-9	-7	-5	-3	-2	0	2
	13%	-10	-8	-7	-5	-3	-2	0
	14%	-11	-9	-8	-6	-5	-3	-2
	15%	-12	-10	-9	-8	-6	-5	-3

Appendix 7: Sensitivity analysis discount rate and growth in dayrates

NPV year 0 (M$)		**Growth in dayrate**						
-13,24		**6,5%**	**7,5%**	**8,0%**	**8,5%**	**9,0%**	**9,5%**	**10,0%**
Re	**4%**	9	13	15	17	19	21	23
	5%	6	10	12	14	16	18	20
	6%	4	7	9	11	12	14	16
	7%	1	5	6	8	10	11	13
	8%	-1	2	4	6	7	9	10
	9%	-2	0	2	3	5	6	8
	10%	-4	-1	-0	1	3	4	6
	11%	-6	-3	-2	-0	1	2	4
	12%	-7	-5	-3	-2	-1	0	2
	13%	-8	-6	-5	-4	-2	-1	0
	14%	-9	-7	-6	-5	-4	-3	-2
	15%	-10	-8	-7	-6	-5	-4	-3

Appendix 8: Beta calculation

	Havila	DOF	Siem*	DESS*	Farstad	Solstad	Eidsvik	Average
Leveread beta	1,12	1,75	1,57	1,85	1,92	1,68	1,12	
Debt (1000 NOK)	6 321 788	26 399 000	1 108 815	179 460	10 659 091	10 070 858	3 351 910	
Equity (1000 NOK)	2 021 605	6 346 000	793 888	257 220	6 877 974	4 954 275	2 348 288	
Unleverad beta	0,27	0,34	0,66	1,09	0,75	0,55	0,46	**0,59**
Debt/Equity	3,13	4,16	1,40	0,70	1,55	2,03	1,43	**2,06**

*Debt and Equity in 1000 USD

Levered Beta	**1,80**