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TITLE:
Buy versus Rent of cargo carrying units in the Wireline segment at Schlumberger Norway

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Abstract

In today's economy with dramatically low energy prices, it is extremely important to make all the processes efficient and lean inside an organization in order to eliminate unnecessary costs.

Schlumberger supplies its offshore customers by transporting them products in baskets and containers. Wireline, together with the other company’s segments has always rented the offshore units and paid for them at daily rate basis. However, such a rental system has generated extra unnecessary costs due to the idle time of the units, and, depending on the various projects’ duration, the company has had poor control of rental costs. Thus, the main objective of the paper is to investigate whether there are economic advantages in buying particular types of units instead of renting them repeatedly. In particular, it was defined which types of units it is beneficiary to buy for Wireline, at what amount, and under what price conditions in order to maximize total cost savings during the life span of the equipment.

The research in this paper was done by conducting the quantitative analysis based on exploratory sequential mixed method and theoretical foundations.

The findings of the research work has shown that there are huge potential cost savings in case of buying mini containers, 8m baskets and 10ft closed containers. The optimal amount of the units for purchase was identified, and the overview of the potential purchase prices and corresponding cost savings for each of the three analyzed units was presented.

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1. Introduction

Supply chain possesses a great possibility of creating competitive advantage for a company though it is the most complex and expensive function in any organization. Especially now, the low oil price environment forces energy companies to examine the ways in which they manage their supply chains. In particular, companies are trying to investigate the ways how costs can be minimized and how to stay economically robust during these hard times.

As such, the management at the Procurement & Sourcing department in Schlumberger Norway has initiated the project aimed to investigate the rental situation with offshore equipment in order to obtain empirical findings on whether there are potential cost savings in buying particular baskets and containers.

1.1. Purpose and research problem

This paper aims to investigate the Buy versus Rent of CCU – cargo carrying units - in the Wireline segment at Schlumberger Norway. Wireline, together with the other company's segments has always rented the CCU and paid for them at daily rate basis. According to Youcef Belkhir, a Procurement & Sourcing department leader, such a rental system has generated extra unnecessary costs due to the units' standby, and, depending on the various projects' duration, the company has poor control of rental costs. Moreover, some types of units have been on rent for a long period of time and maybe their purchase would be a better solution for the company in terms of cost savings. Thus, the management of the Procurement & Sourcing department of Schlumberger Norway has initiated this project in order to investigate whether there is economic feasibility in buying particular types of units instead of renting them repeatedly.

Therefore, the objective of the thesis is to determine which types of units for Wireline segment it will be beneficiary to buy, at what amount and under what price conditions in order to minimize rental costs and maximize the cost savings. In today's economy with dramatically low energy prices, it is extremely important to make all the processes efficient and lean inside an organization in order to eliminate unnecessary costs. Thus, the results presented in this master thesis will give a valuable information about the potential financial outcomes of the particular units' purchase to the Procurement & Sourcing department's management.

The main research problem of the paper is defined as follows: At what tender prices would Wireline maximize its total cost savings during the life span of the equipment in case of purchasing particular units? Based on the research problem and the literature review, the thesis will focus on four research questions connected to the main research problem:

1. What are the potential CCU that should be taken to the analysis? – based on the 2015 spend per unit only the "costly" units will be taken into consideration.
2. Would there be any potential cost savings if Wireline had bought units in 2015? – it will be run analysis based on real rental figures from 2015, and potential in real implementation of the *buy* project will be demonstrated.
3. What is the optimal amount of units for purchase? – based on empirical and theoretical findings it will be determined the optimal amount of CCU to purchase.
4. What are the potential tender prices and corresponding cost savings for each unit type? – based on calculations it will be demonstrated possible tender prices and respective cost savings.

1.2. Layout

This paper is organized in 7 chapters. In *Chapter 1* there is an introduction to the research field. Purpose and the research problem will be defined, and the necessary background information will be given. *Chapter 2* is devoted to the presentation and description of the rental data received from the suppliers. *Chapter 3* will present the theory, which is relevant for this master thesis. *Chapter 4* is devoted to the methodology of this paper, including the presentation of research design, sample description, discussion of validity and the description of concepts and formulas that the quantitative analysis will be based on. *Chapter 5* will present the detailed analysis of the units. *Chapter 6* is intended to interpret the results and discuss them in the light of the theory and practical importance. Limitations and suggestions for further analysis will be presented in this chapter as well. The paper will end with the conclusion of the main findings of the research.

1.3. Scope of work

The main focus in this paper is the Wireline segment and the analysis of the CCU which it rented during 2015 from Swire oilfield services.

However, at the beginning of the research I got a lot of information on various CCU which the other segments had rented. The data was received from Schlumberger's two main suppliers of offshore equipment – Swire oilfield services and MODEX AS. All the data received was carefully examined, the rental data of the similar units from both of the suppliers was merged together, and the CCU were sorted according to the unit type and segment. Such a data processing was carried out based on the professional advice of the suppliers and the staff of the Procurement & Sourcing department of Schlumberger. Therefore, together with the analysis of Wireline, it will be given a detailed description of all the data received from all the segments and it will be explained how the data processing was accomplished. In future this valuable information will give a good start to other researchers who will analyze the rest of the segments.

1.4. An introduction to Schlumberger

Schlumberger Limited was founded in 1926. It was started with the invention of wireline logging technique for obtaining downhole data in oil and gas wells. Today Schlumberger is the world's leading supplier of technology, information solutions and integrated project management to the international oil and gas exploration and production industry (Schlumberger, 2016).

The company operates in each of the major oilfield service markets, controlling its business via three Groups: Reservoir Characterization, Drilling and Production. Each Group consists of specialized service and product lines. These lines or Technologies provide all necessary services for the reservoir life cycle and supply to the markets in which Schlumberger has leading positions. There are four geographic areas for the business: North America, Latin America, Europe/CIS/Africa and Middle East & Asia (Schlumberger, 2016).

Schlumberger has both small and large competitors, but due to its high-quality services and technological innovation the company believes that it is an industry leader in providing wireline logging, solids and waste management, geophysical services, well testing, drilling and completion fluids, exploration and production software, coiled-tubing, drill bits, measurement-while-drilling, logging-while-drilling, directional drilling services and mud logging (Schlumberger, 2016).

Being one of the majors in the world oil and gas industry, the demand for Schlumberger's services is heavily dependent on the amount of expenditures by the energy companies on the exploration, development and production for oil and gas reserves. As energy prices have dropped significantly since 2014 and oil and gas industry was forced to cut down on spending, the demand for oilfield services has fallen significantly (2015 Annual Report, 2016).

As a result, the company's revenue of $35.5 billion for 2015 represents a 27% drop from 2014 and 2015 was the year with the lowest activity during the last five years (2015 Annual Report, p.18, 2016).

1.4.1. Description of Wireline segment

Wireline segment is a part of *Reservoir Characterization Group* which deals with finding and defining hydrocarbon resources. Wireline provides *"the information necessary to evaluate subsurface formation rocks and fluids to plan and monitor well construction, and to monitor and evaluate well production. Wireline offers both open-hole and cased-hole services including wireline perforating".*

During the market downturn and in 2015 in particular, Reservoir Characterization performance was negatively influenced by the customers' cuts in their exploration spending, currency weaknesses, and operational disruptions. That had a huge impact on Wireline activities especially in the Europe, CIS & Africa and Middle East & Asia Areas (2015 Annual Report, 2016).

1.5. Present oil price situation

Oil has never been only a fuel. It is an economic tool, a significant strategic asset and one of the greatest forces driving the economy of a global world. The history of the oil industry has gone through several rises and falls, but in recent years is has been in deepest slowdown since the 1990s, as oil prices dropped extremely low between June 2014 and January 2015 after a four-years period, when oil prices had been relatively constant. By comparing the falls in oil price during the last 30 years – in 1986 and 1998, and between June 2014 and January 2015, the latter one is the third largest oil price decline. Four years preceding the crisis were characterized by nearly the highest average oil prices. Oil industry companies have made record profits those years, til the middle of 2014, when the decline in oil prices has been marked. This drop reached a 75 percent level during the following 18 months (Gordon, 2015).

As a result, the companies in oil and gas industry worldwide suffer. The middle-scale USA's oil companies which policies are based on high price expectations and Western companies carrying out costly oil extraction projects - like oil extraction in the North Sea - are under additional risk. Moreover, companies in countries with developing economies dependent on the raw materials suffer from the situation. The brightest examples are Venezuela, Nigeria, Ecuador, Brazil and Russia (Bowler, 2015).

As it is predicted by analysts, the crisis period in oil industry will pass some time later, as it has always been before (Krauss, 2016). In general, the analytical prognosis, both short and long term, don't expect the return of oil prices to a pre-crisis level. However, the international financial and analytic organizations' forecasts for oil prices are quite different. The Energy Information Administration (EIA) made some short-term prognosis concerning oil process. This organization expects that price pressure is going to be limited in the coming months, and the slight growth in oil prices is expected in the end of 2016 - to reach *41 USD per barrel* (USA EIA, May 2016). The beginning of 2017 is going to be marked with a price increase up to *51 USD per barrel* (USA EIA, May 2016). This price increase will tend to continue during 2017. Thus, the economic risk for oil companies is expected to decrease in comparison with the previous period, but the negative effect of the recent growth of global oil supply will still pressure oil companies. (USA EIA, May 2016). At the International Petroleum Week conference in London in the beginning of 2016 the prognosis was more optimistic. It was stated that oil prices would be able to rise again to reach the level of 100 USD per barrel till the end of the year. Indeed, over the long term, demand for oil is recovering in some countries, and that could help crude prices recover in the next year or two.

The prognosis of *Goldman Sachs, which is American global investment banking company,* is in line with one of The Energy Information Administration. Goldman Sachs expects that crude oil prices could increase to become around 40 USD per barrel by the end of 2016 (Goldman Sachs Global Investment research, 2015).

However, The National Bank of Abu Dhabi is not so optimistic and forecasts that crude oil prices could go down to 20 USD per barrel in the short term due to uncertain economic conditions in the Middle East and North Africa (Gordon, 2015).

The level of optimism in long-term forecasts is also different. So, if to address to the International Monetary Fund prognosis, the crude oil prices are able to reach at average 45.30 USD per barrel to 2020 (IMF Commodity Price Forecasts, 2016). The World Bank assumes that crude oil prices could increase to 51.20 USD per barrel in 2020 (World Bank, 2016). According to the prognosis made by British Petroleum, in long-term perspective the crude oil price will spike at 100USD per barrel again (BP Energy Outlook, 2016).

1.5.1. Projections for Petroleum investments in Norway

Between 2002 and 2013 there was a sharp increase in petroleum investment and a simultaneous growth in costs in oil and gas industry in Norway. However, the increased costs and the fall in oil prices through 2014 - 2015 have reduced energy companies' cash flows and the profitability of investments on the Norwegian continental Shelf substantially. As a result, a number of projects have been postponed or cancelled, and necessary measures were undertaken in order to reduce operating, maintenance and investment costs.

As such, investment fell by almost 15% between 2014 and 2015, and it is projected a further fall by 12% in 2016, and an additional fall in 2017. Namely, petroleum investments are expected to be decreased by NOK 10bn in 2016 and a further NOK 14bn in 2017. In 2018 the fall will continue and results in 2%, and will be a third lower than it was in the peak year 2013 (Monetary Policy Report, 2016).

Due to a dramatic oil price decrease and cost cutting by oil companies, exploration investment between 2014 and 2015 declined. In 2016 the investments are projected to fall by additional NOK 13bn (Monetary Policy Report, 2016).

While attending the "Applied Learning Experience" course at the UiS, and further by working on the project in Schlumberger, I had a possibility to observe one of the majors on the NCS and understood that oil price fall has made a huge impact on both oil-producing and service companies in the industry.

1.6. Presentation of suppliers

Currently Schlumberger has two main suppliers of cargo carrying units – SWIRE Oilfield Services and MODEX. These two contractors have already proven to be financially stable, technically qualified, and reliable suppliers who are available in Schlumberger Web Procurement System (SWPS).

1.6.1. SWIRE

Swire Oilfield Services, part of the worldwide Swire Group, is the world's largest supplier of specialist offshore cargo carrying units to the global energy industry and is a leading specialist in modular systems, offshore aviation services and chemical handling.

Swire Oilfield Services can provide standard, specialized and tailored products certified to DNV2-7.1 and EN12079 to the worldwide oil and gas market. With a huge hire fleet of around 60 000 it allows immediate access, 24 hours a day, to a comprehensive range of products any place in the world.

Swire Oilfield Services was established in 1979. The company is recognized as a specialist in four core areas:

- Cargo carrying solutions
- Modular systems
- Fluid management service
- Offshore aviation services

Operating in 27 countries, with a team of 670 staff across 63 bases around the globe, the company has a presence in all major oil and gas regions with large operations in the Americas, Europe & Africa, and Asia Pacific (Swire oilfield services, 2016).

1.6.2. MODEX

Prior to 2015 the company named Euro Offshore, but in 2015 the name was changed to Modex. MODEX is a leading manufacturer and provider of DNV certified CCU's, cabins and well service equipment for offshore oil & gas operations. MODEX manufactures offshore equipment utilizing leading Norwegian offshore technology, with a focus on quality and safety, for the offshore oil and gas markets.

Modex' core business is rental and sales of offshore containers and modules. In addition, the company buys and sells, from stock, offshore surplus material such as valves, cables, pipes and fittings.

The offices strategically placed around the world – in addition to the manufacturing center located near Shanghai, China – which allows MODEX to service the global sales and rental markets efficiently and cost-effectively, while consistently delivering products of the highest North Sea standards (Modex AS, 2016).

1.7. Baskets and containers

Cargo carrying units that both SWIRE and MODEX provide Schlumberger with are of vital importance for the company. Schlumberger supplies the petroleum industry with such services as artificial lift, seismic acquisition and processing, well testing and directional drilling, well cementing and stimulation, well completions, flow assurance and consulting, and software and information management. All types of equipment involved in this range of services should be transported offshore to customers. Therefore, offshore equipment is an important link in Schlumberger's operations and the customer-seller relationship (per discussion with Youcef Belkhir).

In order to give a reader a more comprehensive information and understanding of the equipment under analysis, it will be now given a description of the CCUs and the illustration of those will be attached. After the familiarization with the rental data, it was discovered that various types of CCU have been used by the segments in their daily operations – from food containers to the modular and pressurized ones. However, as the main focus of the analysis is the Wireline segment, the units that are most frequently used there will be described.

- Mini containers – are the standard sealed containers that suit perfectly for the transportation of smaller goods and especially ideal for palletized chemicals and IBC chemical carriage (Swire oilfield services, 2016).

Figure 1. Mini container

- Closed containers – are standard sealed containers which are ideal for the transportation of large volumes of smaller goods or equipment that is palletized or skid mounted for forklift truck loading (Swire oilfield services, 2016).

Figure 2. Closed container

- Cargo Baskets – are of different sizes from 2 to 21 meter in length which are ideal for transportation of large volumes of both short and long pieces of equipment. Each basket has a full complement of load securing points and can be supplied with an optional net to eliminate the risk of the lifting set snagging on the cargo (Swire oilfield services, 2016).

Figure 3. Cargo basket

All the offshore cargo products provided by MODEX and Swire Oilfield Services are certified to DNV2.7-1 – that is the Det Norske Veritas certification. Units with this type of certification meet high standards with regard to the environment, health and safety. SWIRE provides CCU with a certification of type BS EN12079-1 as well. If an offshore container is used for dangerous goods, it has the IMDG code which is a special certification for units with such application use.

As such, the CCU used in offshore oil industry are made in a secure and safe way. In order to not pollute water, its flora and fauna, offshore containers and baskets have to go through very stringent requirements and get a certification (Swire oilfield services, 2016).

1.8. Description of the visit to Drilling & Management segment

In order to find out about how the process of assigning the unit to the project starts and to take a closer look at baskets and containers in reality, I visited Drilling & Measurement segment and talked to its logistic supervisor Kjell Erik Rosenberg. According to Kjell Erik, the activity has declined in 2015 compared to the previous years, but still there was job to do each day.

The segment has a large base with many different units of various dimensions. While some units came from offshore the other were being shipped to the trucks in order to deliver the equipment.

The segment's supervisor explained that each unit has a unique serial number which should be written on the delivery note before sending it offshore. In this way the equipment is delivered to the right customer. When the units come to the base from offshore, the supervisor makes inspections of them in order to be sure that it is safe to use them again.

If the segment requires baskets or containers, then the supervisor orders them. However, according to Kjell Erik, instead of calling the suppliers and say that they need baskets, they keep the units in the pool. Youcef Belkhir explained that Wireline, together with Drilling & Measurement segment are the ones which had consign stock. Consign stock means that the units always stay on the segments' base, without being transported back to the supplier after the work. However, according to Youcef Belkhir, while Drilling & Measurement was not charged for the units which stood without usage, Wireline always paid regardless of the usage rate. However, in May 2016 a new contract was made with SWIRE, according to which the segments must have a particular number of CCU on the base and will pay only when the units will be in work (per discussion with Deepak Siwach, a leader in the Procurement & Sourcing department).

As for certification of the units, it is valid for one year, but if recertification is needed in order to assign unit to other projects, the supplier does it. The supplier – Kjell Erik talked about MODEX – needs to come to the base three months before the certificate expires. Kjell Erik's responsibility is to tell it to the supplier in the right time.

2. Presentation and description of the rental data from two suppliers

Initially the researcher received all the rental data from the two main suppliers which covered all the segments that Schlumberger consists of.

As such, the rental data provided by SWIRE and MODEX referred to eight segments: Completions, Drilling & Measurement, Geoservices, M-I SWACO, Smith International, Testing services, Wireline, and a Well services & Well intervention segment.

2.1. Description of segments and subsegments

In this chapter will be specified what kind of data was provided by the suppliers and how it was presented. Lots of rental data was received from SWIRE and MODEX. While MODEX has provided the data for 2013, 2014 and 2015, SWIRE has made available only the rental report for 2015.

Before starting the description of data received, it will be given a description of what BORG means.

BORG is a Buying ORGanization representing a place which contains cost centers, suppliers and bill-to/ship-to details specific to the particular location in order to facilitate the requisitioning process (Schlumberger Hub, 2016).

BORG Naming Conventions	**BORG prefixes**	**BORG Naming Conventions**	**BORG prefixes**
Drilling and Measurements (D&M)	A	Water and Carbon services	N
GOLD Replenishment	B	Available	O
Completions	C	Tech Centers	P
Well services	D	SIS/ICS	Q
SEPS	E	IPM Rigs	R
Geoservices/Slickline	F	NeXT, SEA	S
WesternGeco	G	Testing	T
Taken – Undefined	H	Unassigned	U
IPM	I	*Taken – Undefined*	V
Taken – Undefined	J	Wireline	W
DCS	K	OFS HQ	X
Artificial Lifts	L	Hierarchy Borgs *(non-transactional)*	Z
Taken – Undefined	M		

Table 1. BORG description

2.1.1. MODEX data

From MODEX there were received a great number of excel files with different units that Schlumberger has been renting since 2013. The files contained information about what type of unit has been on rent, the name of a project or a customer who the units refer to, rental starting and termination date, the rental price per day and the total amount of money charged. However, some spreadsheets had missing information about what kind of unit was on rent and/or how long it has been on rent. In order to make the data complete, a person from MODEX was contacted, and necessary corrections were made (Appendix 7).

While some files already had the name of a segment where its content belonged to, the other files had either the name of a customer, the project name or a name of a subsegment without specifying the segment itself. As such, additional research had to be made in order to put the rental data into the right segment. A worker from MODEX's financial department was contacted and she gave the information about which BORG had ordered the units. Thus, there are the names of rental report files which lacked the segment information, but which belonged to the following BORGs:

By subsegment:

- Pumping, cementing – DANO
- Stimulation – DNO-3
- Coil tubing – NNO-1

By customer/project:

- Knarvik, OLD5, Ormen Lange, OsebergB – DANO
- OcVanguard – VNO
- Total – CNOS
- TO Searcher – TNWO

As MODEX gave only the abbreviations of the corresponding BORG, I had to check what they meant and referred to SWPS - Schlumberger Web Procurement System - which contains data on the company's purchase orders. After having checked the needed information in the system and in the BORG hierarchy file received from the company, all the rental data from the supplier was finally put in the right segments (Table 1, Appendix 1).

As such, after some investigation and sorting, the data from the following segments were available: Completions, Drilling & Measurement, Geoservices, M-I SWACO, Smith International, Testing services, Well Intervention and Well Services. However, in March 2016 it was announced in the internal communication channel, that Well Intervention was no longer a separate segment, but became a part of the Well Services segment. Thus, all the data on Well Intervention was placed into the Well Services segment.

				2010	2011	2012	2013	2014	2015	2016
Supplier Parent Number	Supplier Parent	ASL Supplier Number	ASL Supplier Name	Spend CM (kUSD)	Spend CM (kUSD)	Spend CM (kUSD)	Spend CM (kUSD)	Spend CM (kUSD)	Spend CM (kUSD)	Spend CM (kUSD)
18414	Swire Oilfield Services	17970	Swire Oilfield Services - Norway	3,851	4,463	4,756	4,123	8,446	5,145	807
		17974	Swire Oilfield Services Ltd - UK	310	500	449	216	1,206	680	123
		256335	Swire Oilfield Services - UK INACTIVE			15				
220621	MODEX GROUP	103389	MODEX AS	1,415	1,211	1,430	1,767	1,681	1,336	134

Table 2. Total spend per supplier in Norway, mil USD

By looking at the table above, we see that during the last 3 years the rental activity from Schlumberger has been decreasing, resulting in 25,5% total spend reduction from 2013 up to 2015. Besides, by having examined financial reports from MODEX for 2013 – 2015, and looked through rental spreadsheets for the last 3 years, it was clear that historically Drilling & Measurement segment, together with M-I SWACO and Smith has generated the largest spend for Schlumberger. However, the rental activity in the latter two ones has decreased significantly from 2013 to 2015, making Drilling & Measurement segment the most active one in 2015 (Appendix 8, 9, 10).

2.1.2. SWIRE data

SWIRE made available the rental report for 2015. All the data was presented in one file and sorted by segment and month. All the SWIRE units had names, had rental starting and termination date, the rental price per day, the total amount of money charged for a particular unit per month (Appendix 11).

While the MODEX rental data had information on units for the whole rental period, the rental data from SWIRE was split on months and segments.

Initially, all the data in the report was allocated into the following segments and subsegments: Cementing, Completions, Drilling & Measurement, Geoservices, M-I SWACO, Smith International, Oilphase, Testing services, TCP, Wireline and Well Services. As in the case of MODEX, the subsegments had to be combined with the corresponding segments. After some investigation – inquiry to SWIRE and a conversation with workers of Rrocurement & Sourcing department in Schlumberger, the data was combined as follows:

- TCP and Oilphase are a part of a Testing services segment
- Cementing is a part of a Well Services segment

Thus, after having assigned all the rental data to the corresponding segments, the final list of the latter ones for both of the suppliers is: Completions, Drilling & Measurement, Geoservices, M-I SWACO, Smith International, Testing services, a Well Intervention and Well Services, and Wireline. The rental data for the latter one was received only from SWIRE.

2.2. General recommendations for the rental data processing

After having assigned the data from both suppliers to the segments, it became clear that segments Completions, Drilling & Measurement, Geoservices, M-I SWACO, Smith International, Testing services, Well Intervention and Well Services had rented units from both SWIRE and MODEX, while *Wireline*, being a segment with lots of rental data, has used *only* SWIRE as a main supplier.

In order to get reliable and valid results for each segment in the first step of analysis, the rental data for each segment from both of the suppliers should be merged together and the necessary sorting of units should be done.

While this master thesis focuses on Wireline, where no merger with MODEX data is needed, the data on all the other segments from both contractors should be put together. For the sake of future analysis and research for the rest of the segments, it will now be explained how the merger should be done.

The merger of the rental information from MODEX and SWIRE, and all the sorting recommendations are based entirely on the advice and information given by logistic experts from SWIRE and Schlumberger segments.

In the analysis I will focus on baskets and containers of various types. Thus, in the analysis of Wireline segment and recommendations for the data sorting, the rental information on tanks, toolboxes, pressurized modules and workshop containers will not be taken into consideration. It was not that much information on the first two, and the last too were not important for analysis according to my supervisor in Schlumberger.

After having examined the rental information from both contractors, the following types of cargo carrying units have been used by Schlumberger's segments:

Containers:

- Mini container
- Mini container special
- Container – 10ft, 11ft, 12ft, 14ft, 20ft
- Open Top Container – 10ft, 11ft, 14ft, 20ft
- IBC Container
- Drill Cuttings Container – 5cbm
- Drill Cuttings Skip – 6cbm
- Mudskip – 10T
- Compactor – 8cbm, 6,5cbm
- Vakuum Skip
- Waste Skip

Baskets:

- Baskets – 3, 3,6, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20 meters
- Coflex basket
- Side Door Basket
- Half Height Basket – 2m, 3m, 6m, 10ft, 20ft, 33ft, 40ft

2.2.1. Guidelines for the baskets' data processing

As it was already mentioned above, baskets of all lengths should be classified into 2 groups: Baskets and Baskets Long and Narrow. In the first group go baskets which are standard and which are low, in the second – which are both low and narrow. Rental data on baskets of the same type/length should be merged together from both suppliers for the same segments and period.

In the rental files from MODEX it can easily be identified the type and model of a basket. As for SWIRE, one should first go to the column "description", find all the baskets of the same length, then go to the column "unit" and find the unit models which have been used. The next step is to apply to the product catalogue and check the width and breadth in order to put baskets in the correct group and merge this data with the same types of baskets from another supplier afterwards.

For example, in Completions segment there are 2 groups of 13m: 1) **Baskets 13m** (where Standard and Low baskets are) and 2) **Basket Long and Narrow 13m** (Appendix 12). After having identified these two groups of baskets based on the rental data from MODEX, it should be checked whether Completions used also baskets of 13 meters rented from SWIRE in the same year. After checking the data, it is clear that both MODEX and SWIRE supplied Completions with baskets 13 meters. As mentioned above, it should be used a little time to find out which 13 m baskets from SWIRE are Standard, Low, and Low and Narrow. I have an Excel file, where all the baskets are and we can see on their dimensions and will understand to which category they go. This spreadsheet was composed by SWIRE people in response to my request about clarifying the dimensions of all the baskets used by Schlumberger since a number of model types from the Rental report 2015 were not in the product catalogue (Appendix 3). In the SWIRE rental report it should be first checked the column **unit,** and there it stands all the model types of 13 m baskets used in 2015. Capital letters and a specific number indicate each unit. Thereby, Completions used 13m baskets from SWIRE of types **CBWN** and **CBW**. Such types of models are described in the catalogue, so one can easily compare their dimensions with those of 13m baskets from MODEX (Swire oilfield services, 2016). In this way, **CBW** and **CBWN** is a Long Cargo Basket 13m, with width and length almost like **B** type 13m baskets from MODEX. Hence, units starting with CBW and CBWN fall into the category **13m Baskets.** Actually, all types of 13m baskets from SWIRE fall into the category **13m Baskets** because their dimensions are almost like standard 13m baskets from MODEX (Appendix 2).

At the same time, if we take a look at the data on 12m baskets from SWIRE, the models starting with **CBZC** have width and height almost like **BS** type 12 meters baskets from MODEX. Therefore, units starting with CBZC fall into the category 12m baskets Long and Narrow. All the other models of SWIRE 12 m baskets - CBZ, CBZN and S - fall into the category **12m Basket** (Appendix 3, Appendix 2).

As it was already mentioned above on the example of 10ft containers, in the rental report from SWIRE there are some unit types which have different names while implying the same model type. For example, **CBX** model of baskets 16 meters have different names in the “description” column (Rental Report 2015).

At the same time, some types of units – e.g. 8 meters baskets – have the same name for different models. However, after the check of all the models’ dimensions - **CBS, CBSC, CBSN, S** – it was clear that all baskets 8,1 m from SWIRE can be easily combined together with baskets 8m from MODEX. Besides, 8,6m Offshore basket small type from SWIRE have width and height size which lets it go to the group 8 meters baskets Long and Narrow. The latter one is slightly longer than 8 meters, but it doesn’t play a big role in a practical use (Appendix 2, 3).

Baskets from SWIRE which have in the “description” column name **3.6mtr/12ft Basket**, are all side door baskets, but with slightly different heights than those from MODEX. All of these unit types can be combined together with FB-3,7 Side Door Basket from MODEX (Appendix 2, 3).

There are some baskets which are only rented out by one supplier, and not the other. For example, 4 m baskets are only found in the rental data from SWIRE (Appendix 2, 3).

In order to be sure that the sorting is correct, one should always check the baskets’ dimensions in the catalogue, or in the spreadsheet received from SWIRE in order to place each basket type in the right group. Besides, all the challenges and peculiarities of the data, which are discussed here should be taken into account (Swire oilfield services, 2016, Appendix 3).

2.2.2. Guidelines for the Half Height Baskets’ data processing:

The following types of Half Height Baskets are found in SWIRE report:

- 10ft H Height
- 33ft H Height
- 40ft H Height
- 6mtr/20ft H Height

- 6mtr/20ft H Height Drop Door
- Special Heavy Duty H Height

In the catalogue for MODEX there are:

- 2m Half Height Basket
- 3m Half Height Basket
- 6m Half Height Basket

10ft H Height from SWIRE can be merged with 3m Half Height Basket from MODEX, because they are of the same length, height and width.

2m Half Heights are only from MODEX and then, cannot be merged with other baskets (Appendix 2).

6mtr/20ft H Height, 6mtr/20ft H Height Drop Door, and 6m Half Height Basket can be combined together because of the same dimensions.

Special Heavy Duty H Height can be excluded from the analysis because it was only one such unit on rent and only for 10 days. The same concerns 40ft H Height since it was only used for 8 days in 2015 (SWIRE 2015 Rental Report, 2016).

2.2.3. Guidelines for the Containers' data processing:

There are 3 main types of containers used by the segments: Closed containers, Open Top containers and Mini containers.

Rental data on mini containers of both types from MODEX – Mini containers and Mini containers Special of models MDS, MDF, MDK, MD, MDA can be merged with the mini containers from SWIRE of models AMD, AMB, AMC, AME, AMN. All the dimensions of these types of containers can be found in the catalogue, showing just some slight differences in the dimensions (Appendix 2; Swire oilfield services, 2016).

Closed containers and Open Top containers from both of the contractors should be sorted according to their sizes/length, there are no special groups inside each type. Different types of containers from both of the suppliers were checked in the catalogues, and it was found out that their dimensions are almost the same. Therefore, containers of 10ft from SWIRE can be merged with containers 10ft from MODEX. Open Top containers and Closed containers of various lengths from both contractors should be merged with each other accordingly (Appendix 2, Swire oilfield services).

M-I SWACO segment has used lots of Mud Skips, Vakuum Skips and Drill Cuttings Containers. In order to be sure in the correct sorting of the rental data on these units, the employee in M-I SWACO was contacted and he gave the information about that Mud Skips, Vakuum Skips and Drill Cuttings Container are different units with different application and should, therefore, be analyzed separately.

2.3. Challenges of the rental data processing

So the first step is to merge the data from two suppliers, then to sort the data in each segment by unit type. As such, one should examine each segment one by one – put the data from both contractors together, find out which units have been rented from MODEX and SWIRE, then put together information about the units which are of the same type and carry out needed calculations. However, while I was trying to merge the data on the same type of units from both of the suppliers, I came across some difficulties.

1. Different ways of the rental data presentation – while SWIRE has split the data on each particular unit per segment and per month, MODEX has only the starting and the termination date for each unit. In order to represent the results for each segment in a more comprehensive way, the information for each unit type in each segment should be split per month. Thus, all the data from MODEX should be separated accordingly.

2. The importance of having reliable information about different units' application – people who deal directly with units on bases were contacted in order to clarify sorting principles. For example, it was found out that baskets from both suppliers had to be sorted not just by length, but by width and breadth, creating two separate groups – Baskets and Baskets Long and Narrow. According to the logistics supervisor at Drilling & Measurement segment – Kjell Erik Rosenberg, such a classification was of practical importance – while

Standard and Standard Low baskets can be used for the most of the equipment, Long and Narrow baskets fit only for some special types.

3. The same type of a unit has different names in the report – some units in SWIRE rental report had different names, while implying the same unit. For example, for Container 10ft, in the "Description" column it was found 4 different names: 10ft container, 10ft container project, 10ft container/10ft container, 10ft offshore container. Such a way of record is a little misguiding, making the researcher to track all the units under those names, check their dimensions and types in order to be sure in the correctness of sorting.

4. Lack of units' description in the SWIRE's product catalogue – in order to sort the baskets of all lengths into two different groups, one had to check each basket's dimensions. It is easy to see that in MODEX data - the first column in all spreadsheets contains unit numbers and types, e.g. **BS-** 13 – 05 – means Long and Narrow Basket of 13 meters, so this will be one group of baskets – Long and Narrow Baskets of 13 meters; **B** – 13 – 06 and **BL-**13-74 mean Standard basket of 13 meters and Low Basket of 13 meters, then these both types fall into the category 13m Baskets (Appendix 12). However, there is no such a classification of baskets in SWIRE report. In the report it only stands the length of different baskets and containers. At the same time, while being of the same length, baskets could be of different breadth and width depending on a model type. For example, in order to check all the dimensions of 13 meters offshore baskets used in a particular segment in a particular month, the researcher has to go to the column "unit", find all the models of 13 meters baskets used and then refer to the SWIRE's product catalogue in order to check the dimensions. Still, one more challenge comes up at this stage – not all the models stated in the report could be found in the catalogue. Thus, it was sent a letter of inquiry to SWIRE in order to get missing information on some units, so that afterwards correctly assign each unit type to the right category (Appendix 3).

3. Theory

In order to obtain a theoretical basis for analysis and further discussion on how many units of different types Wireline should consider to buy and at what price in order to maximize the total savings during the equipment's life span, it is important to study theory related to buy versus rent decisions and supply chain management theory. The purpose of this chapter, therefore, is to build a theoretical foundation for the empirical research in this paper.

3.1. Definition of supply chain

There are several points of view on the definition of the supply chain. Theoretical base concerning this organizational function has been developed over time. *Supply chain* definitions are different ranging from very general "buyer-supplier relationship", offered by Olsen and Ellram (1997), to the complex explanations. For example, New (1994) proposed that supply chain is an integration of industrial production, marketing, economic geography and logistics, so it includes each side of business. According to the opinion of Lambert, Cooper, and Pagh (2008), which has more of a practical meaning, supply chain is the complex of major business processes by which products, services, and information are delivered from suppliers to end users. They also assumed that these processes add value to the product. This idea was developed by Mattsson (2001), who explained that the supply chain was a set of participants, depending on each other. He added that materials, finance and information flow through supply chain. However, his definition is very close to the standard sense of logistics (Jacoby, 2009). Slack, Chambers & Johnston (p.375, 2010), however, give a broad definition of a supply chain and defines it as "*organizations that relate to each other through upstream and downstream linkages between the processes that produce value to the ultimate consumer in the form of products and services*". The processes that procure services and materials, transform them into products, and deliver them to customers include both purchasing and outsourcing activities (Heizer & Render, 2011, p.452).

3.2. Outsourcing and the review of the literature on Buy vs. Rent decision making

Outsourcing means buying products or services from external suppliers that are normally a part of an organization (Heizer & Render, 2011, p.482). Heizer & Render (2011, p. 483) together with Abdur Razzaque & Chen Sheng (1998, p. 91) discuss the following drivers of increased outsourcing in business all over the world: reduced costs, increased specialization and advancements in telecommunications and computers. As such, Heizer & Render (2011, p. 489) in the continuation of the explanation of the popularity of outsourcing specify its advantages and disadvantages. Namely, there are five main reasons why companies outsource:

- Cost savings
- Gaining outside expertise
- Improving operations and service
- Focusing on core competences
- Gaining outside technology

Potential disadvantages of outsourcing are:

- Increased transportation costs
- Potential loss of control of some operations and as a result, bad oversight of costs
- Negative impact on employees
- Creating future competition
- Longer-term impact than that of the advantages of outsourcing

Adrian (2000) in “Buy or Rent” article discusses the same issue and talks specifically about factors that affect *buy versus rent equipment* decision. If the cost of the equipment is high, such a decision can have a significant impact on a firm’s profitability. Before the discussion of the numerical cost analysis, the author points out that one should not forget about some immeasurable factors. One of the factors that favors buying decision is availability. It means that a company has equipment available when it needs it. As for the factors that favor renting, the author agrees with Heizer & Render (2011) in that flexibility of use and technological advantage allow the company to have the equipment it exactly needs and which is technologically advanced.

Further, the measurable factors are discussed. Before specifying those factors, Adrian (2000) points out that for a high cost equipment improved cash flow is often a rental advantage. Indeed, rather than having a huge initial cost outflow associated with financing, renting process gives a balance between cash flow needed to rent the equipment and revenue which is generated by the use of that equipment.

Adrian (2000) explains that in order to estimate the economic benefits of renting or buying the equipment, its rental cost per unit of time and the cost of owning the equipment should be evaluated and compared. While the rental cost is already known to the buyer, the components that make up the cost of owning the equipment should be investigated. Usually there are the following components that should be considered: depreciation**,** operating costs/expenditure that is the money a firm uses on an ongoing, day-to-day basis in order to run its business. These costs depend on the industry the company operates in and on the type of equipment, but usually include administration costs and maintenance (Adrian, 2000). Heizer & Render (2011,p.687) differentiate between preventive and breakdown maintenance. The first one implies carrying out routine inspections, keeping equipment or facilities in good repair and servicing. The latter one include reparation of the equipment and occurs sporadically when equipment fails.

Further, Adrian (2000) points out that finance or interest cost should also be included, as well as insurance cost. If a company finances the equipment through loan, a finance component should be taken into account. If the company uses its own funds, the cost of owning the equipment must reflect the loss of opportunity interest or income. Finally, replacement cost should be considered. Depreciation allows the firm to establish a reserve to replace the assets when they are worn out. Adrian (2000) specifies that depreciation "*is a noncash expense set off against profits in a savings account that holds funds for replacing equipment".* However, the depreciation value by itself won't be enough to replace the obsolete equipment because of inflation and its impact on the cost.

In order to evaluate the benefits of renting and buying, a company should be aware of that some cost components of the owning equipment depend on time, while the other are a function of use.

Equipment maintenance increases as the equipment is used. The more it is used, the higher these types of costs. The depreciation cost is also a function of use since the equipment loses its value quicker if it is used a lot. However, the companies depreciate the equipment as a function of time. Insurance, replacement costs and finance depend on time only. If an equipment unit is sitting idle without being in work, those types of costs continue to run. Adrian (2000) explains, however, that while comparing the measurable OPEX and CAPEX of the equipment, the immeasurable factors should be taken into account as well.

3.3. Capacity planning theory

The word capacity is most commonly used in its physical sense of the fixed volume of units, or the space in the building (Slack et al., 2010). Capacity is also regarded as the number of units a facility can produce, store, receive or hold in a given time. It is of high importance to determine facility size in order to be able to achieve high levels of utilization and a high return on investment (Heizer & Render, 2011, p.314) Consequently, capacity planning issue is very important for any organization. Stevenson (2005, p. 170) gives a number of reasons for why capacity decisions are one of the most fundamental and critical decisions managers in companies should make:

1. Capacity has a direct impact on the ability of the company to meet future demand for products.
2. Decisions regarding capacity have a huge influence on operating costs. The author states that in the ideal world, demand requirements and capacity are matched and that would help to minimize operating costs. However, this is difficult to achieve in reality due to often deviation of actual demand from expected demand. According to Stevenson (2005, p.171) managers could make a decision concerning an attempt to balance the costs of under- and overcapacity.
3. Capacity decisions imply long-term involvement of resources. Once the capacity decision is implemented, it can be difficult to change it without incurring additional costs.

4. Capacity decisions should be planned far in advance due to the substantial involvement of financial and other resources.

Heizer (p.315, 2011) defines utilization and efficiency as useful measures of system performance. The first one is found by dividing actual output in a specific time by design capacity. Design capacity, in turn is defined as “the theoretical maximum output of a system in a given period under real conditions” (Heizer & Render, 2011, p.315). Efficiency is the percent of effective capacity which is really achieved. Effective capacity is the capacity that a company expects to achieve under current operating constraints. It may be difficult to achieve 100% efficiency depending on how the facilities are managed. Nevertheless, effective scheduling, training and maintenance can help to improve efficiency (Heizer & Render, 2011, p.315).

Thus, in order to be able to gain sustained profits, a good capacity decision should be taken by the company. One of the most important bases for it is an accurate forecast of demand. Management must know which items or units/products will be added and which dropped, as well as their expected volumes (Heizer & Render, 2011, p.319). Stevenson (2005, p.170) is of the same opinion and claims that forecasts are key inputs necessary to figure out how much capacity is needed and when it is needed. When capacity is inadequate and results in either shortages or excess, it can lead to loss of customers and market share, or profits will drop (Heizer & Render, 2011, p.137).

3.4. Forecasting

As defined by Heizer & Render (2011, p.136) “*forecasting is the art and science of predicting future events”.* When there is uncertainty, managers try always to make good estimates of what can happen in future. Therefore, the main goal of forecasting is to make best possible estimates. Forecasting may be an intuitive prediction, it can be based on historical data and projecting it to future with the help of mathematical model. It can also be a combination of both – a mathematical model supplied by a manager’s opinion (Heizer & Render, 2011, p.136).

Heizer & Render (2011, p.137) define 3 types of forecasts:

- Economic forecasts
- Technological forecasts
- Demand forecast

Due to the topic of this paper, demand forecasts are of special interest. Such forecasts give estimates of demand for a firm's products and services. Heizer & Render (2011, p.137) emphasize that *"demand forecasts drive a company's production, capacity, and scheduling systems and serve as inputs to financial, marketing, and personnel planning"*.

There are two main approaches to forecasting (Slack et al, 2010, p.170):

1. Qualitative forecasting – is an approach that incorporates collecting and appraising judgments, opinions, best guesses together with past performance from "experts" to make a prediction.
2. Quantitative forecasting – is an approach that uses mathematical models based on historical data and/or associative variables to forecast demand.

There are five quantitative forecasting methods:

- Naive approach
- Moving averages
- Exponential smoothing
- Trend projection
- Linear regression

All the methods use historical time-series data which is a sequence of weekly, monthly, quarterly data points. Time series analysis implies that future values are predicted only from past values and that other variables can be ignored.

Although neither qualitative nor quantitative approach can give an absolutely accurate forecast, a combination of both approaches can be applied in order to reach a better result based on both expert judgments and mathematical models (Slack et al., 2010, p.170).

Due to the nature of the available historical data for the research, an explanation of the naive approach will be given. The bottom line of this quantitative forecasting approach is the assumption that demand in next period will be equal to demand in the recent period. For some systems this naive approach is the most efficient and cost-effective objective forecasting model and provides a good starting point against which more advanced models can be compared (Stevenson, 2005, p.71).

3.5. Decision Modelling

Depending on how much information and knowledge people have about a situation results in the types of decisions they make. Heizer & Render (2011, p.703) explain that there are three decision-making environments:

- Decision making under uncertainty
- Decision making under risk
- Decision making under certainty

In order to reach the main purpose of the thesis, a decision making under uncertainty will be applied. Therefore, a brief presentation of this decision making environment will be introduced.

When there is uncertainty about the situation where the decision should be made, one can rely on three decision methods:

1. Maximax – a criterion that chooses an alternative that maximizes the maximum outcome.
2. Maximin – a criterion that chooses an alternative that maximizes the minimum outcome.
3. Equally likely – a criterion that gives equal probability to each alternative.

The maximin method is of a particular interest for this research and thus, will be now briefly explained in more details. As stated above, this method finds the alternative that maximizes the minimum outcome for each alternative. First of all, all the alternatives should be examined and the minimum outcome for each of them should be found. After that the alternative with the maximum number should be picked. Such a decision making method has been called "pessimistic" because the decision criterion chooses the alternative that has the least possible loss (Heizer & Render, 2011, p.703).

3.6. Just-in-time philosophy

The JIT, or just-in-time approach, that was developed at the Toyota Motor Company of Japan by Taiichi Ohno and his colleagues, is now being used by many companies throughout the world (Stevenson, 2005, p.618). Vonderembse & White (1998, p.477) define JIT as "*a philosophy of operation that seeks to maximize efficiency and eliminate waste in any form, influencing all parts of a company, including purchasing, engineering, marketing, personnel, and quality control, and even determining the relationships among the company, its suppliers and its customers".* Stevenson (2005, p.621) develops this idea and adds that such a philosophy represents a system that operates well with minimal levels of inventories, minimal waste, minimal transactions and minimal space. He continues that the main idea of JIT is " *to make the process time as short as possible by using resources in the best possible way".* In order to achieve this ultimate goal, a range of supporting goals should be achieved first. These goals are:

1. Eliminate disruptions – disruptions are usually caused by the following factors: equipment breakdowns, poor quality, late deliveries, schedule changes. All these factors should be eliminated as soon as possible in order to reduce the uncertainty in the system.
2. Make the system flexible – it means to make the system robust to possible changes in the level of output while still maintaining throughput speed and balance.
3. Eliminate waste, especially excess inventory. All unproductive resources represent waste. Inventory is an idle resource that takes space and adds costs to the system Thus, inventory should be minimized as much as possible.

Smith & Hawkins (2004, p.108) define Seven Deadly Wastes. Here it will be enumerated six of them as inventory has already been mentioned. The other wastes are:

1. Overproduction – too much usage of resources.
2. Waiting time – requires space, adds no value. Concerns maintenance personnel who sit idly and wait for parts to come.
3. Unnecessary transporting – increases work-in-process inventory
4. Processing waste – unnecessary production steps.
5. Defects – leads to rework costs and customer dissatisfaction
6. Motion – reduce productivity due to inefficient work methods.

4. Methodology

The formulation of the main objective of the thesis is followed by such important research stages as determination of the research design, the clarification of the data-collection method and the description of the sample chosen for analysis. (Iacobucci, 2010, p.58).

4.1. Research design

Iacobucci (2010, p.58) explains that a research design in any study is used as a guide to collect and analyze data. In order to answer to the stated research questions and to reach the final objective of the thesis, both exploratory and descriptive research designs were needed. According to Iacobucci, exploratory design is important for the discovery and explanation of unknown facts, ideas and insights, as well as clarification of particular concepts. As for descriptive design, its major emphasis is to look for the knowledge for the defined question, to determine the frequency with which something occurs or to explain the relationship between a couple of variables.

Usually, the research design and the sources of information go hand in hand. Iacobucci (2010, p.59) points out that though the two research designs mentioned above and a causal research have different purposes, they are interrelated as stages in a research process. My master thesis deals with the analysis of the quantitative rental data on CCU in the Wireline segment, as well as explains how the data from other business segments should be sorted, merged and analyzed. Therefore, in this project a mixed method research approach will be applied (Creswell, 2013). This approach incorporates both qualitative method of data gathering which is said to be exploratory in nature, and quantitative data which is used when descriptive design is needed (Iacobucci, 2010, p.84). According to Creswell (2013), the combination of both quantitative and qualitative approaches gives a better understanding of a research problem than any of the approaches alone.

4.2. Exploratory sequential mixed method

There are three primary models in the mixed methods field. They are *convergent parallel mixed method, explanatory sequential mixed method and exploratory sequential mixed method* (Creswell, 2013). In order to answer to the overall research problem in this paper, an *exploratory sequential mixed method* has been used.

In this type of approach the researcher starts first with a qualitative research phase and explores ideas, insights and the views of participants of the topic of interest. The information received is then analyzed and used for to go further to the next phase, which is a quantitative one. The qualitative phase is usually used for *"… to build an instrument that best fits the sample under study, to identify appropriate instruments to use in the follow-up quantitative phase, or to specify variables that need to go into a follow-up quantitative study*" (Creswell, 2013).

The use of qualitative phase first and quantitative analysis after is an ideal approach for this research. Under the first phase all the necessary explanations and clarifications of the received quantitative data was obtained and the researcher was, therefore, equipped with the knowledge in order to execute quantitative statistical calculations which would give a comprehensive answer to the main research problem.

4.2.1. Qualitative phase and data gathering

As such, before that project I had never been exposed to information about the cargo units, and was not familliar with the company's organizational structure and businesses. Therefore, in the early stage of the research I needed first to get a better understanding of the project, the company's structure/segments and the rental data by using the qualitative research techniques and explorative research design. In particular, relevant literature was reviewed - I went through the company's internal webpage – Schlumberger Hub, interviewed SLB employees from different segments in order to gain ideas about the types and application of different units, and visited one of the segments in order to observe a real base with units. All of the contacted people were either directly or indirectly involved in work with CCUs and had knowledge that contributed for the researcher's understanding in how to merge, sort and classify the rental data.

The researcher, therefore, used mainly primary data sources in order to get a first-hand knowledge about the topic under interest under the first phase. Primary data is gathered directly by a researcher in order to obtain immediate information at hand. In this case, both personal interview and mail interview were conducted for deeper understanding of the estimated phenomenon (Saunders, Lewis & Thornhill, 2012).

Furthermore, theoretical foundations for the paper were obtained from the secondary data sources, such as journals, web pages, annual reports and books.

4.2.2. Quantitative phase and data gathering

Having clarified all the necessary information on the first stage of the research process, a further quantitative phase began. The purpose of the last phase was to give an answer to the main research problem of the paper, that is: at what tender prices would Wireline maximize its total cost savings during the life span of the equipment in case of purchasing particular units?

The quantitative phase was based on the information received from the supplier of CCU to the Wireline segment, that is Swire oilfield services. In particular, Rental report for 2015 was received from SWIRE with all the needed numerical information.

The information received from the supplier represented secondary data as it had been gathered for another financial purposes, not the researcher's particularly study (Saunders et al., 2012). Though the data was received quite quickly, it took lots of time in order to figure out what the originator of the reports had meant in some parts of them. However, since the data was obtained from a primary *source*, it was possible to contact the reference people from the supplier and clarify the report's content.

4.3. Sample

So far the research problem has been specified, an appropriate research design and the data-collection techniques have been explained. Now it is time to explain the selection of those elements from which the information will be analyzed. In order to make an inference about a large population of interest, it is possible to collect information from a portion of the population by analyzing a sample (Iacobucci, 2010, p.283).

The target population in this paper is baskets and containers of various types. Though the data was received from all the segments, in this paper I will focus only on the Wireline segment. The data that the whole analysis will be based on is received from one supplier – Swire oilfield services since only this contractor supplied the segment with CCU. The Wireline segment was chosen for the analysis because it is one of the largest segments in Reservoir Characterization Group with a high rental activity of CCU.

For the analysis in this segment only containers and baskets were taken, while the information about pressurized containers, modular containers, workshop containers, invoiced transportation costs, power pack electric and food containers was excluded. The first three were not of purchase interest for Schlumberger, according to my supervisor in the company, and the rest were not taken due to their irrelevance to the population of interest.

The rental data received from the supplier for the Wireline segment was for the year 2015. Since no data for previous periods were made available for the researcher, the analysis was implemented based on the rental data for the year 2015.

4.4. **Validity**

The purpose of a research work is to get reliable and valid results. Brinberg (1982) defines particular criteria which any research work's findings should comply with in order to be valid.

First of all, to be valid the research paper should describe all the characteristics of a studied field (Brinberg, 1982). In this master thesis all the necessary information about the Buy vs. Rent decision making process was gathered – both from primary and secondary sources. The first qualitative stage of the research process gave extremely important information in order to make the quantitative statistical analysis reliable. Firstly, the rental data on different units was sorted and interpreted based on the information obtained from the experts. Then, already possessing solid knowledge of the topic under study, the descriptive design approach came into play and quantitative data analysis was carried out. The final conclusions were made by taking into consideration all the relevant available data. Therefore, the first criterion of the validity is present.

The research work should be subjective, implying that all the diversity of ideas presented in it should refer to one and the same field (Brinberg, 1982). This requirement is also fulfilled since all the concepts, data and ideas in the paper are devoted to the examination of buy versus rent decision.

Finally, Brinberg (1982) states that research work should be based on the information which is reliable and authentic. It has been complied with this requirement as well.

As it was stated above, only the rental data for 2015 was made available in order to carry out the analysis. However, Youcef Belkhir for a number of reasons approved the use of the data of 2015 for the analysis. As a result of a dramatic oil price fall in 2014, the total spend on SWIRE in 2015 fell by 39% in comparison to 2014, and the figures of total spend on procurement in Norway show that 2015 was the year with the lowest spend during the last five years (Table 2, Appendix 6).

Based on the discussion of the current downturn of the oil and gas industry, the prognosis of slightly improved future energy prices, and Schlumberger's historical financial indicators for the past five years, it can be concluded that the final results based on the data analysis for 2015 can be regarded as reliable and safe. Thus, in case of practical application of the results based on the data from low activity year 2015, the risks of possible unnecessary costs generation in relation to a standby of the bought units will be mitigated, and if further negative disturbances should occur, the company could adjust the operations easier with less amount of costs.

Furthermore, the data used for the analysis was received from the primary source of information – the supplier, and only the latest and the most relevant facts necessary to analyze the proposed research problem was used. All the variables needed to carry out the quantitative analysis were received from the reliable sources and were confirmed by the experts – Schlumberger's employees. As such, the values of current rental prices, depreciation and OPEX values are all given by the company's employees from the Procurement & Sourcing department. As such, the final findings of the research are based on reliable figures.

4.5. Data analysis

In this subchapter it will be explained the background information for the empirical research - it will be described what types of analysis will be used, and the formulas and economic concepts that the quantitative analysis is based on will be presented as well.

4.5.1. Scope of the analysis

By following recommendations written above, only containers and baskets were taken for the analysis, while the information about pressurized containers, modular containers, workshop containers, invoiced transportation costs, power pack electric and food containers was excluded.

As such, the following units were rented by Wireline in 2015 from Swire oilfield services: Mini Containers, 3.6m side-door basket, 4m Basket, 6m Basket, 8m Basket, 10m Basket, 12m Basket, 13m Basket, 10ft Closed Container, 12ft Closed Container, 14ft Open Top Container, 10ft Open Top Container, 12ft Open Top Container.

The following models were included into each unit type:

- Mini Containers – AMB, AMC, AMD, AME, AMH, AMN, AS, S, SW
- 4m baskets – S
- 6m baskets – CBR, S
- 3,6m basket – CBT
- 8m baskets – CBS, CBSC, CBSN
- 10m baskets – CBV
- 12m baskets – CBZN, S, CBZ
- 13m baskets – CBW, CBWN
- 10ft Closed Containers – KA, KB
- 12ft Closed Containers – E, SW
- 10ft Open Top Containers – KH
- 12ft Open Top Containers – EH
- 14ft Open Top Container – S

The quantitative analysis with graphs of all the above units was carried out in Microsoft Excel. The Excel file with all the calculations was delivered to one of the Procurement & Sourcing leaders in Schlumberger Norway. In this thesis, however, it will be presented the analysis of the three types of CCU – ***mini containers***, ***8m baskets*** and ***10ft closed containers***. The choice of units for the paper's research is based on the total spend per unit type in 2015 and agreed with the company's Procurement & Sourcing manager. Since mini containers, 8m baskets and 10ft closed containers generated the highest rental costs in Wireline segment in 2015, they will be presented in the analysis. In the beginning of the chapter **Implementation and results** it will be given quantitative background for the choice of the units for detailed analysis and thus, the answer to the first research question will be given (Figure 4).

The analysis of each unit type consists of two parts:

- **Part I**. Visualization and statistical analysis of the rental year 2015. This part aims to demonstrate that there are large potential cost savings in event of purchasing the units. This part will give the answer to the second research question.
- **Part II**. Quantitative analysis of four future years' scenarios. This part aims to give the answer to the last two research questions. In particular - to identify the optimal amount of units for purchase and map the price levels at which Wireline would maximize cost savings during the life span of the equipment.

The calculations of the total cost savings in both parts of the analysis are based on a number of formulas and assumptions, where one of the main inputs are: ***OPEX per year***, ***rental price per unit per day*** and ***the depreciation period***.

4.5.2. OPEX explanation

OPEX and CAPEX are important financial reporting terms. CAPEX, or capital expenditure, is a business expense for the creation of benefits in future. When a business spends money in order to buy a fixed asset or to upgrade an existing one with a useful life beyond the tax year, the business incurs a capital expenditure. OPEX, or operational expenditure, is the expenditure used for the functioning of the day-to-day operations. Operating expenses include deprecation of the acquired assets, wages, maintenance and repairs (Diffen, 2016). Pienaar & Vogt (2012, p.225) use the notion of *inventory-carrying costs* when talking about the operational expenditure. They define those costs as the expenditure associated with holding products in stock. The authors explain that defining the carrying cost percentage requires the allocation of inventory-related costs. They emphasize that such costs should not be based on industry averages. When defining an OPEX or carrying costs percentage, each business should include only those costs that refer to its own circumstances and vary with the quantity of inventory. Pienaar & Vogt (2012, p.225) categorize inventory-carrying costs as follows:

- Insurance
- Damage
- Shrinkage
- Storage costs
- Obsolescence
- Capital cost

OPEX is an important information which must be incorporated in the calculation of a unit's break-even price, that is the price at which the units' purchase will generate zero cost savings. As such, according to the interview with Procurement & Sourcing Leader Deepak Siwach, OPEX for a CCU per year equals 10% of the purchase price. Operational expenditures for the CCU includes: maintenance, certification to DNV2.7-1, repairs, depreciation, administrative costs, transportation costs (As per discussion with Procurement & Sourcing Leaders Deepak Siwach and Youcef Belkhir).

The rental prices per unit per day are taken as the average prices for the corresponding units. As per discussion with Deepak Siwach, it was decided to take the average of the prices for all the units due to the fact that each unit has different model types which slightly differ in price. The prices were averaged and given to the researcher by Deepak Siwach. The average prices are based on the latest contract made with SWIRE, according to which since January the 1st , 2016 the daily rental prices for all the unit types were reduced by 40%.

The average prices per unit per day are as follows:

- Mini container - NOK 18,25
- 8 m basket – NOK 28,11
- 10ft Closed Container – NOK 28,91

The useful life of CCU is from 5 to 6 years. This information was given by Youcef Belkhir. He advised to use 5,5 years as a depreciation period for all the units.

As such, all the three main inputs and their values are confirmed and checked by the company's employees.

4.5.3. Presentation of formulas

First, it was calculated the mean and the standard deviation of the rental data values of the year 2015.

Arithmetic mean

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n} \tag{4.1}$$

Corrected sample standard deviation

$$s = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} (x_i - \overline{x})^2}. \tag{4.2}$$

(Iacobucci, 2010, p.289)

The implementation of the quantitative analysis is entirely based on the following formulas and assumptions which were applied to both parts of the analysis:

$N - number\ of\ units\ purchased$

$T_r - total\ rental\ days$

$T_{idle} - total\ idle\ days$

$p_r - rental\ price\ per\ unit\ per\ day, NOK/day$

$P - purchase\ price\ per\ unit, NOK$

$c_{OPEX} - OPEX\ cost\ per\ unit\ per\ year, NOK$

Comment: this is one of the main assumptions, quantitative definition of the OPEX cost.

$c_{OPEX} = 10\% \cdot P$

$Y - life\ span\ of\ a\ unit, years$

$Y = 5.5\ years$

$$C_{r_0} = T_{r_0} \cdot p_r \tag{4.3}$$

Where

$C_{r0} - total\ rental\ cost\ for$ 5.5 $years\ without\ having\ any\ purchased\ units, NOK$

$$C_r = T_r \cdot p_r \tag{4.4}$$

$$C_{r_0} \geq C_r \tag{4.5}$$

Where

$C_r - total\ rental\ cost\ for$ 5.5 $years\ when\ purchased\ N\ units, NOK$

$$BE = \frac{(C_{r0} - C_r)/N}{1 + c_{OPEX} \cdot Y} \tag{4.6}$$

Where

$BE - breakeven\ price\ per\ unit\ when\ purchasing\ N\ units\ and\ considering\ OPEX, NOK$

Comment: At Break-even price adjusted to OPEX total cost savings are equal to zero.

$$C_{CAPEX} = N \cdot P \tag{4.7}$$

Where

$C_{CAPEX} - total\ cost\ for\ purchasing\ N\ units, NOK$

$$C_{OPEX} = N \cdot Y \cdot c_{OPEX} \qquad (4.8)$$

Where

$C_{OPEX} - total\ OPEX\ cost\ during\ 5.5\ years\ for\ N\ units, NOK$

$$C_t = C_{CAPEX} + C_{OPEX} + C_r = N \cdot P + N \cdot Y \cdot c_{OPEX} + T_r \cdot p_r \qquad (4.9)$$

Where

$C_t - total\ cost\ spent\ for\ purchased\ and\ rental\ units\ for\ 5.5\ years, NOK$

$$Cost\ Savings = C_{r_0} - C_t \qquad (4.10)$$

Where

$Cost\ Savings\ is\ total\ profit\ for\ 5.5\ years\ comparing\ to\ renting\ of\ 100\%\ of\ units, NOK$

$C_{r_0} > C_t\ only\ for\ certain\ P, when\ P\ is\ low\ enough\ to\ be\ profitable$

4.5.4. Percentile

The quantitative analysis in the second part will be based on the statistical approach where a percentile measure will be applied. Percentiles indicate the location of a score in a distribution. A **percentile** is a statistical measure which indicates the value below which a given percentage of observations in a group of observations fall. Percentiles range from 1 to 99 (Lane, 2016).

In this research 10^{th}, 50^{th} and 90^{th} percentile will set the range of the units that will define a pessimistic, normal and optimistic year scenario respectively. These scenarios are forecasted based on the historical available data for 2015. The "real year" 2015 will be the forth alternative together with the three year forecasts allowing to compare the real year with the three other scenarios. The division of the forecasts into pessimistic, optimistic and normal year is defined by percentiles which will give a particular number for different types of units for different scenarios depending on their quantity and distribution. The forecasts are important to show that the activity in the forthcoming years can be either high or low, and in order to ensure that Wireline is ready for both optimistic and pessimistic year in case of buying the units, it will be presented the results for all the three forecasts and necessary conclusions will be made.

It was the researcher's assumption to set the units' range from the sample at 10^{th} and 90^{th} percentile in order to define a pessimistic and optimistic years. Different numbers, other than P10 and P90, could have given percentile range but in this paper these percentile values are applied. A normal year's need for units is set at 50^{th} percentile in order to define the central tendency, that is the center of the distribution. The distribution of the units doesn't follow the normal distribution curve, but a skewed one. As there is a skewed distribution in the data sample, the median , or the 50^{th} percentile, is often more appropriate than the mean in order to determine the central tendency (Lane, 2016).

4.5.5. What-if analysis

The use of what-if analysis tools in Excel was an important part of the research.

The use of the what-if analysis is based on the process of changing the different values in cells in order to find out how the changes will influence the outcome of formulas on the worksheet.

There are three types of what-if analysis tools in Excel: scenarios, Goal Seek and data tables. Both scenarios and data tables tools use a range of values and find possible results. While data tables can only be used with one or two variables, scenarios can take multiple variables. However, data tables accept many different values for the defined variables. A scenario can accept only up to 32 values. Goal Seek works in a different way from scenarios and data tables - it sets a particular outcome and finds possible values that produce that result.

In this analysis it was used a data table tool in order to determine and explore all the outcomes that the defined two variables – number of units purchased and a tender price – produced. The application of data tables made it possible to examine a range of possible outcomes at a glance (Microsoft, 2016).

5. Implementation and results

In this chapter, it will be presented the main results that have been achieved after the detailed analysis of the historical data from the rental year 2015.

The choice of the units for the analysis and for potential purchase is based on the total rental spend in 2015, and based on the figures from the SWIRE Rental report 2015. As it has already been stated in **Data analysis subchapter**, the choice of units for the analysis according to their rental spend was advised by the Procurement & Sourcing manager at Schlumberger Norway and thus, was implemented in the thesis.

Based on the SWIRE Rental report for 2015, the total rental spend per CCU per year was calculated:

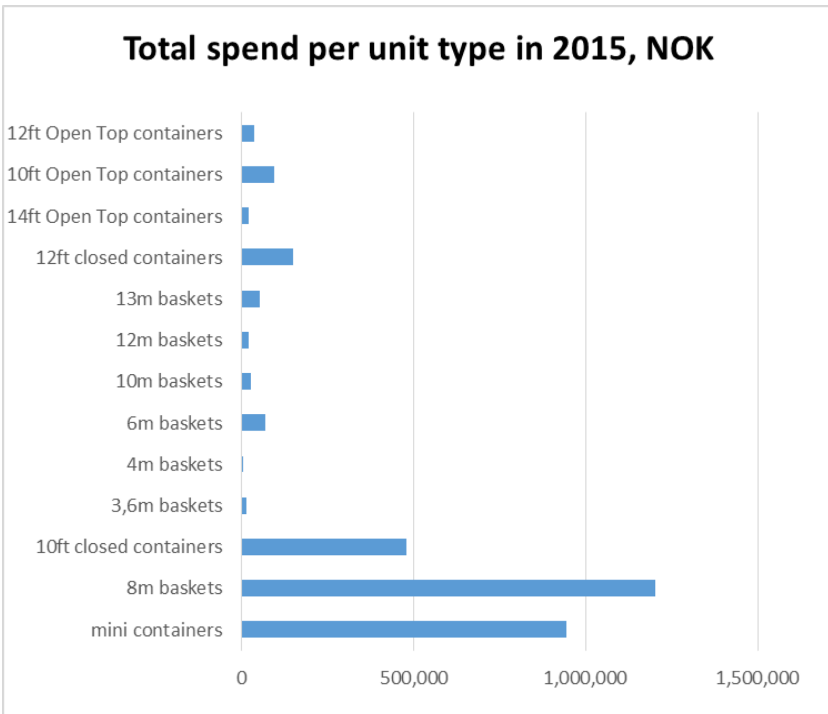

Figure 4. Total spend per unit type in 2015

As such, the graph shows the rental spend figures for the CCU in Wireline for 2015 and indicates that 8m baskets, mini containers and 10ft closed containers generated the greatest rental costs during the year, while the other units' spend was considerably lower. Moreover, during all the CCU's quantitative examination it was found out that the three unit types had the greatest number of units used each day simultaneously during the year (2015 SWIRE rental report, 2016).

Based on the manager's recommendations and the results of rental spend calculations per CCU in 2015, it will be now presented the analysis of the three CCU – mini containers, 8m baskets and 10ft closed containers. As such, it has been identified three CCU which have been mostly used by the Wireline segment and thus, should be further analyzed for the purpose of a potential purchase.

The whole analysis is based on the following assumptions:

1. During 2015 Wireline used each day as many units as it was 100% required. Therefore, in order to give a full picture over the units' usage it was counted how many units were *simultaneously* on rent each day during the year.

2. Wireline will be able to continue to rent the units if needed at the same rental price as before in case of purchasing the CCU.

3. Due to the historical rental data that is available only for 2015, and the low oil price situation I assume this year's rental activity to be representative for the analysis and for making the forecasts.

4. After 5,5 years, that is a life span of the units, the equipment becomes completely worn out with no salvage value.

The whole quantitative analysis is based on the concepts and formulas described in the subchapter **Data analysis.**

In **Appendix 4** and **Appendix 5** it is presented the *examples* of the tables and calculations which were generated in Excel in order to carry out the analysis of the three units. In particular, the example of *Mini containers'* analysis is presented.

5.1. Mini Containers

5.1.1. Part I Analysis

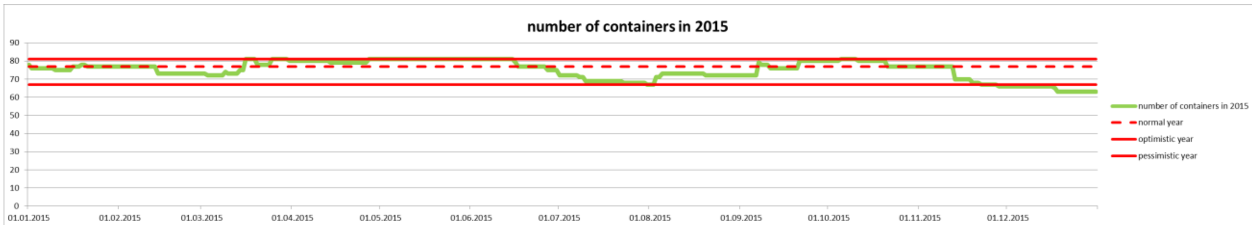

Figure 5. Mini containers. Usage in 2015

The green line on the above graph shows the rental activity of the mini containers during 2015. It was variable during the year with the minimum number of containers 63 and the maximum 81 used simultaneously.

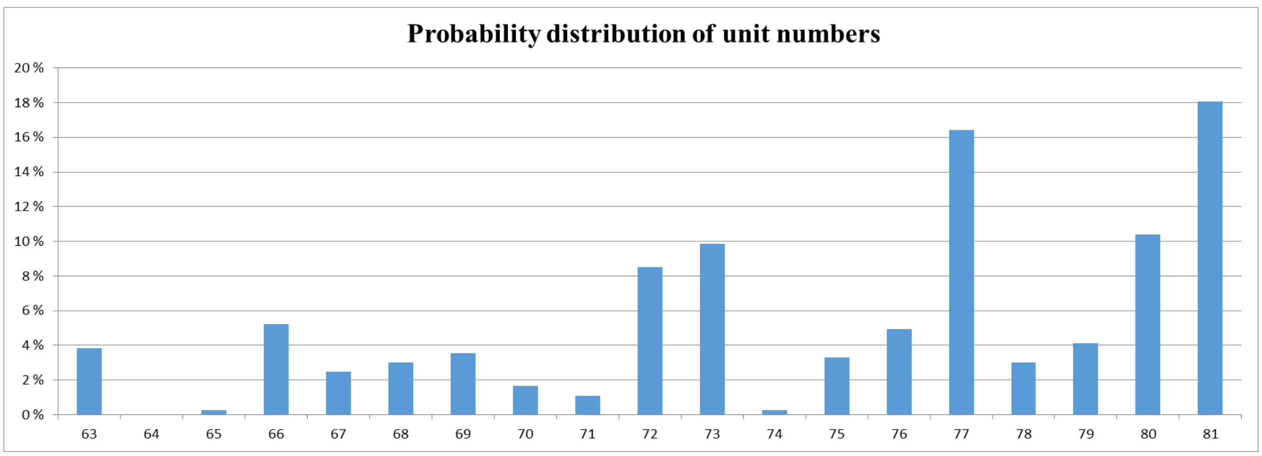

Figure 6. Mini containers. Probability distribution in 2015

The probability distribution of the units follows a skewed shape rather than a normal one. This fact confirms the reliability of the median to be a better choice in the representation of the central tendency or a normal year in forecasting.

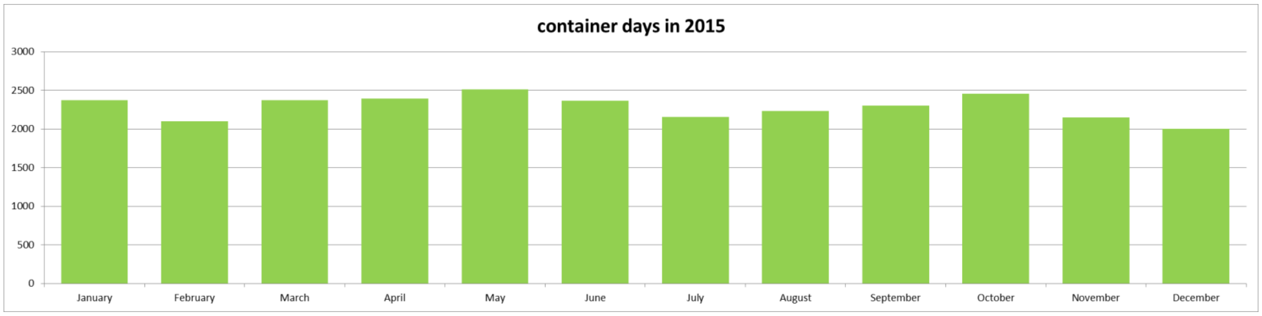

Figure 7. Mini containers. Monthly rental days in 2015

The **"Figure 7"** shows the number of rental days in each month during 2015. The bar charts follow the shape of the green line from the "**Figure 5"** indicating that in the first half of the year the highest activity level was reached in May, whereas in the second half the peak occurs in October. The total number of rental days in 2015 for mini containers was 27 404.

According to the formulas, the Mean = 75,08   stdev ∂ = 5,19

Further, based on the formulas and the use of the what-if analysis it was calculated various total cost savings that could have been generated by *purchased* mini containers during their life span based on the real figures from 2015. In order to carry out the what-if analysis and calculate the cost savings, it was taken containers from amount 63 to 81 and the possible tender prices of NOK 9 000, 11 000, 13 000, 15 000, 17 000, 19 000, 21 000, 23 000, 25 000 and 27 000.

The choice of the tender prices is based on the break-even prices adjusted to OPEX during 5,5 years and aims to show both the profitable combinations and the alternatives at which Wireline could suffer losses (Appendix 5).

After having run the combinations in Excel, and computed the table with final output, the results were presented in the "**Figure 8**": "Total cost savings generated during the life span of the unit should the rental year 2015 repeat itself 5,5 times, NOK".

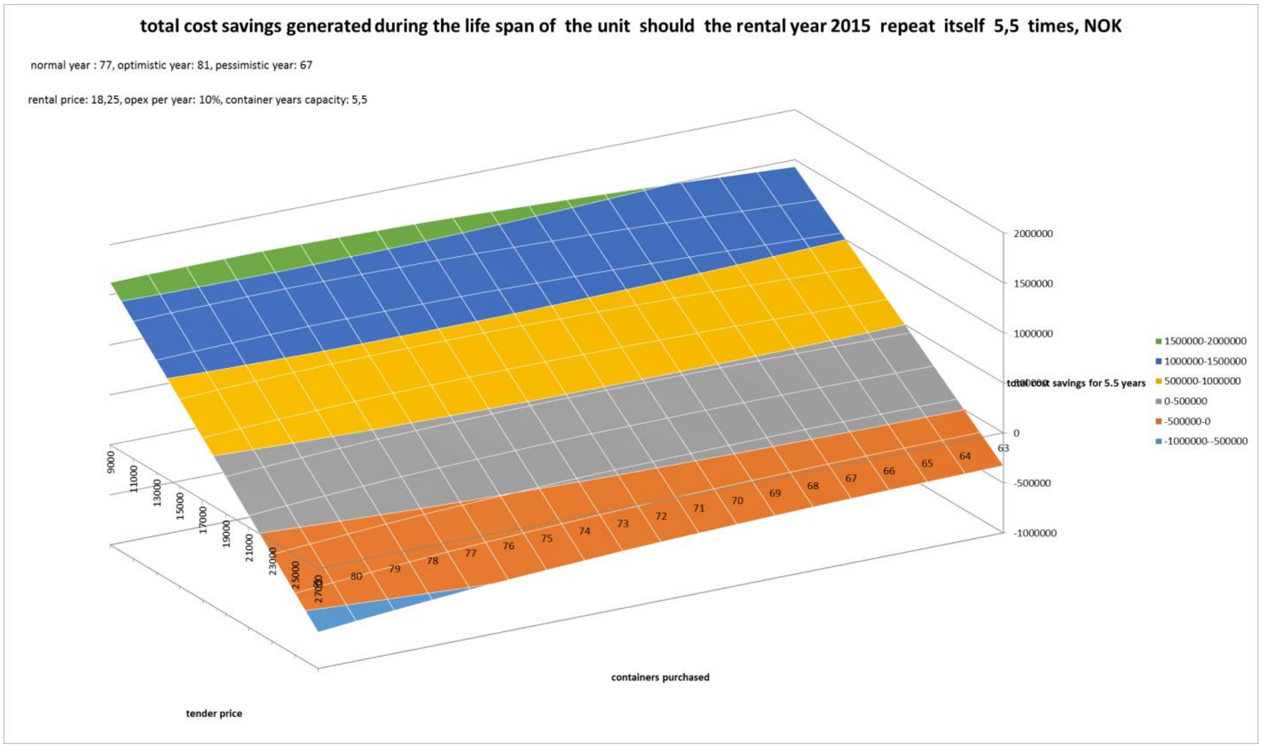

Figure 8. Mini containers. Total cost savings based on 2015

"Figure 8" contains the number of containers from 63 to 81, which can be purchased at ten different tender prices from 9 000 to 27 000 and it shows the total cost savings for 5,5 years that could be generated by these amounts of containers. As this analysis is based on the real rental figures from 2015, where minimum of the containers used was 63 and maximum 81, this range of the units was taken for the graphical presentation.

"Figure 8" shows different tender prices at which Wireline can both save cost and suffer losses. As such, we see that at the tender prices higher than the break-even prices adjusted to OPEX, that is at prices of 25 000 and 27 000, the purchase of any quantity of the mini containers will lead to big losses resulting in the loss of over NOK 100 000 and up to NOK 700 000 (refer to the table as well here). At the tender price of 23 000 the purchase of the containers from 75 to 81 units will result in losses as well. However, all the other combinations of containers' quantity and tender prices will lead to cost savings. Those profitable combinations are represented by the grey, yellow, blue and green areas on the graph. The highest cost savings are presented by the green area. The green area indicates that if Wireline had bought mini containers at the amount from 63 to 81 at the price of 9 000 in 2015, for 5,5 years it would generate the cost savings from NOK 1 500 000 to 2 000 000 under condition that all the 5,5 years are alike in terms of units' usage.

5.1.2. Part II Analysis

By applying the percentile values of 10, 90 and 50 for the 2015 historical data, the pessimistic, optimistic and a normal year forecasts were defined. These forecasts will be analyzed in this part of the analysis. It will now be specified the range of containers that defines all three forecasts.

As such, it was calculated that percentile P10 is equal 67, P50 is equal 77 and P90 is equal 81.

P10=67 implies that in 10% of all the days – from 01.01.2015 to 31.12.2015 – there is a 10% chance that the number of mini containers used simultaneously was less than 67.

P90=81 implies that in 90% of all the days – from 01.01.2015 to 31.12.2015 – there is a 90% chance that the number of mini containers used simultaneously was less than 81 or there is a 10% chance that the number will be higher than 81.

P50=77 implies that on average there have been used 77 mini containers each day during 2015.

As such, based on the statistical approach, it is assumed that if there has been used less than 67 mini containers or more than 81, it means that it happened by chance.

Statistical processing of the rental data with the use of 10^{th}, 50^{th} and 90^{th} percentile has identified 3 forecasts for the future years' activity based on the data sample from 2015. The following scenarios will be analyzed:

1. *Pessimistic year* – it forecasts that each day during a year Wireline will need 67 mini containers, no more no less.
2. *Optimistic year* – it forecasts that each day during a year Wireline will need exactly 81 unit, no more no less.
3. *Normal year* – it implies that each day during a year Wireline will need exactly 77 units, no more no less.
4. *Year 2015* – this is the forth alternative that will be used in the analysis for the sake of comparison of the results.

The four forecasts differ from each other by the number of containers that should be required by Wireline in coming years and their graphical representation is shown by the red lines on the **"Figure 5"**.

The first step is to identify how many units Wireline should buy in order to maximize the total cost savings during 5,5 years. Based on the formulas and "what-if analysis" it was computed cost savings for different numbers of containers purchased at a particular tender price for all the scenarios – pessimistic, optimistic, normal year and the year 2015 (Appendix 5).

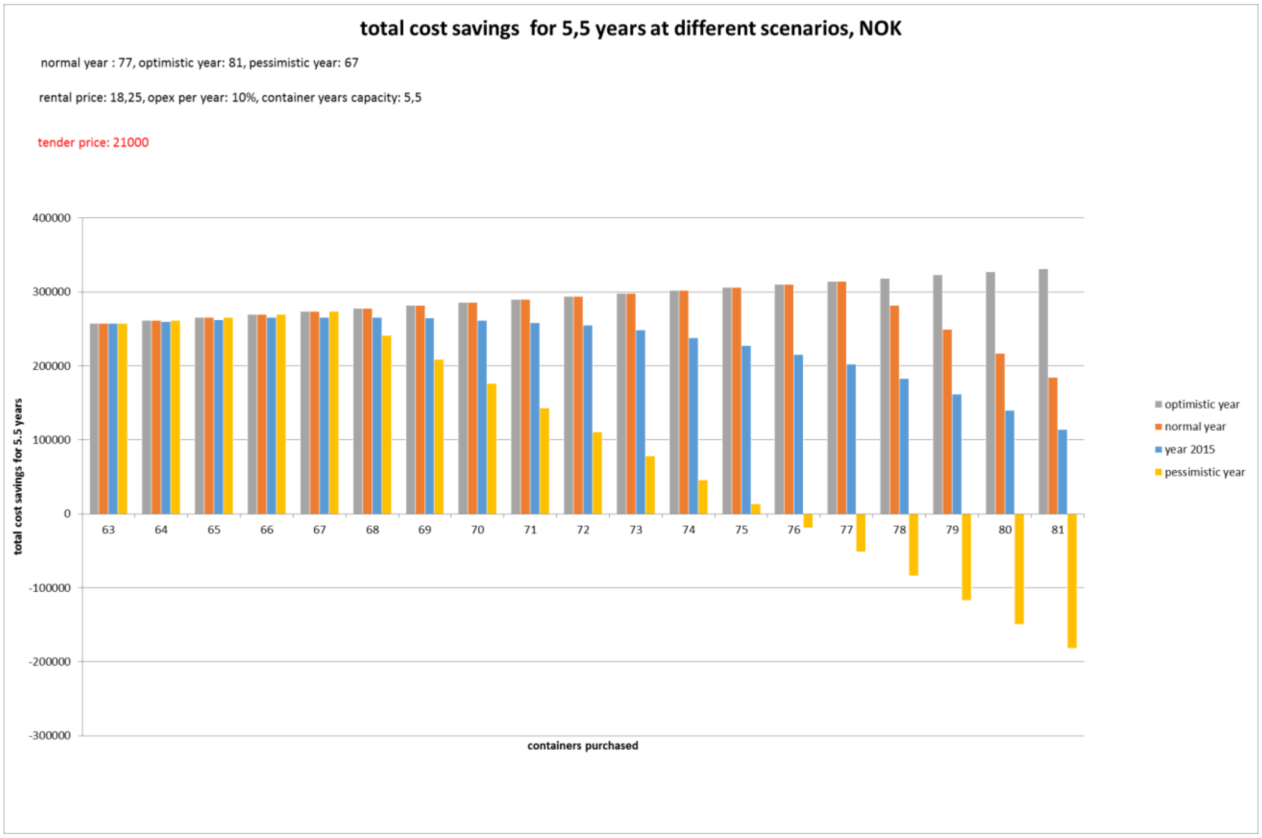

Figure 9. Mini containers. Total cost savings at different scenarios

As in the **"Figure8",** the **"Figure 9"** depicts the range of the containers from 63 to 81 and shows the total cost savings for 5,5 years that correspond to each of the four scenarios at each of the container's quantity at the purchase price of NOK 21 000.

The price of NOK 21 000 – that is the price which is lower than the break-even prices but is close to them - was chosen in order to show that at a particular tender price, in our case NOK 21 000, different amounts of mini containers purchased can lead to either losses or savings at different scenarios. Thus, the graph demonstrates that at the price of NOK 21 000 all the four scenarios generate cost savings if the purchased containers are in the amount from 63 to 75. Starting from 76 units and up to 81 the total cost savings in the event of pessimistic year become negative and in the event of optimistic year they grow.

The mathematical analysis represented on this graph indicates that should a pessimistic year come, the total cost savings are maximized if it is purchased 67 mini containers. If Wireline decides to purchase more containers than 67 units, then there are risks to suffer losses if it should happen a pessimistic year, for instance. At the same time, there is also a chance to gain huge cost savings if the forthcoming year happen to be an optimistic one and Wireline has bought more than 67 mini containers. However, at the purchased 67 units, Wireline will have equal cost savings at the three scenarios – no matter whether the year is optimistic, pessimistic, or normal, the segment will equally save NOK 273 821 during 5,5 years (Appendix 5). Consequently, in order to reduce the risks of losses and be ready for the pessimistic years, the best decision is to purchase the safe, pessimistic number of mini containers, that is 67. In this case containers will always be utilized – both in pessimistic, optimistic and normal year 67 units will be in work and the cost savings will not be changed should a normal or optimistic years come. This conclusion is based on the **formula 4.10** that computes the total cost savings and **the assumption 2** made in this chapter.

After having defined the optimal number of units for purchase, it was calculated the total cost savings which Wireline would gain for 5,5 years at the purchase of a pessimistic number of containers at different potential prices.

According to the **"Figure 10"** the lower the tender price/purchase price, the higher the potential cost savings that Wireline could generate. As such, if the segment decided to buy 67 mini containers at the price of NOK 9 000 per unit, it would save over NOK 1 500 000 for 5,5 pessimistic years. The lowest cost savings are generated at the price of NOK 23 000. At this price Wireline will only make NOK 66 121 for 5,5 years. At the price over NOK 23 000 the savings start to decrease and become negative. Having the overview of the possible tender prices and corresponding cost savings, Wireline can decide on how much money they want to save and what price they can agree on with suppliers.

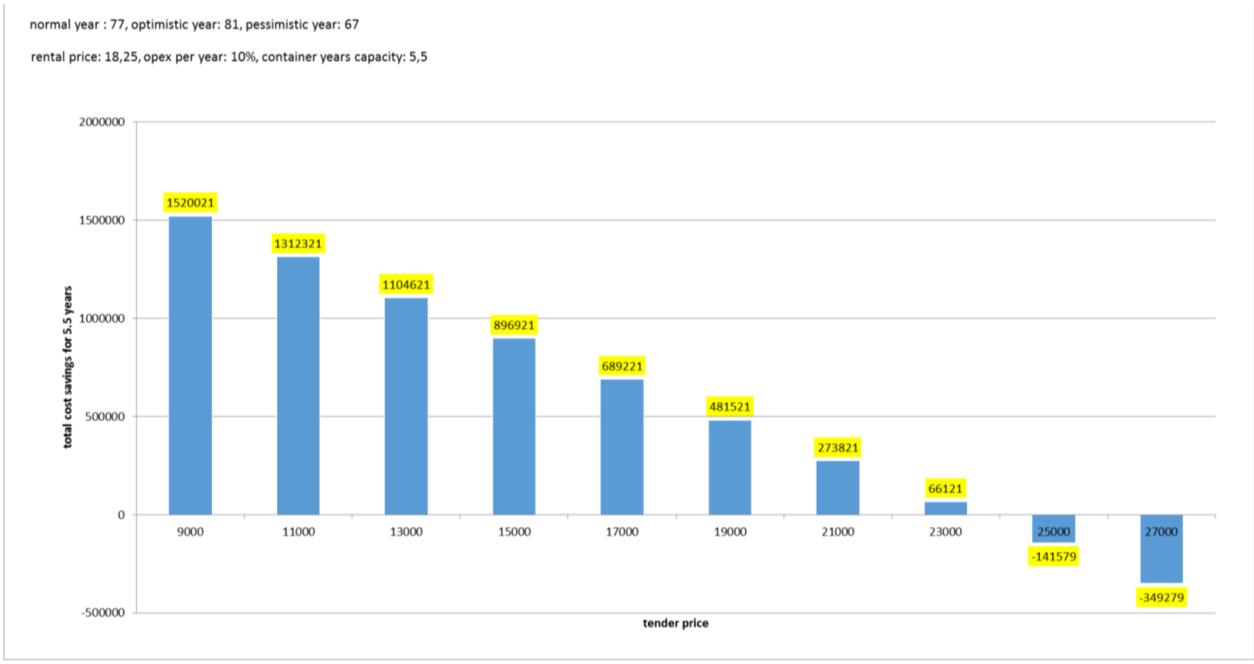

Figure 10. Mini containers. Total cost savings for 5.5 years

5.2. 8m Baskets

5.2.1. Part I Analysis

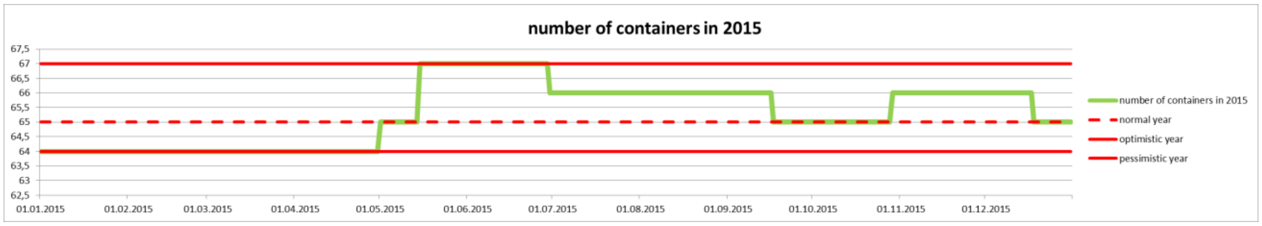

Figure 11. 8m Baskets. Usage in 2015

The green line on the above graph shows the rental activity of the 8 m baskets during 2015, which was variable during the year with the minimum number of baskets 64 and the maximum 67 used simultaneously.

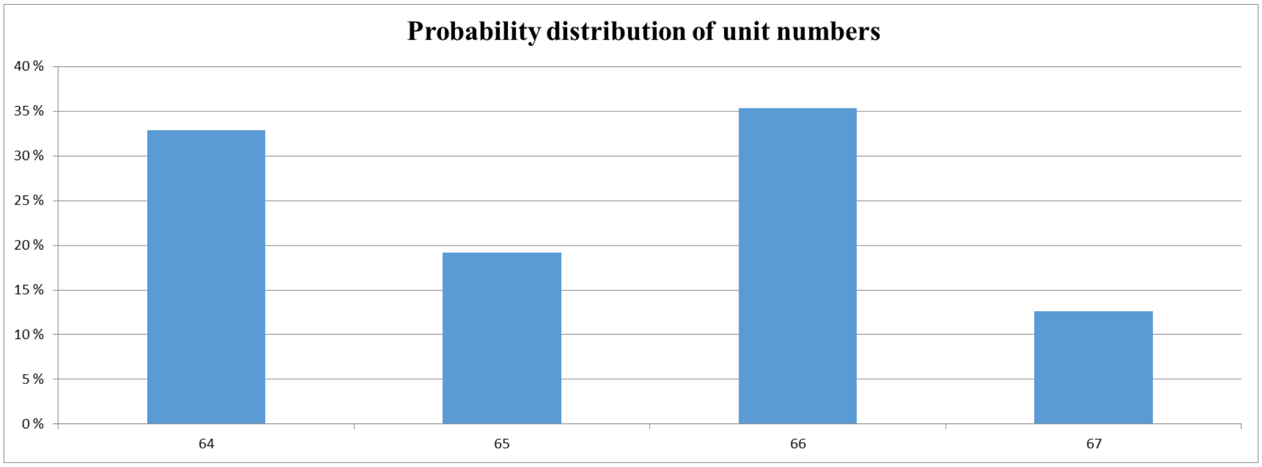

Figure 12. 8m Baskets. Probability distribution in 2015

The baskets' probability distribution follows a skewed shape rather than a normal one. This fact confirms the reliability of the median to be a better choice in the representation of the central tendency or a normal year in forecasting.

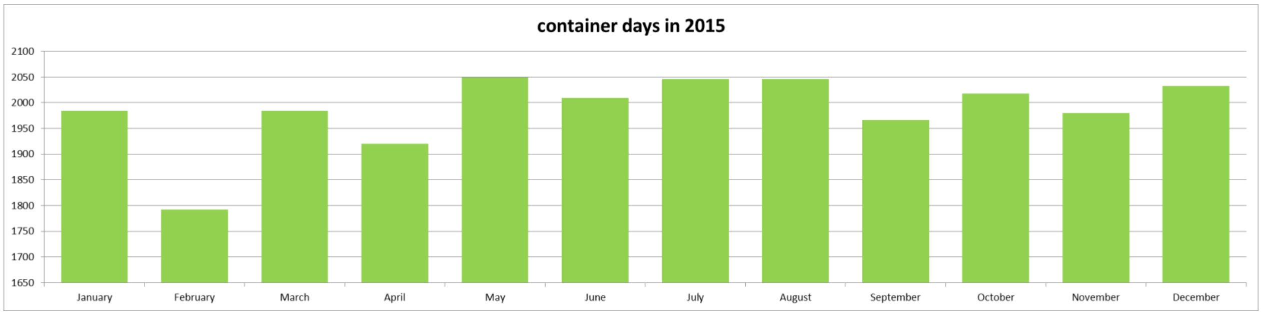

Figure 13. 8m Baskets. Monthly rental days in 2015

"Figure 13" shows the number of rental days of 8 m baskets in each month during 2015. The bar charts follow the shape of the green line from the **"Figure 11"** indicating that the highest activity level was reached in the middle of the year – in May, July and August, whereas February and April are the months of downturn. The total number of rental days for 8 m baskets in 2015 was 23 826.

According to the formulas, the Mean = 65,28 stdev ∂ = 1,05

Further, based on the formulas and the use of the what-if analysis it was calculated various total cost savings that could have been generated by *purchased* 8 m baskets during 5,5 years based on the real figures from 2015. In order to carry out the "what-if" analysis and calculate the cost savings, it was taken baskets from amount 64 to 67 and the possible tender prices of NOK 22 000, 24 000, 26 000, 28 000, 30 000, 32 000, 34 000, 36 000, 38 000 and 40 000.

The choice of the tender prices is based on the break-even prices adjusted to OPEX during 5,5 years and aims to show both the profitable combinations and the alternatives at which Wireline could suffer losses in case of buying the baskets.

After having run the combinations in Excel, and computed the table with final output, the results were presented in a **"Figure 14"**: "Total cost savings generated during the life span of the unit should the rental year 2015 repeat itself 5,5 times, NOK".

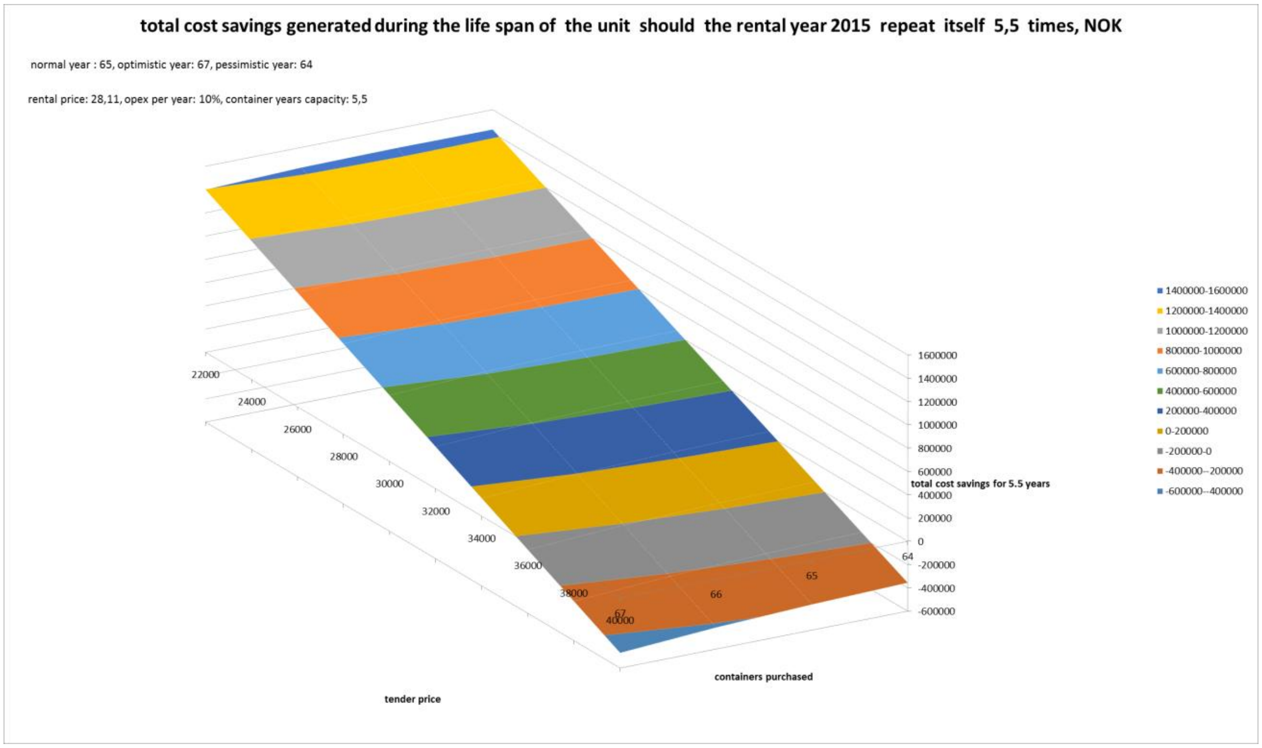

Figure 14. 8m Baskets. Total cost savings based on 2015

"Figure 14" contains the number of containers from 64 to 67, which can be purchased at ten different tender prices from NOK 22 000 to 40 000 and it shows the total cost savings for 5,5 years that could be generated by these amounts of containers. As this analysis is based on the real rental figures from 2015, where minimum of the baskets used was 64 and maximum 67, this range of the units was taken for the graphical presentation.

The above graph shows different tender prices at which Wireline can both save cost and suffer losses. As such, we see that at the tender prices higher than the break-even prices adjusted to

OPEX, that is at prices which are over NOK 38 000, the purchase of any quantity of the 8 m baskets will lead to big losses resulting in the loss of over NOK 300 000 and up to NOK 500 000 for 5,5 years. At the tender price of NOK 36 000 the purchase of the baskets over 65 units will result in losses as well. However, all the other combinations of baskets' quantity and tender prices will lead to cost savings. Those profitable combinations are represented by the grey, yellow, blue, dark blue, green and brown areas on the graph. The highest cost savings are depicted by the dark blue area. The dark blue area indicates that if Wireline would have bought 8m baskets at the amount from 64 to 66 at the price of 22 000, for 5,5 years it would generate the cost savings from NOK 1 400 000 up to 1 500 000 (example Appendix 5).

5.2.2. Part II Analysis

By applying the percentile values of 10, 90 and 50 for the 2015 historical data, the pessimistic, optimistic and a normal year forecasts were defined for 8 m baskets. It will now be specified the range of baskets that defines all three forecasts.

Statistical processing of the rental data with the use of 10^{th}, 50^{th} and 90^{th} percentile has identified 3 forecasts for the future years' activity of 8 m baskets based on the data sample from 2015. As such, it was calculated that percentile P10 is equal 64, P50 is equal 65 and P90 is equal 67.

The following scenarios will be analyzed:

1. *Pessimistic year* – it forecasts that each day during a year Wireline will need 64 baskets of 8 meters, no more no less.
2. *Optimistic year* – it forecasts that each day during a year Wireline will need exactly 67 units, no more no less.
3. *Normal year* – it implies that each day during a year Wireline will need exactly 65 units, no more no less.
4. *Year 2015* – this is the forth alternative that will be used in the analysis for the sake of comparison of the results.

The four forecasts differ from each other by the number of baskets that will be required by Wireline in coming years and their graphical representation is shown by the red lines on the **"Figure 11".**

The first step is to identify how many units Wireline should buy in order to maximize the total cost savings during 5,5 years. Based on the formulas and what-if analysis it was computed cost savings for different numbers of baskets purchased – from 64 to 67 – at a particular tender price for all the scenarios – pessimistic, optimistic, normal and the year 2015 (example in Appendix 5).

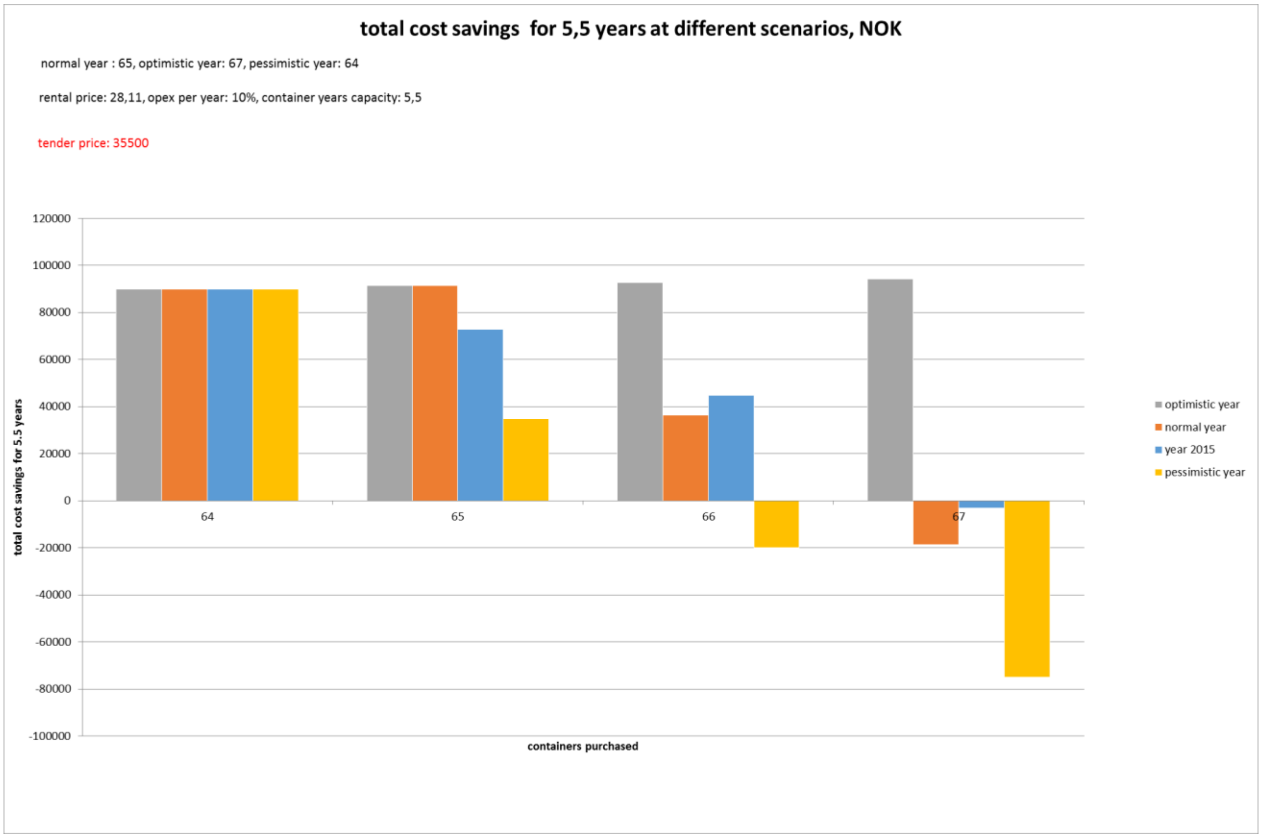

Figure 15. 8m Baskets. Total cost savings at different scenarios

As in the **"Figure 14",** the **"Figure 15"** depicts the range of the containers from 64 to 67 and shows the total cost savings for 5,5 years that correspond to each of the four scenarios at each of the baskets's quantity at the purchase price of NOK 35 500.

The price of NOK 35 500 – that is the price which is lower than the break-even prices but is close to them - was chosen in order to show that at a particular tender price, in our case NOK 35 000, different amounts of mini containers purchased can lead to either losses or savings at different scenarios. Thus, the graph demonstrates that at the price of NOK 35 500 all the four scenarios generate cost savings if the purchased containers are in the amount from 64 or 65. If Wireline decides to buy 66 units and should the pessimistic year come, the segment will have losses. If the segment buys 67 baskets the total cost savings in the event of both pessimistic and normal year become negative, whereas in the event of optimistic year the savings grow.

The mathematical analysis represented on this graph indicates that should a pessimistic year come, the total cost savings are maximized if it is purchased 64 baskets. If Wireline decides to purchase more baskets than 65, then there are possibilities to suffer losses if it should happen a pessimistic or normal year, for instance. At the same time, there is also a chance to gain huge cost savings if the year turns out to be optimistic. The important thing is that in case of purchasing 64 units, Wireline will have equal cost savings at the three scenarios – no matter whether the year is optimistic, pessimistic, or normal, the segment will equally save NOK 89 973 during 5,5 years. Consequently, in order to reduce the risks of losses, the best decision is to purchase the pessimistic number of mini containers, that is 64. In this case baskets will always be utilized – both in pessimistic, optimistic and normal year 64 units will be in work and the cost savings will not be changed should a normal or optimistic years come. This conclusion is based on the **formula 4.10** that computes the total cost savings and **the assumption 2** made in this chapter.

After having defined the optimal number of units for purchase, it was calculated the total cost savings which Wireline would gain for 5,5 years at the purchase of 64 baskets at different potential prices.

According to the **“Figure 16”** the lower the tender price/purchase price, the higher the potential cost savings that Wireline could generate. As such, if the segment decided to buy 64 baskets of 8 meters at the price of NOK 22 000 per unit, it would save up to NOK 1 500 000 for 5,5 years. The lowest cost savings are generated at the price of NOK 36 000. At this price Wireline will only make NOK 40 373 for 5,5 years. At the price over NOK 36 000 the savings start to decrease and become negative. Having the overview of the possible tender prices and corresponding cost savings, Wireline can decide on how much money they want to save and what price they could agree on with suppliers.

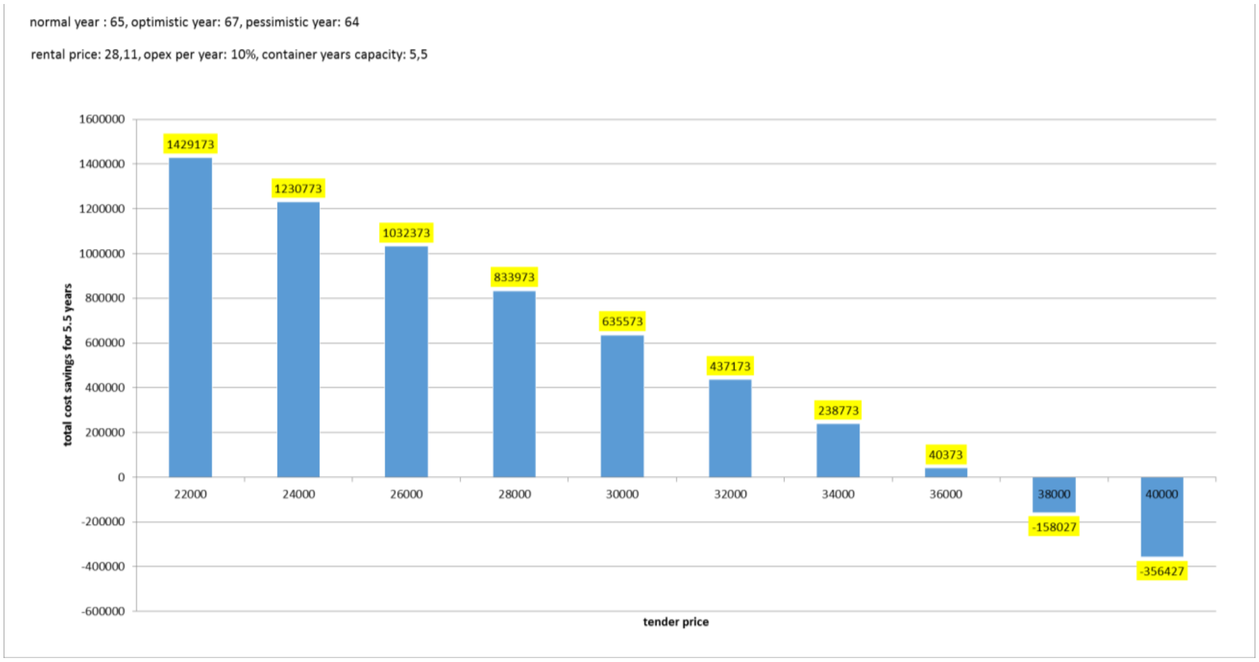

Figure 16. 8m Baskets. Total cost savings in 5.5 years

5.3. 10ft Closed Container

5.3.1. Part I Analysis

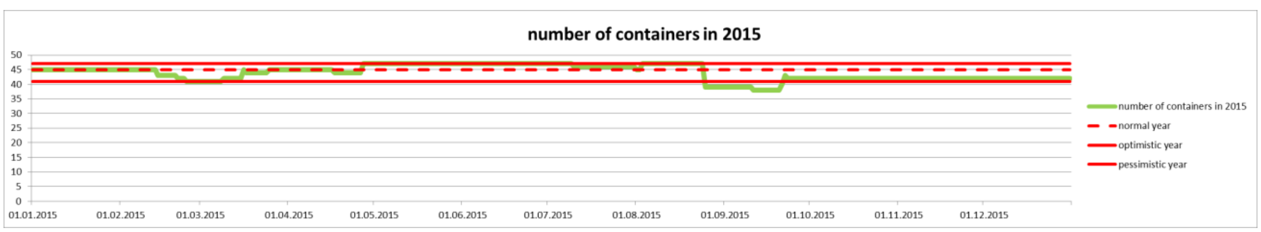

Figure 17. 10ft Closed Container. Usage in 2015

The green line on the above graph shows the rental activity of the 10ft closed containers during 2015, which was variable during the year with the minimum number of containers 38 and the maximum 47 used simultaneously.

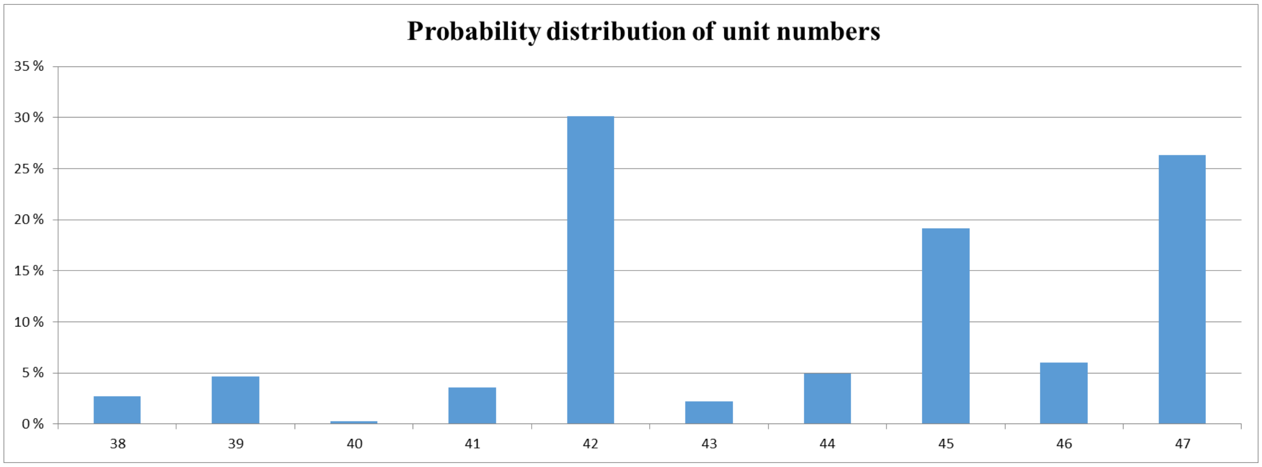

Figure 18. 10ft Closed Container. Probability distribution in 2015

The containers' probability distribution follows a skewed shape rather than a normal one. This fact confirms the reliability of the median to be a better choice in the representation of the central tendency or, in this paper, a normal year in forecasting.

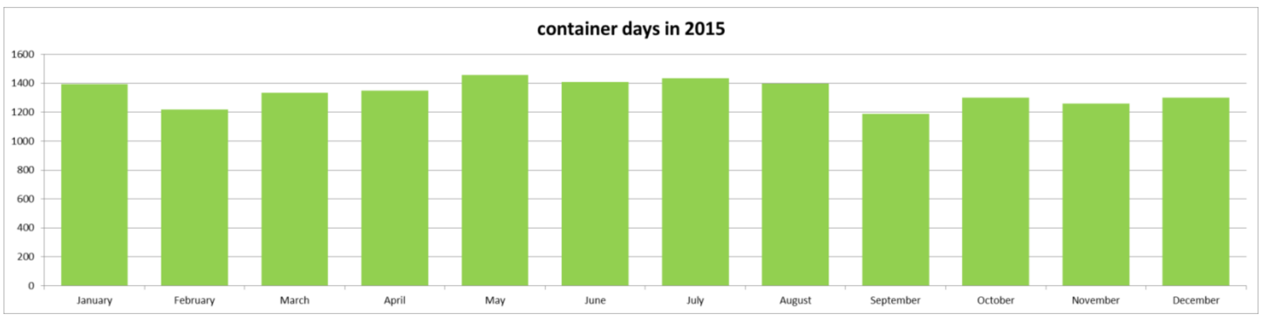

Figure 19. 10ft Closed Container. Monthly rental days in 2015

"Figure 19" shows the number of rental days of 10ft closed containers in each month during 2015. The bar charts follow the shape of the green line from the **"Figure 17"** indicating that the highest activity level was reached in January and the middle of the year – in May, June, July and August, whereas February and September are the months of downturn. The total number of rental days for 10ft closed containers in 2015 was 16 046.

According to the formulas, the Mean = 43,96 stdev ∂ = 2,56

Further, based on the formulas and the use of the what-if analysis it was calculated various total cost savings that could have been generated by *purchased* 10ft closed containers during 5,5 years based on the real figures from 2015. In order to carry out the what-if analysis and calculate the cost savings, it was taken containers from amount 38 to 47 and the possible tender prices of NOK

23 000, 25 000, 27 000, 29 000, 31 000, 33 000, 35 000, 37 000, 39 000 and 41 000 (example Appendix 5).

The choice of the tender prices is based on the break-even prices adjusted to OPEX during 5,5 years and aims to show both the profitable combinations and the alternatives at which Wireline could suffer losses in case of buying the containers.

After having run the combinations in Excel, and computed the table with final output, the results were presented in a **"Figure 20"**: "Total cost savings generated during the life span of the unit should the rental year 2015 repeat itself 5,5 times, NOK".

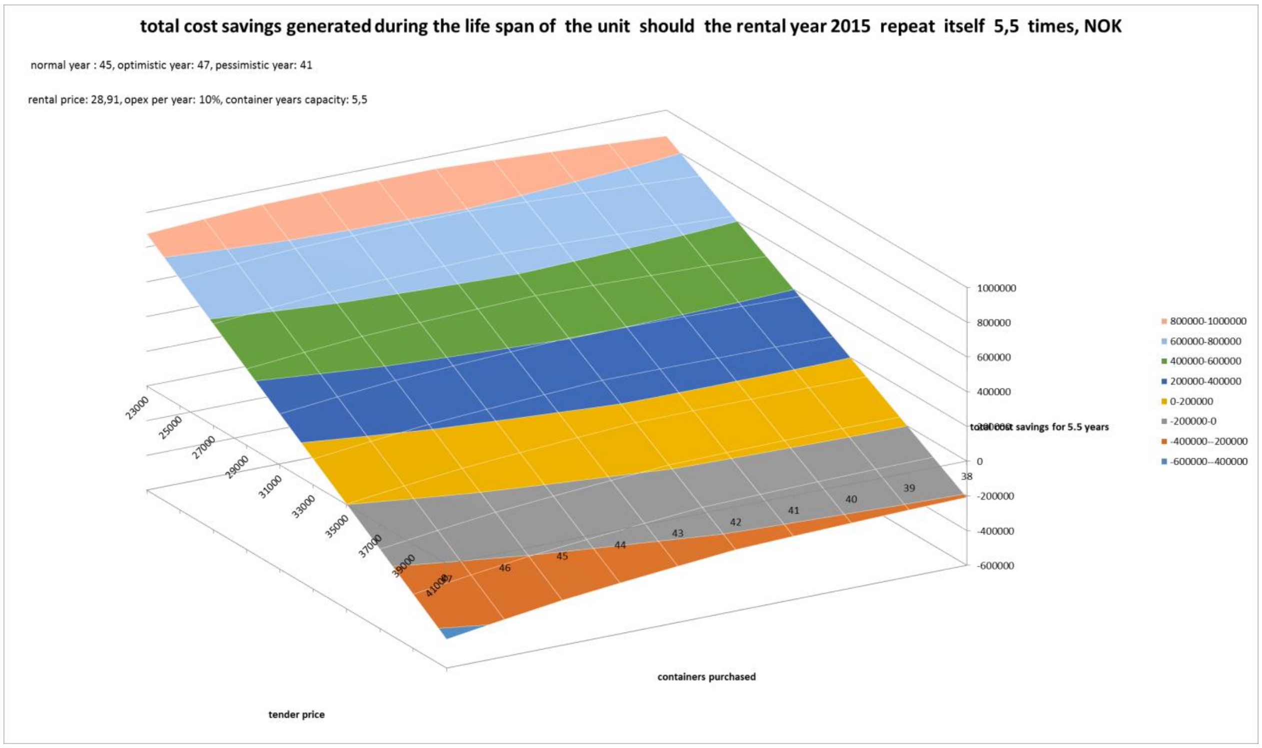

Figure 20. 10ft Closed Container. Total cost savings based on 2015

"Figure 20" contains the number of containers from 38 to 47, which can be purchased at ten different tender prices from NOK 23 000 to 41 000 and it shows the total cost savings for 5,5 years that could be generated by these amounts of containers. As this analysis is based on the real rental figures from 2015, where minimum of the containers used was 38 and maximum 47, this range of the units was taken for the graphical presentation.

The above graph shows different tender prices at which Wireline can both save cost and suffer losses. As such, we see that at the tender prices higher than the break-even prices adjusted to

OPEX, that is at prices which are over NOK 37 000, the purchase of any quantity of the 10ft close containers will lead to big losses resulting in the loss of over NOK 400 000 for 5,5 years. (refer to the table as well here). At the tender price of NOK 37 000 the purchase of the containers over 42 units will result in losses as well. However, all the other combinations of baskets' quantity and tender prices will lead to cost savings. Those profitable combinations are represented by the yellow, blue, dark blue, green and pink areas on the graph. The highest cost savings are shown by the pink area. The pink area indicates that if Wireline would have bought 10ft closed containers at the amount from 38 to 47 at the price of NOK 23 000, for 5,5 years it would generate the cost savings from over NOK 800 000 up to over 900 000 (example in Appendix 5).

5.3.2. Part II Analysis

By applying the percentile values of 10, 90 and 50 for the 2015 historical data, the pessimistic, optimistic and a normal year forecasts were defined for 10ft closed containers. It will now be specified the range of containers that defines all three forecasts.

Statistical processing of the rental data with the use of 10^{th}, 50^{th} and 90^{th} percentile has identified 3 forecasts for the future years' activity of 10ft closed containers based on the data sample from 2015. As such, it was calculated that percentile P10 is equal 41, P50 is equal 45 and P90 is equal 47.

The following scenarios will be analyzed:

1. *Pessimistic year* – it forecasts that each day during a year Wireline will need 41 containers, no more no less.
2. *Optimistic year* – it forecasts that each day during a year Wireline will need exactly 47 units, no more no less.
3. *Normal year* – it implies that each day during a year Wireline will need exactly 45 units, no more no less.
4. *Year 2015* – this is the forth alternative that will be used in the analysis for the sake of comparison of the results.

The four forecasts differ from each other by the number of containers that will be required by Wireline in coming years and their graphical representation is shown by the red lines on the **"Figure 17".** As such, based on the statistical approach, it is assumed that if there has been used less than 41 closed containers of 10ft or more than 47, it means that it happened by chance.

The first step is to identify how many units Wireline should buy in order to maximize the total cost savings during 5,5 years. Based on the formulas and what-if analysis it was computed cost savings for different numbers of containers purchased – from 38 to 47 – at a particular tender price for all the scenarios – pessimistic, optimistic, normal and the year 2015 (example in Appendix 5).

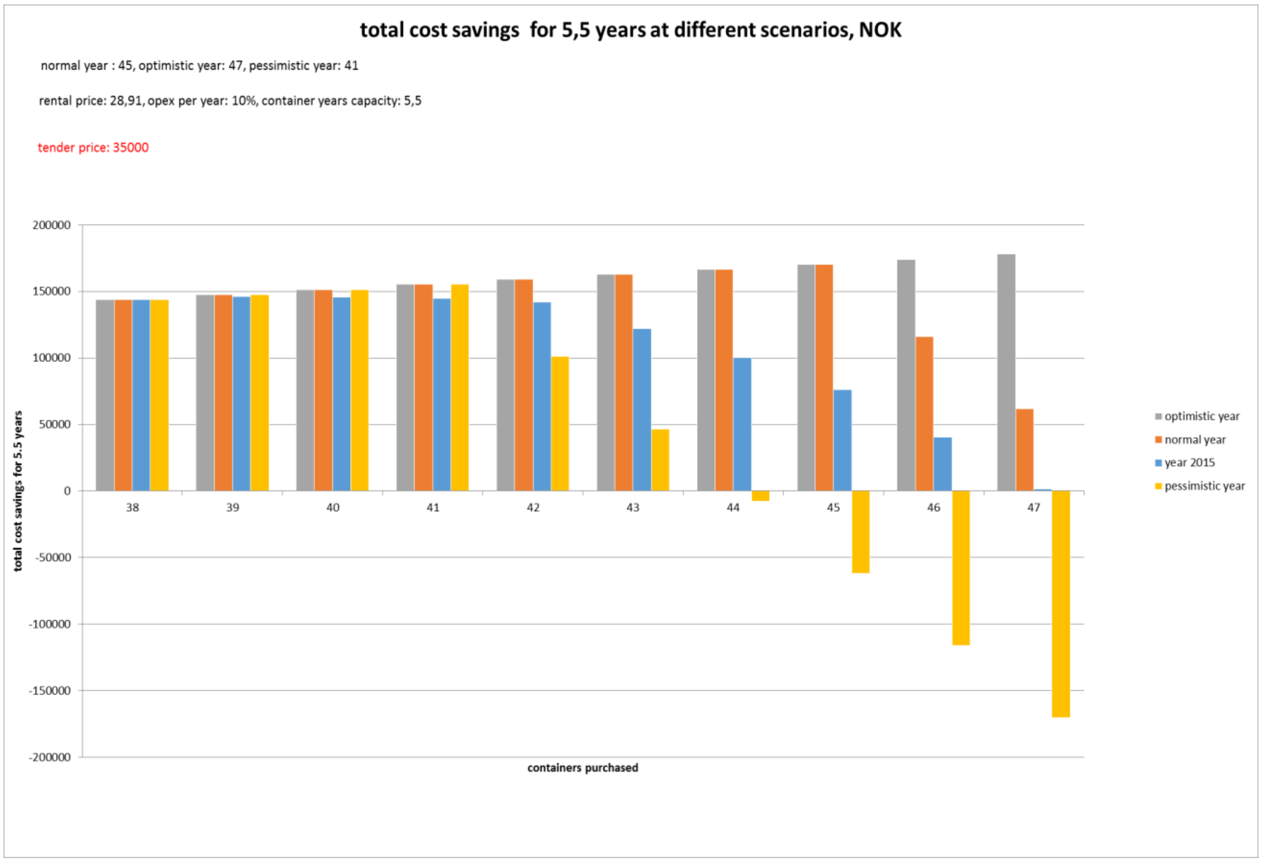

Figure 21. 10ft Closed Container. Total cost savings at different scenarios

As in the **"Figure 20",** the **"Figure 21"** depicts the range of the containers from 38 to 47 and shows the total cost savings for 5,5 years that correspond to each of the four scenarios at each of the baskets' quantity at the purchase price of NOK 35 000.

This price was chosen in order to show that at a particular tender price, in our case NOK 35 000, different amounts of mini containers purchased can lead to either losses or savings at different scenarios. Thus, the graph demonstrates that at the price of NOK 35 000 all the four scenarios generate cost savings if the purchased containers are in the amount from 38 to 43. If Wireline decides to buy more than 43 units and should the pessimistic year come, the segment will have losses. However, if the segment buys 46 or 47 containers and an optimistic year should come, the total cost savings are going to increase drastically.

The mathematical analysis represented on this graph indicates that should a pessimistic year come, the total cost savings are maximized if it is purchased 41 container. If Wireline decides to purchase more units than 41, then there are possibilities to suffer losses if it should happen a pessimistic year. At the same time, having bought containers according to an optimistic year,there is also a chance to gain huge cost savings if the year turns out to be optimistic. The important thing is that in case of purchasing 41 unit, Wireline will have equal cost savings at the three scenarios – no matter whether the year is optimistic, pessimistic, or normal, the segment will equally save NOK 155 260 during 5,5 years. Consequently, in order to reduce the risks of losses, the best decision is to purchase the pessimistic number of 10ft closed containers, that is 41. In this case containers will always be utilized – both in pessimistic, optimistic and normal year 41 unit will be in work and the cost savings will not be changed should a normal or optimistic years come. This conclusion is based on the **formula 4.10** that computes the total cost savings and **the assumption 2** made in this chapter.

After having defined the optimal number of units for purchase, it was calculated the total cost savings which Wireline would gain for 5,5 years at the purchase of 41 container at different potential prices.

According to the **"Figure 22"** the lower the tender price/purchase price, the higher the potential cost savings that Wireline could generate. As such, if the segment decided to buy 41 container of 10ft at the price of NOK 23 000 per unit, it would save NOK 917 860 for 5,5 years. The lowest cost savings are generated at the price of NOK 37 000. At this price Wireline will only make NOK 28 160 for 5,5 years. At the price over NOK 37 000 the savings start to decrease and become negative. Having the overview of the possible tender prices and corresponding cost savings, Wireline can decide on how much money they want to save and what price they could agree on with suppliers.

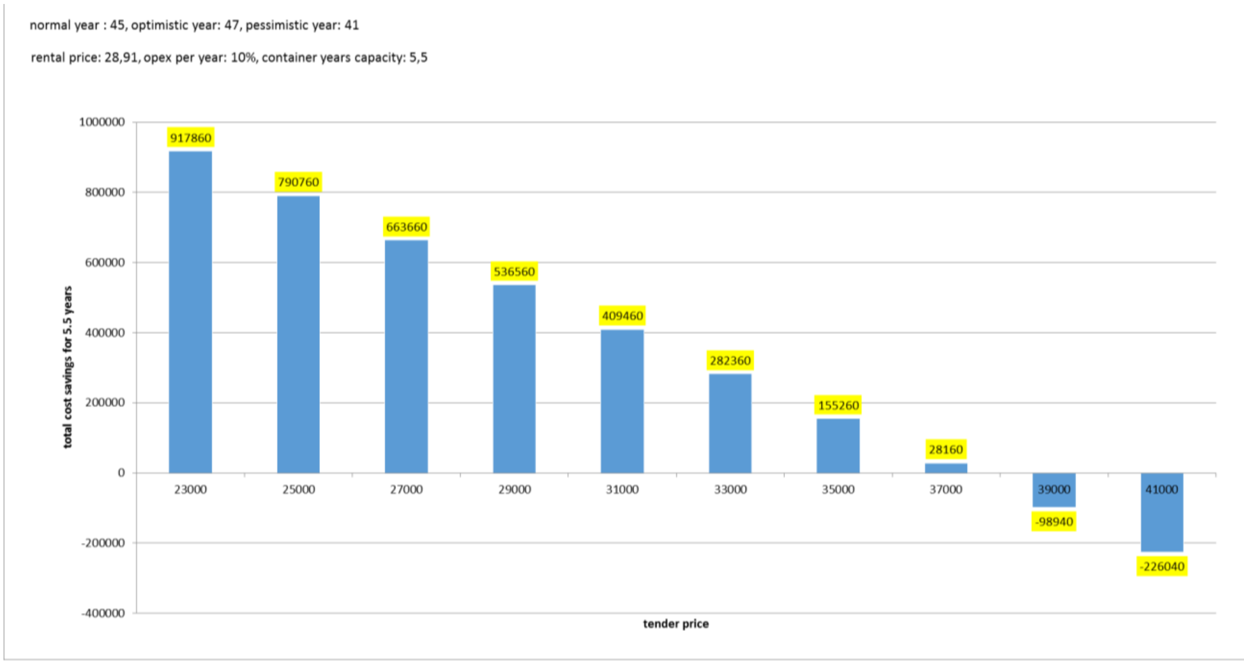

Figure 22. 10ft Closed Container. Total cost savings in 5.5 years

6. Interpretation and discussion

The implications of the findings for practice will be covered in this chapter. Based on the theory used it will be discussed the results presented in **Chapter 5.** The discussion of the results will be divided into two parts, where the first two research questions will be discussed and then the last two will be presented. Later in this chapter I will look into limitations for the findings, and the suggestions for further research will be given.

6.1. Part I. Research questions 1 & 2

Before starting the research, it was first identified the CCU which would be taken for the detailed quantitative analysis. Based on the Rental report 2015 from SWIRE, it was calculated the total amount of spend invoiced for the year for each unit type. Based on the final figures represented in **Figure 4,** three unit types with the highest spend were taken into further analysis – mini containers, 8m baskets and 10ft closed containers. Thus, it was given the answer to the first research question that aimed to find out what types of CCU should be taken to the analysis.

The analysis of the units which was further conducted, aimed to find the answers for the next three research questions.

In Part I of the data analysis it was presented the statistical summary of the year 2015 for the three units and the analysis of the possible cost savings based on real figures was made. The empirical findings represented in graphs are based on formulas and concepts explained in detail in the **Implementation and results chapter.** The results revealed economic feasibility of the potential purchase of both mini containers, 8m baskets and 10ft closed containers indicating that if the rental year 2015 would repeat itself 5,5 times, the total cost savings that Wireline would acquire could be up to NOK 2 000 000, NOK 1 500 000 and NOK 900 000 respectively. As such, Part I analysis showed that this project has huge potential for real implementation in terms of possible cost savings. Therefore, the empirical findings in Part I analysis for all the three CCU types give the affirmative answer to the second research question which aimed to investigate whether there could be any cost savings if Wireline bought the units in 2015.

6.2. Part II. Research questions 3 & 4

In order to reach the main objective of the research and define the tender prices at which Wireline would maximize its total cost savings during the life span of the equipment in case of purchasing the units, the third and the forth research questions had to be answered:

- What is the optimal amount of units for purchase?
- What are the potential tender prices and corresponding cost savings for each unit type?

Part II analysis of mini containers, 8m baskets and 10ft closed containers was used exactly for this purpose.

Depending on the future oil price development, the operations activity in the forthcoming years can be either higher or lower in relation to the available rental year. Thus, in order to ensure that Wireline will be ready for any kinds of activity in case of buying the units, it was made a demand forecast for Schlumberger's CCU in coming years. In order to give the best possible forecast based on the available data, a combination of both qualitative and quantitative forecasting approach was applied (Slack et al, 2010, p.170).

In particular, it was used a statistical approach and a naive quantitative method implying that demand in next period will be equal to demand in the recent period. Naive method was used because the researcher has got available only the historical rental data for the recent 2015 year. However, the application of 10^{th}, 50^{th} and 90^{th} percentile set the range of the units that defined a pessimistic, normal and optimistic year scenario respectively for the three unit types. Therefore, the statistical measure in terms of percentiles, and naive approach based on the recent period data determined the forecasts for the future coming years.

What is more, the forecasts made on the rental data for 2015 was regarded as reliable by Youcef Belkhir and he encouraged the researcher to use this year's historical data as the basis for the research. Year 2015 has been the year with the lowest activity during the last five years (Appendix 6). Thus, in case of practical application of the results based on the data from 2015, the risks of possible unnecessary costs generation in relation to a standby of the bought units will be mitigated, and if further negative disturbances should occur, the company could adjust to them easier in terms of minimized losses.

Thereby, the forecast of a pessimistic, optimistic and a normal year based on both quantitative approach and the expert's judgements was defined, and further analysis was ready to be implemented.

The mathematical analysis based on formulas and what-if analysis represented on the **"Figures 9, 15, 21"** revealed that the optimal number of the units for purchase is the number at which the total cost savings in a pessimistic year are maximized. Namely, it was determined that the purchase of 67 units of mini containers, 64 units of 8m baskets and 41 units of 10ft closed containers will reduce the risks of losses and will maximize the total cost savings during 5,5 years in case of pessimistic years. A more detailed explanation of the choice of the optimal numbers of CCU for purchase can be found in Part II analysis for each of the unit type in the **Chapter 5.**

The empirical findings are based on both mathematical method and theoretical foundations. In particular, as it was described in the **Chapet 1** – the demand for Schlumberger's products and services is directly dependent on the oil price. However, as it was found out, there are prognosis of slight improved but still volatile future energy prices, implying that forthcoming years can be either with slightly higher or the same activity in relation to the available data year.

Thus, the decision about the optimal number of containers for purchase was made under rather uncertain environment. In order to make the best possible decision in the current situation, it was applied a maximin decision method or as it is also called a "pessimistic" approach (Heizer & Render, 2011, p.703). Namely, the total cost savings during the life span of the equipment at a particular price were calculated for each of the four forecasts (together with the "real" year 2015) at different numbers of units for purchase. After that all the values were examined and it was found that if Wireline bought a specific number of units at some particular price, it would suffer losses should a pessimistic year come. In order to mitigate such risks, one should choose the alternative with the least possible losses, that is the alternative that maximizes the minimum outcome. In this case, this alternative is the number at which total savings are maximized under a pessimistic year. The maximin approach was applied to all the three CCU and it was empirically proved that in the situation with uncertain development of the energy prices, the best decision is to purchase the safe, pessimistic number of units in order to reduce the risks of losses and be ready for the pessimistic years.

The purchase of the unit number corresponding to the pessimistic year's demand for CCU will be advantageous for Wireline for two more reasons:

1. Storage capacity on the Wireline base can be extended due to the assumption that all the purchased units will be used each day and thus, all of them are supposed to be offshore, off the base every single day. Only some of them will be at Wireline during some periods for the purpose of preventive or breakdown maintenance purposes (Heizer & Render, 2011, p.687). As such, should the oil prices increase, it will always be space for additional units on the base. Stevenson (2005, p. 170) states that decisions concerning capacity have a huge influence on operating costs. Thus, the management of the Wireline segment might revise the facilities' storage capacity in a way to match it as close as possible to the proposed demand for CCU in coming years in order to minimize operating costs.
2. The purchase of the pessimistic number of the CCU will eliminate waste in terms of excess inventory and the unnecessary extra costs associated with the units' standby/idle time will not be generated. Smith & Hawkins (2004, p.108) define Seven Deadly Wastes, where excess inventory is one of them. The minimization of the excess inventory is one of the steps needed to reach the ultimate idea of JIT principle – maximum efficiency in the process time and elimination of any form of unproductive resources (Vonderembse & White, 1998, p.477).

After having defined the optimal number of CCU to purchase, it was calculated the total cost savings which Wireline would gain for 5,5 years at different potential prices. **"Figures 10, 16, 22"** in the **Part II Analysis** in **the Chapter 5** indicate that there are huge potential cost savings in case of buying the units, and the lower the tender price/purchase price, the higher the future savings will be. Moreover, the figures show the tender prices which will lead to losses if Wireline buys the units at those price level. According to the formulas presented in the **Subchapter Data analysis,** the possible tender prices are different for the units of interest. As such, the following numerical results were received:

1. Mini containers: at the purchase of 67 units at the price of NOK 9 000 total cost savings for 5,5 years equal NOK 1 520 021, at the price of NOK 11 000 total cost savings equal NOK 1 312 321.

2. 8m baskets: at the purchase of 64 units at the price of NOK 22 000 total cost savings for 5,5 years equal NOK 1 429 173, at the price of NOK 24 000 total cost savings equal NOK 1 230 773.
3. 10ft closed containers: at the purchase of 41 unit at the price of NOK 23 000 total cost savings for 5,5 years equal NOK 917 860, at the price of NOK 25 000 total cost savings equal NOK 790 760.

A whole overview of the potential tender prices and corresponding cost savings for each of the three CCU is represented in the **Part II Analysis** in **the Implementation and results chapter.**

Given the definition to supply chain, Heizer & Render (2014) state that possessing a huge possibility of creating competitive advantage for a company, supply chain is the most complex and expensive function in any organization. In the current low oil price environment companies are trying to investigate the ways how costs can be minimized. Thus, the results of this paper can give a good idea of how Schlumberger could save costs.

As the final findings show, there are huge potential cost savings in case of buying mini containers, 8m baskets and 10ft closed containers. However, according to Adrian (2000) when deciding whether to buy or rent the equipment, one should not solely rely on numerical analysis. The author argues that there are some immeasurable factors that should be taken into account as well. In particular, he states that flexibility of use and technological advantage are the factors that favor renting instead of buying. Renting the equipment allows the company to have the equipment it exactly needs and which is technologically advanced all the time.

6.3. Limitations

The results of this research must be interpreted in terms of certain limitations. In this chapter the limitations will be discussed.

One of the main limitations of the paper is that it was available only the data for 2015. If it had been available the data for a longer period, it would be possible to apply more advanced models in order to make forecasting. However, due to the sudden drop of oil price in 2014 and its current and forecasted future stay on the same low level in comparison to the pre-fall years, the rental data for 2015 is representative in order to make the conclusions regarding the future years' demand for CCU.

Another limitation of the paper is that when the cost savings were calculated, the financial costs – inflation and interest rate - were not taken into consideration.

Further, when the total cost savings were calculated in both parts of the analysis, it was assumed that the rental year 2015, pessimistic, optimistic and normal year repeat themselves 5,5 times – a period of useful life of the equipment. However, there are no alike years, each year will differ from another in reality. Nevertheless, the purchase of the pessimistic number of units and the experts' prognosis about future slight oil price increase give the researcher a reason to assume that the demand for CCU will not fall below the pessimistic year's number of units. Thus, the mathematical model used to produce the empirical findings of the thesis can be regarded as reliable in terms of proximity of the results to the real world situation.

6.4. Further research

Due to the time limit, only the CCU of the Wireline segment were analyzed. However, the other segments, which are a part of the company, have rented various types of the units as well. Thus, the CCU in the other segments should be also analyzed in order to get a comprehensive information about the CCU rental vs. buy situation, and deliver CAPEX requests per segment per type of equipment. The detailed analysis of all the segments and its final results could give necessary information for the creation of shared pool of CCU for optimal utilization and the implementation of certification processes and a proper pool management. In this master thesis it was presented the important information about how the data should be analyzed and the detailed recommendations for the rental data processing were given.

7. Conclusion

This paper aimed to investigate the Buy versus Rent decision of CCU in the Wireline segment at Schlumberger Norway. The main objective of the thesis was to determine which types of units for Wireline segment it will be beneficiary to buy, at what amount and under what price conditions in order to minimize rental costs and maximize the cost savings.

The main research problem of the paper was the following: At what tender prices would Wireline maximize its total cost savings during the life span of the equipment in case of purchasing particular units? During the research work it was given the answers to the four research questions connected to the main research problem and thus, the main objective of the thesis was reached.

The CCU with the most frequent usage and the highest rental spend for 2015 in the Wireline segment were taken into analysis. These units are: mini containers, 8m baskets and 10ft closed containers. The quantitative analysis based on exploratory sequential mixed method and theoretical foundations has given the following results:

At the purchase of the optimal amount of the CCU – 67 mini containers, 64 baskets of 8m and 41 closed container of 10ft at the prices of NOK 9 000, NOK 22 000 and NOK 23 000, the total cost savings during the life span of the equipment – 5,5 years - would reach the amount of NOK 1 520 021, NOK 1 429 173 and NOK 917 860 respectively.

The findings of the research work has shown that there are huge potential cost savings in case of buying mini containers, 8m baskets and 10ft closed containers. Having available the overview of the potential tender prices and corresponding cost savings for each of the three analyzed CCU, the management of the Procurement & Sourcing department at Schlumberger Norway will have a valuable information about the potential financial outcomes of the units' purchase.

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SWIRE 2015 Rental Report (2016)

MODEX reports and rental data files

Interview notes from the discussions with suppliers and Schlumberger's staff

Appendixes

Appendix 1. BORG hierarchy

Segment	BORG Hierarchy				
ZNOR-Artificial Lift_ALS	LDK1-DK Esbjerg ALS	LNO1-NO Dusavik ALS			
ZNOR-B&AT (SMITH)	SNO1-5100 Stavanger BAT				
ZNOR-Completions_CPS	CDK1-DK Esbjerg CPS	CNOS-NO Dusavik WCP-TCS			
ZNOR-DCS	QNO2-NO Tananger DCS				
ZNOR-DT&R (SMITH)	SNO2-5100 Stavanger DTR				
ZNOR-Drilling & Measurements	ADK2-DK Esbjerg LWD ANOR-NO Stavanger MS MWD	ADK3-DK Esbjerg MWD ANOX-NO Stavanger repair DBM	ANO1-NO Stavanger MLS	ANO2-NO Geotools Tananger DBM	
ZNOR-GSS (Geoservices)	VDK1-DK-Denmark-GSS-MLG	VDK2 431 Denmark GSS	VNO1-NO-Stavanger-GSS-MLG	VNO2 431 NO Norway GSS	
ZNOR-MI Swaco	M178-DK 7330 Esbjerg MI Swaco	M179-NO 7360 Stavanger MI Swaco	M180-NO 7380 Stavanger MI Swaco		
ZNOR-OFS	XDK1-DK Esbjerg SL2 XNO2-510 SANDSLI Property projects XNOE-NO Bergen CCB	XITN-NO Tananger SL2 SITS XNO3- 511 Horsoy Property Projects XNQH-NO Bergen SL2	XLOG-NO Tananger SL2 SNAS XNO4-028 NO Facility SNAS XSHQ-NO Risabergveien SL2	XNO1-NO Stavanger FRMS XNO5 Knarvik OFS Base NO	
ZNOR-SIS	QDK3 1100 PTS DK NExT	QNO4-NO Tananger SIS	QNO6 - 079 Kjeller SPT Operations		
ZNOR-WIS	DDK7-DK Esbjerg CTS RMC WSV NNO2-NO Bergen Open Hole WIS	DDK9-1100 DK WIS NNO3-NO Bergen WIS	NDK1-DK Esbjerg WIS NNO4-NO Geotools Norway WIS	NDK2-DK GeoTools Denmark WIS WDK3-DK Esbjerg WIS	NNO1-NO Stavanger WIS DNO2-NO Norway DeepSTIM 1&2 WSV
ZNOR-WSV	ANO-NO Bergen WSV DDKA-1100 WSV Denmark Big Orange DNO6-0028 NO Island Captain FST	DDK1-DK Esbjerg Geotools WSV DDKB-1100 NO WSV DNO7-0028 NO Norway Island Centuri	DDK4-DK Esbjerg WSV DNO1-NO Geotools Norway WSV DDK8-DK The Big Orange Vessel WSV	DDK5-DK Esbjerg FlexiStim WSV SDAS DNO3-Boat Club Operation DSNO-NO Stavanger WSV	DDK6-DK Esbjerg Boat Club WSV SDAS DNO5-0028 WSV Big Orange NOBX
ZNOR-WTT	TDK1-DK Geotools Esbjerg WTT	TDK2-DK Esbjerg WCP-TCS	TNO1-NO Geotools Stavanger WTT	TNO2 -028 Porsgrunn PWSM (Non GOLD)	TNWO-NO Stavanger WCP-TCS
ZNOR-Wireline	FNO1 - 0028 Tananger REW WNO2-NO Bergen Cased Hole Wireline	WDK1-DK Esbjerg Geotools Wireline WNO3-NO EMC Wireline	WDK2-DK Esbjerg Wireline WNVW-NO Bergen Open Hole Wireline	WKNR-NO Bergen MDT Wireline	WNO1-NO Geotools Bergen Wireline

Appendix 2. MODEX product range

Dimensions, weight and capacity										
		Internal Dimensions			External Dimensions			Weight & Capacity		
Type	Name	Length	Width	Height	Length	Width	Height	Tare	Payload	MGW
Mini Container	MD-/ MDA-	1 470	1 770	2 500	1 615	1 915	2 880	1 850	4 350	6 200
Mini Container – Special	MDS-/MDF-/MDK-	1 470	1 770	2 500	1 615	1 915	2 880	1 950	4 250	6 200
Dangerous Goods Container	MDG-	1 470	1 770	2 500	1 650	1 905	2 930	1 880	4 320	6 200
Container – 10 ft	C-10-	2 830	2 280	2 240	2 991	2 438	2 690	2 850	7 150	10 000
Special Container – 14 ft	C-14-	4 100	2 200	2 800	4 270	2 440	3 223	4 140	11 360	15 500
Container – 20 ft	C-20-	5 800	2 225	2 520	6 058	2 436	2 996	5 150	9 150	14 300
Open Top Container – 10 ft	OT-10-	2 620	2 118	2 270	2 990	2 438	2 760	2 900	9 000	11 900
Open Top Container – 11 ft	OT-11-	2 970	2 118	2 550	3 357	2 438	2 920	3 200	8 700	11 900
Open Top Container – 14 ft	OT-14-	3 887	2 118	2 550	4 267	2 438	2 920	3 800	8 100	11 900
Open Top Container – 20 ft	OT-20-	5 648	2 118	2 435	6 057	2 438	2 848	4 670	14 930	19 600
IBC Container	IBC-	1 250	1 250	1 405	1 470	1 410	1 797	1 100	1 200	2 300
Reefer Container	KF-	2 300	1 710	2 000	2 700	2 000	2 736	2 500	4 900	7 400
Gas Rack	GR-	1 050	1 050	2 000	1 311	1 281	2 334	1 000	1 950	2 950
Toolbox – 1,9 x 1,29 x 1,75 m	TB-1	1 740	1 130	1 550	1 900	1 290	1 755	1 100	4 900	6 000
Toolbox – 1,9 x 1,6 x 1,4 m	TB-5	1 715	1 410	950	1 915	1 618	1 355	1 000	2 630	3 630
Basket – 3,5 x 3 x 1,2 m	CF-	3 300	2 790	1 000	3 500	2 990	1 226	1 680	5 420	7 100
Side Door Basket	FB-3,7-	3 500	1 270	1 450	3 700	1 630	1 780	1 900	5 100	7 000
Half Height Basket – 2 m	LB-2-	2 000	900	900	2 200	1 200	1 100	960	3 370	4 330
Half Height Basket – 10 ft	LB-3-	3 100	2 225	950	3 300	2 440	1 330	2 060	11 940	14 000
Half Height Basket – 20 ft	LB-6-	5 800	2 225	950	6 002	2 440	1 290	3 145	10 855	14 000
Screen Basket	SB-13-	13 230	1 000	1 300	13 430	1 200	1 430	4 550	9 750	14 300
Basket – 3 m	B-3,1-	3 030	1 000	1 000	3 230	1 200	1 300	1 100	6 300	7 400
Basket – 6 m	B-6,4-	6 340	1 000	1 000	6 540	1 200	1 300	1 960	8 040	10 000
Basket – LoW – 6 m	BL-6-	6 340	1 000	805	6 540	1 200	1 005	1 800	8 200	10 000
Basket – Wide – 6 m	BW-6-	6 060	1 200	1 000	6 260	1 400	1 300	2 150	7 850	10 000
Basket – 7 m	B-7-	7 100	1 000	1 000	7 300	1 200	1 300	2 050	7 950	10 000
Basket – LoW – 7 m	BL-7	7 100	1 000	750	7 300	1 200	960	1 800	8 200	10 000
Basket – 8 m	B-8,1-	8 030	1 000	1 000	8 230	1 200	1 300	2 450	11 800	14 250
Basket – LoW – 8 m	BL-8-	8 030	1 000	750	8 230	1 200	960	2 150	12 100	14 250
Basket – 10 m	B-10-	10 030	1 000	1 000	10 230	1 200	1 300	2 970	11 280	14 250
Basket LoW – 10 m	BL-10-	10 030	1 000	750	10 230	1 200	960	2 600	11 650	14 250
Basket – LoW and NarroW – 10 m	BS-10-	10 030	806	750	10 230	906	960	2 300	11 950	14 250
Basket – 11 m	B-11-	11 300	1 000	1 000	11 500	1 200	1 206	3 100	11 150	14 250
Basket – 12 m	B-12-	12 030	1 000	1 000	12 230	1 200	1 300	3 360	10 890	14 250
Basket – LoW and NarroW – 12 m	BS-12-	12 030	806	750	12 230	906	960	2 650	11 600	14 250
Basket – 13 m	B-13-	13 030	1 000	1 000	13 230	1 200	1 300	3 600	10 650	14 250
Basket – LoW – 13 m	BL-13-	13 030	1 000	750	13 230	1 200	960	3 200	11 050	14 250
Basket – LoW and NarroW – 13 m	BS-13-	13 030	806	750	13 230	906	960	2 800	11 450	14 250
Basket – 14 m	B-14-	14 030	1 000	1 000	14 230	1 200	1 300	3 750	10 500	14 250
Basket – 15 m	B-15-	15 000	1 060	950	15 200	1 260	1 090	3 490	6 510	10 000
Basket – LoW – 15 m	BL-15-	15 030	1 000	750	15 230	1 200	960	3 550	10 700	14 250
Basket – 16 m	B-16-	16 030	1 000	1 000	16 230	1 200	1 300	4 250	10 000	14 250
Heavy Basket – 17 m	B-17-	16 750	1 360	1 510	16 950	1 572	1 778	7 000	14 000	21 000
Basket – 18 m	B-18-	18 030	1 000	1 000	18 230	1 200	1 300	4 800	9 450	14 250
Basket – LoW – 18 m	BL-18-	18 030	1 000	750	18 230	1 200	960	4 200	10 050	14 250
Tank – Helifuel – 2700 l	HELI-	–	–	–	1 995	1 995	2 154	1 790	2 710	4 500
Tank – Helifuel – 4500 l	JET-	–	–	–	2 700	1 900	2 490	2 200	3 200	5 400
Tank – Chemical – LoW – 2700 l	T-27-	–	–	–	2 150	1 850	2 134	2 000	6 000	8 000
Tank – Chemical – Side Valve – 2900 l	TC-29-	–	–	–	2 150	1 850	2 434	2 100	5 900	8 000
Tank – Chemical – 3100 l	T-31-	–	–	–	2 150	1 900	2 331	2 000	6 000	8 000
Tank – Chemical – LoW – 4600 l	T-46-	–	–	–	2 950	1 850	2 064	2 550	7 950	10 500
Tank – Chemical – 4600 l	T-46-	–	–	–	2 750	1 850	2 470	2 100	8 330	10 430
Tank – Chemical – Side Valve – 4600 l	TC-46-	–	–	–	2 950	1 850	2 343	2 400	8 100	10 500
Tank – Chemical – Vertical – 4800 l	HT-48-	–	–	–	2 200	2 200	2 571	2 300	7 700	10 000
Tank – LoW – 2727 l	LT-29-	–	–	–	2 030	2 030	1 450	2 480	4 000	6 480
Tank – LoW – 4500 l	LT-45-	–	–	–	2 030	2 440	1 850	3 000	7 000	10 000
Tank – Heated – 4800 l	TH-48-	–	–	–	2 300	2 300	2 571	2 500	7 500	10 000
Compactor – 8 cbm	LBC/ BC-	–	–	–	4 068	1 685	2 010	2 800	4 500	7 300
Compactor – 6,5 cbm	LBC-	–	–	–	3 570	1 685	2 010	2 720	4 580	7 300
Compactor – 5 cbm	SBC-	–	–	–	3 070	1 629	2 010	2 600	2 740	5 340
Waste Skip – 8 cbm	B-	–	–	–	4 370	1 840	1 510	1 750	5 750	7 500
Waste Skip – 6,5 cbm	W-	–	–	–	3 600	1 840	1 510	1 500	4 500	6 000
Waste Skip – 5 cbm	XW -	–	–	–	3 600	1 500	1 510	1 360	3 700	5 060
Waste Skip – 3 cbm	SW-	–	–	–	3 600	1 225	1 258	1 250	6 250	7 500
Drill Cuttings Skip – 6 cbm	BK-	–	–	–	3 330	2 000	1 500	1 500	8 500	10 000
Drill Cuttings Container – 5 cbm	LBK-/ LCK-	–	–	–	2 200	1 840	1 570	1 700	9 300	11 000
Heavy Lift Basket – 7 x 3 m	LB-7	6 400	2 690	1 000	7 000	2 990	1 550	5 920	19 080	25 000
Heavy Lift Basket – 10 x 3 m	LB-10-	9 800	2 680	1 200	10 000	2 990	1 720	8 100	16 400	24 500
Heavy Lift Frame – 3,5 x 4,5 m	LF-	3 100	4 100	2 000	3 500	4 500	2 460	5 070	32 230	37 300
Heavy Lift Frame – 7 x 4 m	LF-	6 800	3 800	2 200	7 000	4 000	2 460	7 200	30 100	37 300
Heavy Lift Frame – 6 x 4,5 x 3 m	LF-	5 400	4 100	2 534	6 000	4 500	3 000	7 450	30 000	37 450
Heavy Lift Frame – 8 x 5 x 3 m	LF-	7 400	4 400	2 540	8 000	5 000	3 000	9 800	30 000	39 800

Appendix 3. Additional baskets' sizes received from SWIRE

					Length	Width	Height
Rental start date	Termination date	Unit	Item №	Description			
12.06.2015	24.06.2015	CBS403	B8.1M	8 meter offshore basket	8288	1190	1216
26.06.2015	09.07.2015	CBSN070	B8.1M	8 meter offshore basket	8268	1190	1226
20.08.2015	02.09.2015	S-7845	B8.1M	8 meter offshore basket	8226	1196	1185
23.07.2007		CBS204	B8.1M	8.1 MTR/27ft Cargo Basket 27FT	8268	1198	1116
01.06.2008		CBS200	B8.1M	8.1 MTR/27ft Cargo Basket 27FT	8268	1198	1116
16.12.2011	31.03.2015	CBS398	B8.1M	8.1mtr/27ft Offshore Basket	8260	1190	1206
23.04.2013		CBSC035	B8.1M	8.1mtr/27ft Offshore Basket	8260	1190	876
19.03.2015	21.04.2015	CBSN056	B8.1M	8.1mtr/27ft Offshore Basket	8268	1190	1226
18.08.2015		S-7846	B8.1M	8.1mtr/27ft Offshore Basket	8226	1196	1185
29.04.2013		CBSC013	B8.2M	8.1mtr/27ft Special Basket	8260	1190	892
11.11.2015		CBSA001	PB8.2M	8.1mtr/27ft Special Basket	8260	1190	866
16.09.2014	26.01.2015	CBVA020	B8.6M	8,6m Offshore basket small type	8620	868	971
16.09.2014	26.01.2015	CBVA010	B8.6M	8,6m Offshore basket small type	8620	868	971
1. 6m basket							
21.08.2009	28.02.2015	CBR086	B6.1M	6.1 Mtr/20ft Cargo Basket 20FT	6260	1190	980
04.12.2014	23.01.2015	CBR062	B6.1M	6.1mtr/20ft Offshore Basket	6260	1190	980
04.12.2014	23.01.2015	CBRN002	B6.1M	6.1mtr/20ft Offshore Basket	6268	1190	1226
04.12.2014	23.01.2015	S-5634	B6.1M	6.1mtr/20ft Offshore Basket	6330	1160	1135
03.09.2015	15.09.2015	CBRA013	B6.2M	6.1mtr/20ft Special Basket	6260	768	927
2. 4m basket							
31.10.2013	29.06.2015	S-4411	B4.1M	4.1mtr/14ft Offshore Basket	4330	1160	1135
16.06.2015	28.07.2015	S-4408	B4.1M	4 meter offshore basket	4330	1160	1135
3. 3,6m basket							
25.11.2014	03.03.2015	CBTAN192	B3.6M	3.6mtr/12ft Basket	3960	1675	1766
01.12.2014	20.01.2015	CBTA148	B3.6M	3.6mtr/12ft Basket	3960	1680	1759
30.10.2014	06.02.2015	CBT291	B3.6M	3.6mtr/12ft Basket	3660	1460	1670
08.10.2014	26.01.2015	S-837080	B3.6M	3.6mtr/12ft Basket	3670	1605	1715
4. 20m basket							
14.01.2015	13.02.2015	SWB20-001	SPB20M	20mtr/66ft Offshore Basket	20000	1840	1491
14.01.2015	13.02.2015	SWB20-001	SPB20M	20mtr/66ft Offshore Basket			
5. 18m basket							
30.07.2015	30.09.2015	CBY043	B18.1M	18.1mtr/59ft Offshore Basket	18260	1190	1237
17.08.2015	16.09.2015	S-61812	B18.1M	18.1mtr/59ft Offshore Basket	18160	1170	850
20.04.2015		CBYN015	B18.1M	18.1mtr/59ft Offshore Basket	18260	1190	1226
6. 16m basket							
23.09.2015	31.10.2015	CBXN051	B16.1M	16 meter offshore basket	16260	1190	1226
03.10.2015	14.10.2015	CBX039	B16.1M	16 meter offshore basket	16160	1198	1116
17.11.2014	23.01.2015	CBXN013	B16.1M	16.1mtr/53ft Offshore Basket	16260	1190	1216
25.11.2014	21.05.2015	CBX056	B16.1M	16.1mtr/53ft Offshore Basket	16160	1198	1116
07.10.2015	08.10.2015	S-61619	B16.1M	16.1mtr/53ft Offshore Basket	16230	1196	1180

					Length	Width	Height
7. 14m basket							
30.06.2015	07.07.2015	CBQB017	B14.2M	14 meter offshore basket	14190	1160	1205
26.06.2015	01.08.2015	CBQ103	B14.2M	14 meter offshore basket	14260	1190	1237
27.06.2015	21.07.2015	CBQN090	B14.2M	14 meter offshore basket	14260	1190	1226
16.10.2015		S-81479	B14.2M	14 meter offshore basket	14190	1160	1135
09.04.2014	31.03.2015	CBQ032	B14.2M	14.1mtr/46ft Offshore Basket	14260	1190	866
01.10.2014	31.03.2015	CBQB014	B14.2M	14.1mtr/46ft Offshore Basket	14190	1160	1205
05.01.2015	16.03.2015	CBQN082	B14.2M	14.1mtr/46ft Offshore Basket	14260	1190	1226
01.04.2015	15.04.2015	FCB-14002	B14.2M	14.1mtr/46ft Offshore Basket			
01.07.2015	03.07.2015	S-81471	B14.2M	14.1mtr/46ft Offshore Basket	14190	1160	1135
8. 13m basket							
23.06.2015	29.07.2015	CBWN073	B13.1M	13 meter offshore basket	13260	1190	1226
17.06.2015	02.10.2015	CBW209	B13.1M	13 meter offshore basket	13263	1195	1231
26.09.2015	29.09.2015	CBW017	B13.1M	13.1mtr/43ft Offshore Basket	13268	1198	1116
02.09.2015	29.09.2015	FCB-1318	B13.1M	13.1mtr/43ft Offshore Basket			
02.09.2015	29.09.2015	CBWN004	B13.1M	13.1mtr/43ft Offshore Basket	13260	1190	1216
9. 12m basket							
08.10.2015	16.10.2015	CBZ061	B12M	12 meter offshore basket	12264	1193	1232
07.10.2015	06.11.2015	S-61215	B12M	12 meter offshore basket	12230	1195	1185
12.10.2015	28.10.2015	CBZN013	B12M	12 meter offshore basket	12260	1190	1226
14.10.2015	10.11.2015	CBZC005	B12M	12 meter offshore basket	12260	868	871
09.09.2014	31.03.2015	CBZ119	B12M	12.1mtr/40ft Offshore Basket	12264	1193	1232
18.12.2014	15.01.2015	CBZN011	B12M	12.1mtr/40ft Offshore Basket	12260	1190	1226
26.01.2015	06.02.2015	S-61209	B12M	12.1mtr/40ft Offshore Basket	12230	1195	1185
27.01.2015	13.02.2015	S-61215	B12M	12.1mtr/40ft Offshore Basket	12230	1195	1185
19.09.2013		CBZC004	B12M	12.1mtr/40ft Offshore Basket	12260	868	971
10. 10m basket							
11.09.2015	01.11.2015	CBVN043	B10.1M	10 meter offshore basket	10260	1190	1226
03.09.2015	02.10.2015	S-81026	B10.1M	10 meter offshore basket	10190	1160	1190
03.09.2015	05.10.2015	CBVB013	B10.1M	10 meter offshore basket	10160	1160	1205
09.09.2015	08.10.2015	CBV038	B10.1M	10 meter offshore basket	10268	1198	1116
05.04.2005	12.06.2015	CBV056	B10.1M	10.1 MTR/33ft Cargo Basket 33F	10268	1198	1116
10.03.2015	08.07.2015	CBVB004	B10.1M	10.1mtr/33ft Offshore Basket	10160	1160	1205
10.04.2015	15.06.2015	FCB-1029	B10.1M	10.1mtr/33ft Offshore Basket			
30.06.2015	22.07.2015	CBV165	B10.1M	10.1mtr/33ft Offshore Basket	10259	1194	1237
24.08.2015	07.09.2015	CBVA008	B10.1M	10.1mtr/33ft Offshore Basket	10260	868	971
15.07.2015	17.07.2015	S-81026	B10.1M	10.1mtr/33ft Offshore Basket	10190	1160	1190
13.02.2015	07.05.2015	CBVN041	B10.1M	10.1mtr/33ft Offshore Basket	10260	1190	1226

Appendix 4. Examples of input data & calculations in Excel [mini containers]

Input data:

type	unit	start date	termination date
mini container	AMB1699	01.01.2015	31.12.2015
mini container	AMB1807	01.01.2015	31.12.2015
mini container	AMB1900	01.01.2015	31.12.2015
mini container	AMB2067	01.01.2015	19.03.2015
mini container	AMB2131	01.01.2015	31.12.2015
mini container	AMB2166	01.01.2015	17.12.2015
mini container	AMB2231	01.01.2015	19.03.2015
mini container	AMB3098	01.01.2015	31.12.2015
mini container	AMB3124	01.01.2015	02.03.2015
mini container	AMB3325	16.01.2015	31.12.2015
mini container	AMB3356	25.03.2015	19.08.2015
mini container	AMB3376	01.01.2015	19.03.2015
mini container	AMC120	01.01.2015	13.04.2015
mini container	AMC172	01.01.2015	31.12.2015
mini container	AMC442	16.03.2015	31.12.2015
mini container	AMC573	01.01.2015	26.06.2015
mini container	AMC576	01.01.2015	30.06.2015
mini container	AMC582	16.01.2015	22.07.2015
mini container	AMC585	03.08.2015	31.12.2015
mini container	AMC599	01.01.2015	10.09.2015
mini container	AMC624	03.08.2015	31.12.2015
mini container	AMD037	07.09.2015	31.12.2015
mini container	AMD091	01.01.2015	30.06.2015
mini container	AMD102	01.01.2015	31.12.2015
mini container	AMD1395	01.01.2015	15.06.2015
mini container	AMD143	01.01.2015	26.06.2015

Statistical overview of 2015:

prognose	percentile	link
normal year	50%	77
optimistic year	90%	81
pessimistic year	10%	67
max		81
min		63
		normal year : 77, optimistic year: 81, pessimistic year: 67
mean	75.08	
stdev	5.19	link
mean + stdev	80.27	
mean - stdev	69.89	

Monthly overview of 2015:

container days in 2015			
January	01.01.2015	31.01.2015	2370
February	01.02.2015	28.02.2015	2096
March	01.03.2015	31.03.2015	2374
April	01.04.2015	30.04.2015	2391
May	01.05.2015	31.05.2015	2511
June	01.06.2015	30.06.2015	2364
July	01.07.2015	31.07.2015	2154
August	01.08.2015	31.08.2015	2235
September	01.09.2015	30.09.2015	2305
October	01.10.2015	31.10.2015	2453
November	01.11.2015	30.11.2015	2148
December	01.12.2015	31.12.2015	2003

Costs and total savings calculator:

containers purchased	67			
rental days	3026			11
downtime days	77			0
rental price	18.25			
opex per year	10%			
container years capacity	5.5			
	rental price: 18.25, opex per year: 10%, container years capacity: 5.5	FORECASTING	FORECASTING	FORECASTING
	year 2015	normal year	optimistic year	pessimistic year
rental days	3026	3650	5110	0
downtime days	77	0	0	0
rental cost for 5.5 years BEFORE	2750677	2821039	2967587	2454671
total rental cost for 5.5 years NOW	303735	366369	512916	0
break-even price	36522	36637	36637	36637
break-even price considering opex	23562	23637	23637	23637
round number from above	23000			
tender price	21000			
	tender price: 21000			
CAPEX + OPEX for 5.5 years	2180850	2180850	2180850	2180850
total cost	2484585	2547219	2693766	2180850
total cost savings for 5.5 years	266092	273821	273821	273821

Appendix 5. Examples of data tables generated in excel [mini containers]

Total cost savings for 5.5 years based on the year 2015

266092	9000	11000	13000	15000	17000	19000	21000	23000	25000	27000
63	1429273	1233973	1038673	843373	648073	452773	257473	62173	-133127	-328427
64	1450555	1252155	1053755	855355	656955	458555	260155	61755	-136645	-335045
65	1471836	1270336	1068836	867336	665836	464336	262836	61336	-140164	-341664
66	1493018	1288418	1083818	879218	674618	470018	265418	60818	-143782	-348382
67	1512292	1304592	1096892	889192	681492	473792	266092	58392	-149308	-357008
68	1530663	1319863	1109063	898263	687463	476663	265863	55063	-155738	-366538
69	1547929	1334029	1120129	906229	692329	478429	264529	50629	-163271	-377171
70	1563891	1346891	1129891	912891	695891	478891	261891	44891	-172109	-389109
71	1579250	1359150	1139050	918950	698850	478750	258650	38550	-181550	-401650
72	1594208	1371008	1147808	924608	701408	478208	255008	31808	-191392	-414592
73	1606055	1379755	1153455	927155	700855	474555	248255	21955	-204345	-430645
74	1614288	1384888	1155488	926088	696688	467288	237888	8488	-220912	-450312
75	1622420	1389920	1157420	924920	692420	459920	227420	-5080	-237580	-470080
76	1629348	1393748	1158148	922548	686948	451348	215748	-19852	-255452	-491052
77	1634469	1395769	1157069	918369	679669	440969	202269	-36431	-275131	-513831
78	1633568	1391768	1149968	908168	666368	424568	182768	-59032	-300832	-542632
79	1631563	1386663	1141763	896863	651963	407063	162163	-82737	-327637	-572537
80	1628052	1380052	1132052	884052	636052	388052	140052	-107948	-355948	-603948
81	1620727	1369627	1118527	867427	616327	365227	114127	-136974	-388074	-639174

Total cost savings for 5.5 years at the different scenarios

	year 2015		normal year		optimistic year		pessimistic year
	266092		273821		273821		273821
63	257473	63	257473	63	257473	63	257473
64	260155	64	261560	64	261560	64	261560
65	262836	65	265647	65	265647	65	265647
66	265418	66	269734	66	269734	66	269734
67	266092	67	273821	67	273821	67	273821
68	265863	68	277908	68	277908	68	241271
69	264529	69	281994	69	281994	69	208721
70	261891	70	286081	70	286081	70	176171
71	258650	71	290168	71	290168	71	143621
72	255008	72	294255	72	294255	72	111071
73	248255	73	298342	73	298342	73	78521
74	237888	74	302429	74	302429	74	45971
75	227420	75	306516	75	306516	75	13421
76	215748	76	310603	76	310603	76	-19129
77	202269	77	314689	77	314689	77	-51679
78	182768	78	282139	78	318776	78	-84229
79	162163	79	249589	79	322863	79	-116779
80	140052	80	217039	80	326950	80	-149329
81	114127	81	184489	81	331037	81	-181879

Appendix 6. Total spend Procurement Norway (per discussion with Deepak Siwach, Procurement & Sourcing leader)

year	spend, mil. USD
2011	533.6
2012	530.0
2013	626.9
2014	614.0
2015	525.0

Appendix 7. Example of the data received from Modex

Object	ObjectGroup	Product	ProductNm	Invoice Note	From date	ToDt	Days	Price	AM
ISO1	Various types (Lagercontainer - 20 ft - ISO)			Kredit	12.04.2012	30.09.2014	902	-25	-22550
		Skade	Skade 255 - BS-13-06		18.03.2014	31.07.2014	1	267,3	267,3
B-14-15	Basket - 14 m - B-14/BL-14			.443	08.05.2014	26.06.2014	100	87	8700
MDA-062	Mini Container - MD/MDA/MDS/MDK/MDL/MDE			West Hercules	15.05.2014	23.06.2014	80	27	2160
BS-10-06	Basket - 10 m - B-10/BL-10/BS-10			Deep Sea Atlantic	21.05.2014	06.06.2014	17	66	2244
BL-10-24	Basket - 10 m - B-10/BL-10/BS-10			Statfjord C	22.05.2014	11.06.2014	42	66	2772
BS-12-09	Basket - 12 m - B-12/BL-12/BS-12			West Hercules	22.05.2014	06.06.2014	32	83	2656
BL-13-02	Basket - 13 m - B-13/BL-13/BS-13			West Hercules	22.05.2014	23.06.2014	66	88	5808
BL-13-36	Basket - 13 m - B-13/BL-13/BS-13			West Hercules	22.05.2014	23.06.2014	66	88	5808
BS-13-01	Basket - 13 m - B-13/BL-13/BS-13			Transocean Searcher	23.05.2014	05.06.2014	28	88	2464
BS-12-08	Basket - 12 m - B-12/BL-12/BS-12			Maersk Guardian	24.05.2014	06.06.2014	28	83	2324
BL-12-08	Basket - 12 m - B-12/BL-12/BS-12			Transocean searcher	25.05.2014	05.06.2014	24	83	1992
BL-12-12	Basket - 12 m - B-12/BL-12/BS-12			Transocean Searcher	25.05.2014	06.06.2014	26	83	2158
C-10-594	Container - 10 ft - C-10/EO-10/UNOU-			Transocean Searcher	25.05.2014	06.06.2014	26	37	962

Appendix 8. Total Spend on MODEX per segments in 2013, NOK

Spend D&M

D&M	jan.13 Spend	jan.13 total	feb.13 Spend	feb.13 total	mar.13 Spend	mar.13 total	apr.13 Spend	apr.13 total	mai.13 Spend	mai.13 total	jun.13 Spend	jun.13 total	jul.13 Spend	jul.13 total	aug.13 Spend	aug.13 total	sep.13 Spend	sep.13 total	okt.13 Spend	okt.13 total	nov.13 Spend	nov.13 total	des.13 Spend	des.13 total
Total invoice	422 685		313 545		324 530		415 600		382 170		389 850		431 451		391 920		428 633		373 280		302 690		313 990	
Rental	372 610	88%	297 760	95%	296 130	91%	363 920	88%	311 860	82%	331 380	85%	355 676	82%	344 080	88%	368 198	86%	347 180	93%	282 020	93%	291 385	93%
Total extra cost	50 075	12%	15 785	5%	28 400	9%	51 680	12%	70 310	18%	58 470	15%	75 775	18%	47 840	12%	60 435	14%	26 100	7%	20 670	7%	22 605	7%
Transportation	5 220	1%	3 180	1%	3 150	1%	6 950	2%	9 620	3%	10 970	3%	9 430	2%	24 850	6%	5 285	1%	4 900	1%	2 105	1%	8 505	3%
Misc	15 035	4%	9 290	3%	7 000	2%	7 000	2%	8 590	2%	7 000	2%	39 250	9%	8 440	2%	7 000	2%	7 000	2%	7 000	2%	7 000	2%
Net	-	0%	-	0%		0%		0%	-	0%	-	0%		0%	-	0%	-	0%		0%	-	0%	-	0%
Damage	29 820	7%	3 315	1%	18 250	6%	37 730	9%	52 100	14%	40 500	10%	27 095	6%	14 550	4%	48 150	11%	14 200	4%	11565	4%	7 100	2%

Spend other SLB-orders

Others	jan.13 Spend	jan.13 total	feb.13 Spend	feb.13 total	mar.13 Spend	mar.13 total	apr.13 Spend	apr.13 total	mai.13 Spend	mai.13 total	jun.13 Spend	jun.13 total	jul.13 Spend	jul.13 total	aug.13 Spend	aug.13 total	sep.12 Spend	sep.12 total	okt.13 Spend	okt.13 total	nov.13 Spend	nov.13 total	des.13 Spend	des.13 total
Total invoice	68 025		65 915		108 615		105 830		124 380		124 315		88 490		94 000		132 870		161 310		139 035		132 280	
Rental	66 359	98%	56 615	86%	89 540	82%	96 340	91%	113 810	92%	123 380	99%	84 430	95%	85 310	91%	127 920	96%	153 950	95%	129 290	93%	103 035	78%
Total extra cost	1 666	2%	9 300	14%	19 075	18%	9 490	9%	10 570	8%	935	1%	4 060	5%	8 690	9%	4 950	4%	7 360	5%	9 745	7%	29 245	22%
Transportation	516	1%	2 500	4%	5 275	5%	1 910	2%	7 070	6%	935	1%	2 010	2%	8 690	9%	1 950	1%	3 610	2%	7 070	5%	9 190	7%
Misc	-	0%	-	0%	13 800	13%	4 000	4%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	1 825	1%	-	0%
Net	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%		0%	-	0%
Damage	1 150	2%	6 800	10%	-	0%	3 580	3%	3 500	3%	-	0%	2 050	2%	-	0%	3 000	2%	3 750	2%	850	1%	20 055	15%

Spend - SLB - MI

Others	jan.13 Spend	jan.13 total	feb.13 Spend	feb.13 total	mar.13 Spend	mar.13 total	apr.13 Spend	apr.13 total	mai.13 Spend	mai.13 total	jun.13 Spend	jun.13 total	jul.13 Spend	jul.13 total	aug.13 Spend	aug.13 total	sep.12 Spend	sep.12 total	okt.13 Spend	okt.13 total	nov.13 Spend	nov.13 total	des.13 Spend	des.13 total
Total invoice	68 025		65 915		108 615		105 830		124 380		124 315		88 490		94 000		132 870		161 310		139 035		132 280	
Rental	68 025	100%	65 915	100%	108 615	100%	105 830	100%	124 380	100%	124 315	100%	88 490	100%	94 000	100%	132 870	100%	161 310	100%	139 035	100%	132 280	100%
Total extra cost	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Transportation	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Misc	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Net	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Damage	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%

Appendix 9. Total spend on MODEX per segments in 2014, NOK

Spend D&M	jan.14		feb.14		mar.14		apr.14		mai.14		jun.14		jul.14		aug.14		sep.14		okt.14		nov.14		des.14	
D&M	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total
Total invoice	360 380		450 594		465 390		372 670		292 705		240 350		281 700		165 574		229 270		266 694		237 490		234 265	
Rental	314 560	87%	337 529	75%	401 095	86%	324 070	87%	275 020	94%	227 494	95%	244 480	87%	163 874	99%	189 940	83%	226 651	85%	218 010	92%	184 015	79%
Total extra cost	45 820	13%	113 065	25%	64 295	14%	48 600	13%	17 685	6%	12 856	5%	37 220	13%	1 700	1%	39 330	17%	40 043	15%	19 480	8%	50 250	21%
Transportation	15 720	4%	16 270	4%	14 785	3%	6 100	2%	6 785	2%	5 856	2%	6 000	2%	-	0%	13 890	6%	5 640	2%	3 780	2%	35 250	15%
Misc	7 000	2%	7 000	2%	7 000	2%	11 000	3%	7 000	2%	7 000	3%	7 000	2%		0%	14 000	6%	23 303	9%	14 000	6%	-	0%
Nat	-	0%		0%	-	0%	-	0%	-	0%	-	0%	-	0%		0%		0%	-	0%	-	0%	-	0%
Damage	23 100	6%	89 795	20%	42 510	9%	31 500	8%	3 900	1%	-	0%	24 220	9%	1 700	1%	11 440	5%	11 100	4%	1 700	1%	15 000	6%

Spend other SLB-orders	jan.14		feb.14		mar.14		apr.14		mai.14		jun.14		jul.14		aug.14		sep.14		okt.14		nov.14		des.14	
Others	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total
Total invoice	104 575		85 905		90 505		80 300		67 630		113 997		93 900		94 910		171 750		197 308		223 350		245 550	
Rental	93 635	90%	79 120	92%	87 270	96%	73 110	91%	62 580	93%	101 357	89%	80 395	86%	92 715	98%	142 980	83%	188 167	95%	206 895	93%	216 920	88%
Total extra cost	10 940	10%	6 785	8%	3 235	4%	7 190	9%	5 050	7%	12 641	11%	13 505	14%	2 195	2%	28 770	17%	9 141	5%	16 455	7%	28 630	12%
Transportation	8 515	8%	2 185	3%	3 235	4%	5 390	7%	2 815	4%	12 641	11%	9 855	10%	2 195	2%	28 770	17%	8 291	4%	16 455	7%	27 560	11%
Misc	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	1 070	0%
Nat	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Damage	2 425	2%	4 600	5%	-	0%	1 800	2%	2 235	3%	-	0%	3 650	4%	-	0%	-	0%	850	0%	-	0%	-	0%

Spend - SLB - MI	jan.14		feb.14		mar.14		apr.14		mai.14		jun.14		jul.14		aug.14		sep.14		okt.14		nov.14		des.14	
Others	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total
Total invoice	447 010		355 050		446 025		407 000		701 735		879 120		435 450		296 940		148 942		92 988		61 900		39 600	
Rental	441 860	99%	353 900	100%	424 675	95%	378 950	93%	694 185	99%	879 120	100%	433 400	100%	294 100	99%	146 674	98%	89 754	97%	57 940	94%	36 250	92%
Total extra cost	5 150	1%	1 150	0%	21 350	5%	28 050	7%	7 550	1%	-	0%	2 050	0%	2 840	1%	2 268	2%	3 234	3%	3 960	6%	3 350	8%
Transportation	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	2 840	1%	2 268	2%	3 234	3%	3 960	6%	-	0%
Misc	-	0%	-	0%	-	0%	8 000	2%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Nat	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Damage	5 150	1%	1 150	0%	21 350	5%	20 050	5%	7 550	1%	-	0%	2 050	0%	-	0%	-	0%	-	0%	-	0%	3 350	8%

Spend - SLB - Smith	jan.14		feb.14		mar.14		apr.14		mai.14		jun.14		jul.14		aug.14		sep.14		okt.14		nov.14		des.14	
Others	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total	Spend	total
Total invoice	11 740		50 095		81 085		62 950		30 595		18 186		5 900		5 640		550		-		-		8 690	
Rental	11 740	100%	50 095	100%	75 285	93%	58 900	94%	30 595	100%	18 186	100%	5 900	100%	5 640	100%	-	0%	-	#DIV/0!	-	#DIV/0!	4 690	54%
Total extra cost	-	0%	-	0%	5 800	7%	4 050	6%	-	0%	-	0%	-	0%	-	0%	550	100%	-	#DIV/0!	-	#DIV/0!	4 000	46%
Transportation	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	#DIV/0!	-	#DIV/0!	-	0%
Misc	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	#DIV/0!	-	#DIV/0!	4 000	46%
Nat	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	#DIV/0!	-	#DIV/0!	-	0%
Damage	-	0%	-	0%	5 800	7%	4 050	6%	-	0%	-	0%	-	0%	-	0%	550	100%	-	#DIV/0!	-	#DIV/0!	-	0%

Appendix 10. Total spend on MODEX per segments in 2015, NOK

Spend D&M

D&M	feb.15 Spend	feb.15 total	mar.15 Spend	mar.15 total	apr.15 Spend	apr.15 total	mai.15 Spend	mai.15 total	jun.15 Spend	jun.15 total	jul.15 Spend	jul.15 total	aug.15 Spend	aug.15 total	sep.15 Spend	sep.15 total	okt.15 Spend	okt.15 total	nov.15 Spend	nov.15 total	des.15 Spend	des.15 total	jan.16 Spend	jan.16 total
Totalinvoice	206 116		249 733		178 718		253 950		217 140		161 475		229 555		269 233		275 155		269 310		358 262		408 690	
Rental	174 436	85%	225 329	90%	161 098	90%	221 000	87%	183 490	85%	143 270	89%	195 130	85%	220 203	82%	221 225	80%	224 000	83%	329 762	92%	314 930	77%
Total extra cost	31 681	15%	24 405	10%	17 620	10%	32 950	13%	33 650	15%	18 205	11%	34 425	15%	49 030	18%	53 930	20%	45 310	17%	28 500	8%	93 760	23%
Trasportation	22 581	11%	3 605	1%	7 320	4%	6 050	2%	19 800	9%	4 565	3%	11 500	5%	5 000	2%	17 080	6%	13 230	5%	11 250	3%	10 670	3%
Misc	7 000	3%	7 000	3%	7 000	4%	7 000	3%	7 000	3%	7 000	4%	7 000	3%	36 180	13%	15 000	5%	8 730	3%	7 000	2%	22 500	6%
Net	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Damage	2 100	1%	13 800	6%	3 300	2%	19 900	8%	6 850	3%	6 640	4%	15 925	7%	7 850	3%	21 850	8%	23 350	9%	10 250	3%	60 590	15%

Spend other SLB-orders

Others	feb.15 Spend	feb.15 total	mar.15 Spend	mar.15 total	apr.15 Spend	apr.15 total	mai.15 Spend	mai.15 total	jun.15 Spend	jun.15 total	jul.15 Spend	jul.15 total	aug.15 Spend	aug.15 total	sep.15 Spend	sep.15 total	okt.15 Spend	okt.15 total	nov.15 Spend	nov.15 total	des.15 Spend	des.15 total	jan.16 Spend	jan.16 total
Totalinvoice	250 577		284 906		314 818		329 720		460 200		370 815		519 740		282 425		239 470		186 925		169 935		419 880	
Rental	220 058	88%	253 289	89%	280 308	89%	317 750	96%	324 630	71%	347 905	94%	325 500	63%	257 281	91%	205 120	86%	170 845	91%	149 185	88%	154 015	37%
Total extra cost	30 520	12%	31 617	11%	34 510	11%	11 970	4%	135 570	29%	22 910	6%	194 240	37%	25 144	9%	34 350	14%	16 080	9%	20 750	12%	265 865	63%
Trasportation	27 620	11%	26 829	9%	28 281	9%	9 070	3%	20 700	4%	17 110	5%	30 400	6%	12 100	4%	18 750	8%	14 780	8%	12 500	7%	18 865	4%
Misc	-	0%	4 788	2%	3 729	1%	-	0%	113 720	25%	4 000	1%	160 940	31%	9 344	3%	-	0%	-	0%	5 800	3%	243 000	58%
Net	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%		0%
Damage	2 900	1%	-	0%	2 500	1%	2 900	1%	1 150	0%	1 800	0%	2 900	1%	3 700	1%	15 600	7%	1 300	1%	2 450	1%	4 000	1%

Spend - SLB - MI

Others	feb.15 Spend	feb.15 total	mar.15 Spend	mar.15 total	apr.15 Spend	apr.15 total	mai.15 Spend	mai.15 total	jun.15 Spend	jun.15 total	jul.15 Spend	jul.15 total	aug.15 Spend	aug.15 total	sep.15 Spend	sep.15 total	okt.15 Spend	okt.15 total	nov.15 Spend	nov.15 total	des.15 Spend	des.15 total	jan.16 Spend	jan.16 total
Totalinvoice	8 904		5 704		6 233		13 800		26 850		21 920		15 650		10 228		10 292		8 198		10 220		25 500	
Rental	8 904	100%	5 704	100%	6 233	100%	13 575	98%	26 850	100%	21 920	100%	15 650	100%	10 228	100%	10 292	100%	7 248	88%	10 220	100%	20 250	79%
Total extra cost	-	0%	-	0%	-	0%	225	2%	-	0%	-	0%	-	0%	-	0%	-	0%	950	12%	-	0%	5 250	21%
Trasportation	-	0%	-	0%	-	0%	225	2%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Misc	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	5 250	21%
Net	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%
Damage	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	-	0%	950	12%	-	0%	-	0%

Spend - SLB - Smith

Others	feb.15 Spend	feb.15 total	mar.15 Spend	mar.15 total	apr.15 Spend	apr.15 total	mai.15 Spend	mai.15 total	jun.15 Spend	jun.15 total	jul.15 Spend	jul.15 total	aug.15 Spend	aug.15 total	sep.15 Spend	sep.15 total	okt.15 Spend	okt.15 total	nov.15 Spend	nov.15 total	des.15 Spend	des.15 total	jan.16 Spend	jan.16 total
Totalinvoice	2 395		4 783		4 349		2 950		1 685		-		-		-		-		-		-		-	
Rental	2 395	100%	783	16%	2 349	54%	2 950	100%	1 685	100%	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!
Total extra cost	-	0%	4 000	84%	2 000	46%	-	0%	-	0%	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!	-	#DIV/0!

Appendix 11. Example of the data received from SWIRE

Segment	Typ	Link nr	Period	Invoice Date	Invoice from	to date	Qty	Rate	Amount Invoiced Local Curr	Amount Invoiced Foreign Curr	Currer	Rental start date	Termination date	Unit	Item	Description
WIRELINE	Hire	AB7696	January	31.01.2015	01.01.2015	31.01.2015	31,0	23,50	728,50	728,50	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	February	28.02.2015	01.02.2015	28.02.2015	28,0	21,15	592,20	592,20	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	March	31.03.2015	01.03.2015	31.03.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	April	30.04.2015	01.04.2015	30.04.2015	30,0	21,15	634,50	634,50	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	May	31.05.2015	01.05.2015	31.05.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	June	30.06.2015	01.06.2015	30.06.2015	30,0	21,15	634,50	634,50	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	July	31.07.2015	01.07.2015	31.07.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	August	31.08.2015	01.08.2015	31.08.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	September	30.09.2015	01.09.2015	30.09.2015	30,0	21,15	634,50	634,50	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	October	31.10.2015	01.10.2015	31.10.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	November	30.11.2015	01.11.2015	30.11.2015	30,0	21,15	634,50	634,50	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	December	31.12.2015	01.12.2015	31.12.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1699	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	January	31.01.2015	01.01.2015	31.01.2015	31,0	23,50	728,50	728,50	NOK	01.12.2004		AMB1807	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	February	28.02.2015	01.02.2015	28.02.2015	28,0	21,15	592,20	592,20	NOK	01.12.2004		AMB1807	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	March	31.03.2015	01.03.2015	31.03.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1807	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	April	30.04.2015	01.04.2015	30.04.2015	30,0	21,15	634,50	634,50	NOK	01.12.2004		AMB1807	CMINI	Mini Container/Mini Container
WIRELINE	Hire	AB7696	May	31.05.2015	01.05.2015	31.05.2015	31,0	21,15	655,65	655,65	NOK	01.12.2004		AMB1807	CMINI	Mini Container/Mini Container

Appendix 12. Example of the data on baskets – Standard, and Long & Narrow

Object	ObjectGroup	From date	ToDt	Days	AM	Price
B-13-06	Basket - 13 m	15.07.2015	21.08.2015	38	2838,6	74,7
BL-13-12	Basket - 13 m	15.07.2015	12.10.2015	90	6723	74,7
BS-13-16	Basket - 13 m	15.07.2015	28.01.2016	198	14790,6	74,7
BL-13-19	Basket - 13 m	15.07.2015	29.09.2015	77	5751,9	74,7
B-13-22	Basket - 13 m	15.07.2015	20.08.2015	37	2763,9	74,7
B-13-31	Basket - 13 m	15.07.2015	29.09.2015	77	5751,9	74,7
B-13-35	Basket - 13 m	15.07.2015	20.08.2015	37	2763,9	74,7
BL-13-41	Basket - 13 m	15.07.2015	29.09.2015	77	5751,9	74,7
BL-13-47	Basket - 13 m	15.07.2015	21.08.2015	38	2838,6	74,7
B-13-53	Basket - 13 m	15.07.2015	12.10.2015	90	6723	74,7
B-13-55	Basket - 13 m	15.07.2015	21.08.2015	38	2838,6	74,7
B-13-57	Basket - 13 m	15.07.2015	29.09.2015	77	5751,9	74,7
B-18-04	Basket - 18 m	16.11.2015	18.01.2016	64	7776	121,5