

The oil price challenges: Strategic responses of the Norwegian offshore industry

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Research Report 1/2016

BI Norwegian Business School

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Preface

The project "Strategic Responses of the Norwegian Offshore Industry is undertaken by BI Norwegian Business School on behalf of the Norwegian Oil and Gas Association (Norsk olje og gass), with Professor Torger Reve as Head of Research, Marius Nordkvelde as Project Leader and Ole Jakob Ramsøy as Project Coordinator and Researcher.

We would like to thank the companies that took part in the different surveys for their significant contribution. This report would not have been possible without some of the major players in the oil and gas industry, thank you.

Executive summary

Throughout our project, the situation in the global oil and gas industry has changed significantly. Following the last peak in June 2014, when the oil price per barrel of Brent oil was \$ 114, it has plummeted to its current level around \$ 40/barrel. We argue that it is reasonable to assume that the industry will have to adjust itself to a future oil price at a considerably lower level than what it was before the oil price fell in 2014. We present E24's Oil and gas projects map, computed by Rystad Energy, showing the profitability of the most important oil fields currently in development on the Norwegian Continental Shelf. At the time of writing this report, only one of the fields in the Oil and gas projects map was profitable at today's prices. This shows the profound issues facing the industry today. Our report is an attempt to uncover how these issues are being solved strategically in the Norwegian offshore oil and gas industry.

The steep decline in oil prices has forced the entire industry to make significant changes in their operations. The natural reaction for the individual firms, with a decreasing activity level, is to reduce the number of employees. In addition, systematic efforts to reduce investment and operating costs are undertaken. This attacks the underlying problem of the Norwegian offshore oil and gas industry – a much too high cost level. Our interview objects stated that the shock in the industry was something that was needed in order to reduce its ever-increasing cost levels. However, the steepness of the decline was more severe than most would have preferred and the considerable lay-offs opened up for new issues for the industry.

We found that the industry is facing a period of consolidation, where the biggest companies with the biggest cash reserves view the current market situation as an opportunity to acquire other companies at a cheaper rate. Many of the current acquisitions, mergers or alliances were years in the making, but the timing and amount of big deals shows a trend in the market. Examples include Schlumberger's acquisition of Cameron and Halliburton's acquisition of Baker Hughes. An output of this consolidation that we found through our research was that the largest companies in the industry had uncovered an opportunity in the market to supply integrated solutions to the operators. The idea is that the suppliers would be able to offer complete and integrated solutions for various operations on an oil or gas field, in an effort to lower costs for both operators and suppliers. By utilizing strategic alliances and acquisitions in order to obtain a more complete portfolio of services they believe that they could cut costs

for the operators through for example lower administrative costs because they no longer had to control several contracts with several companies at once. The companies further stated that these solutions would be most viable for smaller sized operator companies with a smaller administrative capacity. Increased need for cooperation and collaboration in the industry was also one of the key findings in our interviews. Both suppliers and operators believed that a key to achieve consistently lower costs in the industry was to increase the cooperation and collaboration between the parties. We uncovered that an inherent conservatism in the industry was something that it needed to overcome in order for it to reach its new targets.

In terms of policy recommendations, we believe it is essential for the competitiveness of Norway to retain the knowledge base built up within this industry. There are fields under development that will have a lifespan of minimum 70 years, so there will still be demand for new knowledge and competence within the industry. New projects on the NCS is a key component for developing knowledge and activity in the oil and gas industry in Norway, we therefore believe that it is of vital importance that the government emphasizes that the industry will continue to be a vital part of the Norwegian economy moving forward. New large projects also play a key role in new innovations. Thus, both from a competence retainment perspective and from a technological innovation perspective, opening up for new fields on the NCS is of high importance for the future of this industry.

The layoffs in the industry has led to tens of thousands of engineers and other highly skilled employees to lose their jobs. Some of these will move into adjacent industries, such as renewable energy and other ocean industries, while others might start on their own, utilizing the strong knowledge base in the offshore industry to innovate. However, not all of the highly skilled workers will find suitable jobs after they are laid off. The oil and gas industry will remain one of Norway's largest and most important industries also in the years to come, but at a lower capacity. It is therefore important for the Norwegian government to implement policies that make sure that the Norwegian economy capitalize on the innovation and entrepreneurship capacity of the offshore oil and gas cluster. Some will develop more cost efficient solutions for the offshore oil and gas industry. Some will go to work in the related Ocean industries. Finally, some need to be retained to work in other industries. The worst outcome is to keep unemployment high and not utilize the valuable knowledge capital in the oil and gas industry.

Introduction

The underlying idea of this research project is to analyze strategic responses of the Norwegian offshore oil and gas supplier industry to the 2014 oil price crisis and set recommendations for moving forward. Through interviews with industry leaders, we pay special attention to industry responses across different segments of the value chain and compare company strategies and actions. The proposed research study is a continuation of the previous work conducted by Torger Reve's research team at BI Norwegian Business School¹, focusing more on strategic development processes in the Norwegian offshore industry amid the current oil price challenges.

Methodology

Throughout this study, we have interviewed several actors within key organizations that operate in Norway and on the NCS. The interview objects within the companies were chosen from the top level of the organizations, such as the CEO, CFO, COO or board members. We made this choice in order to obtain the most in-depth knowledge from the people in charge of the strategic changes. We wanted to include as many actors and companies throughout the analysis, within all parts of the oil and gas value chain. We have included both suppliers and operators in order to get a complete picture from "both sides of the table". We conducted 10 in-depth interviews with different actors, both Norwegian-owned and multinational organizations. The interviews would typically last for an hour. Extensive secondary sources were also used.

We constructed the interview guide as "semi-structured", meaning that we had topics and main themes we wanted covered, but allowed the interviewees to elaborate on topics they deemed important. We opted for leaving the interviewed companies as anonymous in order to allow them to speak more freely about topics they might be restricted to talk about, if they had been named. Our target was to uncover the key strategic changes undergone within the companies, both in short-term as well as long-term perspectives.

By interviewing both supply companies as well as operators in different size companies, we believe that we are able to create a better picture and draw more soundly based conclusions from the data gathered through the interviews. Bias is of course something that has to be

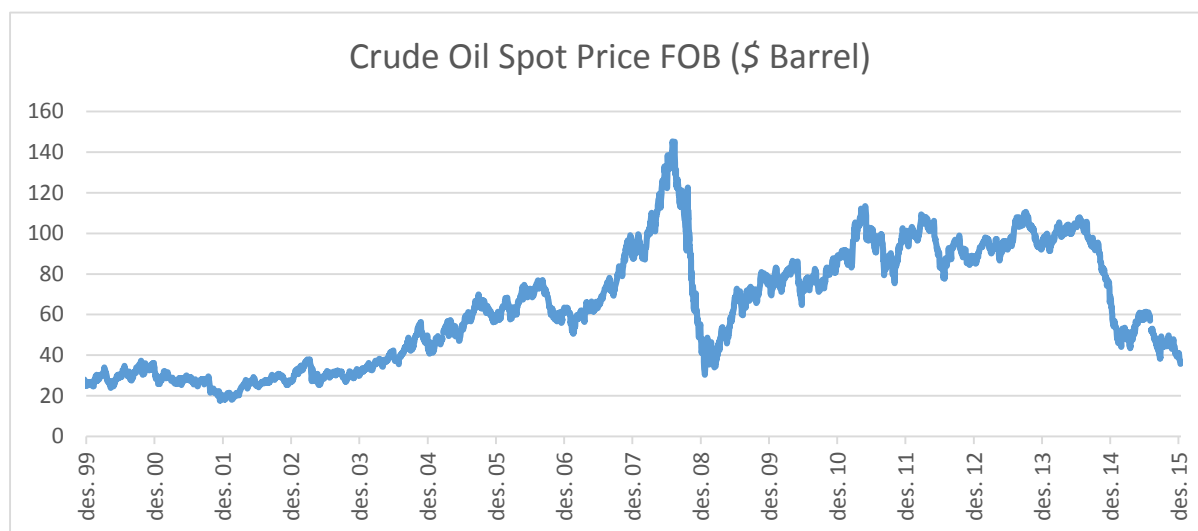
¹ Zhovtobryukh, Y., Nordkvelde, M., and Reve, T. (2013). Offshore Oil and Gas as Industrial Driver. Forskningsrapport, 3/2013, BI Norwegian Business School.

taken into account when conducting such a project and we believe that we have omitted that as much as possible through including such a variety of companies in our sample.

Market snapshot

The situation, not in only the Norwegian-based oil and gas industry, but the global oil and gas industry has changed profoundly since 2014. From the last peak in June 2014, when the price per barrel of Brent oil was 114 USD, the price has plummeted and reached prices around 30 USD per barrel. What is profoundly challenging for the industry is that, currently, the oil price does not seem to have stabilized at a given level. At the time of writing this report, the price has reached 36 USD/Barrel. We will not attempt to assess at which level the oil price will stabilize, given the vast amount of variables that are affecting the variation in the price levels. However, given the current market situation it is reasonable to assume that the oil price will stabilize at a considerably lower level than it was before the drop in 2014.

Figure 1



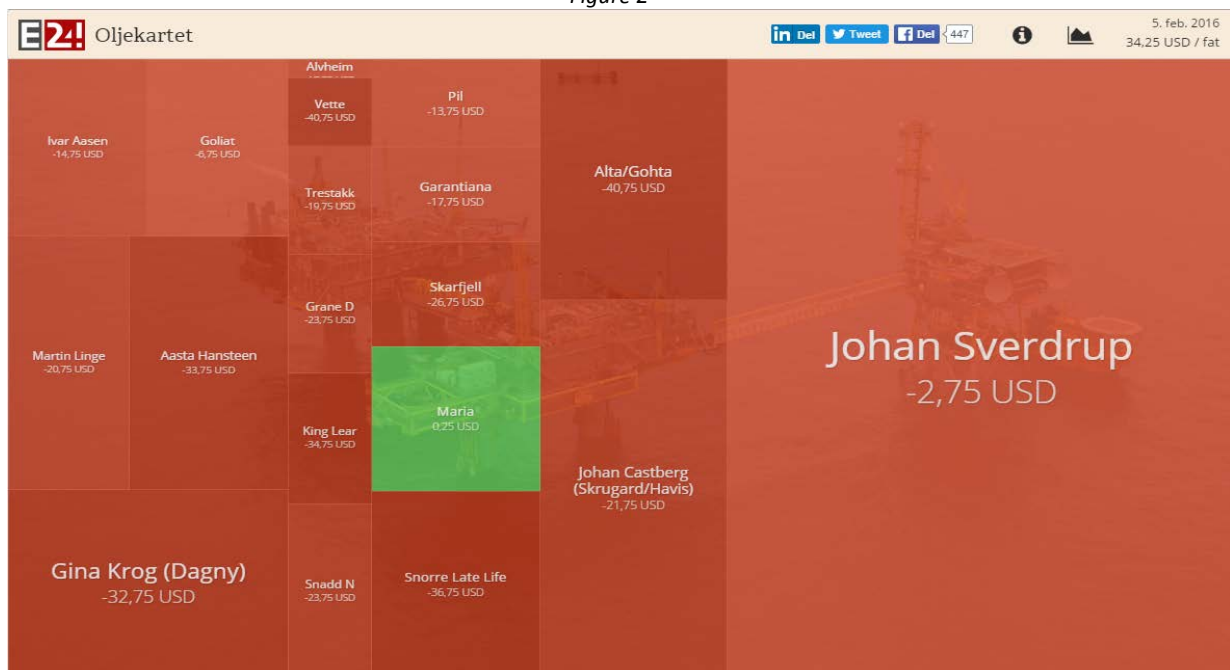
Source: (Oslo Stock Exchange)

The oil price affects the supplier industry differently than the upstream oil & gas industry, which is an important factor to note. Since the supply companies do not sell oil & gas directly, they are affected by the oil price indirectly; meaning that they are affected by the activity levels where they operate and the level of investments from the operator companies. Therefore, as the activity levels and investments on the NCS was reduced drastically, the supply companies was severely hit by this downturn. Another negative factor for the supply

industry is that their earnings and profits would not be directly affected by a sudden upturn in the oil price, that is down to the change in potential investments by the operator companies. The various cost cutting schemes undertaken by the operator companies has therefore hit the supplier industry severely and they will not see an increase in earnings until the operator companies increase their investments, or they come up with schemes that increase the profitability for both parties in the industry.

The online business paper E24 published a profitability overview, developed by the analysis company Rystad Energy, of the most important oil and gas fields currently under development at the NCS. The overview (Figure 2) is based on the current oil price and thereby let you see the current break-even for the fields. The size of the squares indicate the size of the oilfield, while the colors indicate their profitability. Green color represents profitable fields and red represents unprofitable fields, and at the time of writing, there were only one field that was profitable at the NCS. This overview is based on the current spot price in the market and the development of oil fields are based on the expected value of the oil price in the future, so this overview is subject to change as the oil price changes. However, it showed the major challenge facing the sector and the importance of cost cutting in order to meet the new break-even levels on these fields in the future.

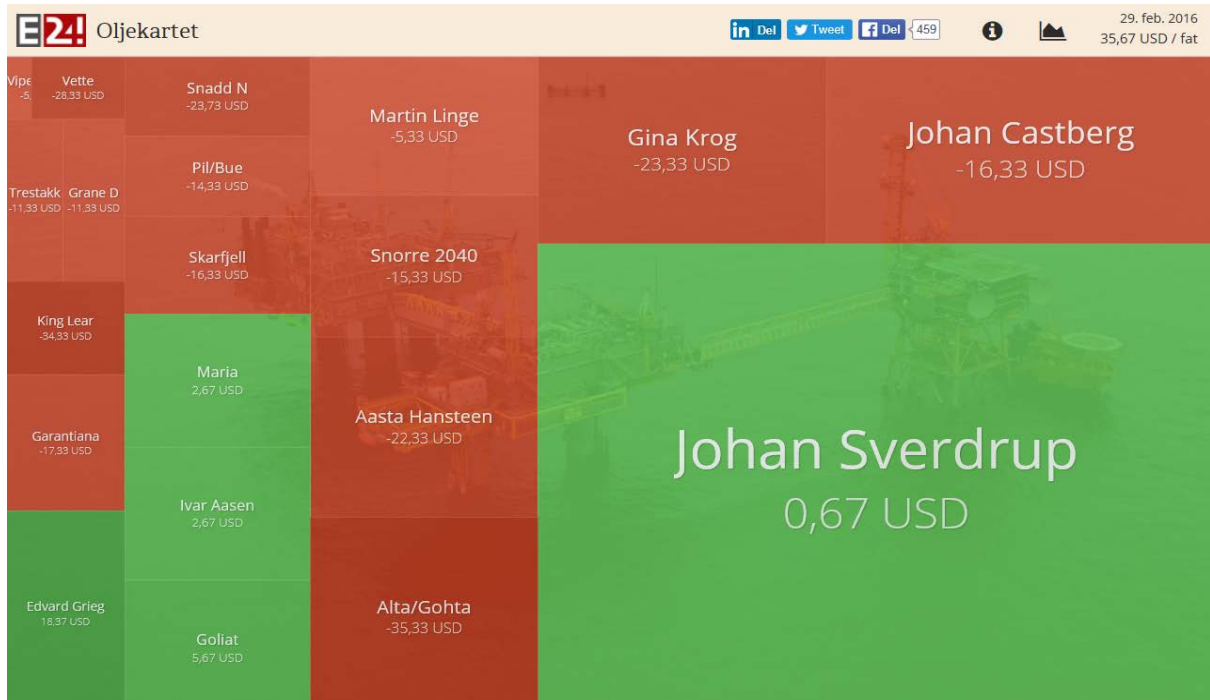
Figure 2



Source: (E24.no, Rystad Energy)

E24 published an updated version of the profitability overview Sunday February 28th, where one could see the effects of the cost cutting schemes.

Figure 3



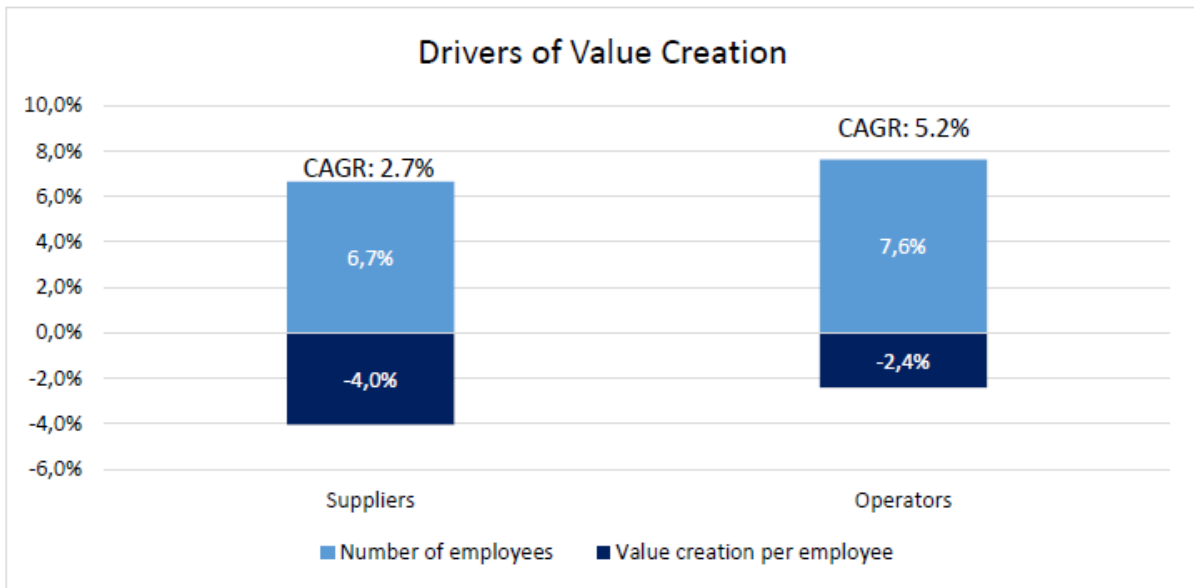
Source: (E24.no, Rystad Energy)

The updated overview shows that the number of profitable fields had grown from one to five as a result of the cost cutting schemes undertaken. Statoil said in their statement that they had managed to cut the costs as drastically partly thanks to the collaborative relations with their partners, both fellow operators and service firms².

Leading up to the drop in oil prices there were a few signs that the industry had profound challenges, even with high oil prices. Zhovtobryukh et. al.'s report from 2013 pointed to the fact that the productivity in the industry had been declining from 2008 to 2012, for both the suppliers and the operators. On the supplier side, the employee growth was 6,7% in the period, while the value creation per employee was -4,0%. On the operator side, the employee growth was 7,6%, while the value creation per employee was -2,4%.

² <http://e24.no/energi/olje/derfor-har-flere-oljefelt-plutselig-blitt-loennsomme/23626036>

Figure 4



This figure shows that the industry as a whole, both operators and suppliers, had significant productivity challenges before the oil price dropped, which was arguably offset by the activity levels on the NCS.

Findings

Throughout the interviews we conducted, a few key topics arose. In the following section, we will present these and discuss their importance for the industry.

A necessary shock?

A natural and necessary first response strategy to such a shock as the sharp drop in oil prices unfortunately laying off excess capacity in the various companies operating in the oil and gas industry. In the years preceding the drop in oil price, the activity levels in the Norwegian offshore industry soared to unprecedented levels and thereby needed an influx of workers to meet the demand in market. Zhovtobryukh et al (2013) pointed to a drop in productivity in this period, which can be attributed to the influx of so many new workers. So, when the market demand decreased, the actors were forced to lay off the employees who now were in excess. This is something we have observed throughout the industry both on the operator side as well as for the suppliers.

However, a question was introduced during one of our interviews; *“When do we move from necessary cuts to something that is long-term damaging?”*

This is a highly interesting question considering the current situation in Norway. The picture painted is quite bleak, and the lay-offs have been considerable and are continuing. A key issue for the industry as a whole now is not losing employees and assets that are key to their current competence and future growth. Considering the oil prices are still highly volatile, this will continue to be challenging. Another issue for the industry in Norway is that the students seems to shift away from “petroleum-focused” studies at university levels. Data from the University in Stavanger show that potential students with petroleum-focused studies as their primary choice for studies has dropped 47% in the last year. This trend is consistent with universities with similar studies in both Bergen and Tromsø³. Considering in the fact that the Norwegian Petroleum Directorate (NPD) has estimated that the Johan Sverdrup field currently being developed will last for approximately 70 years. The estimate could potentially move even further by the increased focused on increased oilfield recovery (IOR) in operations on the NCS. Statoil, being the main licensee of this field, presented in 2014⁴ a report that covered the impact this field would have for the Norwegian industry and society. It is worth

³ <http://www.aftenbladet.no/energi/Unge-vender-oljenaringen-ryggen-3680051.html>

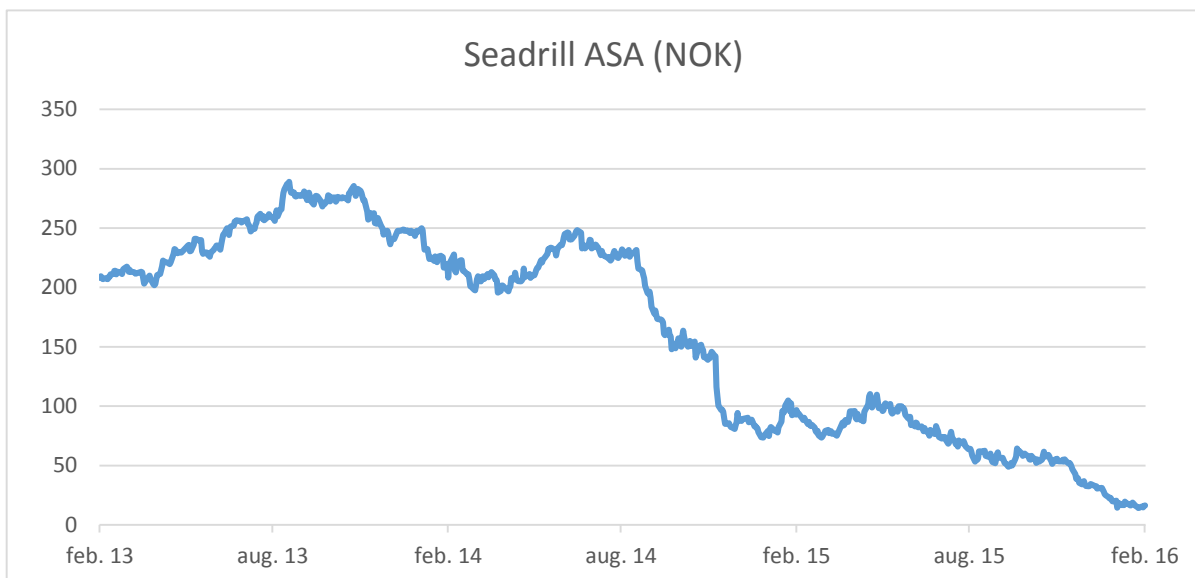
⁴ <http://e24.no/energi/statoil/statoil-johan-sverdrup-vil-skape-51-000-aarsverk/23328038>

noting that the oil prices have decreased even further since the time of publication, so the estimated could therefore have changed since then. However, the data presents the following estimates:

- It will generate approximately 1.350 billion NOK in revenues
- The corporate tax income from the revenues alone will represent 670 billion NOK for the Norwegian government
- The creation of 51.000 FTE's⁵ (22.000 of these in the supplier industry and approximately 12.000 in their sub-contractors)
- The creation of 2.700 FTE's in relation to the operations of the field in an average year, rising to 3.400 when the field is fully developed

As one can observe in figure 2, the current oil price and cost levels currently renders the Johan Sverdrup field unprofitable. Data such as these show that there will continue to be a significant demand for competent, new employees in the Norwegian oil and gas industry in the coming years and the issue of declining student application and potentially laying off key employees due to the volatile market is something that is very important for the industry to address.

Figure 5



Source: (Oslo Stock Exchange)

⁵ Full Time Equivalents

One specific example of a company that has suffered the severe consequences of the oil price drop is the drilling company Seadrill ASA. In regards to Seadrill's development the last years, we can clearly observe that they have struggled. Being one of the largest drilling rig operators in the world, they were in a market that was flooded with overcapacity even before the oil price dropped. Following the peak of almost 300NOK/share the fall of 2013, the share price, helped even further by the oil price drop, has plummeted to a record-low of approximately 16NOK/share at the time of writing this report. From the start of the oil price drop the market capitalization of Seadrill has dropped 94,1%. Seadrill arguably had challenges dating before the oil price drop in terms of overcapacity in an already flooded drilling market. However, this example shows the profound challenges in this high cost industry and its severe implications under such a shock.

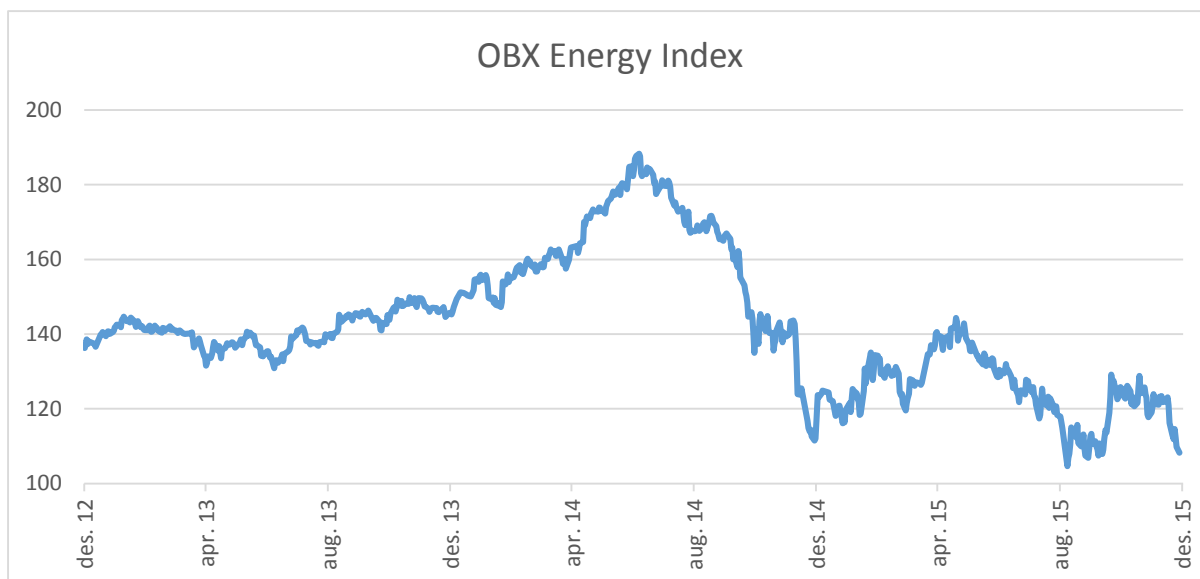
The big companies we interviewed repeatedly stated that they did not want to be as exposed to oil price fluctuations. The next section presents one strategy that many of the bigger companies may have applied in order to mediate this exposure to the oil price.

Consolidation

As the industry has gone through this shock and quite steep downturn, the aggregate value of the companies has decreased. Looking at the Oslo Børs Energy Index⁶ we can observe that the combined value of the companies in the energy sector in Norway has decreased sharply from the oil price drop in 2014 to today, rendering the companies in the industry comparatively "cheaper" than they were before the oil price dropped.

⁶ An index that consists of companies listed on the Oslo Stock Exchange operating in the energy sector.
<http://www.oslobors.no/markedsaktivitet/#/details/OSLENX.OSE/overview>

Figure 6



Source: (Oslo Stock Exchange)

This opens up for some interesting challenges within the industry. Companies within the industry that has cash available for acquisitions in the current market has the opportunity to acquire other companies at a comparatively cheaper price than before. This is something that we have observed already, for example through Schlumberger's acquisition of Cameron, Shell's acquisition of the BG Group and Halliburton's merger with Baker Hughes. These specific examples may very well have been set in motion before the oil price dropped, however it tells a story of how the market is moving forward, and consolidation seems to be an important factor.

An interesting case and thought experiment in this aspect is Aker Solutions. A significant supply company in the Norwegian oil and gas industry with a Norwegian owner; The Aker Group. In the recent years, Aker Solutions has divested a considerable portion of their corporate portfolio. They split off their Kristiansand-based drilling company, Aker Solutions Drilling Technologies (now called MHWirth), as well as Aker Oilfield Services, Process Systems, Surface Products and Business Solutions to the investment firm Akastor in 2014⁷. This left Aker Solutions with their Subsea section, as well as Engineering and MMO. Following this strategic choice, they have entered into joint ventures and alliances with foreign companies such as the American Baker Hughes and the Italian Saipem. Entering into cooperative ventures such as these are done under the pretense of increased value creation through

⁷ <http://www.dn.no/nyheter/energi/2014/04/30/Oljeservice/derfor-deles-aker-solutions>

pooled resources, however we believe that strategic actions such as these could point in an interesting direction. If we recapture all the stories presented:

- Divesting major sections of the company, making them a “leaner” organization
- Joint ventures and alliances with global actors
- Market price dropped significantly “post oil price drop”

One assumption one could draw if one were to view all these strategic choices made in the recent years as a complete story, is that Aker Solutions is perhaps making themselves “look good” to potential foreign buyers. In addition, the cooperation with large MNC’s in certain projects can be a way of showing themselves to these potential buyers. This is merely a speculative exercise and case example; but it illustrates a possible scenario for the Norwegian offshore oil and gas supplier industry; it may become much smaller in size, and we may see less Norwegian ownership in the industry. The end effect of such consolidation remains uncertain, but there may be tipping points where the larger international corporations, so important to the technological development in the offshore industry, will reduce their activity level in Norway or simply close down their operations here.

Strategic actions such as these could open for interesting challenges for the Norwegian offshore industry and its position within Norway. The possibility that foreign MNC’s acquire traditionally Norwegian-owned companies and in the future move out of the country, if it is no longer profitable to operate here or they find it better to operate elsewhere is an interesting possible challenge for the future. The lack of competent and strong Norwegian ownership in the industry can be detrimental to the industry in Norway in the long run. Should foreign-owned companies opt to relocate out of Norway, for various reasons, their threshold to move back again once such a decision is made would arguably be much higher.

One example presented earlier in the report, one company that has opted to move their main operations out of Norway is Seadrill. The rig operator and drilling company, main owner being John Fredriksen, opted to move their headquarters from Stavanger to London in 2012. Huge protests followed, but the argument was that it was more profitable to operate based out of London.

If we look at this more thoroughly, the project had an initial hypothesis: Norwegian offshore oil and gas industry had over the years grown so strong that companies had become major exporters of Norwegian offshore technology regardless of the activity level on the Norwegian Continental Shelf. Key examples were drilling technology and subsea technology. Using Norway as the global knowledge base for exporting offshore oil and gas technology seem to be a weaker proposition today, given the current development in the Norwegian offshore oil and gas industry.

One of the companies interviewed; a major foreign-owned player in the Topside Equipment & Vessels segment, stated that they continually monitored their situation and position in Norway and would move out of the country if it stopped being profitable to be located there. This segment is tightly connected to the operations on the NCS activity given the importance of geographical proximity to the NCS, so the activity and cost levels naturally played a huge part on their profitability.

Other foreign-owned companies mainly in the Drilling & Well and Subsea segments stated that they had made such significant investments in Norway and therefore saw no sign of them considering a move away from the country. Many of them had created global knowledge hubs in Norway because of the knowledge and competence in the Norwegian industry, developed over several years of operations on the NCS. Technology developed here, was exported all over the world. At the same time, they stated that operations on the NCS were a key part of their Norwegian operations and a key reason why they initially located here, and any significant changes in the activity level would naturally be something they would have to take into consideration.

The operators we talked to, both Norwegian owned and foreign owned operators, had not experienced the same degree of consolidation as the service companies. They were more concerned about their shrinking margins as a result of the high cost levels on the NCS. They therefore implemented aggressive cost reduction programs, even before the oil price dropped in 2014, in an attempt to lower their high investments and operating costs. The cost cutting would span from lay-offs, simplification of procedures, reducing bureaucracy, more standardization of technology and changing the internal culture. What we did find were that their cost cutting programs would affect the earnings of the supply companies they hired, which had created much tension. Many believed that this tension could be eased through

better communication and collaboration between the companies, however that is easier said than done.

Cooperation & collaboration

An increased willingness and need for cooperation and collaboration between the companies both within the supplier and operator segments is something that was emphasized by several of the interview subjects. Industrialization and standardization has long been factors that have been largely lacking in this industry, partly by the lack of urgency when oil prices were so high and partly by an industry that is traditionally quite conservative. In the current market, this urgency has definitely appeared, and the industry is starting to make strategic choices that require a greater sense of cooperation and collaboration.

Several of our interviewees agreed that the industry as a whole and themselves in particular, had been quite conservative and not strategic enough in taking the cost rise seriously. Standardization and industrialization is something that has been virtually non-existent in the industry in the past. Each individual company has had their own way of operating, and there has been no need or urgency to change until today. One operator pointed to the example that if they had a certain way of doing things that had worked previously they would continue with that. Consider that every single company has this conservative way of thinking; they all want their own tailor made solutions on every new project with new changes, and modifications added to each new project, the costs would continue to increase. An apt example of this was an article which presented FMC Technologies, a subsea technology company that, at the time costs were increasing most rapidly in the industry, had 27 different shades of yellow paint for their subsea constructions in stock in order to meet what specific clients demand. This shows a clear lack of standardization and ability to collaborate in order to reach a commonly accepted standard⁸.

The idea of increased collaboration and cooperation between the companies in order to mediate this challenging lack of standardization and industrialization is a key topic that surfaced during our interviews. A subsea company we interviewed came with the example that if the industry were to agree on a “shell construct” that “all” other constructions (for example a subsea skeleton that functions as a base construct) were based on, then the savings could be profound. This also applied to specific rules on how contracts were written and

⁸ <http://www.tu.no/petroleum/2015/11/26/mens-oljekostnadene-eksploderte-hadde-fmc-27-forskjellige-gulmalinger-pa-lager>

monitored. The contracts were something almost all the interviewees pointed to as a possible way of saving everyone a significant amount of bureaucracy. Even something as trivial as a set paint color (as exemplified above) would help and be a step in the right direction in this aspect. Thus, contract costs need to be addressed in a systematic manner if cost savings are going to be achieved.

However, there is still some way to go, and our interviews showed that many of the companies in the industry feel that they are treated quite strictly and “told what to do” by the operators, rather than having an open conversation and agreeing on the best practices in order to reach a shared target. Furthermore, the supply companies stated that after the oil price shock, there has been a shift in how the project risks are being shared. They stated that before the shock, the risks involved in a field development project would be shared more or less equally by the operators and the supply companies. The new shift, according to the supply companies, is that the major operator companies with substantial market power would shift the project risk towards the supply companies, leading to more demanding projects for the supply companies.

The oil price drop and current climate in the market seem to have created a higher degree of animosity between the parties, because of the severe and strict cost cutting schemes. Thusly, what we have seen is that parties on both sides of the table are beginning to see the value and importance of collaboration and cooperation in the current market in order to reach common targets, but there is still a substantial way to go.

During our work on this research project, several stories have emerged which fits perfectly into this narrative of cooperation and collaboration conveyed by our interview objects. Statoil stated in January 2016 that they had cut costs in the magnitude of 40 to 50 billion NOK on the Johan Castberg field in the Barents Sea. The field development decision was put on hold in 2013 due to the high costs portrayed at that time. They further stated that they were able to cut the costs so significantly through an increased collaboration with their development partners, both the other licensees and the companies in the service industry⁹.

⁹ <http://e24.no/energi/statoil/statoil-har-halvert-kostnaden-paa-johan-castberg-vi-har-spart-40-til-50-milliarder/23599012>

Integrated solutions

An output of the M&A strategies we addressed leads us to the next strategic response type we uncovered throughout our interviews; namely offering integrated solutions to the market. The biggest supplier companies have uncovered an opportunity in the market to supply integrated solutions to the operators to cut costs for both sides. By acquiring or merging with other companies, their target, amongst others, is to obtain competences they did not previously have, in order to offer integrated solutions.

By integrated solutions in this case, the interviewees presented the opportunity for a single supplier company to provide more a complete package of solutions for an oil field operator rather than single service solutions, leading both the supplier and operator to significant administration costs in order to control the complete process. The idea that an operator can go to a supplier company and be able to receive a complete, integrated solution can lead to severe OPEX and CAPEX savings for both parties.

One of the companies we interviewed in the subsea category painted a picture of a highly segmented industry, where operators pick the companies they want for each segment within, in this example, subsea solutions. This was something they had a significant strategic focus on changing. Through offering an integrated solution where the operator merely had to choose a single company that can solve all the tasks within each segment and the cost savings would be profound for both parties. By utilizing strategic alliances or acquisitions of companies with technologies the suppliers needed, the suppliers would be able to provide a more complete portfolio to the operator, leaving them in no need of controlling several contracts at once. The company also expressed that solutions such as this were perhaps most viable for smaller operator companies with a smaller administrative capacity.

However, we learned that integrated solutions would most likely be met by resistance by key actors in the industry. By offering these kinds of solutions, one would not need as many administrative and monitoring functions, possibly rendering many jobs obsolete, especially in the operator companies.

Increased focus on green solutions

Many companies stated that they had increased their focus on green investments and green tech in the recent years. Several of the large actors we interviewed expressed an increasing

interest in investments in green tech and green energy solutions. They were creating subsidiaries with focus areas outside oil and gas and more towards new “greener technologies”, such as for example offshore wind and solar. What we did find however, were that many companies believed their core competence and their corporate structure were not “set up” for a significant shift in focus towards this new market. The supply companies we talked to experienced that their technologies in a few cases were applicable in other industries as well, for example, technology in developed originally for subsea umbilicals and cords could be used in water and sewage treatment. We did not observe a significant new shift in technology development in “pure green tech” here. In addition, many of the companies that had moved into this area, for example in offshore wind, were quite skeptical to the earnings potential in these markets in the near future. What was also quite clear was that the current market situation worked as a deterrent towards further investments and focus in this direction. Low oil prices simply slow down the green shift.

As stated, most of the companies in our selection said that they did not have the internal capabilities to focus on new “pure green tech” technologies, and today’s situation is not helping in that aspect. However, what was interesting was that all of the companies deeply believed that they played a key part in the global climate challenge through providing cleaner oil and gas to the international market that is still currently relying on heavily polluting coal. They stated that they focused on investing in technologies that made the oil and gas production itself less polluting. The topic of the electrification of Utsira høgda came up several times during the interviews, and the recurring theme was that the actors in the Norwegian oil and gas industry failed to see how using Norwegian hydropower to operate offshore platforms on the NCS would help decrease the global emissions. Many viewed it as symbol politics, considering countries that had previously imported Norwegian hydropower would now have to substitute it with other energy sources, which would likely be fossil-based. There has been reports pointing in the direction that there is a positive effect on the global emissions¹⁰. What was clear; however, was that this story had not been conveyed to all the actors in the industry.

¹⁰ <http://www.tu.no/petroleum/2014/06/13/her-er-regnestykket-som-viser-at-elektrifisering-er-et-klimatiltak>

Table 1

Type of fuel	Pounds of CO2 emitted/Btu
Coal (anthracite)	228.6
Coal (bituminous)	205.7
Coal (lignite)	215.4
Coal (subbituminous)	214.3
Diesel fuel and heating oil	161.3
Gasoline	157.2
Propane	139.0
Natural gas	117.0

Source: EIA

As we can read from Table 5, natural gas pollutes about half of what coal does¹¹, and the effect of substituting part of the European coal market with Norwegian natural gas is something that can potentially have significant effects on the global emissions.

¹¹ <https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11>

Conclusions

What have we learned?

The initial responses to the oil price drop was described as purely “reactional” and not necessarily strategic from almost all our interviewees; they had to lay off employees in order to position themselves for the new market outlook and the high activity levels had driven them to all-time highs in terms of employment. Some even said that the shock was something the industry needed in order to refocus and force them to take a closer look at their rising cost levels. As the first shock was met through quite significant lay-offs, the continued negative trend in the oil price forced the industry to take an even closer look at their businesses. Throughout our interviews, we have uncovered some new key point about the industry:

A conservative industry in need of change

Throughout our interviews, we were often told that the Norwegian oil and gas industry (and possibly the global industry) was inherently conservative with ideas and ways of thinking that has not changed or disrupted in a significant way in many years. The interview objects further stated that the industry needed change, and that it has to happen fast given the current situation. Increased focus on costs at all levels, lean strategies and increased technological utilization are a few strategically directions that arguably will become increasingly important in the future. Catching up to other industries that already have had this transition through industrialization and standardization and most recently increasing utilization of big data technologies is something the industry has to have a strategic focus on.

Consolidation is happening

Through our analysis, we have uncovered that throughout the various segments in the Norwegian offshore industry there has been a trend towards consolidation and collaboration. Several recent mergers and acquisitions points towards a strategic trend of consolidation in the industry, with major actors such as Schlumberger and Cameron as well as Baker Hughes and Halliburton merging, is paving the way for a new industry outlook. We learned that the biggest supplier companies wants to provide full service packages to operator companies; where they would provide a complete package needed for operating various projects on the NCS. The companies stated that this was currently most relevant for the “smaller” operator companies; however, it shows a trend where the biggest actors will play an even bigger role.

What was also telling was that the actors making these moves were foreign-owned conglomerates, operating in Norway, not Norwegian-owned companies. One big foreign-owned company with considerable activity on the NCS and bases in Norway stated that they were continuously monitoring the profitability of the operations in Norway and further stated that they would move away from Norway once it proved unprofitable to operate from Norway or it being better to operate from another country. Other big foreign-actors more integrated into the Norwegian technological cluster, stated that they had no plans of moving away from Norway, nor that they were monitoring the situation closer in terms of moving away.

Increased need for cooperation

The actors we interviewed throughout our project, both operators and supply companies, stated that there is an increased need for cooperation and collaboration in order to meet the new challenges in the market. Many companies have chosen to enter into alliances and joint ventures in order to meet the new challenges in a more efficient way. Other companies stated the importance of collaboration in the way they would handle their current cost cutting schemes. Rather than being told how much to cut costs from a client, we uncovered that the actors believed the most efficient solutions would be reached through collaboration rather than coercion from another party. We have observed an increased willingness for collaboration, but there is still some way to go in terms of the operator-service company collaboration. Many of the actors feel that the strict cost cutting schemes work as a deterrent and is something that is forced, rather than a product of cooperation. This is where the conservative nature of the industry comes into play, and that is something that has to change in order for the industry to reach new cost efficient solutions, through for example standardization and industrialization.

Continued importance for the Norwegian economy

The Norwegian offshore oil and gas industry has been and will continue to be highly important for the Norwegian economy in the future. Even though the current market outlook in the oil and gas industry is presented quite pessimistically from both the media and, at times, the government, the industry will continue to play a significant role in the Norwegian economy in the years to come. As presented earlier in the paper, the Johan Sverdrup field currently in development could last for as long as 70 years, potentially even longer through more efficient IOR technologies. This means that the last worker on the field has not even been born yet.

Most of the foreign-owned actors within all segments of the oil and gas industry, situated in Norway, has stated that they have no plans of moving away as long as Norway has a strong and competent industry. This shows that the Norwegian government and policy makers has to play an important role in the future of this important industry. They have to put in place sound policies for the industry to continue to be prosperous and profitable in Norway in the future.

Recommendations

Fight conservatism

The industry needs to change its inherent conservative nature. By conservatism, we mean that the traditional operators and quite a few service companies have become “stuck” in their own path dependency. Meaning that they have “their” way of doing things and “their” way of interacting with others and are skeptical of changing in any particular manner. This is something that was uncovered throughout our analysis and interviews: a conservative industry in need of change. This has become even more important and urgent in the current market. In order for the industry to meet the challenges currently facing them, we recommend all parties to attempt to put the old conservatism aside and open up for new ideas and solutions. This would include new technologies such as Big Data analysis, industrialization and standardization of the industry. The last two points would most efficiently be reached through increased collaboration and cooperation as previously discussed in this paper.

Stable long-term policies

The current situation in the Norwegian offshore oil and gas industry has been presented as very bleak in the Norwegian public. This view has a natural reason, considering the substantial lay-offs in the industry today, but this view can have potentially challenging implications. As presented earlier, the Norwegian Petroleum Directorate (NPD) has estimated that the Johan Sverdrup field currently developed will last for approximately 70 years and a recurring story from the interviews we held were that they all view activity on the NCS as very important for the industry.

The industry has expressed that they are not going anywhere, but there need to be good and stable long-term policies for them to operate profitably on the NCS. Increased focus on R&D programs and helping the entrepreneurship in the industry are essential areas that the government should continue to focus on through various research programs. The “green shift” that has been touted by various agencies and politicians is something that is coming in the long run, but throughout our interviews we were told that the companies in the oil and gas industry indeed wanted to be a part of this. Offshore technology has great potential in

many green industries, most notably in renewable energy, but also in related ocean industries such as offshore aquaculture.

Open up for new fields

At the same time as IOR has been an important factor in the continued prosperity of the NCS, both the actors in the Norwegian offshore oil and gas industry as well as ourselves strongly believe that in order for the industry to continue to prosper, we argue that the Norwegian government should open up for new fields at the NCS. Or, as one of our interviewees stated; "... at least do a thorough analysis of the effects of opening new fields, such as Lofoten and Vesterålen". The new offshore projects at the NCS are one of the key drivers in terms of technology development in the Norwegian offshore industry, it is therefore important that the Norwegian government takes this into consideration when assessing whether new fields should be opened up.

Retain the competence

The Norwegian government along with the industry itself has an important job in terms of not letting the vast knowledge and competence built up in Norway go to waste. We would therefore recommend the Norwegian government to prescribe stable long-term policies for the industry and assist them in a challenging time. One policy that has been presented in the recently is opening up for extended suspension periods. By extending the period from 6 months to 1 year, the companies have the chance of retaining more employees that they would otherwise have to fire. Retaining the key competences and knowledge in the Norwegian oil and gas cluster is essential for the industry moving forward, we therefore believe that this would be an effective and important policy by the government.

However, the current layoffs will, as previously stated, leave many highly competent workers without a job. Some of them will move into the "adjacent industries", such as the maritime, fisheries or offshore wind, but not all. The knowledge developed in the Norwegian oil and gas cluster is of such importance and used in many other industries, it is therefore of utmost importance that Norway does not lose the knowledge and competences of the employees that are currently without a job. The Norwegian government and the industry should put in place measures so that the offshore industry knowledge base is retained and further developed. This knowledge base represents an important innovation and entrepreneurship capacity for Norwegian industry, not only in the offshore and ocean industries, but in other

industries as well. This requires measures stimulating new firm start-ups and growth, especially as it comes to risk capital. Several of our interview subjects stated directly that they were interested in being in Norway because of the innovation that takes place here. Creating new projects with new research and development is what is going to keep them interested. Further, we believe that the knowledge created throughout the years in this industry is highly applicable to several other of the aforementioned “adjacent industries”. In order for them to grow, new measures have to be implemented in order to retain and develop our world leading knowledge commons in these ocean industries. The Norwegian government and business community need to capitalize on the innovative capacity and use the entrepreneurial capacity in order for both the Norwegian offshore industry to prosper, as well as the Norwegian economy as a whole.

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