

How do Norwegian firms within the offshore wind energy industry internationalize?

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Abstract

In an increasingly globalized world, Norway's dominating industries exist because of natural resources and continue to be subject to heavy regulations. The biggest of these, the petroleum sector, stands for a substantial part of the state income and is to a large degree responsible for the high standard of living the country has. The dependency on this single industry has made politicians in Norway to call for diversification. However, the current status quo of the Norwegian industries and economy imply a poor domestic market and a push for internationalization from the start. A method of commercialization in strong contrast to the development of the energy sectors in Norway.

In this thesis we have investigated how companies internationalize in the context of having a poor domestic market. We do this by researching an industry that can show a substantial synergy with the existing petroleum and maritime sectors; offshore wind. The market for this industry is created as other countries slowly shift their investments away from fossil fuel to also include renewable energy production.

The theoretical framework used is based on the continuous work done in 'International Entrepreneurship' and 'Effectuation vs Causation'. These theories show four elements that are necessary for an international new venture, as well as giving knowledge to analyze the development and creation of the products and company. Additional support for this framework is found in the research done on strategic decision-making and the resource-based view. With this theoretical framework in mind, we have investigated 5 separate industry actors who have invested in the industry and engaged the international market. In addition we interviewed one industry network organization to get a better overview. The companies were both start-ups and spin-offs that represent various parts of the value chain and range from delivering one specialized component to complete solutions for a wind park.

Our analysis shows a distinction between start-ups and spin-offs in how they have tried to internationalize. The start-ups showed a strong coherence towards what the theoretical framework suggests. This means that our start-up ventures and their opportunities are created through more effectual processes and that they use their unique knowledge and resources in a way that utilizes international location advantages. Further; Norwegian firms within offshore wind internationalize by directly approaching the international market. How they approach the international market is governed by the resources available and their established networks.

Preface

The paper you are now about to read marks the conclusion of our master's degree in Innovation and Entrepreneurship at the University of Oslo. We would like to thank all that have contributed during this degree and the finalization of this thesis. This includes the companies that were able to contribute and also the individuals that have assisted us during the writing of this thesis. We would especially like to thank our supervisor Nicolai Løvdal for his valuable inputs and OREEC for their generous contribution in regards to our data collection.

Eigil Risan

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Abbreviations

CFD:	Computational fluid dynamics
EPCI:	Engineering procurement construction and installation
EU:	European Union
GHG:	Greenhouse gasses
GDP:	Gross domestic product
GW:	Gigawatt – one billion watt
IE:	International Entrepreneurship
INV:	International New Venture
IPCC:	Intergovernmental Panel on Climate Change
kWh:	Kilo watt hours – thousand watts per hour
MNE:	Multinational enterprises
MW:	Megawatt – one million watt
O&G:	Oil and gas
OECD:	Organization for Economic Co-operation and Development
ROI:	Return on investment
TW:	Terawatt – 1000 gigawatt
TWh:	Terawatt hours – billion watts per hour

1 Introduction

This thesis will investigate the internationalization of new renewable technologies from Norway. There are two main reasons for why this focus is of significance; the first is the importance for Norway to diversify and expand their industrial footprint in international markets without necessarily having the domestic market for initial growth. The second is the current debate on climate change, with the technological and commercial opportunity this presents.

The world's population faces major challenges concerning the energy needs of the future. Due to an increasing demand, especially in developing countries, some predict energy crisis to be the standard in the not-too-distant future, and a source of conflict (IPCC, 2011: 164-166). Additionally, emissions of greenhouse gasses are reaching ever-increasing levels, and most researchers are predicting an increase in the world's average temperature. IPCC states that around 85 % of the primary energy need today is met by the combustion of fossil fuels, and that the use of these account for 56, 6 % of the total anthropogenic GHG emissions (IPCC, 2011: 164). To combat these two major concerns, the world's power production and build-out of the future needs not only to be extensive but also reliable, sustainable and renewable.

Even though the last attempts to reach an international treaty to combat the rising GHG levels and limit the use of fossil energy have been undeceive, there is an outspoken opinion among many politicians that there is a need to increase the amount of renewable energy and decrease the use of fossil fuel. Several countries have set directives and devoted resources to develop and install alternative energy sources as e.g. renewable electricity production. The EU has for instance through their energy directives implemented a plan called the "20-20-20" targets (CEC, 2008). With 1990 as a baseline for emissions, this directive states that the emission of GHG should be reduced with at least 20% and that the energy mix should consist of at least 20% renewable energy within 2020. This represents a substantial shift in focus and as a consequence larger European countries are investing in renewable resources.

When it comes to production of electricity Norway has been dealt a favorable hand. The topography meant that the build-out of energy production facilities in the industrial age came with hydro-power plants, a very effective and relatively cheap production method. As a result, Norway is virtually self-sufficient with "green" electricity for domestic use (SSB, 2012). On

the other hand, Norway is the fourteenth largest oil and gas producer in the world and the tenth largest exporter (USEIA, 2012). In a country with a small population the consequence is that 23 % of the annual GDP and 30 % of the total state revenue directly derives from the O&G industry (NPD, 2013). This large revenue base has in turn been transformed into a vast social economic model that benefits the whole Norwegian population. The dependency on income from this single industry have, however, made politicians and other public personalities take the opportunity to state that “Norway needs more legs to stand on” (Løkeland-Stai, 2013), call for an “entrepreneurship surge” and claim that the “restructuring needs to happen now” (Melgård, 2013).

A way to address both these issues is for Norway to develop renewable energy production technologies. Thereby, one will address two concerns expressed to be high up on the agenda of politicians and public personalities; a build out of domestic industry and lowering of GHG emissions. Reve and Roland (2003) suggest in their research that Norway should focus on competence based growth and technology knowledge export because of the rapid internationalization processes of renewable energy technologies. Much of the complementary knowledge and experience from the O&G and the maritime sector are directly transferable into development and operation of several renewable energy technologies, facilities and services.

One of the industries that have been subject to attention due to the political focus, and can show an easily accessible synergy for the existing industry is offshore wind. As the industry started to emerge in the 90s and early 00s, research showed a large potential for the industry and that offshore wind could potentially be one of the major electricity producing technologies. The current status quo of the Norwegian economy and energy situation indicate a lack of domestic market to test and build a foundation in.

The environmental debate is only one of the arguments and opportunities that can be exploited for a diversification of the domestic industries in Norway. The industry that dominates the country as of today, O&G, exist as a consequence of the resources found within the country’s borders and the build-out have been subjects to heavy regulations. The environmental debate highlights this dependency on a single industry with a possible expiration date both in resources and viability. On the other hand, the world of today is globalized and according to theory; the combination of a desire to build up a company and a poor domestic market does not need to be a contradiction (Buckley & Casson, 1979). This

does inevitably create a push for internationalization from the start, especially for offshore wind with its complete lack of a home market. In general; building out additional industries that do not have the same position in the international market as O&G will also face the same push for internationalization. To be able to diversify the country's industries and be able to maintain the status-quo of the Norwegian system in a post-oil area Norway must therefore learn to facilitate the growth of such industries in a sustainable matter.

Despite its immaturity, offshore wind has already experienced extensive internationalization and serves as a direct example of an industry that the current, dominating industries can show a great synergy with. The positions and technical standards are being established now in offshore wind, and it is crucial for Norwegian companies that do not want to fall behind to act immediately. Several companies and individuals have acknowledged this push for internationalization and saw a potential in the emerging offshore wind industry combined with a source of synergy in the existing industries. With the status-quo as described, it is important to explore how these have, and are, relating to the obstacles of building a company without a domestic market, and how they directly chose to approach this predominantly international market.

1.1 Scope

The purpose of this thesis is to investigate how Norwegian ventures within offshore wind internationalize.

An emerging industry creates a potential for innovation and entrepreneurship. The obvious complementary knowledge from the Norwegian O&G and shipping industry should on paper provide an easily accessible synergy that can be exploited and developed for this industrial opportunity. Further, this could help reduce the dependency on the O&G sector called for domestically, as well as renewable energy production that is focused on internationally. This creates a push for internationalization, and it is therefore natural to research this domestic industry with perspectives from international entrepreneurship theory. The industry has now been emerging for several years, and during this time private actors and the Norwegian government, with their agencies, have invested in research and development related to this field. Up until 2012 the total support from the various governmental programs has been in excess of over 500 million NOK (Energi21, 2013).

We will investigate these subjects by interviewing industry actors who have succeeded in internationalizing or tried doing so. In combination with the theoretical considerations we are to present, we will look closer at the processes of these firms and how they conceived their ideas, developed their products and approached the international market.

1.2 Theoretical Foundation

To investigate how Norwegian spin-offs and new ventures set up in an international context, we rely on research done in international entrepreneurship and on effectuation/causation.

International entrepreneurship describes the concept of an international new venture, INV, to be defined as an international entrepreneurial organization that uses alternative governance structures to control their assets. By leveraging unique knowledge or resources in a way that utilizes international advantages, they generate sustainable competitive advantage.

"International" is defined as limited to a few countries and locations and "global" is in contrast defined as crossing several national borders and spanning across continents. (Coviello, McDougall & Oviatt, 2011:628)

Effectuation theory is used to explain how opportunities and new markets can be created through a transformational process initiated by the entrepreneur. This is in contrast to causation where opportunities exist independently from the entrepreneur and are just waiting to be discovered and exploited. Both effectuation and causation will be used as a basis for analysis in order to ensure that we find a suitable position for our analysis.

In addition to these main theoretical frameworks, we will elaborate on the resource-based view and draw in perspectives from strategic decision-making. The resource-based view will be used to explain how resources are defined and how they shape the advantages of a firm as discussed under IE. Strategic decision-making will be used to provide a basis for understanding the processes undergone in companies when the opportunity is ripe for exploitation in relations to effectuation/causation.

1.3 Research Questions and Propositions

The aforementioned theoretical research, and to be presented later, can help explain the various sides of how Norwegian start-ups and spin-offs relate to the international market. The

research question we set as a basis for conducting the investigation is intentionally set fairly wide, giving us more freedom for combining the theoretical frameworks chosen, and thereby the research and interviews. We will nonetheless establish some propositions to focus our research and the evaluation of the data found.

Research question:

How do Norwegian firms within the offshore wind energy industry internationalize?

Propositions:

Norwegian offshore wind firms leverage domestic and foreign resources in accordance to international entrepreneurship theory to create a sustainable advantage.

Norwegian offshore wind firms use an effectual approach to gain resources for internationalization.

The reputable and mature Norwegian petroleum and shipping industry is a valuable hub of resources that offshore wind companies are using in their efforts to internationalize.

As presented during section 1.3 Scope, the confines and outer boundaries of the international oriented market, but also the stage and size of the industry itself gives a limitation for the research. In general, the whole Norwegian offshore wind industry is in an early phase and is emerging. This means that there are a limited number of companies operating, and thereby creating a more narrow scope than the research question may inherently imply.

1.4 Considerations

We have in this thesis chosen to focus on the international aspects of commercializing new renewable energy production technologies and services. In that lies the argument presented in the introduction that the Norwegian domestic market is poor, or virtually non-existing. It should be noted at this point it is not our interest to investigate what could have been or should be done domestically to give a better foundation for new technologies. We stated in the introduction that Norway is virtually self-sufficient with “green” energy, and there is a question whether or not there actually is a need for more energy production domestically. A

build out here would easily lead to the country becoming an electricity exporter. Positive as this might be in relation to lowering the GHG emission internationally, it does not imply a potential build out of domestic industry to the same extent as commercialization and internationalization of renewable energy technologies. Electricity might of course reach a point in time where the price are high enough for this to be interesting, but will most likely not lead to any wider development of Norwegian domestic industries at the current time. We will revisit this debate in section 4 concerning the industry development.

1.5 Thesis Structure

We will in the following chapter present a thorough review of the theoretical aspects chosen in order to explain the internationalization process as done by the interviewed companies. Chapter 3 will focus on the methodology and the reasoning behind choosing the analysis method we have opted for. To give a better introduction to the industry and the market this paper is concerned with, we will afterward present the background and status quo of the industry along with a short overview of the different technologies found in the sector. Chapter 5 will present the findings and analysis of our data collection. The findings are systematized over the various theoretical aspects we have considered, before we present our analysis and give room for our own discussion. The thesis ends with the presentation of our concluding remarks in chapter 6, which also involves implications and limitations of our research in addition to suggesting future research paths.

2 Theoretical Framework

What follows in the sections below is a presentation of the different theoretical aspects we have used to investigate our research question. First we will present international entrepreneurship as our main theoretical pillar. The theory goes in depth on how new ventures can internationalize. It considers various aspects such as lack of resources and presents four elements that are crucial to internationalization. Since the understanding of resources and its implications for a new venture is of importance for international entrepreneurship, we also present a subchapter introducing the theoretical foundations of the resource-based view.

Our second theoretical pillar is the research done on effectuation and causation. We explore these theories to understand how opportunities arise and how entrepreneurs create or discover these opportunities. We will use this theoretical aspect to investigate how ideas and new ventures arise in the offshore wind industry. To give insight to how decisions are made and the process behind development and exploiting opportunities, we also present a subchapter illustrating how the theory relates to strategic decision-making. This creates a better foundation in relations to our forthcoming analysis and discussion.

To summarize; we will use effectuation/causation to investigate how opportunities and new ventures are started, and use international entrepreneurship to see how these new ventures have internationalized.

2.1 International Entrepreneurship

The underlying theoretical framework that will be used in this study is the continuous research done in the field of international entrepreneurship (IE). The term "international entrepreneurship" was coined by McDougall (1989) and focused on new ventures that pursued international business. It developed as a research field trying to uncover the process of internationalization of the marketplace and the increasing existence of entrepreneurial firms in the world economy (Oviatt & McDougall, 1994). Many definitions of IE have been given during its history, but the latest iteration from Oviatt and McDougall (2005: 540) states that 'international entrepreneurship is the discovery, enactment, evaluation, and exploitation of opportunities - across national borders - to create future goods and services'.

The definition of IE reveals some of the meaning behind the words "international" and "entrepreneurship". The phrase 'discovery, enactment, evaluation and exploitation of opportunities to create future goods and services' highlights the thought of entrepreneurship as a pursuit of opportunities (Shane & Venkataraman, 2000). Entrepreneurship defined as creation of a new economic activity will apply to both new ventures and established firms. This activity can be innovation through a new idea, or imitative behavior that is new to the firm (Schumpeter, 1950).

The notion of 'across national borders' as a term for internationalization refers to either 'entrepreneurship crossing borders' or 'comparative studies of entrepreneurship across borders' (Coviello, McDougall & Oviatt, 2011: 626). There has been a debate on the interchangeable terms used to define IE firms, 'international new venture' (INV) or 'Born Global' (BG) (Coviello, McDougall & Oviatt 2011). In their 1994 article, Oviatt and McDougall distinguish between 4 different types of international new ventures, one of them being "Global Start-up". These global start-ups are described as 'the most radical manifestation of the international new venture' because they combine operations in many countries and coordinate a number of value chain activities within these countries. These firms are also described as not only responding to market shifts, but also actively leveraging opportunities to acquire resources and combining these to create profitable value globally. Recognizing that the terms "international" and "global" are being used interchangeably, we consider the perspective given by Coviello, McDougall and Oviatt (2011) that "international" refers to crossing a single or a few land borders and "global" refers to operations in many countries or on several continents. With this in mind, we will use the term "International New Venture" (INV) as our main focus. This is primarily because of the "international" rather than "global" nature of Norwegian offshore wind firms and the newness of the global industry.

Historically, large multinational companies were developed through internationalization of mature domestic firms (Chandler, 1986). However, Oviatt and McDougall (1994) argue that modern communication and travel innovations establish new foundations for international business, implying that international business opportunities are not only for larger, mature firms. Defining an INV as a firm that is international by inception leaves much to be discovered about how and why they internationalize. In addition IE research expands the scope of previous international business research by not only looking at MNEs, but also including small entrepreneurial firms and start-ups alike.

The theoretical framework for IE is based on traditional traits of larger multinational firms such as transaction cost analysis, market imperfections and international internalization (Oviatt & McDougall, 1994). IE looks further at how vital resources can be controlled without necessarily owning them and how competitive advantage is dependent on unique assets. There are four elements that are identified as crucial to a sustainable international new venture. The figure below depicts the order that these elements progressively follow to define the successful INV.

Resources are something we will touch upon several times in this thesis, and therefore we intend to define this more properly in a subchapter discussing the resource-based view.

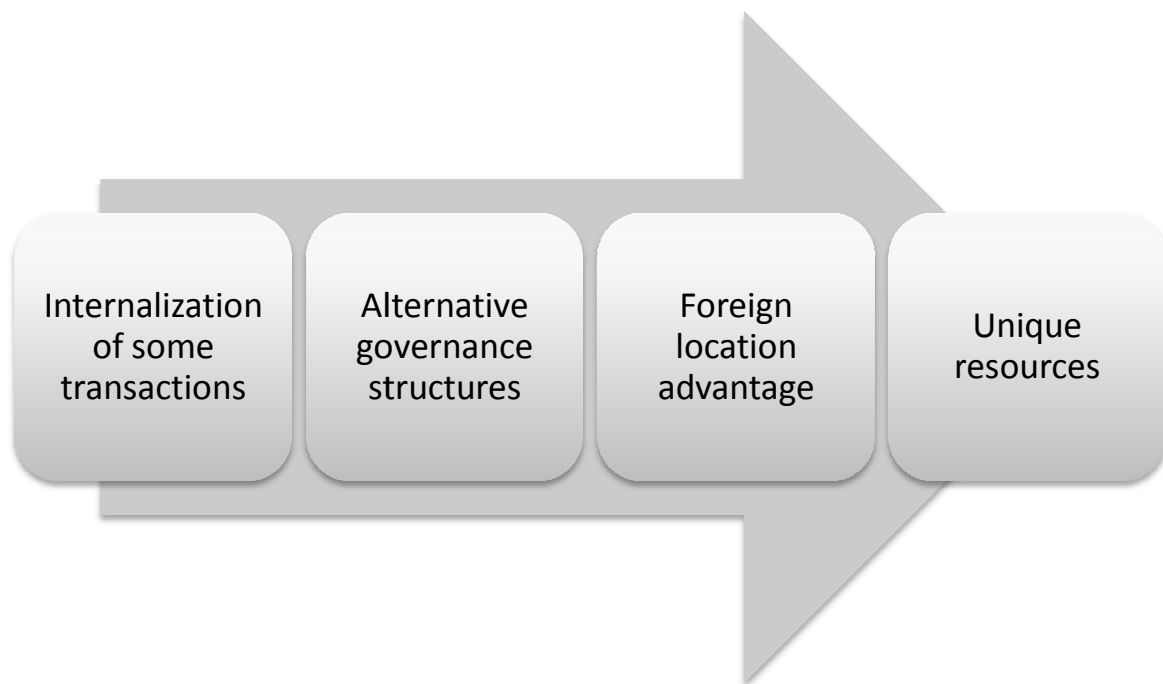


Figure 1. Elements of the sustainable international new venture. Source: Oviatt and McDougall (1994)

Element 1: Internalization of some Transactions

Defined as the most clear and basic part of traditional organizational theory, the internalization of transactions is said to occur when the transaction cost between parties is at their lowest, and authority within the company is the governing mechanism (Buckley & Casson, 1976). In a small firm this is likely to be directed by the entrepreneur, or the entrepreneurial team. An example could be the design of a product, something that can be

internalized or alternative to internalization; transacted over markets. As noted by Oviatt and McDougall (1994), owning foreign assets does not define the firm as an INV, but of course some assets must be owned in order to initiate economic transactions.

Element 2: Alternative Governance Structures

The second element refers to challenges that new ventures might face due to a lack of resources or power. Compared to larger and more mature firms that traditionally can own most of its assets, new ventures must rely on alternative ways of gaining and controlling resources. Rangan (2000) presents a view where social networks can give a cost-effective way of searching for economic opportunities and potential partners. When searching for partners in a social network, the search will tend to be cheaper and often more effective. It is cheaper because information can be acquired through relations that are maintained for other purposes than business (Coleman, 1988). Well-established social networks will also be effective in the sense that the entrepreneur has an overview of the information available; time spent collecting overlapping information is minimized (Montgomery, 1992).

Rowley et al. (2000) presents two embedded features of networks: *Relational embeddedness* - the characteristics of relations, and *structural embeddedness* - the characteristics of the structures of relational networks. Relational characteristics in networks theory separate between two kinds of ties, strong and weak. Rowley et al. (2000) separates these two by measuring frequency of interaction in addition to level of emotional commitment.

Furthermore, some sort of formal contract often accompanies strong ties and these ties then act as governance mechanisms. Structural characteristics explain the difference between dense and less dense networks. In much the same way as strong ties, dense networks will act as governance mechanisms in inter-firm alliances. Dense networks will often engage in cooperative behavior, and actors in these networks will not only trust in each other because of the relational ties, but also trust in the system and structure of the network. The effect of networks and especially social networks will be discussed further in the section describing speed of internationalization.

A major feature of this element is that new ventures will tend to use alternative governance structures to minimize their internalization and expand their resource pool, even when the risk associated with hybrid partnerships is present.

Element 3: Foreign Location Advantage

Foreign location advantages are what separate an international from a domestic firm. As mentioned previously, we apply the term INV so that international does not necessarily mean global, and the advantages of moving resources across borders can be limited to a few transactions over a few borders. Many firms encounter challenges when doing international business (Barkema et al. 1996) such as cultural differences, misunderstanding of laws and governmental barriers to entry. Bigger and more mature companies will use their wealth of power and resources to overcome such challenges, but INVs will often have to rely on other strategies.

One of these strategies is to rely on private knowledge. Knowledge as a resource is increasingly more mobile due to modern infrastructure and communication (Buckley & Casson, 1976). Combining mobile knowledge and less mobile foreign resources may create an advantage to the threat of facing competition from larger companies. Oviatt and McDougall (1994: 56) states that new ventures facing competition from large firms must 'be international from inception or be at a disadvantage to other organizations that are international already'.

Another aspect to consider is the strategic choices made when entering a foreign market. Agarwal and Ramaswami (1992) emphasize the importance of the strategic considerations done when choosing an entry mode. Once an entry mode has been chosen, the resource commitment initially made will make it unlikely for a small firm to change its mode of entry at a later point. This is not only a matter of evaluating risk, but also considering the resources available and the potential of the market. Agarwal and Ramaswami (1992: 20) found that small firms with limited international experience, preferred to engage in joint ventures to compliment their need for foreign resources in high potential markets. Entering new markets and becoming first movers can be an advantage, and at the same time a threat if bigger firms were to follow suit when the first mover have tested the waters. The theoretical background used to present a definition of strategic decision-making will be described in a separate segment later.

Element 4: Unique Resources

While the first 3 elements constitute the essentials for an international new venture, the fourth element discusses unique resources as a source of a sustainable competitive advantage.

Barney (1991) presented the idea that a firm resource could generate a sustainable competitive advantage. To do this, a resource has to be valuable, rare, imperfectly imitable and without strategically equivalent substitutes (Barney, 1991: 116). When relying on private knowledge as discussed in element 3, one has to recognize that knowledge is a fragile resource in modern business, and its ability to stay unique might be easily diminished.

One can protect knowledge in forms of patents, copyright and trade secrets. However, such direct protections have the possibility of being ignored in some countries. In addition, disclosing a patent provides competition with the chance of copying the ideas, altering the product slightly and releasing it as their own.

When discussing imperfect imitability, emphasis can be put on ambiguous relationships, unique history or management styles. And although these characteristics may be hard to imitate, they can be difficult to transfer to several locations when the firm grows.

Various licensing strategies can also be used to gain value out of and protect knowledge. If unique knowledge is expected to have a short period in which it contains value, high fees can be used to extract maximum value in a short period. On the other hand, if the knowledge has a long period of value, low fees can discourage competitors from trying to move around your protection.

Since new ventures frequently rely on alternative governance structures such as networks or alliances, risks and opportunities might arise concerning knowledge expropriation. Risks can also involve predatory alliances that use knowledge shared in an unethical business manner. The network structure and its strong personal and economical ties can be a counterweight to this risk, and as such a management team with diverse networks in the countries of interest can be a major asset to an INV.

Summary of IE

In essence, IE theory describes the international new venture as an entrepreneurial organization that uses alternative governance structures to control their assets. By leveraging

unique knowledge and resources in a way that utilizes international location advantages, they generate sustainable competitive advantage.

2.1.1 Speed of Internationalization

An additional aspect to consider within international entrepreneurship is the speed of which firms internationalize. Oviatt and McDougall (2005) present a model in which this speed is determined by four forces: enabling, motivating, mediating and moderating. Furthermore, there are three vital aspects to this speed, with the first aspect being the time between acting upon an opportunity until the first foreign market entry. The second aspect is how fast foreign markets entry occurs, and the third is how quickly foreign revenues increase, called international commitment. The figure below depicts the model of speed internationalization.

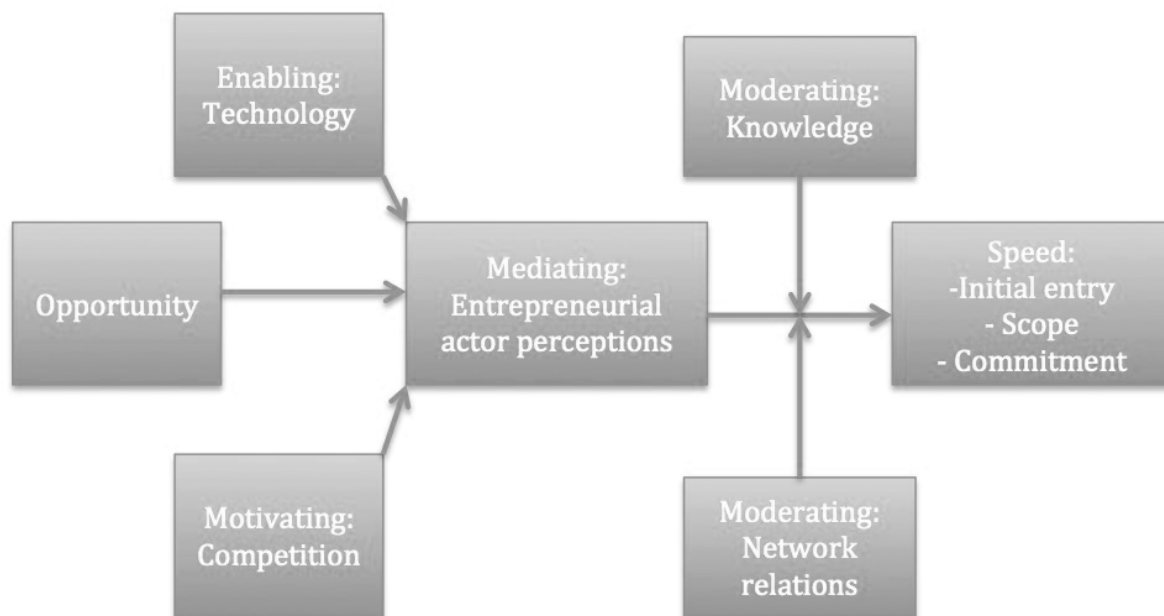


Figure 2. Model of forces influencing internationalization speed. Source: Oviatt and McDougall (2005)

Initially the process starts with an opportunity, either discovered or created through enactment. This is a point that we will emphasize later when discussing the nature of opportunities and the theory of effectuation. Enabling is the first force presented, and is what makes fast internationalization possible. The improvement of communication, travel, transportation and digital technology is a great enabler for internationalization.

The second force presented is the motivating force of competition. Oviatt and McDougall (1994) explains how entrepreneurs can be pressured into taking preemptive advances in foreign markets due to the fear of competitors blocking them out from this market if they started domestically. Combining the two first forces one can say that technology makes rapid internationalization possible, while the pressure of competitors strongly encourages internationalization.

The entrepreneur as a mediating element is the third force. The people that exploit the opportunity are central to the success of a venture, and this is also applicable to the speed of internationalization. The individual perceptions of entrepreneurs will evaluate the other forces and make critical decisions as when to internationalize. It is therefore of importance to understand how these critical decisions are made when evaluating the speed of internationalization.

As Figure 2 depicts, there are two moderating elements that affects the speed of internationalization: knowledge and network. The knowledge intensity of the opportunity and the previous knowledge base of the entrepreneurial team will be combined with the available international networks and moderate the speed as the fourth force.

Alternative governance structures are at the heart of international entrepreneurship, and Rangan (2000) presented how social networks can add resources and opportunities to the venture. Since social networks are likely to be influenced by experience, this will determine some of the range of contacts and what scope of opportunities and resources that seems available to the entrepreneur (Aldrich & Zimmer, 1986). Social networks might start as highly personal, but with time it is likely to spread and include a wide range of contacts and not only close friends and family. To add to this social network, entrepreneurs often engage in external relationships called weak-ties. These may be facilitated through trade shows, conventions and tertiary education (Rothwell, 1991). A weak-tie in the social network could for example be that a friend of yours studies at the university and knows (but does not have a strong tie to) someone in his class that can possess some of the information or resources you require. Oviatt and McDougall (2005) emphasize three aspects of importance in relation to networks: existence of cross-border weak ties, the amount of ties/size of network and finally the density of networks. Sparse and spread networks can be good at gathering a wide range of information, were as more dense networks can be good when trust and stronger bonds are of

importance. In essence, entrepreneurial teams that have established good cross-border networks are more prepared for rapid internationalization.

The concept of knowledge as a moderating force refers to both market knowledge and knowledge related to the opportunity. Oviatt and McDougall (2005) discuss the demand for foreign market knowledge and organizational learning and how this is a recognized topic of research by many. Due to the scope of this thesis we will not go into the theories of organizational learning, but it is evident that when faced with liability of foreignness, learning quickly and correctly is of importance when wanting to accelerate internationalization. Knowledge as a unique resource is one of the four elements of sustainable advantage previously discussed and knowledge-intense firms are shown to have a more rapid pace of internationalization (McNaughton, 2001).

2.1.2 The Resource-Based View

During the presentation of IE we emphasized unique resources, as for example knowledge, for the new venture or specifically in the context as an INV. In this section we will introduce one of the fundamental aspects of INV, the resource-based view. We will further elaborate on which properties and qualities needed to yield a sustained competitive advantage according to researchers.

A firm's resources are defined to; 'include all assets, capabilities, organizational processes, firm attributes, information, knowledge etc., controlled by the firm that enable the firm to conceive and implement strategies that improve efficiency and effectiveness' (Barney 1991: 101). In a study on market penetration of new energy production technologies, Lund (2006) concludes that the penetration rate can typically average around 20-30 years (p 3326). One can argue that most new energy production technologies are resource demanding, and offshore wind is no exception. The industry involves fairly large and complex structures that are comprehensive to develop and test, but also service and maintenance of the installation require specialized constructions. If one adds this to Lund's (2006) result and the factors mentioned above of efficiency and effectiveness to the INV equation, it is obvious that it can be essential to emphasize the correct resources in order to be able to gain and sustain a market position.

The theoretical track of the resource-based view can be followed back to the middle of the last century with elements found in the works by e.g. Selznick (1957), Penrose (1959) and Chandler (1962), but also back to the neo-classical economists (Barney 2001: 645). The research that coined the term, however, was initiated by Wernerfelt in his article 'A Resource-Based View of the Firm' from 1984. Wernerfelt's article adds to the theory by arguing for evaluation of a firm in 'terms of (*their*) resources rather than in terms of their products' (1984: 179). When one makes decisions after evaluating these resources and the probability of importance, Wernerfelt argues in favor for a dynamic resource management; 'optimal growth of the firm involves a balance between exploitation of existing resources and development of new ones' (1984: 178). Wernerfelt (1984) argues that strategic decisions can be made to leverage existing resources, or development of new specific firm resources in relation to the competition.

Barney (1991) gathered the lines of the different research done on the impact of emphasizing resources and developed the concept further in to a complete theoretical framework. All firms have some set of resources that enable them to exist, but to yield an advantage over others, and possibly a higher return, the resources needs to inhabit certain traits. As we mentioned in the previous section, Barney (1991: 116) provided an argument where 'sources of sustained competitive advantage are firm resources that are valuable, rare, imperfectly imitable, and non-substitutable'. Elaborating on these four points, Barney (1991: 106) states that a resource is *valuable* 'if it enables a firm to conceive of or implement strategies that improve its efficiency and effectiveness'. 'A firm enjoys a competitive advantage when it is implementing a value-creating strategy not simultaneously implemented by a large number of other firms', a resource can then be called *rare* (p 106). A rare and valuable resource can only be a source of sustained competitive advantage if 'a firm that does not possess these resources cannot obtain them' (p 107), thereby being *imperfectly imitable*. The last requirement for a resource to be source of sustained competitive advantage in this definition is that it is *non-substitutable*. Following Barney's (1991: 111) definitions substitutability can take two forms; first, even though a firm is not able to copy another firm's resource exactly, they can develop a resource that can enable them to conceive and implement the same strategy. Second, several different resources in different firms can be strategic substitutes and deliver the same strategy or advantage, thereby cancelling each other out (p 112).

Several researchers following Wernerfelt (1984) and Barney (1991) have highlighted the importance of resources for the new venture and, a comparable four point-analysis that argued for leveraging of resources was further discussed by Petarf (1993). Petarf's (1993) article is often contributed with co-defining the modern theory of the resource based view with Barney (1991). She concludes that the resource-based view helps explain; 'long-lived differences in firm profitability that cannot be attributed to differences in industry conditions' (p 187), and thereby that internal factors help companies succeed. Comparably to Barney (1991), Petarf (1993) presents an analysis of resources over four factors to determine a competitive advantage. Different from Barney (1991), Petarf's (1993) factors are more concerned with traits of the industry environment. The four factors are; *heterogeneity*, *ex post limits to competition*, *imperfect mobility* and *ex ante limits to competition*. Petarf elaborates that there should be heterogeneity in resources, meaning that firms in one industry have varying capabilities (1993: 180). Following the lines of competitive advantage, Petarf (1993: 180) further states that 'firms with marginal resources can only expect to breakeven'. For this competitive advantage to be sustained, a firm is also dependent on an ex-post limit to competition (Petarf, 1993: 182). This means that the heterogeneity in distribution of firm resources in the industry must be preserved over time. Two critical factors for ex-post limits to competition is '*imperfectly imitability* and *imperfect substitutability*' (p 183), pointing directly at the conclusion from Barneys' (1991) article. A resource with the necessary quality also has to have an imperfect mobility, meaning that it cannot be easily traded between firms (Petarf 1993: 184). The last point states that there has to be an ex-ante limit to competition; 'prior to any firm establishing a superior resource position, there must be limited competition for that position (Petarf 1994: 185)', or else it would just be competed down to a point where it is no longer profitable.

2.2 The Nature of Opportunities and the Theory of Effectuation Versus Causation

In an introduction to the special forum of international entrepreneurship, Coviello, McDougall and Oviatt (2011) presents several areas of interest for studying implications of IE theory. One of these areas is the definition and understanding of "opportunity". Opportunities lie at the heart of entrepreneurial activity, and the question of creation versus discovery arises. We will use the debate presented by Alvarez and Barney (2007) as a basis to introduce the

thoughts of Sarasvathy (2005) on how new markets and opportunities can be created through effectuation or discovered and exploited through causation.

In their 2007 article on discovery and creation of opportunities, Alvarez and Barney pose the question 'Do entrepreneurial opportunities exist, independent of the perceptions of entrepreneurs, just waiting to be discovered? Or, are these opportunities created by the actions of entrepreneurs?' (p 11). The table below depicts some of the assumptions made on the differences between creation and discovery.

	Discovery Theory	Creation Theory
Nature of opportunities	Opportunities exist, independent of entrepreneurs.	Opportunities do not exist independent of entrepreneurs.
Nature of entrepreneurs	Different in some aspects from non-entrepreneurs.	Entrepreneurs are not necessarily different from non-entrepreneurs.
Nature of decision making	Risky	Uncertain

Table 1. Assumptions made on the differences between creation and discovery. Source: Alvarez & Barney (2007).

The major difference in the nature of opportunity is highlighted by the question asked by Alvarez and Barney (2007: 11). Discovery theory assumes that opportunities arise exogenously, through changes in market preferences, technology or industry (Shane, 2003: 23). In addition, entrepreneurs caught under the banner of discovery theory are considered to possess certain qualities that make them more suitable and able to discern good opportunities from bad, and exploit them in a proficient manner. Kirzner (1978: 67) summarizes these differences in attributes with the concept of "alertness". These differences might be cognitive, preferences in terms of risk or information asymmetries and can be used to explain why some becomes aware of opportunities.

Contrary to discovery theory, Shane (2003) points out that creation theory do not have a single defining theoretical framework and so a variety of descriptions have come forth. We will use the theory of effectuation to look deeper into the creation of opportunities. Sarasvathy (2001) presents the theory of effectuation in contrast to causation, a theory that fits more into

discovery of opportunities and the strategic exploitations that follow. As such, one can link discovery theory to causation and creation theory to effectuation. However, both will assume that exploiting opportunities is the end goal of entrepreneurs, and those opportunities exists because of competitive imperfections. Although as we will see, the practical life of the entrepreneur is not necessarily black and white, and shades of grey in the intersections of theories are where many will dwell.

Below follows a table from Sarasvathy (2001: 251) depicting the contrasting differences between causation and effectuation.

Categories of differentiation	Causation Processes	Effectuation Processes
Givens	Effect is given	Only some means or tools are given
Decision-making and selection criteria	Help choose between means to achieve the given effect Selection criteria based on expected return	Help choose between possible effects that can be create with given means Selection criteria based on affordable loss or acceptable risks
	Effect dependent	Actor dependent
Competencies employed	Excellent at exploiting knowledge	Excellent at exploiting contingencies
Context of relevance	More ubiquitous in nature	More ubiquitous in human action
Nature of unknowns	Focus on the predictable aspects of an uncertain future	Focus on the controllable aspects of an unpredictable future
Underlying logic	To the extent we can predict the future, we can control it	To the extent we can control future, we do not need to predict it
Outcomes	Market share in existent markets through competitive strategy	New markets created through alliances and cooperative strategy

Table 2. Causation versus effectuation. Source: Sarasvathy (2001: 251).

When comparing causation and effectuation Sarasvathy (2001) depicts some of the main differences in the theories. In a causation processes, the desired effect is given and the decision-making is based on how to choose between the means to achieve this desired effect. Drucker (1998: 147) claims that most opportunities are discovered through a search process, a view fitting well with the classical thinking in entrepreneurial strategy. This classical way of thinking and way to view decision-making in business is then close to Sarasvathy's (2001) presentation of the causation process.

Effectuation on the other hand, presents a new vision where opportunities are created through an expanding cycle of resources and a converging cycle of constraints on the product/goal. The Figure 3 depicts the dynamic process of effectuation. It starts with examining where you or your company is now. 'Who you are, what you know and whom you know' (Sarasvathy & Dew, 2005: 543) are questions that answer what resources and networks are available. In contrast to a causal way of thinking, the first entrepreneurial step may or may not start off with an opportunity or a defined goal. In addition a causal process will focus on predictable aspects of building a new venture within a known market. Classical strategy then dictates the actions of the entrepreneur to be 'identification, recognition or discovery of an opportunity, followed by a series of tasks to exploit the opportunity' (Sarasvathy & Dew, 2005: 542). Effectuation will instead focus on controllable aspects when facing unpredictability, and after answering the questions posed in the first steps of effectuation process the entrepreneur then act upon whatever they can afford (Sarasvathy, 2001).

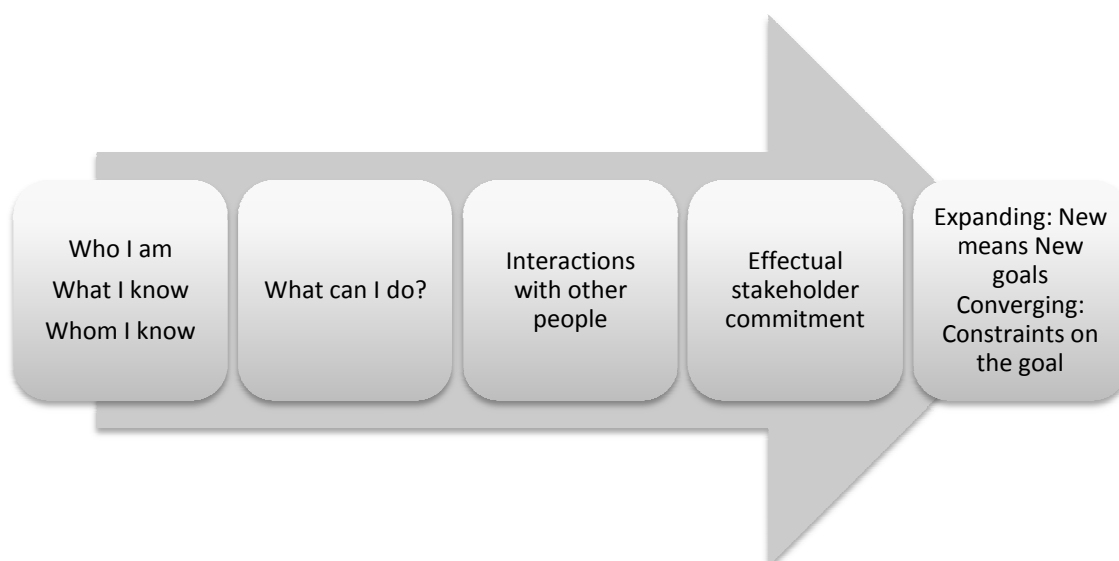


Figure 3. The transformation process of effectuation. Source: Sarasvathy and Dew (2005: 543).

The first steps of self-evaluation lead to interaction with other people. These people may be known, or be someone that the entrepreneur meet at a point in the process. This network of people and what they bring to the enterprise will determine how they face contingencies and which opportunities will arise. Over time, the expanding cycle of resources will add new people and resources to the enterprise. The effectual stakeholder commitment is the level of involvement and sacrifice each member feels is affordable for them. In that sense, the end goal is not what drives them, but the creation as a process is the motivating factor. Note that the commitment process is self-selecting, meaning that new team members are not "forced" to work or add to the enterprise. Co-creation is at the heart of effectuation (Sarasvathy & Dew, 2005).

The converging cycle of adding constrains to the end product or service could be thought of as making a stew with the favorite ingredients of each "cook" on the team. Some things go well together, and some do not. If you want to make the best stew possible, you must add the ingredients that are good together and toss out the others. Taking the analogy a step further, if a "cook" on the team is adamant on using seafood only, then the rest must either agree and work forward, or kick the seafood lover out of the team. The idea is that each member of the entrepreneurial team will add their own ideas and thoughts of what could or should be done, adding constraints to the final goal or product. As the effectual network grows, more and more of the external world will have an impact and the process will become less effectual (Sarasvathy & Dew, 2005: 548). This is a logical step when thinking that the product will become more and more constrained, to the point where a new market or an opportunity has been created and must be utilized to give value.

When the opportunity or product has matured enough, traditional strategy theory takes over and exploitation begins. With international entrepreneurship theory in mind, it will be interesting to see if the firms we investigate use an effectual logic to overcome poverty of resources and gain sustainable advantages when facing the pressure of internationalization and international competition.

2.2.1 Strategic Decision-Making

As a new product or service emerges, started either from an effectual or casual logic, it reaches a point where strategic decisions and exploitation of the opportunity reaches critical

importance. For a start-up or spin-off company in an unpredictable development phase that has not yet developed a general foundation, it is obvious that it is of importance to emphasize the correct areas in the development. Making the best strategic decisions can be difficult, but can still mean the difference between failure and success. In this section we present some of the theoretical aspects on the view on how strategic decisions are made. Having a deeper understanding of how decisions are made will help us evaluate how the companies we investigated acted upon their opportunities and how they planned on exploiting the opportunity, leveraged their resources, and internationalized.

Decisions made that concerns any company's strategic options is known as strategic decision-making, defined as decisions made that have a 'significant impact on the performance of the business making them' (Chrisman, Bauerschmidt, & Hofer, 1998: 7). There can be many reasons for setting up an entrepreneurial new venture or spin-off; for example to build competence or maximize ROI. Whatever the goal of the new venture is, the logical assumption is that achieving the goal is closely related to the quality and the accuracy of the strategic decision-making processes that takes place. Due to the fact that energy technologies have a long maturation phase, it becomes obvious that it is important to be able to take the correct decisions both concerning the opportunity and development of resources as one goes international.

Eisenhardt and Bourgois (1988: 817) found that in the classical decision-making theory there are two predominant views on how top management takes strategic decisions. 'Rational-comprehensive' where one agrees on the priority, search for alternatives and integrate into the existing strategy. The other is 'political incrementalism', where no prior goal exists and strategy is taken in constrained and small steps after an agreement is made. Furthermore, there is a consensus among the theory that: 'top management is responsible for making strategic decisions, and, therefore, is responsible for the performance of a business' (Chrisman, Bauerschmidt, & Hofer, 1998: 7). However, due to the nature of entrepreneurial new ventures, the top management team will naturally consist of a limited number of individuals to take these decisions. Mixed with the industry environment and lack of resources discussed, the survival of the whole company may depend on each single strategic decision. In spin-offs, the story can be a little different. Being supported by another company implies that you might get the resources to set up the ventures foundations and a solid overall structure fairly quick. Dependent on the agreement between the company and the participant in the spin-off, the

structure of the company will most likely involve an arena for the “mother company” to give opinions and contribute, for example in the board of directors. Whether the company is a well supported spin-off or a new venture with a single entrepreneur, the start-up phase nonetheless has the consequence that the quality of the decision needs to be good. The nature of spin-offs can give foundation for a more consensus-based and iterative decision-making, with more employees and structure early on, an environment that might not be found in a comparable entrepreneurial new venture at the same time after establishment.

Busenitz and Barney (1997: 25) state in their investigation into the differences between entrepreneurs and managers that ‘in entrepreneurial ventures...the window of opportunity would often be gone by the time all the necessary information became available for more rational decision-making’. Decision-making in new ventures therefore do not only need to be of good quality, i.e. correct and with the best future implication for the venture, but also with correct timing. As a derivate from this one can say that this ability to take the right critical decisions and executing the right strategy is ultimately what differentiate a successful entrepreneur from an unsuccessful entrepreneur.

3 Methodology

3.1 Research Design and Methodology

In this section we will elaborate on the research design and on the methodology chosen for our thesis. A presentation of how the data is elicited will be given, in addition to the reasoning behind choosing a case study.

When choosing research design for a thesis, the question of doing a qualitative versus a quantitative analysis arises. This thesis will focus on a small industry in a small country and look at how companies within this industry are coping and have coped with the pressures of internationalizing. A quantitative analysis would be unsuitable for such a thesis due to the un-numerical and multi-variable nature of the data collected.

The methodology chosen is a case study on how Norwegian offshore wind firms deal with the pressure of internationalization. This follows the logic presented by Yin (2009) as we ask "how" questions in a case with real-life context where we have no control of behavioral events. In addition, the case study method proves its worth when measuring and analyzing behavior (Chetty, 1996: 74). Wilson (2010: 109) raises the issue of setting a clear unit of analysis, and explicitly defining this is of importance. To answer the research question and investigate our propositions the firm is chosen as unit of analysis. This will narrow the scope of analysis of the thesis and exclude industry and policy level analysis. In choosing the firm as unit of analysis, we will focus on the choices made by the venture and not individuals within the team. However, since the entrepreneurial teams of startups are usually small, key decisions are often made by a selected few as mentioned in our theoretical considerations of strategic decision-making. As a result, gathering primary data from key personnel within the ventures will be important to give us a good view of how the firm has dealt with the issues at hand.

3.2 Data Collection

To gather primary data from a wide scope within the industry, we have chosen a variety of companies within different stages of success and with different starting points. This is done to

ensure a comprehensive view of how the theory fits with reality. International entrepreneurship theory stems from research done on MNEs, but has expanded this scope by including small entrepreneurial ventures. As such, the companies chosen are both start-ups and spin-offs and will provide us with a basis for comparing how the different mechanisms and theoretical aspects differ within these companies. Additionally it's worth noting that our propositions and the research question does not differentiate between start-ups and spin-offs, but look at the industry as a whole. Including both in our data sample is then important to ensure adequate industry data. The term successful is difficult to properly define, and so we only use this as a subjective measurement to get variety in our group of chosen companies. We will emphasize the ways in which they internationalized and not necessarily objectively measure if they succeeded in doing so.

As a primary data collection source, we will conduct five semi-structured interviews with companies involved in offshore wind. In addition we will conduct an interview with INTPOW, a Norwegian network organization created to promote cooperation between international and Norwegian actors in the renewable energy sector. Semi-structured interviews are chosen due to the possible in depth answers in addition to allowing us the possibility to probe the interview object with questions that can control the theme. Combined with the theoretical framework and our research question we have constructed a sheet of questions split into themes. This will allow us to keep a clear view of where in the theoretical landscape our answers are given, and additionally allowing us to keep track of the unstructured part of the interview.

When identifying relevant data, a thematically based analysis will be conducted. Each transcription will be evaluated in terms of the theoretical elements, searching for key elements discussed in our theoretical framework. Our analysis of the propositions will be based on these findings since the propositions are so closely linked to the theoretical aspects we have considered.

3.3 Quality of Research

Wilson (2010: 116) emphasizes the importance of addressing validity and reliability in a thesis. This section will discuss each subject independently and also look at what measurements has been made to uphold the credibility of the thesis.

Reliability is how ‘a measurement of a phenomenon provides stable and consistent results’ (Wilson, 2010: 116). In essence then, reliability is closely related to repeatability. This is challenging for any business research done, and especially when choosing a more open semi-structured interview design. To improve the reliability of this thesis, several sources of evidence has been used and a clear setup of the themes covered in the interviews has been provided (see appendix). Naturally, our supervisor has followed the work done closely to ensure that we have maintained a chain of evidence, where the logical steps from questions to conclusions can be followed.

Validity refers to the relationship between a construct and its indicators (Wilson, 2010: 119). There are two main types of validity, internal and external. Internal validity is separated into construct and content validity, in which content validity deals with the issues of measuring correctly and measuring enough to cover the subject. Finding the right measurements for the concepts studied is construct validity. External validity raises other issues of how the study relates to other cases or can be generalizable to other settings. To ensure a valid thesis, we have strived to clarify our questions and objectives. We have actively engaged our data collection participants so that our content validity is of high standards. Ensuring construct validity in a case study is challenging due to extensive complexity and variables (Yin, 2009: 41), and so triangulation of data is key. Interviews, secondary data and previous case studies were used together with information available on the Internet to ensure sufficient triangulation of data sources. We have in addition chosen to present our primary sources anonymously. This was done to ensure that they felt comfortable revealing detailed information to us, and in fact some of the sources insisted that their information was given anonymously. It must be noted that the interviews has been translated from Norwegian to English, and that this can be a source of missing out on finer points in the data. However, as stated earlier, the interviewees has read through the translated transcripts and given their approval so there should be no misinformation as a result of translation.

Being able to generalize our case is not the primary concern for this thesis. However, Flyvbjerg (2006) points out that the misconception of case studies and their lack of usefulness when it comes to generalization can be addressed by thoughtfully picking the right case and data sources. This thesis focuses on a small industry in a small country, and the number of actors is limited. As we have discussed, we have chosen 5 firms in different stages of success and development as primary sources of data. And as such, we feel that it gives a detailed

description of the case, without it needing to be a formal generalization. Flyvbjerg (2006) also points out that a formal generalization is definitely not the only source of scientific progress, and that descriptive and phenomenological case study has been helpful in scientific innovation.

4 Industry Background

To provide a better understanding of offshore wind as a technology, in addition to the market and the context it have been, and is currently, developing in, we will provide an introduction to the industry. This will include a discussion around the domestic context for development of new renewable energy technologies and an introduction to what issues offshore wind addresses and why this industry has emerged. To further give the reader a better foundation for the presentation of the data from our interviews, we will also provide a short technical introduction and a summary of the international status quo of the market.

4.1 Domestic Context

The O&G industry stands for a substantial part of the national budget, and the industry must be said to be to a large degree responsible for the economic progress Norway have experienced. The industry directly employs around 43 000, but calculations show that over 200 000 employees are working directly and indirectly with O&G (NHD, 2011), around 10% of the total workforce (SSB, 2010). The oil fields and production facilities are also predominantly located far offshore or in low populated areas. Even though there have been a couple of tragic accidents, 90 % of the Norwegian population states they are positive to the domestic O&G industry (NTB, 2012).

The other domestic sector that can provide an easily accessible synergy is the shipping and marine industry. Historically, the maritime industry represents a very important sector which also provided a good source of expertise as the O&G industry grew in the early 70's. Today this industry employs around 100 000 in Norway and controls the world's third largest fleet in tonnage (NHD, 2013). It is worth mentioning that these two industries are intertwined and to some extent overlap each other, but the maritime sector nonetheless generate the second largest export revenue after O&G (NHD, 2013).

Norway as a country has great potential for several renewable energy production methods. The build-out of energy production facilities have since the start in the industrial age largely come with hydro-power plants. Even though the environmental impacts of the facilities that result from these build-outs (e.g. dams and transmission lines) have been a subject of

recurring debate and demonstrations, the build-out continued through the last century. A history with green and abundant electricity have had the effect that Norway today has an electricity consumption of almost three times the average for OECD, and almost four times that of the EU (WBG, 2012). Much of this is a result from the industry relying on electricity in combination with the climate of the country. It is also common to use electricity for purposes like heating and cooking which in other comparable countries often is done by other means. This does however show the extent of the build out of hydro power plants, and the position electricity has in the society. Below is a graph comparing the electricity use in Norway to that of the average EU country and OECD country.

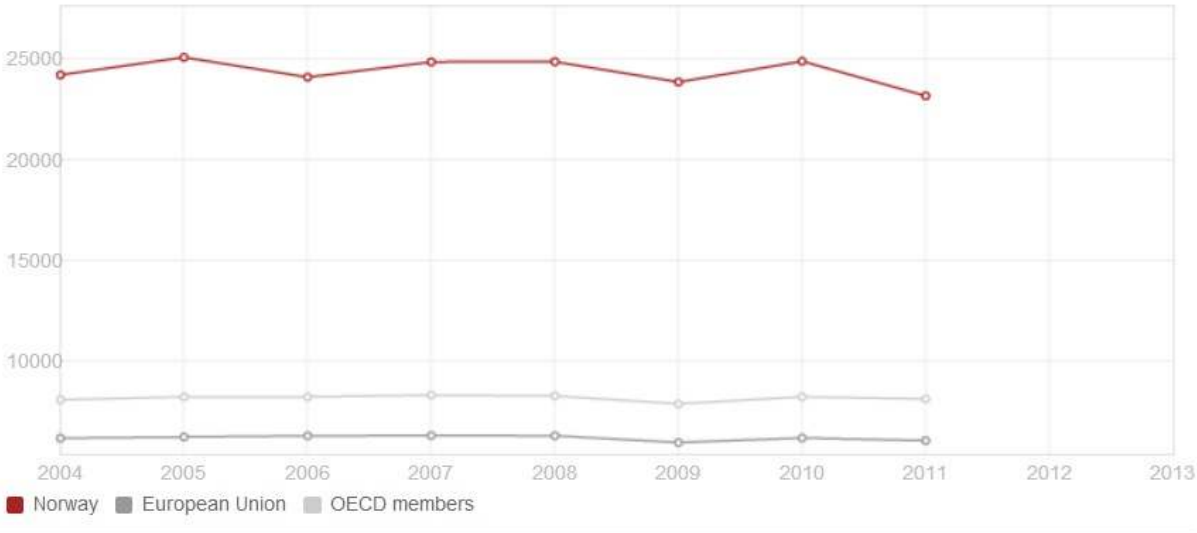


Table 3. Electricity consumption per capita, Norway, EU and OECD. Y-axis shows KWh consumed, while the X-axis show year from 2004 to 2011 Source: WBG, 2012.

These two points illustrate the current status-quo of the Norwegian society, and help demonstrate the lack of market faced if one should set up new renewable energy technologies domestically. With the addition of a low unemployment rate and large governmental income from the O&G sector, finding political arguments for a drastically shift and to heavily prioritize development of “potential” industries is difficult on a short term.

Regardless, there have over the last decades been initiatives to build out several “new” renewable energy technologies, most mentionable is the build-out of land-based wind mills and wind farms. With a long windy coastline, Norway has great resources for wind-generated production of electricity, a technology that neighboring countries have embraced on a larger scale throughout the last decades. Historically, shifts like these have emerged from a desire to

reduce the dependency on import of fossil fuels with a fluctuating price, often produced in unstable areas. An issue Norway has not faced to the same extent. Nonetheless, there is as of today 810 MW installed in Norway divided over 19 locations (Vindinfo, 2014), and according to a survey 84% are positive to wind farms (EnergiNorge, 2012). However, there are several local effects of land based wind farms, and engagements are high when the discussion of positioning a wind farm in an area comes up. This leads to a long time frame for development and build out of these wind farms, and on average it takes five and a half year just to process the applications for larger wind mill installation (Riksrevisjonen, 2014).

In section 1.4 ‘Consideration’ we mentioned that building more renewable energy production domestically, for example wind farms, potentially can lead to a situation where one can lower GHG emissions internationally by exporting the electricity. This will in turn imply that Norway becomes an electricity exporter and do not develop such a favorable “leg to stand on”. This because the wind turbine industry, as one of the most prominent renewable energy production methods today, has gone through a long maturation phase and is an industry dominated by a few major international actors. With wind being a more abundant resource than O&G, the Norwegian government does not have as good a hand for setting requirements of domestic build-out as they did during the development of the O&G industry. Building out a large amount of wind farms here will most likely not contribute to any large development of domestic industries, and is therefore not a thread interesting to visit for us in this thesis.

4.2 Offshore Wind

To combat some of the disadvantages and issues of land-based wind farms, offshore wind have emerged as a viable alternative since the early 2000. Here, we define offshore wind as any installation, floating or anchored, installed in/on water for the purpose of generating electricity from the movement of wind. Installing wind turbines out at sea means a more stable airstream and speed, since there is no terrain that can disturb the wind flow. In addition there are no nearby inhabitants that are bothered with the sound and visual impact that a modern wind turbine is bound to give. With a good location selection it is also possible to avoid negative impact on the fauna, for example concerning birds, which has been a discussion regarding some land-based wind farm areas. Even though the energy generating turbine industry itself is mature, there are complementary features of offshore wind transferable from O&G. This involves installation and service vessels, fundaments and

transmission lines, which are similar to installation and operation of facilities of the O&G fields offshore in Norway.

One smaller test site has been set up for offshore wind in Norway. This was for the concept “HYwind”, developed by the Norwegian company Norsk Hydro. Rosvold (2013) informs that Hydro was in 2008 bought by Statoil, the largest O&G actor in Norway, which took over the project. The test site was set up in 2009 and even though the direct cost of the site is unknown Statoil have reported to have invested around 400 million NOK in the project, with an additional support of 59 million NOK from the governmental agency ENOVA. The test site consisted of one floating wind mill with electrical energy transportation means (Rosvold, 2013).

4.2.1 Offshore Wind Installation

Somewhat simplified, an offshore wind production facility consists of three major parts (The Crown Estate, 2010). The first is the turbine. This is in general very similar to the turbines found onshore and can be of various sizes and be able to produce various amounts of electricity. These turbines are placed and fixed to a fundament, also called the tower. These fundaments can have very different designs and be either fixed to the seabed or floating. The major designs of fixed fundaments are monopiles, tripods or jackets. Jackets are a steel lattice construction, generally with three or four legs installed on/in the seabed, while monopiles are large tubular constructions that through various installation methods are fixed to or driven in to the seabed. Tripods are large tubular constructions with three legs near the bottom that are fixed either by suction or driven in to the seabed. Floating wind turbines are currently being developed and tested, but have not been installed in great numbers. The third aspect of an offshore wind farm is cables and electricity transportation means. Cables are connected from each turbine and usually gathered in a subsea transformation station before it is sent to a facility on shore that distributes the electricity further out to the grid.

An offshore wind mill is preferably installed by specialized vessels designed for carrying and installing the fundament and wind mills. Due to the size of the constructions, how many fundaments and turbines the vessel is able to carry varies on the technology chosen from project to project and vessel to vessel. The ship involves a crane or a multiple of cranes for lifting the part in to place. If a vessel is not able to carry all parts necessary for the installation

of one field it must at some point receive additional parts. This is referred to as the feeding cycle and either involves the vessel going back to shore, or that another ship comes out with the parts and they are lifted into place by the specialized vessel. Laying electrical cables are done in many applications in many industries and are done by specialized cable laying vessels not unique to any particular industry.

4.2.2 Economical Background and Potential

The potential in offshore wind as a producer of electricity is hefty. For instance, a report published by the Norwegian governmental agency ENOVA states the potential in Norway exclusively to be in excess of 14 000 TWh, almost four times the total consumption of the EU (ENOVA, 2007). Reports like this and others contributed to, as the industry started to emerge in the early 2000s, the idea that offshore wind would be one of the main fundamentals for renewable energy production in the future.

The total market of the industry worldwide was in 2013 estimated to be around \$180 billion by 2020 (Rolan Berger, 2013). In 2013 over 1,500 MW of offshore wind capacity was installed across the globe, with almost everything in Europe (EWEA, 2014). Of that, 75% was conducted in the UK and Denmark (EWEA, 2014). This corresponds to an estimated investment of between 4.6 – 6.4 billion EUR and around 14 % of the total installation of wind electricity production in Europe (EWA, 2014). Even though the very large growth pictured in the early 2000s have yet to occur, the installed capacity is steadily increasing from year to year and taking a larger and larger portion of the total wind market in Europe.

One of the key reasons why offshore wind is not growing as fast as many would believe might be the cost of installment and operation compared to alternatives. The first installations of offshore wind have shown to be more complicated and prone to problems than anticipated, and several have gone over budget and their timeframe. At the current time, installing offshore wind turbines are around twice (or more) as expensive as land based wind mills per KW, and the operational cost is also more expensive than for land based turbines (NREL, 2013).

5 Findings and Analysis

5.1 Company Presentation

In general, few companies have had viable success and survived until today as a consequence of development and sales of their products solely within offshore wind. The foundation for our analysis is six separate interviews with industry actors. Of these, five separate companies were involved, in addition to one industry organization who was also interviewed to give a better general overview. In chapter 3 Methodology, we argued for interviewing companies with different experiences, both in product and level of success to get the best possible insight into the research topic. This chapter will present our findings thematically in accordance to the theoretical framework, and our analysis presented in accordance with our propositions. We have kept these separate to better keep the quality of our data and not present the reader with data that already have been subject to our own interpretation.

Below follows a presentation of the companies given anonymously.

Company	Product	Started	Revenue 2012 (in 1000 NOK)		Grade of success
Company A	Full value chain	2001	31 100*	Spin-off	Success
Company B	Complete floating wind turbine solution	2008	56	Spin-off	Passive
Company C	Installation and service vessel	2008	30	Start-up	Passive
Company D	Installation, service and maintenance vessels	2010	6 800	Spin-off	Passive
Company E	Foundations	2004	12 400	Start-up	Success

INTPOW	Organization for promoting and networking the industry	2010	NA	NA	NA
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Table 4. Presentation of interviewed companies

**Not solely focused on offshore wind*

Company A

Company A is primarily known as a shipping company. The main company was founded in 1848 and owns several companies over a wide range of industries. Although the spin-off that we have named Company A is just a small part of the larger corporation, there are over a 1000 employees in the corporation's renewable energy sector that was started officially in 2001. The offshore wind interest was a transition from its interests in both O&G, shipping and onshore wind. They own several onshore and offshore wind parks and provide the entire value chain with installation, logistics and technology. They have invested over 8 billion NOK in the offshore wind industry. Taking all of this into consideration we have considered this company as a spin-off with success.

Company B

Company B is a spin-off company of the Norwegian branch of a foreign company. The mother company performs certification, engineering services, inspection and development focused on the O&G and marine industry. Company B was set up in 2008 based on technology developed by the main company in 2006. The company had success in getting additional partners and investors, since then it has only done smaller prototyping and tests and has had no sales. Currently it is in a state of hibernation, and is considered a passive company.

Company C

Company C is an entrepreneurial startup established in 2008. Their main focus is on developing and operating purpose built vessels for installation of turbines and foundations. They have been close to building the vessels, but have been unable to secure the funds. They are currently in a state of passiveness awaiting further progress in gaining capital, or changes in the market.

Company D

Company D is a spin-off company from a Norwegian shipping and investment company. The mother company deals with ship operation, logistics and ship brokering in addition to ownership and activities in various other companies. Company D was set up as a product of an internal project based on installation of offshore windmills, and as such the company focuses on technological and logistical challenges in offshore wind. Their main goal is to develop a purpose built vessel for offshore installations. The company has done several projects and is not entirely passive, but it is currently not in full operation. They are awaiting external market factors to improve, and as such we consider them as a passive company.

Company E

Company E is an entrepreneurial startup formally established in 2004. They focus on providing fixed jacket solutions for offshore wind. The company has had several larger contracts and has in total delivered over 80 jacket foundations. They have had a substantial growth in its lifetime and we consider them in this context as a success.

INTPOW

INTPOW is a Norwegian networking organization with a main purpose of promoting cooperation between Norwegian and foreign actors in the renewable energy industry. It is a joint venture between the renewable industry and the Norwegian government. They have published extensive reports on the offshore wind market in Norway.

5.2 Findings

Our findings will be presented thematically below. Given our semi-structured interview method it can be difficult to clearly distinguish the topics of the data based on the theoretical framework. In presenting the findings thematically we aim at providing a more clear view of the findings building up to the analysis and discussion to come where we analyze over the propositions. The presentation within each element is split into start-ups and spin-offs.

5.2.1 International Entrepreneurship

The research done on international entrepreneurship proposes 4 different elements that are crucial to the success of an INV (Oviatt & McDougall, 1994). The first of these is the internalization of some transactions. This element has not been a focus of this project since it basically depicts why firms and organizations exist. We assumed, and rightly so, that the firms we investigated owned some assets, not necessarily finalized products but also knowledge and services, that could be used in economical transactions.

Below is a presentation of the findings in relation to the remaining elements of international entrepreneurship theory.

Alternative Governance Structures

The element of alternative governance structures refers to the challenges a new venture faces when a lack of resources, both in capital and knowledge, lead them to seek resources outside of the venture. Presented below are the findings related to how our companies use networks and alternative governance structures to add resources and capabilities.

Start-ups

Company C and E are startup companies that both mention the use of external networks when starting up. Company C, a small startup based in Stavanger, had a board of directors with networks that helped them in the beginning.

"We have at every stage had very few employees in this company, between 0 and 6-7. But we have had a significant board of directors with an extensive network. And this network aided us especially in the first years to develop faster than what you would think for such a small company" (Company C).

Not only previously established networks were mentioned as an aid to gain additional resources. The use of consultants in processes where the existing network could not provide adequate expertise is also presented as means to gain resources.

"Consultants have also been used in addition to the 6-7 employees we had, since we can't cover all fields of knowledge with such a small team. Especially in the design process we

hired external consultants to contribute. In the communication with shipyards we also hired a consultant that had previous experience from the O&G industry and great knowledge in ship building" (Company C).

"One important thing about our internationalization process is also that we had great knowledge in O&G, marine activity and finances, but lacked the knowledge about wind. So we have had two Danish employees that came from the wind industry, and especially the last one came from a large manufacturer of turbines. So he brought with him additional networks in the wind industry that we lacked, and so we gained a lot more momentum with the important actors in the industry" (Company C).

Although most companies and their projects are capital intensive in this industry, Company E offers design solutions and project services, and as such did not need the large upfront cost of building a vessel or large constructions. This company also mentioned networks from previous experiences when we asked about the lack of resources new ventures might face.

"In the beginning it was just the two founding entrepreneurs, and they had the finances to start for themselves. They were not afraid to speak their mind and had a great network because of their extensive experience" (Company E).

The company also talks about the extensive collaboration with turbine manufacturers. The wind park developer will typically ask them to do an analysis of 10 turbine manufacturers and their product with the foundations the company provides. With that, the dialogue between the turbine manufacturers and the company is close. This iterative process where data is shared creates a more optimized solution.

When Company E was asked if doing a joint venture had been considered, in part to extend their product portfolio, they mention the risk involved in addition to the possibilities being a small company gives you.

"We see that of the larger EPCI contractors, some get almost no contracts while others get maybe every other contract, and a few get many. So it would be difficult to find the right partner for us, and with being independent we can collaborate with all the larger companies in the industry. But yes, it is a possibility filled with risk since you place all your eggs in one basket" (Company E).

Spin-offs

Not only startups use external networks to gain resources. Company B, a spin-off from a Norwegian branch of a foreign company was created when external companies engaged in a joint venture. With the mother company having strong competences in onshore wind, they built on this and wanted to combine this with the strong offshore competence associated with Norway.

"A large state-owned renewable energy company decided to support the concept and become, in addition to another Norwegian industry group, shared owners in a newly founded spin-off. The Norwegian industry group is not only a considerable factor in the offshore industry, but also has experience in renewable energy and electricity production, and owns a company that build turbines and equipment for hydro power plants. The large state-owned renewable energy company became the major shareholder in the company. For us and our concept this was about the best possible thing that could have happened..." (Company B).

Company B also mentions that they didn't use many existing networks to engage and research the international market. Instead they utilized Innovation Norway and various embassies to facilitate meetings and conferences. The other two owners added a network, and were used to meet a variety of interesting actors. However, the company never left the project phase, and so the full extent of the resources that could be gained from the network the co-owners provided is unclear.

The two other spin-off companies, A and D, are owned and backed by large companies involved in O&G and shipping. As such they have not mentioned the focus on external resources as a way of combating the lack of resources in their own company. Especially Company A with its large and complex infrastructure focuses on providing the entire value chain, and so they do not focus on less internalizing and alternative governance structures. When asked how they tried to internationalize and if they used existing networks, company D, a spin-off from a large shipping and investment company, mentions trade fairs as a meeting ground for the industry. In addition they list the respect the mother company has within the marine industry as a way to get access to networks.

"We explored and investigated, there are some meeting grounds where you can come in contact with actors in the industry. In the start, when we started investigating the market in

2006/7, there was not that many who were involved and you could get through a whole trade fair in a couple of days. It was just classic market work, traveled around and asked for meetings with the ones we wanted to talk to" (Company D).

INTPOW, a Norwegian networking organization, believes there are two things that are important for start-up in offshore wind. First is finding an industrial partner, and the second is to find someone willing to invest. However, finding someone willing to invest without an already established industry partner might be difficult, and vice versa. So expanding your network and letting your project be known within the industry is important.

Foreign Location Advantage

In this section the theoretical framework moves into an international perspective. The term INV, international new venture, is used so that international means the transaction across a few borders and not necessarily completely global. All of the companies have interests in the international market and has either done business there or is/was planning to do business in the international market. The theory presents differences in the way international strategies are chosen being a small or a large company. Smaller companies cannot rely on their wealth of resources to overcome challenges, and needs to focus on other options such as utilizing their private knowledge. Presented below are the findings related to international aspects of the operations in the companies.

Start-ups

Company C developed a design and an idea for a vessel used for offshore installations. Their knowledge and expertise was their main resource, but building the ship in Norway was not an option due to the commercial conditions and general cost.

"After testing and prototyping we did a proper tender evaluation back in 2011. We had pre-qualified a couple of shipyards, all international, and the most important terms for us were commercial conditions, experience in building jack-ups with propulsion and also experience and understanding of how to build offshore wind specific vessels. The shipyards were situated in South-Korea, China, Singapore and in the Middle East." (Company C).

After negotiation with both the different shipyards and the board of directors, the company chose the Chinese shipyard because of the superior commercial conditions and financial packages offered. In the end the financial situations both in the firm and in China altered the agreement. This in turn meant that the company could not meet the financial requirements for the new agreement.

The company focused on international customers and the turbine manufacturers. They thought of 3 potential groups of customers in the market; energy companies, turbine manufacturers and larger EPCI contractors. Their goal was to take part in round 3 projects planned in the UK, but they have been unable to gain finances for building the vessel, and as such been unable to gain customers in the international market.

Similarly, Company E has brought jacket foundation designs and concepts to international manufacturers and used their expertise in conjunction with foreign production. They snatched their first big contract after entering the tender process in the last minute.

"The jackets were then built in Scotland. Since then we have built foundations for four different offshore parks and one onshore park. In total 86 foundations for wind turbines, and our last contract was on 48 foundations for turbines and one for a transformation station, all constructed in Belgium" (Company E).

Delivering the design to just a small part of the value chain is one of the ways the project can be made feasible if customers are worried about domesticating production according to the company. Being Norwegian, with a good reputation as business partners can be a plus despite of the cultural differences and barriers of foreignness.

"So the bigger worker numbers go into manufacturing and installing, and the concern of domesticating production is more directed towards those processes, not design" (Company E).

Spin-offs

Not only the start-ups had the idea of providing for one small part of the value chain, and similarities to Company E can be found in Company B. Their intention was to be a company that sell services and develop concepts, the actual production and developing of wind parks was to be done by others. In the beginning their idea was not to look at the domestic market,

but instead to focus on the export of services similarly found in the O&G industry. At the same time, the Norwegian government and the political environment was pushing for new technology and saw the potential in the Norwegian coastline. It looked promising for Company B to enter that development but then the financial crisis hit and the situation changed; the focus was back on internationalization. Although the company never reached the phase of construction and sales, the intention was different compared to the start-ups when it came to where construction should happen.

"We, through our involvement in company B, have on the other hand tried to argue for the creation of jobs and activity in Norway and the export of technology as the focus. However, it always falls back to the same argument. The policy and funding system says that one should develop Norwegian technology and industry for the domestic market and, basically then focus on the international market" (Company B).

The larger companies A and D have more complex structures in terms of manufacturing and international location resources. Company D does not have any specialized vessels currently and has in their previous projects used the ships available. Where and how the production of future vessels was to be done was not revealed, but when asked if there were any problems in going international the company mentions cultural differences. Additionally, the company emphasized their view on how a home market could be beneficial to the development. They were also involved in a proposition to the parliament for a domestic pilot project in collaboration with other industry partners and government agencies. It did not go through, but the company believes the Norwegian industry would have looked different, since a lot of testing and proof of concepts could be done before going international.

"... specially related to not understanding the culture and politics of how things are done. It would have been very beneficial to have a home market, you are in a network and know people, and are close to the decisions and able to act fast on projects and problems" (Company D).

Company A is more elusive about their detailed operations, but they do have a strong international foothold. The mother company owns several renewable energy concepts and companies, and the ownership structure is complex. They have also been known to buy companies with technical innovations within the industry and so add their technology under the company portfolio. In addition the company aims to deliver the whole value chain, from

exploring to construction and development. Without a home market this means that most of their operations within offshore wind are international, with UK and Germany mentioned as the most prominent markets.

Unique Resources – The Resource Based View

For a unique resource to be sustainable, the theory states that it needs to be valuable, rare, imperfectly imitable and without strategically equal substitutes (Barney, 1991). Below we present some of the findings related to the uniqueness of each company and what they expressed as their advantages.

Start-ups

Although many of the companies have filed patents on their technology and solutions it seems like this is not something that they have emphasized. None of the companies mentioned the protection of technology without being asked if they did, and when discussing resources, they mention more intangible sources such as human capital and experience.

"We have several patents on different parts of the jacket. Especially the spacer we talked about and the detailed part of the leg socket, the actual stop ring is patented. In fact, pretty recently a bigger project contacted us to ask if their design infringed our patents" (Company E).

With company E, their main focus in the beginning was the technical solution and making the design better than the competition. However, not only their patented product has been a useful resource to them, and in fact the experience and human capital inhabited by the entrepreneurial team has shown its importance over the years.

"We deliver the design of foundations yes, but we experience that a lot of projects encounter problems in some areas. But with the background of this company has and with the previous experience from oil/gas we are able to see the project as a whole. We want to see the project succeed in getting installed, not only sell foundations. When meeting customers I have experienced that one of the founding entrepreneurs of our company asks how things are planned. And they will be surprised by the knowledge he has about what problems they face,

and he will bring some ideas on how to solve these issues. And so he has gained a lot of credibility and is sought after in the market" (Company E).

When Company C started to look at offshore wind as a potential market, they pooled their expertise and knowledge from other industries to look at the installation process. The company credits their expertise and the dense networks in O&G in Norway for their quick development.

"...we realized that we could pool our knowledge from the O&G and marine industry to the installation process in offshore wind. This is also one of the main reasons for starting up the company, the dense network of O&G knowledge realized the potential in offshore wind and how the market had a lot of similarities to O&G 30 years ago" (Company C).

They saw their core advantages to be the extensive experience within O&G in addition to the dense network of offshore competence, together with the network gained from the board of directors.

Spin-offs

All the spin-off companies have filed and been granted patents on their technological solutions, but did not emphasize this point during our interviews. Company B focuses on the competences they gained from the mother company and the experience they had from doing work in wind and offshore industry.

"We have for example a good competence in CFD analysis, materials, corrosion, service and maintenance, and this was something we tried to focus on during the development of the concept" (Company B).

In an offshore project outside Denmark, issues were raised when service on the gearbox had to be done and expensive crane vessels needed to be hired. Company B addressed this issue with their solution where you can disconnect the installation and tow it to land and use normal equipment. This demonstrated their knowledge and competence within installation, operation and service, something that they felt was their competitive advantage.

Company D focuses on the logistics and technology within installation of offshore wind, and has used a lot of resources to develop new technologies for the emerging market. Although

they have protected some of their new technologies they focus on their experience and know-how in the marine and shipping industries as their advantage. They also emphasize the newness of the industry, and in general that the ones that commission the projects have little experience in doing things at sea.

Company A differs from most companies on our list in terms of their sheer size and available capital. They have many patents, and have among many other things developed a specialized jack-up vessel for offshore installations. They stated that their advantage was how they could provide the entire value chain, and that the strong background in O&G and shipping made them experts when the offshore wind industry emerged.

5.2.2 Effectuation and Causation

The research done on effectuation and causation explains the nature of opportunities and how companies mediate the resources required for developing the product or service to commercialization. The evaluation of whether or not the process has been a result of an effectual or causal logic involves many gray areas and overlapping traits that will be subject to analysis in the next section. We will here present findings from our interviews concerning the process the companies have had around their product development, how they related to the opportunity and inevitably the establishment of their company.

Start-ups

Company C and E are start-ups that was set up after evaluating the emerging industry. Company C was set up with individuals having extensive experience in O&G that saw a synergy in the competence possessed by the team and the different traits of offshore wind. There was also a personal motivation in investing in the industry.

“... (my father) had contacts in the states with some investors involved in onshore wind projects. And the talk of offshore wind parks emerged, something that they were going to invest in, but had little knowledge in...they searched for people with knowledge, and knew that Norway did a lot of offshore. They contacted us, and we started to look at the market and realized that there were many parallels to oil and gas.” (Company C)

“...one of the main reasons for starting up the company, the dense network of oil and gas knowledge realized the potential in offshore wind and how the market had a lot of similarities to oil and gas 30 years ago.”(Company C)

“We looked at installation and realized it was something we could do and it would be interesting and rewarding to do something new and oriented for the future.” (Company C)

The product development itself for Company C seemed to have started without a somewhat concrete idea, but instead looked at the experience and the competence of the individuals involved in the start-up.

“We started in 2008, and looked a bit on developing our own foundation since one of our board members had the knowledge to do so.” (Company C)

“...it did not fit us...but we realized that we could pool our knowledge from the O&G and marine industry to the installation process in offshore wind” (Company C)

After starting to look at this idea, the company hired individuals who had the knowledge and competence to aid in development of the project.

“...in the beginning we didn't have the detailed knowledge, but we saw the vessels that were used and decided that this was something we could do better.” (Company C)

“Pretty early on we got 3 employees with oil & gas background with more technical understanding and knowledge of how installation and cranes work.” (Company C)

Company C used this knowledge to develop a concept for an offshore wind turbine and fundament installation vessel. After the initial idea was created, the company also had several rounds before ending up with their end concept. They used this phase to look at other available solutions on the market and where they could find a competitive advantage in the industry.

“Our main idea in the beginning was that jack up vessels are more suitable for stationary operations and are not designed for shipping. Both the technical and economical aspects of using jack up vessels for transport seemed not optimal to us.” (Company C)

“With the feeder process we proposed, the technical challenge is the dynamic lifts from the transportation vessel to the jack up. So that is one of our strongest technical advantages, our crane can do these lifts but our competitors cant.” (Company C)

This phase also involved communication with other links in the value chain, with an intention to make the idea as generic as possible within what they had envisioned.

“All offshore turbine manufacturers are international; so we have focused on have a close dialogue with these for our technical layouts” (Company C)

“Some of the larger contractors and turbine manufacturers have helped us along the development track in terms of providing technical information etc., and some have been more focused on the feeder cycle in terms of installation of foundations.” (Company C)

The company also stated that the active ownership culture shown above was used as a control in the idea generation and designing of the concept when they involved more investors.

“Expanding this circle of investors was not just to gain backing but also to calibrate and see if others believed in the company and the idea. If we just sit here in a closed club in love with the project, we might cloud our vision.” (Company C)

Not having the resources to design a complete vessel alone, the company approached a foreign company doing ship design for finalizing their idea. In this they widened their competence pool further.

“... (they) have been doing vessel design for many years and been involved in many of the offshore wind specific designs in other companies. In this design process we brought our ideas and specifications and they brought their ideas that originated in a drilling rig” (Company C)

The initiative behind Company E was started by the founders in 2001, thereby engaging fairly early in the emerging industry. Similarly to Company C, the founders were encouraged to look at the industry by outside individuals, and saw a potential for using their competences and knowledge from O&G in offshore wind.

“...they started on this project in 2001, under a different name, after someone advising them to look at offshore wind. And so they looked at the current market, and the estimated growth

rates and saw that the industry had potential and that there was use for the knowledge and competence they had.” (Company E)

The company won their first contract in 2004, and as for the other companies presented earlier, the founders had several rounds of adapting and altering their solution before finding an idea and concept they wanted to proceed with.

“They looked at a lot of different things in the beginning. One was a gravitation-based solution in which you cast a foundation and create a jacket with a column up to where the turbine is attached. So they looked into all different ways one could do this, but focused more on jacket solutions. In the beginning they had both three legged and four legged solutions, but what ended up as the technical winner was the four-legged jacket.” (Company E)

“...the concept was superior with the 25 years of experience they had from that segment of offshore installations. But it took a bit of time to learn how the industry worked; it was and is still an immature industry” (Company E)

The company established themselves as a provider of jacket fundament designs, but has chosen a business model where they are an engineering company delivering the service of designing. This enables the construction of the products to be built where suitable or where the contractor may choose.

“Many may feel that they want things to be built locally to have the most control.” (Company E)

The product they offer is not dependent on a specific turbine or manufacturer, but as a logical analysis they have chosen to keep the options open for whatever solution the contractor chooses. As a consequence some of the service the company offers is optimizing their product against others to find a best solution.

“Often when building larger parks/projects they do a feasibility study or analysis, and tell us that they are looking at 10 different turbines, and ask us to do an analysis of these turbines with your foundation” (Company E)

The company further stated that as the industry is not mature and no standardized plan of how to conduct a project exists. They wanted to build credibility around their solution and the company, and this led the entrepreneurs to utilize the experiences from the O&G sector and

from projects conducted to slightly widen their service. With that, they did not only deliver fundamentals but also advice and provided insight in to several other links in the value chain for the contractor. This is also something they now want to consider to deliver a better overall product.

“...they will be surprised by the knowledge he has about what problems they face, and he will bring some ideas on how to solve these issues. And so he has gained a lot of credibility and is sought after in the market.” (Company E)

“The new CEO has mentioned that we need to deliver that EPCI-like consultant service on how to best stitch together a project. That was one part of our winning recipe before, not just delivering the jacket but also useful tips and hints on how to solve issues.” (Company E)

Spin-offs

Company B and D are both spin-offs of larger companies involved in O&G and shipping, that were set up after internal projects in their mother company. Company D saw a direct gap in the market they wanted to act on.

“There were some good projects we worked on, transportation of fundamentals and equipment associated with offshore wind that was going out to the fields with barges or tugboats. So we saw, as many others did, that there was a gap in the market.”(Company D)

Both projects were started as a consequence of a desire of addressing a new market that looked promising. The gap Company D had come in contact with showed a possibility to utilize the competence they already possessed and the project had a goal of what they wanted to achieve. After setting that goal they did have rounds of finding out how to achieve their specific solution, involving the company competence and designing the technology.

“The main principles, or the goals and function, were put down early on. There have been a bit back and forth to find out how we were going to do it, but the main idea has been followed.”(Company D)

Throughout the interview, Company D stated their experience and foothold in the shipping industry as their source of competence, and also that the projects they had been involved in was a basis for their design.

“...we have developed the technology with operation in mind and did not just start out with a plan to build a thing in steel. It is based on our experience and what we have learned in the project where we have been involved.”(Company D)

Company B wanted to utilize the competences found in the entire branch and in Norway as a whole, and had a clear view on utilization of their existing resources. It was favorable to relate it to wind, but they had a looser plan of what they wanted to achieve. This did have its effect on the design process of the product, where they wanted to play on as many of their core activities as possible but also differentiate from what others had done previously.

“We, as a part of a company with strong competence in wind, can draw on the competences found there and the very strong offshore competence found in Norway. Not only in our company, but the knowledge found throughout the industry clusters in Norway.” (Company B).

“We did not consider land-based energy generation from wind, in that sector the positions are well established and the industry is dominated by the big actors, we instead tried to see where we had a competitive advantage. To gain this it had to be offshore... It is useless to copy something that already exists, so we wanted to think differently and started looking at the linear costs and the non-linear costs” (Company B)

Company B referred to adapting their product after experiences they have had in projects, but also learning from how other problems have been faced by the competition and comparable industries operating offshore.

“...we knew from the offshore experience that some of the expenses are not linear, a lot of fundamental costs are similar, and as a future analogy that the more installed capacity you get from each floater the better the economy should be” (Company B)

“That is also a competence we have learned and see from our offshore experience that it costs 4-5-6 times as much to do things offshore compared to onshore.” (Company B)

“We saw a project in Canada where they could uncouple a large oil and gas platform in the case of an iceberg, even though it has never been put to use the concept of “plug and play” couplings is there and implemented. So when you can do that with a large oil and gas platform you can do it with an electric connection, and the couplings are basically off the

shelf products. So if you get a complication you call on two conventional supply vessels, uncouple the electrical connections, drag it to land, do the maintenance and drag it out again.” (Company B)

When Company Bs’ concept had reached a stage where they could approach the market, they started discussions with potential partners and started a validation of concept phase. The company had rounds tailoring and optimizing their core idea to the response they got from industry actors. Among them was opting for three equal turbines, instead of having two different technologies.

“The feedback from energy companies was that it was not beneficial to have two different turbines, so we altered the concept to have three equal upwind turbines.” (Company B)

Company A is also to be considered a spin-off, but is in this context more difficult to present both based on complexity and the interviewee not wanting the conversation to be recorded. The company started with onshore windmill projects in the 90’s and from that continued on too offshore. With the investment in onshore windmill projects they developed a competence in wind energy and with the core activity of shipping, the transition into offshore wind was a logical next step as the industry started to emerge.

The company wants to be involved in the whole value chain, from exploring possible sites to development and building of farms. Because of the size of the company, the ownership structure is complex, and there is no single company that has been created to deal exclusively with offshore wind. Because of this, the innovation process is also complex. Mainly, they work goal oriented and leadership from top management initiates tech development, but in regards to expanding the resource base, the company has bought many smaller tech companies to access their technology and add it to their portfolio.

5.2.3 Strategic Decision-Making

The theory agrees that strategic decisions in a company are taken by the top management and therefore the performance and survival of the company (Chrisman, Bauerschmidt, & Hofer, 1998: 7). Our companies consisted of spin-offs and start-ups in different phases of maturity that should provide an interesting basis for an analysis around this theoretical angle and provide a basis for the analysis around effectuation vs. causation.

Company A

For Company A with their amount of resources and sheer size with many sub-companies, the structure of the decision-making process is complex. The interviewee expressed an opinion that the main responsibilities lie with top management, and it is them who decide the strategic route forward. The start of the renewable energy division in the company was initially also an initiative started by the owner of the company based on a desire to move in to renewable energy.

Company B

Company B is the result of a project conducted within the Norwegian branch of a foreign company, but did after the project completion involve additional partners. The decision-making processes throughout the company development therefore changed when the additional partners were included. In the first part of the company development, when they conducted the project to research alternatives, it was important to have a foundation for decisions in the whole company:

'The decision for allocating those resources to develop a concept was made by the board of directors for the Norwegian branch of our owner company where we got acceptance to use these resources. We also had it up for discussion in the board of directors for the whole company, to anchor it and get acceptance from the whole company, but also so we could involve competence from other parts of the total company' (Company B).

In including a large part of the company to take the decision and be involved in the process, the company felt that they could better exploit the competences found throughout the branches. After the initial concept was developed and the start-up was set up, the company involved the other parties in the decision-making process.

'When the start up was founded we had a board of directors where the different owners were represented, and they had an active part in the company as well' (Company B).

Company C

Company C is a start-up company founded by individuals with a diverse, but strong competence in O&G. As we presented in the findings related to effectuation vs. causation, the

company was a bit back and forth in deciding what product they were going to develop, and the company stated that the headroom and the possibility to discuss anything with the individuals involved in the venture as criteria for developing a solid product.

'The board meetings were very active in the beginning and acted more as operational meetings' (Company C).

'The board has processed the most important decisions with the entrepreneurial group. And there has been a lot of headroom in the company' (Company C).

'It might be that groups fall so much in love with their project that they sugar coat it before presenting it to the board/owners, but that has not been the case with us' (Company C).

Company D

Company D is also a spin-off from a larger company that was set up after an internal project. The company also expressed that important decisions have to go through the board of directors.

'We have a board of directors above us where the owners are represented that things go through and larger decisions are made' (Company D).

Company E

Company E was started by two individuals with solid knowledge from relatable industries that saw a potential in offshore wind. Having the capital to start for them self, and delivering a product that was not as capital intensive, meant that they could in the beginning run the company without involving a long list of investors. As the company grew they also established a board of directors to channel the decisions through and where the various owners were represented. Most recently 49% of the shares were bought by a larger international company. This has also inflected the decision making process in the company.

'The difficult thing about going from a small company of two to a larger one is defining who does what and when...There is a very different professionalization, new rules and procedures and quality control over the work that is done.' (Company E)

5.3 Analysis

At this point it can be fruitful to revisit the initial propositions and questions that we posed. Our research question is set quite wide in terms of scope, but our focus is narrowed down with the help of our propositions. The main purpose of this thesis was to get a deeper insight into how Norwegian offshore wind firms cope with the pressure of internationalization, and how they have tried to reach foreign markets. The analysis of the data retrieved will be conducted in accordance with these propositions and presented in relation to their theoretical angle to ultimately provide a basis for answering our research question.

Research question

How do Norwegian firms within the renewable offshore energy industry internationalize?

Propositions

Norwegian offshore wind firms leverage domestic and foreign resources in accordance to international entrepreneurship theory to create a sustainable advantage.

Norwegian offshore wind firms use an effectual approach to gain resources for internationalization.

The reputable and mature Norwegian petroleum and shipping industry is a valuable hub of resources that offshore wind companies are using in their efforts to internationalize.

5.3.1 International Entrepreneurship

The theoretical framework given from international entrepreneurship presents a view where certain components are essential for a sustainable international new venture (Oviatt & McDougall, 1994). Our analysis will exclude the first point about internalization of transactions as we argued for in the findings section. Analyzing our findings relative to these components will allow us to evaluate our first proposition:

Norwegian offshore wind firms leverage domestic and foreign resources in accordance to international entrepreneurship theory to create a sustainable advantage.

Alternative Governance Structures

The first component that needs to be present for a company to succeed internationally according to international entrepreneurship theory is the use of alternative governance structures. Both of the startup companies, and particularly Company C explained how the previously established networks and new networks were used to cover up the resource potholes that they had. The startup companies also mention the close collaboration with industry partners when developing their solution. This extensive use of existing networks and the search for new networks to fill their gaps indicate that the startups use alternative governance structures as the theoretical framework suggests.

Company B, one of the spin-offs, was created as a joint venture after the mother company had established their idea. This gave them access to a wide range of new networks, particularly in renewable energy and offshore industries.

Larger companies with backgrounds in O&G and shipping own the two other spin-offs, and it seems like they do not seek external resources and networks to the same extent as the others. As such it seems like the larger companies are accustomed to mature industries and do not feel the need to use alternative governance structures.

To summarize; from our data sample, the smaller start-up companies use alternative governance structures as suggested by theory. Spin-off B was created as a joint venture to gain both capital and resources, and as such also follow the theoretical suggestions. The other spin-offs rely more on their wealth both in resources and capital, and would rather purchase technology or invest in companies that add to their portfolio.

Foreign Location Advantage

The second component that is crucial to the international new venture is foreign location advantage. The theoretical framework presents several strategies that can help new ventures in their internationalization efforts. Private mobile knowledge and strategic decisions in market entries are some of these (Oviatt & McDougall, 1994: 56).

Again the start-ups show prominence in their use of mobile private knowledge. Private knowledge and the use of less mobile foreign resources are one of the key aspects presented as a tool to face competition from larger companies. Company C developed a technical design

for a vessel and took their knowledge and expertise to international resources that developed the idea further. Especially considering the shipyards tendered for construction, the foreign location advantage was demonstrated. The financial and technical considerations demanded internationalization in this step, as Norway would be too expensive.

Similarly Company E took their design and technical solution and used construction sites abroad. In addition, they mention the fact that since they just deliver a small part of the value chain, they do not take away too much of the domestic labor that would be required. As such they do not pose as much of a threat when going international.

With that, the start-ups again show a clear coherence with theory when it comes to relying on private knowledge. However, in terms of strategic choices the theory states that small firms with limited internationalization experience prefer to engage in joint ventures to compliment their need for experience with international resources. Neither of the start-ups has engaged in joint ventures, and even though Company E had considered it as an option they mention some of the risk involved, especially with an industry that has not matured significantly.

Company B has used similar ideas in terms of international location advantages and their intention was to be a service and concept development company. The actual building and park development was to be done by others in foreign locations. However, they do emphasize the fact that they wanted to create jobs and activity in Norway, and then export the technology. Since they never got to the construction phase, it is tough to predict if domestic construction would be an option or if they similarly to the start-ups felt that foreign locations was more advantageous.

Company A and D, spin-offs backed by larger companies, have more complex company structures. They were more reluctant to reveal their detailed operations, but seeing as their mother companies are large and international, one can assume that the spin-offs have some international involvement. Company D also discusses the possible benefits of a home market, or at least available test sites. While this does not necessarily contradict the theoretical suggestions, it does however point to the nature of the knowledge the companies possesses. Some knowledge might be less mobile by nature, and needs a stronger development and proof of concepts before taken international. Company A is a different beast from the rest, and relies on their sheer wealth and size when internationalizing. They have developed several farms and projects internationally and in that sense one can consider that they leverage

international location advantages, but they do so at an entirely different level than the other companies.

To summarize; our data shows that all the companies have international interests, and most of them have expressed their use of foreign location advantages in their company. The theory suggests strategies that international new ventures can use to internationalize when they have a lack of resources, and as we saw, our start-ups follow some of these, if not all. The theory does not focus too much on large companies, and so Company A with its reluctance to reveal detailed information and their complex structure is hard to evaluate properly.

Unique Resources

The last component that the theoretical framework presents as crucial to an INV is unique resources. We have through reviewing the research done on the resource-based view defined unique resources as a source of competitive advantage if it fulfills a number of criteria. These criteria is that a resource has to be valuable, rare, imperfectly imitable and without substitutes (Barney, 1991).

Although the companies have patented and protected aspects of their technology, they seem to focus more on the value gained from human capital. Extensive previous experience and technical know-how within the founding group was of great importance in Company E. Company C additionally mentions the networks gained from an active board of directors. These resources fulfill many of the criteria set by the theory since you cannot just copy a person and his knowledge, and you cannot imitate the board of directors and their unique networks within several industries. One can argue that similar advantages can be obtained by other means, but these human resources are unique to these companies and have in their view helped them in gaining an advantage.

Not surprisingly the spin-offs focus on the competences that they could draw from the mother company. Company B had from the mother companies drawn experience in installation, operation and service, and developed the design and solution after that. Company D focused on logistics and offshore technologies, something that the mother company was experienced in. And finally Company A, with its sheer size and wealth decided to provide the entire value chain. In fact Company A stated that being able to provide for the entire value chain is their foremost competitive advantage. Since relying on the competences of the mother company,

spin-offs also have unique resources that are hard for others to copy directly. Substantial networks, experience and synergetic know-how from O&G are all resources that can give competitive advantages. The spin-offs have all protected parts of their technology portfolio with patents creating additional possibilities for competitive advantages.

To summarize, unique resources play a large part for all the companies. Although the nature of resources is different between the companies, they all show coherency towards the criteria set by the theory.

Summary of Analysis

Our analysis of the data given in relation to our first proposition shows a number of things. First, our start-ups show the greatest similarity to our theoretical framework and their use of domestic and foreign resources are in accordance with international entrepreneurship. The exception is going into joint ventures when internationalizing. This is however just a small part of the suggested strategic choices, and the theory also mentions the evaluation of risk. Company C expressed this point when talking about considering a joint venture as an option. The spin-offs on the other hand show different strategic choices, and tend not to follow alternative governance structures, with the exception of Company B as we described. To conclude, our first proposition fits well with our sample of start-ups. Additionally, the spin-offs have a more varied approach to their operations and do not fit that well with all parts of international entrepreneurship.

5.3.2 Effectuation and Causation

In the findings presented earlier, the companies show different approaches and a range of arguments and analogies behind the development of their products. The theory of effectuation presents a view where one leverages and combines available resources to develop the best imaginable end. That end and the future is however unknown at the start of the development. On the other hand, causative thinking entails that you combine your resources to work against a specific goal. As we presented in Table 2 ‘causation vs. effectuation’, this can be simplified as focusing on the predictable aspects of the future, i.e. working to control the predicted future. Even though this goal orientation is essential for defining which logic that has been utilized, the evaluation of whether a casual or effectual approach has been used

involves many gray areas that need elaboration. The theory strictly divide the development process into two extremes, either effectuation or causation, but provides some points for interpreting what approach have been used in the gray areas. Effectuation theory determines that after an opportunity is created the process will inevitably move over to a causative approach as the companies develop for the specific opportunity. It is therefore the first stage of development we are after and want to analyze in this context. As we mentioned in the methodology however, some of the interviewed companies were reluctant to reveal detailed information about their development process. This makes it difficult to evaluate this specific stage as direct as the theory entails. In the coming section we analyze and discuss the approach the companies have and show what traits the companies inherently used in their development and try to address the gray areas of theory where necessary.

We do this by evaluating our second proposition:

Norwegian offshore wind firms use an effectual approach to gain resources for internationalization.

Company A

Of the companies interviewed, Company A is the most complex to analyze. As we stated in the findings, the company moved into renewable energy by decision from the owner, and the transition into offshore wind was a natural progression of the renewable commitment. The interviewee stated that the company wants to be involved in the whole value chain, which might indicate an example of a fixed or established goal of the company. On the other hand, this can also indicate a certain level of effectual thinking, as there will always be uncertainty connected to which technology will become the most used and what to expect. The interviewed individual did however express that they work goal oriented and leadership from top management initiates tech development, another example that might indicate a causative approach to their development. For acquiring new resources that is required to address an opportunity, the sheer size of the company enables them to acquire additional resources and add it to their portfolio. Again a displayed goal orientation, where one is predicting what is to be address in the future and then act with their resource base.

As we have now mentioned several times, the sheer complexity of the ownership structure and the many sub-companies makes it difficult to analyze Company A in this context. The

processes that occurs in these different sub-companies and in the companies that have been acquired and put under the main company is based on our data collection, unknown. The projects conducted there might be the result of an effectual thinking, and might involve a wider use of the resource pool to discover opportunities. However, based on the data collected, Company A seem to have a causative approach to opportunities, and in that develop resources or expand to address specific opportunities seen, or goals set, via a causation logic.

Company B

Company B on the other hand is a spin-off conceived without the same active resource management as Company A. Company B wanted to act on an opportunity they saw in an emerging industry. They declared that they wanted to utilize the competence found in other parts of the company (wind) and the in-house competence in Norway suggested offshore, but as they stated there were not a definitive plan for what exactly was to be developed

Addressing a direct opportunity as they gave the impression of doing suggest that a causal logic was utilized, but the future development of the actual product did however not follow the same traits inherent for the theory. We presented in Figure 3 that there is a realization of the status quo with “who we are, what we know and whom we know” included in effectuation theory. For Company B, deriving from a larger company involved in engineering activities mostly delivering to the O&G sector, the in-house resources to play on and “add to the stew” had to be somewhat related to that. They indicated that they saw an opportunity in an emerging market that also entailed that they could widen the “pantry of resources” and involve the wind expertise found in other parts of the company. Thereby they defined the industry they were going to address and the possible means available to address it with, but not what was to derive from it.

As shown in the findings, the future analogy from the company quickly excluded land-based wind mills and wind mills in shallow water. The company was now at the end of the realization of the status quo, and began their actual product development and leveraging of opportunity with the given means, in a context of a realization of what and who they are. The end result was therefore not defined, and that they were going to end up with a floating wind mill with three turbines, was not a fixed end. This result was subject to its own progression

and cycles of development and imagined ends with the best combination of their resource pool.

Company B falls in to the gray areas between the theory, and as we have presented, show traits of both an effectual and a causative approach to their product development. Based on the data collected, we argue that the limitations and realization of the status-quo, falls within effectuation theory. Further the following product development and combining of resources after this to develop the best possible product suggest an effectual approach where they considered different solutions. Here they excluded and combined various traits to end up with their product. This suggests that an effectual approach to product development and acquiring of resources was the foundation for Company B to gain resources for internationalization.

Company C

Company C is a start-up that was set up by individuals having extensive experience in O&G that were introduced to a possibility in the emerging industry by external networks. The pathway to creating a product for the company started without a direct gap to fill in the market, but was according to the data collected more evaluated around existing competence and knowledge. This suggests a utilization of an effectual logic. For Company C this meant that multiple diverse ideas for a product were developed during their process. These were within several fields, but still within where the different individuals had their expertise i.e. the available resources. In the end the company ended up pooling all their competence together and developed a concept for a ship, and that product development was again subject to its own cycles and iterations. This creation of a product based on the combined resources available to develop the best imagined end fits well with an effectual logic. In the development of the end product however, they developed towards a fixed end product. As we described in the introduction to this analysis, an effectual approach moves over to an causative as the opportunity is discovered, and the product development seems to have then moved over to phase of addressing the opportunity. This is further supported by the company seeing that they needed additional competence and went searching for new employees, actively expanding their resources to address the potholes in the team. The process had then moved over from an effectual development into a causative in accordance with the theory.

Based on the data collected and our analysis, we argue that Company C has used an effectual approach to gain resources and develop their concept for internationalization.

Company D

Company D is the third spin-off interviewed for this thesis. Several of the traits for Company D are comparable to those of Company A and Company B, and position them somewhere in between the two in the context of this analysis. Company D was started as a project within their mother company after they came in contact with a direct gap in the market. Similarly, they wanted to utilize the competence found in the company, but different from Company B the goal of what they wanted to develop was indicated as decided early on. This suggests a causal logic behind the product development, but this also involves a gray area of the theory. Company D originates from a shipping company and is to all intents and purposes a shipping company. As we argued for under Company B, the theory involves a realization of the status quo, and for Company D the logical product to develop is related to shipping. Company D and B's process might at this point seem similar, but the reasoning behind addressing a direct gap and utilizing what they had learned in projects to address this, testify to a managerial decision and a development in accordance with a specific goal. Company D further stated that they had reoccurring cycles throughout the process of development. It must be considered natural to have a level of uncertainty when one is developing complex structures and some cycles are to be expected. This does therefore not necessarily indicate an effectual approach, but give indications that the process continued to address their direct opportunity in accordance with causal theory.

According to our analysis, Company D has not utilized an effectual logic for acquiring resources to internationalize throughout their development process. However the processes around this initial product development is uncertain as we were not able to get decisive data on this point, and we are not able to fully conclude on the approach used.

Company E

The second start-up we have interviewed in our data gathering is Company E. Similarly to the other start-up, Company C, the entrepreneurs were encouraged to investigate the industry by external networks. They had an extensive knowledge from O&G they could use in offshore

wind, but the interviewee stated that there were several rounds of development and adapting before ending with the product they wanted to market. There is a level of uncertainty surrounding this point in the interview, as the interviewed individual was not one of the original entrepreneurs. Nonetheless this can imply the use of an effectual approach in the same sense as for Company C and B. They were two individuals with a set of experiences, and to be able to use this in the 'new' industry they were limited to a defined part of that industry. Since the industry was so early in its development, exactly what technology they were ultimately going to end up with was however more uncertain and could from the start have become any of the various solutions used. This indicated coherence towards the initial steps of effectuation, where you start with your experience and your network and work to leverage the contingencies you face. They developed their product in accordance with the best imaginable end, and not what was most common in the industry at the time. On the other hand, the entrepreneurs came in to the industry with a very specific set of competences and a specific range of products that could result from the resources. This can indicate an example of working towards a fixed goal in coherence with causal theory.

Based on our findings, we argue that how they combine resources and product cycling to end up with the best possible solution suggest an effectual approach. However, Company E falls in to a gray area of the theory and show traits coherent with both theories. We are therefore unable to fully pinpoint the defined theoretical explanation behind their product and company development.

Summary of Analysis

The start-ups and spin-offs interviewed had different foundations, not to mention resources, going in to the new venture. This has resulted in different reasoning and thoughts around creation of the product and ultimately the ventures. The theory is generalized into two separate logics, either an effectual or a causal approach, but based on our analysis all the ventures cannot as easily be put in to one of the two different columns. As we have discussed under several of the presentations above, the creation of a venture and the opportunity falls in to a gray area between the two.

We have found a difference between the two start-ups and the spin-offs, where the start-ups show a greater similarity to the theoretical framework presented for effectuation. Company C shows the greatest similarity, and was started by several individuals with diverse

competences. They had several rounds of development to find the best possible use of their combined resources, a clear sign of an effectuation approach. Company E also shows some of the same traits, but it is more challenging to position in to one of the two extremes. The company show more effectual traits, but also displays some causative characteristics.

The spin-offs interviewed show greater coherence towards a causative approach as they addressed a direct gap in the market or a direct decision to evolve into certain elements of the value chain. The exception here is Company B, who even though they originate from a larger international company and saw a potential, had reasoning behind their product development more identifiable with an entrepreneurial and effectuation approach. There are some uncertainty related to Company A and D as they were less willing to give out detailed information around their product development. There is therefore a possibility that their various initiatives at some point have involved effectuation. What seems to differentiate Company B from A and more interestingly from D, is that even though the project development in all cases was well anchored in the mother company; Company B's initiative involved one branch. This entailed that the initiative was more locally anchored, but more importantly that it involved individuals that had seen a possibility to expand into a new market, without having been in contact with or engaged in the renewable industry before. This allowed for a more unconstrained product development and a wider range of stews as a possible end result, to use that metaphor. It seems that Company A saw a logical expansion of their existing portfolio and Company D saw an opportunity for development and delivery of a specialized version of the main company's existing area of expertise. An opportunity they had been presented with through projects they had conducted. Company B, on the other hand, could evaluate how to best combine their resources into a product without the constraints of an identified gap. Company A and D expresses a more goal-oriented development and strategy.

To summarize, the start-ups and Company B shows a more throughout investigative approach to combine the opportunity presented by the new industry with the resources possessed by the involved parties. They therefore show properties identifiable with an effectual logic in accordance with the theory. The two other spin-offs, A and D, have an approach that does not fit well with our proposition of the ventures using an effectual approach to gain resources before internationalization.

5.3.3 Existing Industry as a Resource Hub

The importance of networks, both weak and strong, is presented in our main theoretical frameworks, international entrepreneurship and effectuation vs. causation. Analyzing the importance of these networks and how they add resources to the companies will allow us to evaluate the third proposition:

The reputable and mature Norwegian petroleum and shipping industry is a valuable hub of resources that offshore wind companies are using in their efforts to internationalize.

In terms of alternative governance mechanisms, strong and dense networks are said to accommodate these mechanisms and cooperative behavior will follow (Rowley et al., 2000: 383). As our analysis of the alternative governance mechanisms show, the start-ups have actively used previously established professional and social networks within O&G and shipping to add resources to their company. Taking the dense network available to them and creating a valuable and active board of directors was of great use for Company C in their efforts to internationalize, and shows an example of how strong ties with a formal contract act as alternative governance mechanisms.

Company E, the other start-up, had founding entrepreneurs that had a wealth of experience from offshore and O&G. Their expertise allowed them to build a concept and an organization that drew resources and ideas from the O&G industry. The company also mentions the fact that the Norwegian industry has a good reputation as business partners and service providers, serving as a plus for the company when internationalizing.

Company B was created as a joint venture between the mother company, a state owned renewable company and a Norwegian industry group with focus on the offshore industry. Hence, they have benefited from the Norwegian industry in terms of building the technology and solution. They used the partners and networks they possessed to meet various interesting actors, but also relied on network organizations and embassies when approaching markets where no such ties existed.

Company D with its ties to the mother company has a great synergy with the shipping industry. Both their technology and market approach was facilitated through expertise gained from the mother company. They also mentioned the respect the industry has abroad and how this has helped them to gain access to industry actors.

Company A is such a major actor in both shipping and offshore petroleum operations that it is hard to imagine that it did not impact the way they internationalized with their offshore wind projects. They did not mention whether the Norwegian industry external to their own companies helped them to gain any resource advantage, but they did state the synergy they achieved from their portfolio of resources and how this helped them creating new technologies suited for the market.

Interestingly, INTPOW stated that there was a great synergy between offshore wind and the marine sectors in Norway. However, when the economical situation after the financial crisis stabilized and new oil fields were discovered, the attention from larger marine and offshore companies subsided. Additionally, they mention the importance of connecting with industry partners, but if the larger offshore companies are not interested, does this industry work as a hub of resources as according to our proposition?

Summary of Analysis

To summarize, the companies and especially the start-ups have benefited from their networks from the O&G and shipping industry. However, it is unclear how resources external to their immediate networks has helped them. Yes, the industry is reputable and Norway are well known for their offshore and shipping expertise, but if the larger offshore companies are not interested in lending their resources and networks to the emerging offshore wind industry it is hard to justify it as a hub of resources readily available for all offshore wind companies. Our analysis of this proposition is that yes, the O&G and shipping industry in Norway are a useful hub of resources for companies trying to internationalize. Several have noted that the reputable industry has been a door opener when contacting international markets and potential customers and collaborators. Then again, the availability of this hub of resources is dependent on the existing network and ties that the entrepreneurs and companies possess.

6 Concluding Remarks

In our concluding remarks we will present our conclusion towards our research question and additionally address our thoughts on implications, the limitations of our research and suggestions for future research.

6.1 Conclusion

We have in this thesis investigated how Norwegian offshore wind firms have internationalized, especially in the context of lacking a domestic market. Our theoretical framework has been based on the research done on international entrepreneurship and effectuation vs. causation, with additional backing found in research from strategic decision making and the resource based view. The theoretical based analysis and research has been done to answer our initial research question:

How do Norwegian firms within the offshore wind energy industry internationalize?

Our analysis displays a distinction between start-ups and spin-offs in how they have tried to internationalize. The start-ups showed a stronger coherence towards what the theoretical framework suggests. This means that our start-up ventures and their opportunities are created through more effectual processes and that they use their unique knowledge and resources in a way that utilizes international location advantages.

The spin-offs have a more diverse approach to their internationalization and do not show such a clear coherence towards all points presented by our theoretical framework. Our findings show that the spin-offs have a more goal-oriented and causal logic, and that they rely on different resources in their efforts to internationalize. Start-ups often face a lack of resources and will use alternative governance structures to counter this, while most of our spin-offs rely on the wealth of resources provided by their mother company. The exception is company B, a joint venture that engaged in an opportunity outside their original area of expertise and followed a more effectual approach. The strategic choices made in this company also falls more in line with international entrepreneurship in terms of utilizing alternative governance structures, and were the only joint venture of those interviewed.

All of the companies interviewed stated that the reputable and well established petroleum and shipping industries provided networks and resources that helped them grow and reach out to the international market. However, the availability of these resources and networks depend on the existing networks of the ventures. Even though the potential synergy is great between these industries and offshore wind, lack of interest from the petroleum and shipping industries can make it difficult to exploit this potential.

To answer our research question; Norwegian firms within offshore wind internationalize by directly approaching the international market. How they approach the international market is governed by the resources available and their established networks.

6.2 Implications

6.2.1 Company

Going in to the industry, our interviewed companies had different approaches and goals of wanting to create or exploit an opportunity, natural if you consider the different foundations for the ventures. What is however apparent is that the product, and ultimately the company creation, was the result of a very thought out process. The individuals that engaged in the industry were all experienced engineers, or with experience from engineering companies engaged in O&G or shipping. Possibly as a consequence of this, most of the projects and the decisions made followed a recognizable development pattern that were defensible and justifiable, and as we said; thought out. The companies could also show some of the same coverage for their internationalization process and had many of the traits that the theory suggests. What is however also suggested, is that these two stages, technology development and internationalization, was two separate processes for several of the interviewed companies. Even though there of course was overlapping timeframes and processes, the general consensus we are left with after the data gathering is that one would first develop the technology to the point where it is complete on the drawing board, ready for production. After that one could start to approach investors, and after that customers. Several of the interviewed parties reached the investor phase, but then ran into financial problems and the whole company came to a halt. A new venture has naturally few resources, and is forced to focus on

development of specific aspects of their company, and it seems like our interviewed companies first and foremost focused on technology development.

Some of the technologies developed in the industry can be very capital intensive, and finding private equity willing to take the risk in an unproven market we can imagine is very hard, as mentioned by most of the subjects. On the other hand, all the companies paint a picture of almost exclusively approaching the international market, and that their first commercialization was going to be international. This will somehow require an international network and resources, resources that most of the companies did not acquire or actively started engaging before the technology was more or less developed. At that point the founders had already invested a noticeable amount of resources in the venture. The exception here is Company E, who has a big advantage in that they have to tailor the product to every order. They had possibly a substantial technology development in the beginning as well, but is because of the product forced to engage customers and get contracts before focusing on the technology again.

The main implication of our investigation on the company level boils down to the points we have here discussed. Establish and use the network and resources to gain customers and ties early on, without focusing too much on the technology development.

One can also discuss the implications towards other comparable industries in Norway. The country's industrial landscape is dominated by O&G and shipping, and other industries can face similar obstacles to the offshore wind industry as they are internationalizing. With increased globalization, growth industries will have huge potential markets internationally. If Norwegian tech companies are to gain competitive advantages in these markets, they need to focus on the same aspects as offshore wind. Establish and use networks, focus more on the customer and market and not so much on the tech development.

6.2.2 Policy

Our analysis has focused on the company level, but implications to the policy level can be found based on our theoretical framework and findings. The importance of networks and resources are presented as key to both internationalization and the birth of the company or opportunity. INTPOW is an organization that tries to organize networks between industry partners, but the support from the government and politicians seem to dwindle (Ramsdal,

2014). The financial requirements for the companies are great, and so the availability of funds both private and public is an important factor. Although many governmental grants are available, private capital is mentioned as scarce and unwilling to invest in something new and risky. Our findings show that start-ups and spin-offs have differences in their financial situations, and that spin-offs can have easier access to private capital or capital from their mother company. Still there is a lack of willingness to push forward, maybe because of the immature market that is hard to reach, or maybe because of the political landscape in Norway. If Norway is to reduce their dependency on a dominating industry it is necessary to facilitate changes in policy to accommodate new industries such as offshore wind. Several of the interviewed subjects stated that if the industry is to grow there must be political will and a change in terms of the conditions for investing in offshore wind. This lowers the risk and grants the companies the possibility to cover their investment needs. If this happens the possibility of growth in the industry is bound to occur, and the network of companies and the collaboration between these can facilitate even further growth and possibilities.

6.2.3 Theory

We have combined the theoretical frameworks of international entrepreneurship and effectuation vs. causation in an effort to expand the understanding of the internationalization process of Norwegian offshore wind companies. Coviello, McDougall & Oviatt (2011) presented thoughts on future research for international entrepreneurship, and the nature of opportunities was one of these. Our analysis and combination of our theories show the importance of networks, both weak and strong, when addressing the lack of resources a new venture face and also in the creation of opportunities. It could be beneficial to the development of international entrepreneurship theory to take this into account, and look at the creation or discovery of opportunities in relation to the nature of networks available. Are the networks that help create the opportunity similar to the networks that help companies use alternative governance mechanisms?

6.3 Limitations of Thesis

Finishing up the thesis, there are some points we have realized can be of interest to keep in mind for the reader of our analysis and conclusion, and for someone who are potentially

looking at doing a relatable research project. We will therefore elaborate on the possible limitations of our thesis that might have affected our paper and the research conducted. Because of the obvious implication of time and page limitations we have chosen to exclude these as this is something that will inevitably affect all papers of this format equally.

Available Companies

The first limitation we will discuss that might have influenced our results is the availability of relevant companies to interview for our data collection. The offshore wind industry, which we wanted to use as a case because of the direct international market, is small and consists of a limited number of companies. The products delivered in this industry can also be large, complex and very capital intensive, and the process behind them can therefore be very different. This means that even though you deliver to the same market and ultimately end up with a contract with the same “park”, the steps to get there are very different dependent on the product you market. The limited number of companies and the different products has the consequence that it is not as easy to generalize the processes of the industry.

We are also evaluating this industry in a relative hindsight, as we want to get the experiences learned from the companies that have tried to, or are at the current time, internationalizing. The subjects indicated that the industry looked most promising around 2006-7 and many companies and individuals engaged in the industry with various levels of commitment at this time. Many of these did not succeed, and even though their point of view and experiences would have been of great interest for us they have proven hard to find and have therefore not been included. This can on the other hand be a positive thing in terms of eliminating the products or commitments that were not viable, but there are without a doubt several individuals that would be of interest to this paper that we were not able to identify or reach.

Gathering of Data

We elaborated in our methodology for the choice of a semi-structured interview form. The interview method has proven to allow us to follow the flow of the conversation and make the interview subjects elaborate on the topics without asking too many leading questions and giving hints. Naturally, some interviews had a better flow than others, but surrounding a couple of the topics we wanted to address some subjects were afraid to reveal detailed

information about the company. This has forced us to interpret some of the answers or simply evaluate that we cannot conclude on these questions, and this might prove a possible source of error. Even so, we have tried to avoid this, and make it clear when this has been an issue.

Theoretical Framework

There are two main points we want to discuss in relation to our choice of theoretical framework. First; evaluation of our two main theoretical research angles, international entrepreneurship and effectuation vs. causation, against the data collected have shown us that the theory is more easily relatable to start-ups. This is somewhat to be expected if you take the complexity of spin-offs in to consideration, and the many various forms and different organization they can have, but still something to keep in mind as you go into the interviews. Adding another layer of theory directly related to spin-offs and the generation and operation of these might have been a solution, but our main interest of this paper was the internationalization process with the development of their product and not the different forms a spin-off can take. More layers of theoretical foundations to build on might have skewed the focus of our research.

On the other hand, narrowing down the theory even more might also have proven a solution. This might, however, have caused a problem in finding data and relevant firms to interview. As we explained, the industry consists of a limited number of companies and limiting the theory might rule several of these out. Coupled with the second point of this limitations chapter, the willingness to provide details, narrowing the theory down to fewer topics or to fit fewer subject is still no guarantee that the ones left is willing to reveal more detailed information on the theoretical angle.

6.4 Future Research

Excluding the points we have highlighted in our own research in ‘6.3. Limitations’, there are several future paths one can undertake with this thesis as a basis.

We have in our paper focused on development and internationalization on a firm level, but it could also be of interest to investigate this topic on a policy level. We have stated the Norwegian government has offered large amounts in R&D grants, but what has come out of

this is more unknown. As we have mentioned and as can be seen from the transcripts in our appendices, almost all of the interviewed subjects mentioned the governmental involvement as a factor with both positive and negative experiences that could be subject of investigation.

With the theoretical framework chosen in mind, it can be of great interest to compare our topic to other industries both domestic and international with reference to the Norwegian Offshore wind industry and their situation of a poor domestic market. Especially in an historical context it would be interesting to see how other countries with a more or less equal situation of a dominating industry overcame the obstacles' of internationalizing.

Domestically, it could be of interest to investigate the O&G industry and their international processes in comparison. This could reveal if there are processes that could be transferable, even though the background and the basis for sales is different. Other emerging renewable energy production technologies and their respective industries could also provide an interesting basis for investigation, though this might entail some of the same complications we have described in our limitations.

Altering our theoretical framework, it could also be of interest to look purely into the creation and discovery of opportunities within renewable industries. The data would potentially be varied and complex and studying this could give a good insight into the birth of renewable technologies and how Norwegian companies over several comparable industries see opportunities. To keep the complexity of data reasonable, and avoid some of the limitations mentioned, it is recommended to focus purely on either start-ups or spin-offs.

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1. Case Study Protocol

Commercializing Offshore Wind

Introduction

Norway has a large oil and gas sector, as well as a renewable foundation for domestic electricity production in the existing hydro power plants. Fossil fuels are going to diminish, and Norway might lose portions their largest export industry and the biggest single source of income for the state. Ability and stability of electricity production is a concern for many states worldwide and in addition GHG levels is rising, creating a shift for electricity production not dependent on fossil fuels, which often are imported. Offshore wind is one of the methods for production of energy that is emerging, and with the obvious synergy from the very potent oil and gas sector, this is an industry Norway could develop as an interesting opportunity. The poor domestic market does however create a push for internationalization.

Questions, Hypothesis and Propositions

In this case study we will investigate how Norwegian start-ups and spin-offs within offshore wind internationalize, and have formulated the following research question:

- *How do Norwegian firms within the renewable offshore energy industry internationalize?*

As a result of our education and during the research that sets the basis for this thesis, we have also had thoughts and preconceived opinions that have been formulated into the following propositions we are going to investigate in this thesis.

- *Norwegian offshore wind firms use an effectual approach to gain resources for internationalization.*
- *Norwegian offshore wind firms leverage domestic and foreign resources in accordance to international entrepreneurship theory to create a sustainable advantage.*

- *The reputable and mature Norwegian petroleum and shipping industry is a valuable hub of resources that offshore wind companies are using in their efforts to internationalize.*

Theoretical Framework

The main theories that will be used are the research on International Entrepreneurship and Effectuation. Since there is a poor domestic market, there is an inevitable push for internationalization of the industry. The theory of International Entrepreneurship describes the concept of an international new venture, INV, to be defined as an international entrepreneurial organization that uses alternative governance structures to control their assets. By leveraging unique knowledge or resources in a way that utilizes international location advantages, they generate sustainable competitive advantage.

Effectuation theory is used to explain how opportunities and new markets can be created through a transformational process initiated by the entrepreneur, and will be used for in the research help explain how the entrepreneurs or intrapreneurs saw and acted on the opportunity in the offshore wind industry.

In addition, we will use the resource-based view and perspectives from strategic decision-making. The resource-based view will be used to explain what we mean with resources and how they shape the advantages of a firm. Strategic decision-making will be used to look into the decisions companies make when the opportunity is ripe for exploitation.

Data Collection Procedures

The purpose of this master thesis is to investigate how Norwegian Offshore Wind Firms deal with the pressure of internationalization when faced with a lack of a domestic market. We have chosen an in-depth qualitative case study as the most fitting methodology. In the words of Yin (2009) this is a single-case design, with the firms as the unit of analysis and the offshore wind industry in Norway as the context. The interviews will preferably be done face-to-face with us meeting the relevant subject were they find suitable. The interviews will further be recorded at the subjects consent, and transcribed within days of the interviews being done. The transcribed interviews will be found in the appendix of the final thesis. The theoretical articles will follow the subjects described above, and will all be referenced in

accordance with the 'Harvard' style with page numbers for easy tracking when quotes or phrases are used directly.

We plan to interview and evaluate several firms that span both failures and successes, in addition to differentiating between spin-offs and start-ups. In total we hope to conduct 6 interviews. As the investigation process is currently on going, we cannot be more concrete than to say that these will hopefully be conducted during March. The interviews will most likely be conducted in Bergen and Stavanger, due to the high concentration of possible firms around those areas.

The interviews will follow a semi-structured interview plan.

We will come back to this protocol and update with a complete list of dates and interview subjects when appropriate.

2. Case Study Questions

We have developed the following questions that we mean can help guide us when we are performing the interview and conducting the research:

Creation

How did the company develop?

What processes shaped the idea/product?

What was the founding entrepreneur's background, in terms of expertise and knowledge related to the product/business?

Internationalization

What advantages was given when going international?

How did the companies internationalize?

To what extent has firms used the oil and gas sector in their efforts to internationalize?

Strategy

Does a smaller entrepreneurial group make the strategic decisions?

How are the strategic decisions made?

Did decisions making change as the company grew?

Interview Questions:

Try and get a timeline of the company development

Creation/Development

How did the idea or company get started?

When starting out, what did you do to make the company grow?

Did the product/idea change at any point, and why?

What was the founding entrepreneurs background?

(Possibly ask about whether or not social networks was used as a "resource searcher")

Internationalization

Has the company tried to internationalize or is considering to internationalize? (Are your customer's domestic or/and international?)

What made you decide to go international or use international resources?

What challenges did the company face when trying to internationalize, and how did you solve these issues?

Are there any countries where you see higher potential for expanding or creating a network?

Was there any close international ties that shaped the creation of the company or the idea?

How has being situated in Norway affected the venture? What are the reasons for staying in Norway?

Strategy

Who takes important decisions in the venture? Are all major decisions decided at board meetings?

Have you taken decisions to emphasize specific international resources? Have you actively engaged in international networks, and how have you done this?

3. Interview, Company A

Company A is primarily known as a shipping company based in Norway. The company was founded in 1848 and the group holds several companies in its portfolio. Spread across these companies, over a 1000 people works in renewable energy, with over 8 billion NOK invested. The renewable energy part of the company started in the 90s with a focus on land based windmills primarily based in Scotland. Several onshore wind farms are owned and run by the company in the UK and Scandinavia. A company based in Denmark developed different technologies and solutions for the offshore market based on service boats and installation vessels, and were bought by the main company some years ago. They also purchased a company that had developed new technology for foundation technology. So in total for the offshore wind industry the company has several services and technologies on the market, but does not own and run a built farm yet. There are however consented projects (with a total of 500MW) in the UK where the company holds 50%.

The interview was done in a semi-structured way, and the questions found in the appendix were used as a guideline so that the themes of our research could be answered efficiently. The answers given below will focus on the parts of the company that is involved in offshore wind. The interviewee was asked if recording the interview was okay, but decided that taking notes was preferred, hence direct quotes will not be given. In addition, which such a large company, detailed information is hard to collect from a single interview, and as such, the data from this interview will use a broad brush to paint the image of how the company works.

Creation/Development

The company has a long history in international shipping, and also in renewable sources of energy. It started its onshore windmill projects in the 90's and from that continued on too off shore. With a strong foothold in shipping and wind energy, the road to offshore wind was short. The company wants to be involved in the whole value chain, from exploring possible sites to development and building of farms. Because of the size of the company, the ownership structure is complex, and there is no single company that has been created to deal exclusively with offshore wind. Because of this, the innovation process is also complex. Mainly, they work goal oriented and leadership from top management initiates tech development.

Resources

The company possesses large resources in marine and shipping industries. This has enabled them to achieve great synergy between the industries, and made developing new technical solutions for offshore wind within their realm of expertise. In addition, the size and wealth of the company has enabled them to take risks without needing outside capital.

Internationalization

Since the main part of the company has a strong international foothold, it was clear path for the offshore part of the company to follow. With no home market, other countries/regions has been the main sites of operation. UK and Germany is mentioned as the most prominent countries. Historically Scotland has been a region of great importance for the renewable part of the company due to the on-shore wind farms and other projects. Through these international relations, the company has established many networks that have helped them in the process of internationalizing. Also, the interviewee points out that the reason for succeeding internationally is that they provide a wide range of services needed in the industry. This allows them to lower the risk for the customer, and enable them to expand.

Strategy

As a large company with many sub-companies, the structure of decision-making is complex. Main responsibilities lie with top management. In regards to expanding the resource base, the company has bought many smaller tech companies to access their technology and add it to their portfolio.

4. Interview, Company B

Company B is a spin-off company of the Norwegian branch (limited company, AS) of a foreign company. The Norwegian branch is set up to perform certification, engineering services, inspection and development mostly focused on the oil and gas and maritime industry. The Norwegian branch had revenue of 300 million NOK in 2013.

Company B was set up in 2008 after a concept was developed by the Norwegian branch of the foreign company from 2006. The interview was held with the managing director of Company B, which is also the managing director of the Norwegian branch of the foreign company.

The interview was done in a semi-structured way, and the questions found in the appendix were used as a guideline so that the themes of our research could be answered. Below is a transcription of the recorded interview, not broken in to sections of topic to keep the chronological order and not risk taking elements out of context. However, small talk and subjects not relevant to this paper is taken out. The company and collaborating partners are given anonymously.

Interview:

Tell us about the foundation of Company B:

We are owned by a foreign company that are strong in wind and have a history in research and development of wind projects. Norway is very good in offshore solutions, it have not always been this way and when oil was found and the industry started developing in the early 70's the Norwegian industry lacked this industry specific knowledge. However, we had a very good maritime sector, and the shipping building industry and ship owners were very good. In addition we had some good politicians who set up a decent set of requirements and a framework for the new industry. This became a very good mix between the maritime sector and the Americans who came in with their knowledge from oil and gas, under the requirements set by the politicians.

We used some of same mindset in establishing this company, i.e. company B. We, as a part of a company with strong competence in wind, can draw on the competences found there and the very strong offshore competence found in Norway. Not only in our company, but the

knowledge found throughout the industry clusters in Norway. We did not consider land-based energy generation from wind, in that sector the positions are well established and the industry is dominated by the big actors, we instead tried to see where we had a competitive advantage. To gain this it had to be offshore. Further, we thought that offshore wind turbines that are placed in shallow water are not interesting, because it is too similar to land-based windmills, so we decided to look at floating wind-mills. At the time (2006) there were very few floating wind mills that were thought up. The only solution or concept that was interesting at the time, and under development, was a project owned by a large Norwegian energy company. For better or for worse that might have impacted our thoughts around the process for creation of our concept slightly.

We decided (2006-2007) that we should develop a concept, some rough lines at least, for a floating wind mill. The concept should deviate from what we had seen previously and knew existed as a concept, among other from patent applications we had seen. There were some good patents, especially from Japanese manufactures out there, but we wanted to deviate from the standard one floater, one wind turbine. Partially because we knew from the offshore experience that some of the expenses are not linear, a lot of fundamental costs are similar, and as a future analogy that the more installed capacity you get from each floater the better the economy should be. The anchoring system for example is not very different if you have one or three turbines on the floater (the concept involved three turbines), but you can produce almost three times as much energy. The concept was developed and it looked very good. We did some calculations on it here, where we have a very good competence on offshore installations and especially floaters. We have for example a good competence in CFD analysis, materials, corrosion and service and maintenance, and this was something we tried to focus on during the development of the concept.

In the spring or early summer of 2008 the concept had reached a point where we started to approach the market. We contacted large players in the Norwegian market that could be interested in developing this with us, and to our joy the concept received a very good feedback from the actors. At the same point the Norwegian politicians started to become active and express their opinions. Some said that this should be treated as a great new industrial adventure, and everything looked good. A large state-owned renewable energy company decided to support the concept and become, in addition to another Norwegian industry group, shared owners in a newly founded spin-off. The Norwegian industry groups is

a considerable factor in the offshore industry, but also has experience in renewable energy and electricity production among others own a company that build turbines and equipment for hydro power plants. The large state-owned renewable energy Company became the major shareholder in the company. For us and our concept this was about the best possible thing that could have happened, and we were very happy.

After the creation of the spin-off we decided on the work that needed to be done, and established a Validation of Concept phase. This was planned to start in the summer of 2008 and to be finished in the end of the year. We all invested a lot of resources in this and drew in the synergy and competence from our experience, the Norwegian industry groups experience from construction and the large state-owned renewable energy company's experience in among other power production and transportation of electricity. In the end of 2008 we finished this phase and developed a finished concept. We had then tested a model of the concept in a wave pool, in wind tunnels and a combined wave pool and wind test. This was in addition to the calculations we had done our self, which we had also hired an independent third party to perform as independent third party verification. Our calculations, the actual test and the independent third party's calculations were more or less the same, so we concluded that the concept was doable with a good efficiency as it was. The concept involved two headwind turbines placed in the front and a tailwind turbine placed in the back; this was all connected with a triangular frame. The two front turbines were identical (upwind turbines), while the one in the back was taller than the two others and turned the other way (downwind turbine). The total efficiency of the construction was over 93% for the three turbines. We were aware that the two turbines in front would create turbulence / wake effect for the one in the back, but we thought that if the economical cost of the additional turbine could be justified in the energy produced and what one would make their, it would be worthwhile (marginal cost versus marginal energy production philosophy). The efficiency for the two turbines in front is 100%, because the whole unit will rotate around a turret and therefore always be placed in optimal wind direction i.e. head wind all the time. This also gives several other advantages for example that you can design the tower as a wing instead of circular construction. We placed the back turbine in the middle and raised it to capture more wind. We calculated the wind flow over the two front turbines, and came to the conclusion that the wind would break, form turbulence etc., further back than the turbine placed in the center thereby not reducing the efficiency of this as much as one should think. This was unheard of by the industry, and the market didn't full capture and appreciate this, and still doesn't. Nonetheless

we showed through extensive modeling and testing that the efficiency of the rear turbine is of course reduced, but the overall total efficiency shows that it is a profitable addition.

Our intention, that is the Norwegian branch of the foreign foundation, was never to be a turbine owner and energy producer. We as a company sell services, and the intention was that we developed the concept and made it a reality, and then other actors came in and built and developed the fields. Company B's intention, as a spin-off, was on the other hand to develop a technological solution not primarily for the domestic market. At the same time a Norwegian governmental branch (ENOVA) published a report that showed that the Norwegian coastline had an enormous potential for wind generated electricity, and the technology as such got a lot of attention. The whole environment actually fitted the development of Company B very well. This was in 2008 and the financial crisis had not hit Norway yet, so that capital was actually quite easily available, politicians were positive and everything looked very good. After that things have proven more difficult. To sum up, it was not the domestic market that was our intention; it was the global market that was the focus. O&G is the largest export this country has, but the second largest is equipment and services related to O&G production, and that market is international, and this is what we thought of here as well. Make the product and keep the engineering work places, but not primarily sell domestically.

Did you have any international contacts (except from the once in the "mother company") before you started to internationalize?

No, not really, but it is quite easy to find the interesting geographical areas that are willing to invest in this or looks interesting. Portugal for example, a poor country, but with a long and advantageous coastline, that is dependent on foreign import of energy. Malta had good conditions and looked at the industry; there are several countries that fit the profile. The story is also that we came after the development of an offshore wind project by a large Norwegian energy company. Even though we see some problems with that solution, for example that it requires a very large depth, they used a lot of resources in developing and testing it, so we took the assumption that they had done a good market research. There are of course some disadvantages with setting up testing of something developed in another country and we have met a certain level of protectionism, which is understandable, but probably not as much as the large Norwegian energy company.

So after this initial market research in 2008 early 2009, how did you proceed?

As mentioned, the company was established with the two well renowned actors. We were a bit unlucky with the timing of the establishment, with the financial crisis hitting Norway and the international market at that time, and the market did not just slow it came to a complete stop. The Norwegian renewable energy company was very pleased with the concept and the development so far, and had practically paid for a lot of the whole development and testing up to that point and contributed with the resources that were needed. They did however at that time take a strategic decision to pull out of Company B. This was of course a disadvantage for Company B, and we did not understand why they had suddenly decided to stop supporting the concept... It was however done in a very professional and good way. In addition it is fully understandable that the Norwegian renewable energy company is not a company that should own technology, as they are mostly devoted to producing energy and the technologies they have there. They gave up all their rights to the technology and said thanks for now in a very professional way.

There is also a political dimension that came in to play at this time. Even though offshore wind received a lot of positive press, we felt that a lot of the political environment and the various governmental organizations not fully understood, and still don't, our concept and the plan for Company B. One always returns to the argument: 'why should we build a wind industry in Norway? We already have a lot of renewable resources in hydro power plants, what are we to do with more.' We, through our involvement in Company B, have on the other hand tried to argue for the creation of jobs and activity in Norway and the export of technology as the focus. However, it always falls back to the same argument. The policy and funding system says that one should develop Norwegian technology and industry for the domestic market and, basically then focus on the international market. And that is of course a valuable point of opinion by them, but someone should take a step back and try to see the bigger picture. To get funding for one component, a small piece of product or very specific software is probably very exciting and good and do get funding by the institutions. However, the industry thinks a bit differently, and wants big concepts to keep their position and jobs, as Company B's product is. This might be difficult for the various governmental actors to fully understand.

If one goes back in time to 1995 when the Heidrun field was developed by a large international oil company, and if one goes to the research facilities in Norway, most of this is funded by the oil and gas companies that had to cofound them to get the research they wanted

done, and it was given as a policy incentive that investment in R&D and new technology should be done. It was one of the requirements from the government to be allowed to develop the oil fields, i.e. to grant a license from the government... It is two completely different approaches to the two industries by all parties. You also get a huge tax return (78%) of the development costs for offshore fields back, the model is under pressure, but it is not the same possibilities in for example offshore wind. If you go far back to the development of hydro power plants, you find some of the same regulations here; those big thoughts are not found around the development of new renewable energy production. Hence, after my opinion, all industry that is not related to oil and gas as an energy source moves very slowly and it is a fair question if it is ever going to be any volume to talk about at all from Norway in the offshore wind industry.

How do you see this developing internationally, are there the same tendencies?

No, it is completely different in other markets like for example in the UK. They are of course in a whole different situation because their gas reserves are diminishing, they have decided not to build more nuclear power plants, and are, slowly, more dependent on import of foreign oil and gas. They got a need to develop and get a new main source of energy and have therefore started large programs over many fields to develop these, both from the central government, but also from the various local authorities. The requirements and the tariffs were also defined early on and were clearly stated.

However, former Prime Minister Gordon Brown did also state that the prices of offshore wind development had to come down by 40-50% to be competitive, and when we started in 2007-2008, 2,3MW turbines were the common turbine size. We tried to see what was going to come on the market and designed the concept for using a 3,6MW turbine, which was very big. The concept was designed with a scaling effect in mind, i.e. to cater for further increase in turbine sizes. Now however, 10 MW turbines are being developed. Making the turbines as large as possible will increase the overall potential for one windmill dramatically. That is one way to decrease the cost, but I still believe that the concept we developed with three turbines is very beneficial and one of the better - using bigger turbines here can also increase the potential. There is another concept that uses a semi-submersible triangle with good results, and there are tons of data on triangles semi submersibles and their performance. They use one turbine which works very well, and here the state-owned energy company in Portugal has been the economical supporter.

What happened after 2008, has there been any activity in Company B after this reorganization?

Yes, we have used both time and money on the concept. The feedback from energy companies was that it was not beneficial to have two different turbines (upwind and downwind turbines), so we altered the concept to have three equal upwind turbines, which was tested and had more or less the same results. We did also realize here that for Company B it was a long way to market. The market was not fully ready, and floating offshore wind mills according to this concept were a long way from the market, maybe 15-20-25 years down the line.

We tried to look at options that had a shorter time to market. We looked at a jacket and other fixed fundement installations, for example a monopile. We concluded that we did not have much faith in monopiles. If you increase the turbine to 7-8-10 MW, even if you can reduce the weight of the windmill the nacelle weight, height of the Monopile and the required strength would for any practical purposes not be cost efficient.

We also developed a jacket which we marketed and tried to sell, but we have not succeeded to develop a position on either the Company B floater or the jacket. Since 2008 the oil price has also had a positive increase, at least for that industry, and the activity in the industry has been very good both domestic and international, and still is. As one of the owner companies of Company B, this is our primary interest and we therefore focused on this industry, but we have continued to try to push the Company B concept internationally. We have been in China on several occasions and had meetings with major actors over there. The reactions have been ok, but we have gotten the sense that there is the same protectionism idea; ‘this is probably something we can develop our self’. In addition it is difficult to understand how you sell to that market, and we have used the Norwegian network over there as best we can, but it has come to a halt. We have also considered looking at Japan, but came to the conclusion that this is an even tougher business culture to understand and market to enter. Now we see that major Japanese companies are introducing their floating concepts, and with that it has in many ways come to a halt for Company B. We do however have some processes running, so it is not completely dead, but we do not put many resources in to Company B.

As we see now, the oil and gas industry is downsizing and that in the future more and more development in that industry is maybe also moved to other countries, do you believe the industry can have a revival in Norway?

There are absolutely scenarios like that that can be beneficial for offshore wind as an industry. It is easy to blame the support mechanisms and the government, but I believe that in this industry the development needs to happen in a symbiosis with all the interested parties. The government needs to be willing to take risks with their capital, and show a will to make uncertain investments and support the industry. The governmental support as of today has a mandate to be a co-investor, meaning that you have to get another investor before they are interested in supporting a development. If you are in a position to get private equity companies interested and willing to take risk, why should you bring the government on board who are more risk averse than private capital?

Were you under the impression that Company B had a synergy- and competitive advantage when you tried to take the concept international?

Absolutely, that is an undisputable fact in my opinion. We saw that the thoughts and ideas that we had in 2007-2008 are now emerging in full effect globally. When we went around and talk to possible candidates it was clear and everybody was of the opinion that everything surrounding offshore wind, service, installation etc, the Norwegian industry is very competent and have very good position and environment built up on the field. This was a definitive advantage for us, and I believe that if we had come without this as a starting point with the reputation and expertise that we possess, we would not have come close to what we after all did. We got to see almost who we want on the basis of our expertise. Except for turbine manufactures, we never understood why, but it might have something to do with their financial position after the financial crisis.

Concerning the idea creation and the concept development, did you begin with a concrete idea or did you start with a general understanding of where you wanted to go?

No, we formed the concept as we developed. I have a strong believe in developing a cluster mindset and having a larger group developing together. It is useless to copy something that already exists, so we wanted to think differently and started looking at the linear costs and the non-linear costs. This influenced the development highly, right from the start, and we said

that we need to have more capacity on each installation. At the time, 10MW turbines was out of the question, but even today I think we would have gone for a concept with more turbines and increased the installed capacity. We looked at reducing the risk as much as possible to make the concept as interesting and credible as possible by the use of known constructions. The offshore construction with almost no risk was a triangular, semi-submersible design. A very well known design in the offshore industry and this removes the uncertainty in the construction, and some of the uncertainty from a “new” product as the floating offshore windmill was. We continued to look at the installation costs, and a semi-submersible construction only need about 8 m of water depth when it is without ballast, meaning that it can be anchored at a normal dock anywhere. Meaning that you can complete the construction almost anywhere, and when it is done you can just tow it out to the site and fill in the ballast and it goes down to about 20m. So, we took a lot of the competence and knowledge we had on installation, operation and service and put in to use on the project. In an offshore wind project outside Denmark they had experience with gearbox issues, where you had to hire specialized crane vessels to service the turbine, which is very expensive. Our thought addressing this issue was that if you get a serious complication with the installation you could, instead of calling on a large barge with a large crane at high expense, you can just disconnect the installation and tow it to land with normal vessels. We saw a project in Canada where they could uncouple a large oil and gas platform in the case of an iceberg, even though it has never been put to use the concept of “plug and play” couplings is there and implemented. So when you can do that with a large oil and gas platform you can do it with an electric connection, and the couplings are basically off the shelf products. So if you get a complication you call on two conventional supply vessels, uncouple the electrical connections, drag it to land, do the maintenance and drag it out again. That is also a competence we have learned and see from our offshore experience that it costs 4-5-6 times as much to do things offshore compared to onshore. We did some calculations, not completely through I admit, but we looked at one of the more expensive crane vessels. It is positioned someplace not very near, you have to wait 15-30-60 days until it fits it schedule, it has to drive to the location, do the lift, go onshore to get the replacement part, go out again and finish the operation. We calculated the margins in this example and for all practical purposes the economics of one installation was ruined if you got one of those errors.

You say “we thought” and “we developed”, were the other owners of the projects involved in the same degree as you?

We defined the concept and went looking for interesting candidates afterwards to join us in the validation of concept phase. The changes and the alternation of design was however marginal and it was our company that came up with the idea and did the preliminary work. The other actors have been active, and got their saying later on.

How was the structure of the company before and after the concept phase? How was the decisions made and who had a saying in the process?

The decision for allocating those resources to develop a concept was made by the board of directors for the Norwegian branch of our owner company where we got acceptance to use these resources. We also had it up for discussion in the board of directors for the whole company, to anchor it and get acceptance from the whole company, but also so we could involve competence from other parts of the total company. Primarily it was the Norwegian branch that should develop the concept, but we could also use some of the competences found in various other parts of the organization. When the start up was founded we had a board of directors where the different owners were represented, and they had an active part in the company as well.

Did you have a concrete plan on how you were going to internationalize?

Yes. We had a clear plan and developed several “roadmaps” for how we were going to internationalize. The first point after developing the concept and getting the validation was to build a prototype and get it tested. We had looked at other development of floating offshore windmills that they developed prototypes and thought that we should do the same here. That was a mistake from our part, and was very expensive, we could have downsized it and built the prototype in a small scale and gotten the results from that, but we felt that was the way forward to get acceptance. We could instead had a 1:8 sized construction and installed that out at sea. Then however, we needed a test site and the government should have been willing to provide such a site. Nonetheless, that was our roadmap and plan, but we could not get the capital for building it, and we could not get a test site to install it on. Other countries, like Scotland, have set a test site but the Norwegian government has never gotten around to setting up one. That is our general understating during the development as well there was never any push and power behind the willingness to invest in the research from the governments side.

Do you in retrospect that you could have gone more directly international for example Scotland?

Yes we could, but for us it seemed a bit problematic to not develop anything here. We felt that it should be founded in the competitive advantage we have from the sectors here and the cluster mindset. If we just moved the whole package to another country we felt that the competitive advantage would be gone. So we felt that the foundation should be made in the technological environment in Norway, and then you could internationalize. Our general idea was that at the point when the concept was finished and could be installed, the construction itself could be built anywhere, but the engineering jobs for development, maintenance and so on were kept here. We understand that the building costs in Norway are expensive and that could be done cheaper somewhere else, but some jobs should stay in Norway. So we never thought of going directly international, but if we knew what we know today, maybe we would have tried. However, we thought that it would be easier to get financing than it was and we had a much bigger confidence that the government would facilitate the development of this industry. Either through incentives, facilitating test sites and capital willing to take risks. The picture looked different in 2008 and politicians looked very positive at the industry, but the interest did not hold over time.

My view on the case is that it seems to be easier to get an understanding and support for a single component, but when the idea gets to big something disappear. I do not know what one can do to alter the mindset. If Company B is going to get its break I can't see that anything is going to happen in Norway, i.e. that a marked break through will happened domestically in Norway. We run some processes, and that do not involve the domestic market at all, on any stages. The ownership would be here and we will be an engineering partner, but the build and installation is international. We do not use many resources on Company B, but it is not dead and if an interesting opportunity comes up we will jump on the boat.

When you contacted potential clients and partners and researched the international market what networks do you use? Are these previously established connections or did you go out and probe for new?

That is sort of two faced. We have done very little active probing on our own, but we have used the various embassies and Innovation Norway to help facilitate meetings and participations in conferences. The two other owners of the companies also have companies

they know and partners in various regions, and we have through them gotten the possibility to meet interesting actors.

5. Interview, Company C

Company C is an entrepreneurial startup company based in Stavanger, Norway. The company was established in 2008, and is focused on owning and operating purpose built vessels for installation of turbines and foundations. The interviewee is the CEO of the company, and the company is now in a state of passiveness.

The interview was done in a semi-structured way, and the questions found in the appendix were used as a guideline so that the themes of our research could be answered. Below is a transcription of the recorded interview, not broken in to sections of topic to keep the chronological order and not risk taking elements out of context. However, small talk and subjects not relevant to this paper is taken out and do therefore not follow the conversation word for word. The interviewee is given a copy of this transcription for approval. The company and collaborating partners are given anonymous.

Interview:

What is your background?

I have an education from NTNU, where I studied chemical engineering. In addition I have an economical education and worked in the oil service industry prior to working for this company.

(The interviewee presents a few slides explaining the background of the company and their technology)

As you see in this first slide, we focus on the installation of turbines and foundations in the offshore wind industry. In the long run we might start looking at service as well, but for now we focus on installation, and only fixed offshore wind projects. We have developed a design for a jack up vessel and I will come back to how our design is different from the competition.

We started in 2008, and looked a bit on developing our own foundation since one of our board members had the knowledge to do so. We decided that it did not fit us, in terms of production etc. But we realized that we could pool our knowledge from the oil/gas and marine industry to the installation process in offshore wind. This is also one of the main reasons for starting up the company, the dense network of oil and gas knowledge realized the potential in offshore

wind and how the market had a lot of similarities to oil and gas 30 years ago. And so using previous knowledge could diminish the steep learning curve.

And so for the Norwegian industry, we feel that this is one important dimension, to think internationally without needing a home market. There have been a lot of complaints in the offshore wind industry in regards to the need of a home market, and that we as an industry really have to develop something at home before we can manage to internationalize. And although some companies may be right about that, we have always focused on internationalizing. And the whole Norwegian coastline has always been used to exporting, whether its fish or something else and so we thought it would be possible for us to internationalize. Even when there has been talk about starting up offshore wind parks in Norway, nothing has happened and it doesn't look like it will in the near future.

At the end of 2008 a design agreement was made with a Dutch company that has been doing vessel design for many years and been involved in many of the offshore wind specific designs in other companies. In this design process we brought our ideas and specifications and they brought their ideas that originated in a drilling rig. The other vessels they have designed for offshore wind originated a bit differently in that they have been more focused on transportation and shipping. Our concept is a bit different with its three legs and a focus on stationary operation.

After the concept design was done, we had several inquiries with ship builders in terms of what it would cost to build this vessel and how the market would accept it. The general feedback was positive and we thought that this was something that could work. And so we invested more money into prototyping and testing up to 2010.

Who was involved between 2008 and 2010?

We have at every stage had very few employees in this company, between 0 and 6-7. But we have had a significant board of directors with an extensive network. And this network aided us especially in the first years to develop faster than what you would think for such a small company. The board meetings were very active in the beginning and acted more as operational meetings. As we grew though and the team in the company was established we engaged more normal operational activities, although the network of the board members was still used.

Consultants have also been used in addition to the 6-7 employees we had, since we can't cover all fields of knowledge with such a small team. Especially in the design processes we hired external consultants to contribute. In the communication with shipyards we also hired a consultant that had previous experience from the oil and gas industry and great knowledge in shipbuilding.

After testing and prototyping we did a proper tender evaluation back in 2011. We had pre qualified a couple of shipyard, all international, and the most important terms for us were commercial conditions, experience in building jack ups with propulsion and also experience or understanding of how to build offshore wind specific vessels. The shipyards were situated in South-Korea, China, Singapore and in the Middle East. When narrowing down to our last picks some of the board members were very skeptical of the Chinese yards and were eager to deal with the yards in Singapore due to experience of quality and networks. But the commercial conditions and financial packages offered by the Chinese were superior, and so an agreement was made with a Chinese shipyard to build a vessel. This agreement was to be effective once we had secured enough capital for the first down payment and working capital for the construction period. And this has been the main challenge for us throughout the development of the company. We started in August 2008, and the financial crisis came in September and so capital has been a great challenge. This has helped us in other instances, especially when discussing conditions with the shipyards, so its not all bad. We initiated renegotiations in 2012 with the shipyard, explaining that we would not gain enough capital for the first down payment with the conditions previously agreed. And so we turned every stone and changed some technical aspects in addition to the yard giving us better conditions, paying a significantly smaller amount up front. And at this time we were pretty sure we would be able to secure enough capital to make the project work. We attracted 2 new big investors, but were unable to raise enough capital for the first down payment and working capital.

So currently we are in sleeping mode. There are nobody that wants to shut down the company since we have used so much effort and time. The market is promising and the agreements have favorable conditions. But as the financial situation in China changed at the end of 2013, the shipyard could not agree to the last terms, and went back to the original terms. And at that point, there was no way we could meet the demand for capital. And so the owners decided to put the company on hold, and wait for the company to be acquired or find new partners.

Looking at the Norwegian situation for the offshore companies, maybe the debate of creating something at home should be revisited. But for our case it wouldn't change much. The vessel isn't created for Norwegian conditions, the laws are a bit unclear and the price would be much higher.

So, if the financial situation changes and we happen to secure more capital somehow, we are ready to be operational within 2016. Our ultimate goal has been round 3 projects in the UK, due to depth of water and the technologies chosen. And since these projects have also been delayed, the market has not yet been lost. The industry realizes this and it looks like there will be more large EPCI contracts to build the offshore wind parks in the future. And while they have most of what is needed, they will lack offshore wind specific jack up vessels. They will have knowledge of the market and we are one of few independent players, and they know of us. And so this might be a possibility in the future, large EPCI contractors needing specific vessels to build out projects as soon as possible. We have a close communication with the shipyard so that in the event of an acquisition of the company, the vessel should be ready to be built as soon as possible.

When it comes to possible markets, the UK and Germany have been our main focus. There are also some wind farms coming up in Denmark and France is also emerging. Our whole vision has been to make offshore wind power profitable, to remove the need for subsidies and get the costs down.

The interviewee goes into depth of their idea, and technical aspects of the design. Their main idea of using a jack up vessel is to introduce a feeder process, in which more suitable vessels deliver parts to their jack up at sea.

Our main idea in the beginning was that jack up vessels are more suitable for stationary operations and are not designed for shipping. Both the technical and economical aspects of using jack up vessels for transport seemed not optimal to us. With the feeder process we proposed, the technical challenge is the dynamic lifts from the transportation vessel to the jack up. So that is one of our strongest technical advantages, our crane can do these lifts but our competitors cant. We calculated that with our technical and logistical propositions, one could save over 25% on some projects. Our calculations also show that the further off shore the projects are, the better the savings. So, for very close to shore projects our vessel can be used in the traditional fashion without the feeder cycle.

One thing we have worked extensively on is the payload available on the vessel. And we have been very adamant with the shipyard about. And so this was important to us because of the amount of turbines or foundations we could have on the vessel is very dependent on this. If we lose 500 tons, then we are possibly carrying one turbine set less. It's easy for the shipyard to just add some more weight or steel at some point to make up for something, but for us this has been important to be aware of. In the beginning of the design process we also contemplated using two cranes on the vessel, one for the dynamic lift and one for the actual installation. But as we calculated this, it made more sense to go with just one crane. Also with the depth of ports around Europe we went for retractable thrusters.

In the beginning of the offshore wind industry, the focus was on how to make every part of the process as cheap as possible, so the cheapest possible vessels were selected. But experience shows that it's the price per MW or kWh installed that matters, and that specialized vessels, although more expensive, make up for it in efficiency.

All offshore turbine manufacturers are international; so we have focused on having a close dialogue with these for our technical layouts. Many of these are not the easiest to deal with, and some have been reluctant to collaborate due to our proposed feeder cycle, while others have been more susceptible to our reasoning. And this might be an opportunity for new and emerging turbine manufacturers, if they can find a way of optimizing installation. Siemens have almost had a complete monopoly in the market and have just pushed their product out, while now in round 3 projects we see that the industry has matured a bit and want others to come in so that competition can create better product solutions and lowered cost. Some of the larger contractors and turbine manufacturers have helped us along the development track in terms of providing technical information etc, and some have been more focused on the feeder cycle in terms of installation of foundations.

It is also worth noting the clash between an onshore industry focused on wind and an offshore industry focused on oil/gas. And so it seemed that the onshore industry deemed the methods used in offshore installations to be too expensive, while the offshore industry proposed that you can't just move things out on the sea without thorough considerations. But as the industry has matured this bridge between these separate industries has started building, and there is an understanding of the challenges from both sides.

So you feel that the industry has matured or settled?

I feel that there is now a matured industry where its not just onshore wind going offshore, but actually a defined offshore wind industry.

The interviewee presents a slide demonstrating layouts of different monopile and jacket foundations on their vessel.

There has been a lot of talk lately on larger monopiles, giant monopiles and how large a turbine can be put on it. But we have always focused on larger depths and more into jacket solutions.

The interviewee presents a slide of the ownership structure of the company. Since we have chosen to anonymize the companies, the owners will be anonymous as well.

There are several larger industrial investors, but we started typically with “friends and family” here in Stavanger. Expanding this circle of investors was not just to gain backing but also to calibrate and see if others believed in the company and the idea. If we just sit here in a closed club in love with the project, we might cloud our vision. All investors are local with the exception of one based in Oslo.

As you see from the board of directors, my father is the originator of this project. He had contacts in the states with some investors involved in onshore wind projects. And the talk of offshore wind parks emerged, something that they were going to invest in, but had little knowledge in. And so they searched for people with knowledge, and knew that Norway did a lot of offshore. They contacted us, and we started to look at the market and realized that there were many parallels to oil and gas. We looked at installation and realized it was something we could do and it would be interesting and rewarding to do something new and oriented for the future.

Many of the employees we have had are also shareholders, and still have their shares after we put the company on hold.

We started as previously mentioned with a small board with a broad experience and knowledge base. And in 2009/2010 we had an expansion round and gained 7 new investors, that were less involved then the initial board. We are only about 20 shareholders, so it is easy to have a good overview.

In the large financial rounds that we had to make, we tried to think global and pursued every option we saw. With the amount of money and effort we put in we tried to exhaust every possibility before putting the company in sleeping mode. We gained one investor from Singapore (who would have joined if we gained the remaining funds) and one large industrial one in Norway. The problem in Norway is that most investors know what they are good at oil and gas and the financial conditions are better, and so they are reluctant to try something new in the renewable energy sector. There has also been discussion about the market and subsidies and if the market will struggle if they disappear, but offshore wind is a train that will keep on going. There is a lot, and there will be more, so the market is present.

The thought was to gain contracts as the vessel was built, to enable the remaining financing based on the cash flow from such contracts. But the whole financial hurdle has been the largest for us, if contracts and loans when completion was near had failed, the finger would have been pointed at the investors and the risk would be high. There are many examples of failure in the industry, and not that many successes, so maybe we need more stories of success to attract more willing capital.

Has the political environment for offshore wind changed since you started?

The political regime has maybe changed a little, but it has always been pretty clear. You can't really say anything negative publicly about renewable energy, but there hasn't really been any need for it in Norway. The unemployment rates are low, we have plenty of energy, good energy security and a dominant industry in oil and gas. So we lack the incentives that UK has for example. It seems that the new oilfields and the success of oil and gas in the later years has prohibited the larger oil companies to look at offshore wind as a possibility. So with recent complaints of oil service contracts going international rather than domestically, it might increase the possibilities of more focus on offshore wind. But you have to remember that a lot of the companies in offshore wind have lost a bit of steam, so it might require too much from them to get interested again.

Did you use a lot of resources to gain investors in the beginning? In our checking the background of the company it would almost seem like a spin-off?

The first rounds were pretty okay actually, and also the first contact with vessel designers and ship yards was made easier with the networks provided by board members. So that has been a big advantage for us.

How was the idea conceived? Was it tied closely to your background?

We realized that our experience in offshore oil/gas could be used. They were to install these turbines at so and so depths at tough conditions. Pretty early on we got 3 employees with oil & gas background with more technical understanding and knowledge of how installation and cranes work. So in the beginning we didn't have the detailed knowledge, but we saw the vessels that were used and decided that this was something we could do better. Most of our competitors have focused on installations at 40-45 meters depth, while we have focused on depths down to 65 meters with the round 3 projects in mind. While there might be saturation of vessels for depths up to 40-45 meters, in the niche we have chosen there are not a lot of actors that have developed vessels.

How did you go international and use international contacts? Was there any specific tactic?

Primarily we used contacts that were in our network already, and in the first instance that was the design company that we had experience with in designing drilling jacks previously. All the customers were international as well, so work had to start early in opening up a line of communication with for example the major turbine manufacturers. One important thing about our internationalization process is also that we had great knowledge in oil/gas, marine activity and finances but lacked the knowledge about wind. So we have had two Danish employees that came from the wind industry, and especially the last one came from a large manufacturer of turbines. And so he brought with him additional networks in the wind industry that we lacked, and so we gained a lot more momentum with the important actors in the industry.

What was the strategy after the vessel was built? Run as a shipping company?

Our plan was to build an entrepreneurial venture within offshore wind. So operate the vessels, operate installation processes and after a while go into the service part of offshore wind. And before the financial crisis, our plan was to gain contracts up front and then build the vessel. But that was totally impossible, and is still totally impossible to accomplish. So the strategy was changed, and we needed to design the vessel with specs first, start building the vessel and then gain contracts. And so when going to investors and explaining the situation,

we used comparatives within the industry where all gained contracts while the vessel was under construction.

How does the offshore wind industry look to you? Are there a few actors that control the majority?

The ones with the most power in the value chain have been the turbine manufacturers. There are some larger companies like DONG that emerge as large actors in the industry with more power as well.

We have always thought of 3 potential customer groups; the energy companies, turbine manufacturers and third larger EPCI contractors. With energy companies as customers it could work very similar to how offshore oil/gas works today, with turbine manufacturers they could offer a package of turbine w/ installation. One of the issues of getting cost down in offshore wind is that there hasn't been a good pooling of projects, especially considering logistics and installation. Projects are small and short in time scale, and so the daily cost have been high. And so this shows some of the immaturity still in the industry, project leaders think about their own projects and will not think about streamlining the overall projects together. With the larger companies like DONG doing big contracts and having clear frameworks this is changing, and is showing how it is likely to become. Large actors that control the industry, and unfortunately this will make it harder for smaller companies to gain success in the industry.

In terms of the discussion between floating and attached installations, do you feel that the market has settled on a preference?

If you look at all the projects that are planned, most of them are going to use bottom-attached installations. But of course if you look at floating installations, they show promise in regions of high population density, high electricity costs and deep waters right off the coast. So we have focused on attached installations, and feel that floating installations won't be a large market contributor in the immediate future.

In Norway there might be some possibilities for floating wind with the emerging debate about electrification of the oil cap. If you could get offshore wind turbines relatively close, you could have a better solution than to drag cables from shore to the platforms.

Did you feel that the Norwegian track record in oil/gas was something you could draw synergy from when going international?

There is a lot of respect because people know how well the Norwegian oil industry is running and how we do things. But also there will be some pushback because they will think that any Norwegian solution will be expensive.

And also the term green collar jobs means a lot in the UK and Germany. When a company decides where to put a factory, they can shop around and see where they will get the best terms.

Have you had any contact with INTPOW or similar network organizations?

We have been in contact with INTPOW, but are not members per say. But we collaborated with them in setting up stands etc. We have also used Innovation Norway a little in Germany to set up meetings, this prior to hiring the Danish employee with all the wind energy networks. Innovation Norway was also used when did were in China when we were in touch with the ship yard, to see if there were any possibilities of finding investors.

If you had the chance to start over again today, is there anything you would have done differently?

I mean, we started with very little money, and I think that you should as an entrepreneurial venture. But this is a very capital-intensive project, and so gathering more financial capital up front should maybe have been focused on a little earlier. But its not sure that it would have been possible, and you have to start at one end when you are so small and starting up. So I think we did a good job, and so I feel that it's not entirely our fault that we are on standby right now, its more the things around us, especially the financial crisis and the different situation afterwards.

And so we have tried to gather investors and capital all over the world, and had a very global perspective all the way.

In terms of strategic decisions, how has this been made in the company?

The board has processed the most important decisions with the entrepreneurial group. And there has been a lot of headroom in the company. So we have always spoken our mind, and

been truthful in communication with the board. It might be that groups fall so much in love with their project that they sugar coat it before presenting it to the board/owners, but that has not been the case with us. And so we have developed as a company and changed our position several times, such as with the Chinese yards or building the vessel on spec.

6. Interview, Company D

Company D is a spin-off company from a Norwegian shipping and investment company based in Bergen. The company deals with ship operation, logistics and ship brokering in addition to ownership and activities in various other companies. The mother company have just under 2000 employees worldwide and had revenue of almost 6,6 billion NOK in 2012. Company D was set up as a product of an internal project in the shipping company, and focuses on technology and solutions related to installation of offshore wind mills. The interview was held with the person responsible for marketing and sales as well as business development.

The interview was done in a semi-structured way, and the questions found in the appendix were used as a guideline so that the themes of our research could be answered. Below is a transcription of the recorded interview, not broken in to sections of topic to keep the chronological order and not risk taking elements out of context. However, small talk and subjects not relevant to this paper is taken out and do therefore not follow the conversation word for word. The interview subject is given a given a copy of this transcription for approval. The company and collaborating partners are given anonymous.

Interview

Tell us about the start of Company D.

Company D started as an internal project in a Norwegian shipping company, and later founded as a separate company in 2007. So, we have been in business for a while, and have had some projects. In 2008-10/11 there was a lot of attention on the industry and offshore wind, but after that it has more or less slowed down. The valley of death you might want to call it. There was a big optimism with several pilot-projects in different countries with offshore wind technology that we have focused upon, namely jacket foundations, but after that it has not been that great development and growth that everyone thought was going to come. The growth curve for jacket foundations has been pushed further and further in to the future. Now however, it looks like the activity is gradually increasing and it looks like offshore wind might get their big break, also including jacket foundations. Not in the explosive manner that someone thought, but slow and steady. The installation capacity that exists today, for example in various ships, implies and have implied, a much lower growth

and that is what looks like it is coming now. In addition the industry has shown to be more immature and lacking the competence and/or human resources to give that large growth. In addition, the financial crisis some years ago has also had an impact.

Did you set up the company with the domestic market in mind?

No, we have never looked at the domestic market, only international. Of course we have participated in initiatives and what came up domestically as well, but it was not the focus. Early on there was no ambitions or demand for developing offshore wind in Norway, the reason for that is as you know low prices on electricity and little subsidies to kick-start the industry, so there is no economic incentives for building out the industry here.

How is the involvement from the original company in offshore industries in Norway?

Not much, the ships are cargo ships and part of a merchant fleet. Some parts have off course at points been involved in the oil and gas sector and moved equipment and oil and gas related cargo, but the company has not moved in to the supply vessel or installation market.

Have you been involved since the start of Company D, and why did you/they start up in this industry?

Yes, I have been involved since the start. There were some good projects we worked on, transportation of fundamentals and equipment associated with offshore wind that was going out to the fields with barges or tugboats. So we saw, as many others did, that there was a gap in the market. Dedicated or good installation vessels did not exist or installation methods for that matter. So we started working and before we knew it we had a fairly large project. This was in Germany were we installed 6 offshore wind turbines with jacket fundamentals. That project went very well. Aside from the economical aspect it was a very good project, all was installed according to plan within the timeframe, the technical aspect was good, in relation to safety it was good and they are still standing. It was a real pilot project; no (dedicated) installation vessels existed or plan for how to install the turbines. It was really exciting. The financial side on the other hand was not very good for any of the involved parties.

Is the economical aspect of offshore wind still a bit unsure?

Yes, in that project the customers were not interested in paying for any delays or increased cost. After that project we have seen the need for better installation methods and vessels, and

have developed a lot of technology related to installation and vessels, and also subsea technologies. These are ready to be built, so we are ready for the next step, but the whole industry needs to move in to a larger and more professional phase and the market and customers needs to be established. We have used a lot of resources to develop these technologies, also research incentives, know the industry and are ready to realize the concepts. In my opinion we can just do it.

So if I understand you correctly, you have developed the whole process and it is ready if you get the order?

More or less. There are external factors that are important when one develops new technologies and as new industries are emerging. And all these external factors surrounding the development cannot be control. The financial crisis that hit in 2009 slow down much of the offshore wind market, and the access to capital disappeared.

How did this develop for your part, were you put under pressure by the owners?

It affected us of course, but we have been lucky. We have a big owner backing us up, and without them this would not have worked at all. It has however meant that the projects and the whole market have been postponed a year, two years, and three years, maybe more. But the projects have been approved and commissioned by the various governments, so we know that they are coming and in my opinion it is just to be patient and wait for them to start. There are some established companies that do fairly well only on offshore wind, the best ones are maybe energy producers, and they are active now as the market is emerging. For example a Danish company who is moving away from fossil fuels and is taking the EUs law and directives on emissions very seriously with full backing from the board of directors. You don't see the Norwegian energy companies doing the same, and the Danish company is making money on their projects. They have done some in the later years and have learned a lot, know how to do it and how to develop them within a budget and make it economically viable. They buy the projects other actors can't make happen, and do it well. There are a couple of contractors that are starting to make money as well.

When you were trying to internationalize, what channels did you use? Did you have existing networks you used or did you go out and explored?

We explored and investigated, there are some meeting grounds where you can come in contact with actors in the industry. In the start, when we started investigating the market in 2006/7, there was not that many who were involved and you could get through a whole trade fair in a couple of days. It was just classic market work, traveled around and asked for meetings with the ones we wanted to talk to.

Did you feel you had a competence and resource to use as a foundation being from the company you are and from Norway?

Yes, to some degree. Both are known and respected as actors in the maritime industry and know how to do shipping and offshore work, so it was a nice way to get access. When we started doing projects many years ago however, we realized that the customers had a lack of knowledge, and did not respect that for example weather conditions can postpone a project and that there can be storms out at sea restricting you from working for weeks. I think the industry in general has suffered from the fact that the ones that are actually paying and/or planning the work have little experience with doing work at sea, and showed little understanding or willingness to act on the input they got. When you are in a meeting with someone and they don't say anything but just nod, you expect that they have understood what you meant, but the next time you met them you realized they had no idea what you had gone on about. You had just been talking over their heads, and they don't dare to ask. We are used to work with people that know ships, offshore installation and the environments out at sea and we clearly see that we underestimated this aspect. That was a really good learning process, and we had to have a couple of rounds before we learned what levels to talk on to make them understand. That was then and the industry has been fast learning and things are much better now where the competence base is steadily growing and innovations are fast being developed based upon experience.

Did you feel it was a problem in the industry that it seems that for many the idea was to just take land based wind mills and stick them out at sea?

Yes and a lot of the problems in the projects were just down to a lack of experience and knowledge from the customer's side where the offshore aspect was underestimated.

When you internationalized, what markets did you focus on?

In offshore wind it is mostly in the countries around the Northern Sea that have shown potential to us; Germany, Britain and Denmark. Things are of course happening in Asia as well like for example China, but they are probably going to do it themselves and are putting huge resources behind their developments. We have also been in Korea and talked to actors, but they probably have sort of the same mentality that they want to do it themselves. They have also been here to visit us, but I think we are more involved in their learning process, and when the time comes for them to actually build out the fields they are going to do it themselves.

There is a certain level of protectionism from all countries, and I believe that is the only thing that can get offshore wind out of the starting block is a test site and a certain amount of projects here in Norway. This with a certain amount of constraints that domestic companies should lead the development and that the involved parties should be an amount of Norwegian companies. Without that you don't get any publicity in the media or attention in the society, and without that you don't get the awareness needed to build a basis so that for example the ship yards, but also the smaller actors get interested and see potential in the industry. We have since 2008 been working to get a small pilot project going, and we and large portion of the industry and some governmental agencies worked together to deliver a government proposition in 2009-10. We asked for around one billion NOK over the national budget to establish the pilot project; install subsea equipment, fundamentals and so on. Had that gone through I believe the industry in Norway would have looked very different, first of all it would have been very timely for the development we see coming now, but we would also have been able to test and work through a lot of the problems the industry have and would have been ready for the big market. The big market we now see coming in 2016 and further in France, UK and so on. Now we are falling behind, and I am personally afraid it is too late for the Norwegian industry in general. Of course there are some companies that have seen this early on and have worked a lot on it from the beginning. There are some (domestic) actors that definitively are present, invest in the development, and are ready when projects start.

How do you feel the support from the government and politicians have been?

There have been a lack of putting actions behind their words, there have been words and talk about investing in the industry, but no actions have backed this up. And the action the industry needed was a pilot project, a small one of 4-5 turbines. Then you would have created a fundament for a lot of the companies and the picture would have looked completely

different, also for smaller companies. It is the smaller companies that especially would have benefited from it.

In your mind, would it have been easier to get support for a smaller component or one single product?

Maybe, but shipping and installation is what we know and have a competence in. Offshore wind is based around turbines and is dominated by large foreign actors. Norway has competence and experience in the surrounding industries of offshore wind and getting in to the turbine industry or any of that would have been difficult.

How many employees are you in Company D now?

At this point we are only 5. We worked on technology development and market related activities for a long time, and the strategy is that we were to develop the technology and bring vessels and installation solutions in to the industry through a larger partner or owners. At this time we do not have need for more people, more have been involved and quit, but we have ownership in several other smaller companies that we also use for development and engineering. The plan is to scale it up when the product and solution is set in to action.

What vessels have you used on the project you have conducted?

In the projects we have conducted we used existing vessels available. They were not ideal for the installation, but were the only ones available to do it. At that time there was no specialized vessels built and available.

Is this also the strategy for the future, to develop the company as a ship owner and handler?

In a way, but we will use the vessels and contribute to the planning of projects and maybe other steps. Everything is now planed in detail and developed on the basis of the experiences we have had with the other projects, and is now ready to be built.

How has the technology development been, did you have a specific goal or started out with a vague idea of the end result from the start?

The main principles, or the goals and function, were put down early on. There have been a bit back and forth to find out how we were going to do it, but the main idea has been followed. There have been a lot of detailed work that have been more uncertain, but we have developed

the technology with operation in mind and did not just start out with a plan to build a thing in steel. It is based on our experience and what we have learned in the project where we have been involved. In relation to the type of fundamentals or technologies we have taken account for installing we have taken some choices, but our solution can also work with a wide array of products.

How does the industry look today?

Larger energy companies are beginning to show their presence, and are dominating today. Below them on the customer side there are smaller project companies, and under them you have the larger contractors. Earlier the large contractors have been involved in oil and gas, and have not seen potential in the industry, but now several large companies are showing interest with several other international companies following. So they are sort of established as a main customer for the larger projects. Below that again there are companies like us, which deliver in to the main contractor. What are installed out at sea are turbines, fundamentals and cables, and what we see is a three way split in the installation methods chosen for those there parts. Installation of the turbine is an air-lift, while installing fundamentals is almost an 80% subsea operation and laying cables is another operation for itself with specialized vessels. All the phases require specialized methods and probably very different solutions.

Do you believe that a shift in the domestic oil and gas industry can give a small revival for offshore wind in Norway?

No, the costs are too high, and it has only accelerated in the last year. I don't know if the country is able to turn around and focus on other things if it should come to a halt either. I believe the only way to make the shift for the domestic industry is if there is a larger domestic project, a la the build out of the first Norwegian oil field, but to get this done in a country with politicians with a lack of vision for the renewable energy industry seems difficult. It is more or less a political choice, and they seem to lack the visions and incentives to do anything.

What do you think of the future for offshore wind?

When the costs start going down for offshore wind during the next years, and when the industry becomes self-sufficient without subsidies I think this industry can be very good. As of now it is the only energy solution that can make a real difference in terms of large amount of kWh, and the potential is huge, especially if the cost of electricity goes up. There are many

exciting projects focusing on what you can do with the surplus energy, for example produce hydrogen, so I am positive. I also believe that within the next ten years you will see a project domestically as well.

Have you taken a choice and a stand in deciding what technology will become the standard and designed after that?

We have worked mostly on fixed solutions, but we had some dialogue with companies developing floating solutions as well. That market does however more or less not exist, and probably will not come within the next ten years.

How is decisions made in the company?

We have a board of directors above us where the owners are represented that things go through and larger decisions are made.

Have you had any special problems going international, other what have been mentioned?

Yes of course, specially related to not understanding the culture and politics of how things are done.

It would have been very beneficial to have a home market, you are in a network and know people, and are close to the decisions and able to act fast on projects and problems.

7. Interview, Company E

Company E is an entrepreneurial startup company based in Bergen, Norway. The company was formally established in 2004, and is focused on providing seabed installed jacket solutions for offshore wind. The interviewee is a business developer in the company and had worked there for slightly over 1 year. He had previously worked as an IT manager for a larger drilling company. The company has done well in the industry and has delivered their products and services to many projects.

The interview was done in a semi-structured way, and the questions found in the appendix were used as a guideline so that the themes of our research could be answered. Below is a transcription of the recorded interview, not broken in to sections of topic to keep the chronological order and not risk taking elements out of context. However, small talk and subjects not relevant to this paper is taken out and do therefore not follow the conversation word for word. The interviewee is given a given a copy of this transcription for approval. The company and collaborating partners are given anonymously.

Interview:

Can you tell us a little bit about the history of the company?

The two starting entrepreneurs had great knowledge from steel, oil/gas and foundations from previous endeavors and over 25 years of experience. And so they started on this project in 2001, under a different name, after someone advising them to look at offshore wind. And so they looked at the current market, and the estimated growth rates and saw that the industry had potential and that there was use for the knowledge and competence they had. The current company was started in 2004, and gained a contract in the UK for foundations of two 5MW wind turbines in 2005/2006. The foundations and turbines were installed in 2006 at 45 meters depth, and was a big challenge with the huge turbine and the big water depths. Some of our foundations have been installed near oil platforms, and so they don't run their generators, creating an environment with a lot less hum.

And so they won this first big contract, and they won this despite of competition from major companies that had already gained this contract. The company then entered the process in the last possible minute and snagged the contract themselves. The jackets were then built in

Scotland. Since then we have built foundations for four different offshore parks and one onshore park. In total that is 86 foundations for wind turbines, and our last contract was on 46 foundations that were constructed in Belgium, a contract that was similar to the first in that we snagged the contract in the last minute.

The concepts you have beaten in competition to gain contracts, are they technically different? Monopiles etc?

In most cases they have been monopiles yes, but it turned out so that they couldn't be used in those fields or that our concept has brought less risk with it.

Now, we haven't won any big contracts since 2011, and so that is one challenge we face today. There have been three projects lately where we have tried to gain a contract, but lost to another concept. And when we look at those we lost to, especially one test turbine in Belgium we see that this is something we could have done better. If you build something expensive in the oil/gas industry, it doesn't matter that much, it's just a onetime cost. But when you need 50, 100 or 300 foundations, weight matters in many ways.

Every time somebody delivers a foundation to a project we think of it as a positive thing. Almost like a pendulum, you can make people aware of their mistakes by letting them finish their project, and then they can realize that what they had in the beginning (us) was a better solution. So you can wait for projects to finish before you reenter for a second evaluation. So we hope that we can enter several larger projects in the future.

What is your strategy when contacting and approaching these market potentials?

All projects are different, but you can separate them by two generalizations. Either a utility company builds the parks/projects or more independent developers build them and utility takes over. In one of the projects we sold to in England we got a contract from the yard that was supposed to build the foundations. So the contracts can be given from a wide range of companies involved in the value chain, from larger EPCI contracts doing the whole thing, down to smaller companies like that construction yard. It is also very different how the developers look at the importance of the design, if they feel its something anyone can build and they just order it or if they are very concerned about optimization. And so it varies greatly by whom we try to sell to, it might as well be the turbine companies, that wants their turbine to look more attractive in the market and so they can add our foundation to the package. This

way they can give a more complete cost structure than the competition, with a proven foundation.

Do you have a lot of collaboration with turbine manufacturers?

Yes, a lot. Often when building larger parks/projects they do a feasibility study or analysis, and tell us that they are looking at 10 different turbines, and ask us to do an analysis of these turbines with your foundation. And when taking this on we have to be in dialogue with these 10 turbine manufacturers, preferably looking at several turbine models. This process is quite interesting because the innards of the turbine can be controlled and changed dependent on the foundation on which it stands. So if it sits on a very rigid foundation like the one we deliver, then things can be controlled so that it moves less or have different strains on the construction. This is done iteratively as they first look at a set of standardized foundations from us, change the controllers, give us the numbers so that we can alter the jacket and provide an optimized solution for them. So there is a lot of iterative processes and research done in the field, and it is also an immature field with a lot of conservative opinions. Many will just add extra steel to be sure or because they lack knowledge.

Do you feel that being Norwegian with its marine and offshore history gives you a competitive advantage when advocating your know-how to possible customers?

We have had an advantage because of our marine background and understanding that you can't squeeze the margins of cost all the time because it goes over budget. Onshore plants can cut costs and squeeze the margins in a lot of ways without the risk you get offshore. Offshore operations are more complex because of the weather conditions, wave conditions, dynamic lifts etc. And so offshore you have to be absolutely sure that it works. And so our understanding of this process and being able to see the complete picture has been an advantage. We have relatively often entered projects where the dialogue has been with the one responsible for buying foundations, and they look at it in an isolated way. We can ask "What footprint do you want the jacket to have?" and they will tell us to decide. We will then ask what kind of installation vessel you will use, because we would like to know how wide it can be to get as many on board the ship as possible. But that is not within that person's responsibility, he is just there to buy foundations. We think more of the bigger picture, how do the foundations fit on the vessel, what kind of crane would you have to use etc. So we will bring advice and tell them that we want to build this kind of foundation because it fits with

these three vessels and these cranes. Others will often just manufacture the jackets, and not spend too much time and effort with the design or to think about the bigger picture. This brings down the cost of each foundation, but does not mean that the overall cost in the end is lower. And so this knowledge base is something not all manufactures in the market inhabits, we have been in 5 projects so we know the vessels and the logistical challenges. There is a lot of talk about lowering costs in offshore wind, and we feel that this can be done in a good or a bad way. Lowering cost at one point in the value chain might increase the cost at another point in the chain, so we feel lowering costs should be done with insight on how each point affects the bigger picture.

Your primary focus was the design of foundations. Do you feel that with this insight into the bigger picture that you have expanded the services you provide to the customers?

I think that is true. We deliver the design of foundations yes, but we experience that a lot of projects encounter problems in some areas. But with the background this company has and with the previous experience from oil/gas we are able to see the project as a whole. We want to see the project succeed in getting installed, not only sell foundations. When meeting customers I have experienced that one of the founding entrepreneurs of our company ask how things are planned. And they will be surprised by the knowledge he has about what problems they face, and he will bring some ideas on how to solve these issues. And so he has gained a lot of credibility and is sought after in the market. We have travelled a lot, and been in contact with a lot of actors in the industry, which also adds value in the sense that we know the value chain well.

In the beginning when the network was not that big, how did you first internationalize? Did you just scout around, or did you have some starting network points you used?

I think we had some existing networks we could use, but the starting entrepreneurs also contacted turbine manufacturers for example and asked if they could design a jacket around their turbine that was to be used in the market. And they did not take no for an answer, called every week to ask if they had changed their minds and was on top of the situation at all times trying to find information about the solutions they had picked, and argue that their solution was better.

Also the founding entrepreneurs knew that designing a jacket is easy enough if you don't care about the amount of steel used or the thickness of the construction beams. But the cost of

materials, construction, transportation and installation can grow exponentially down the line if it's not a concern from the beginning. And so the entrepreneurs used a lot of time and effort to come up with a great design that they could present to projects and customers. So with a good understanding of the issues and a great design, they managed to enter the projects eventually.

I was brought in the company to try and gain 3 big new contracts. Unfortunately no large contracts were given this year, but a good amount of smaller projects or studies. And our product is given favorable reviews and the feedback given is very good, saying that our solutions are better than others in the market. Still, we have managed to lose at least 2 big contracts to a competitor and their jacket solution.

Why do you think this is?

I am currently reading a book called "David against Goliath" that discusses various strategies to use against an opponent. If you are firm in the belief that you will accomplish something, you manage to alter the rules or the way you act in a way that is favorable to you. If you think you are mature and not that creative, you play by the rules that your opponent uses. And that is something I have seen in this market. In the procurement procedure that the utility companies use we will fall through because we do not fit the criteria that they have set. They will look at revenues from the past year and then larger engineering companies "beat" us by a large margin. They will also look at the number of engineers or if we have all the resources needed in-house, in which we are just a small design company using subcontractors to build the foundations. So if we play by these rules we will lose in these bigger procurement processes that are optimized for mature markets. But this is not a mature market, so the concept or the solution is a lot more important than your organization. We will not show up on their graphs of larger engineering companies, but we do have the best product. For this to work you need a procurement manager with a lot of guts that will go past the guidelines and pick the best solution independent of what the traditional criteria tells him.

So that is one of the reasons why I think we haven't one these big contracts. We have gone from being a small company with a lot more freedom to alter traditional views, that does not quit and that pops up at the right place at the right time. Being at a trade conference or at an expert panel meeting you can have more freedom as a small company to advocate your solutions "by the backdoor".

Another reason is that the projects that look promising and seem to have a green light for construction have stopped in its tracks, while others that has seemed unpromising suddenly has been developed into a living project. In offshore wind there is maybe 5-6 parameters that has to be locked in before the project gets its go ahead. If one of them is missing, the project is stopped. This can be external finances, grid connection, internal finances, manufacturing capabilities available with a good offer from manufacturers etc.

Personally I want to go back to the smaller company strategy that we had in beginning, if not we need to grow substantially to about 160 employees. What we also see is contractors that want to optimize the park ask us to create a jacket for that field. We tell them yes and ask what turbine and installation vessels are to be used in which they reply that they don't know yet. They have 6 turbines that they are thinking about and installations are too far into the future to worry about. So we can deliver a jacket, but not an optimized jacket unless the turbine and vessel are chosen. If they could just gather the foundations, turbines and vessels they are considering together and see what combined solution would be optimal. But they do not do that. Instead the first pick the turbine for example since it's a large part of the contract, and then go into the market looking for solutions. A jacket with a larger footprint can be made lighter and still withstand the forces of a 6 MW turbine on top, but might be more expensive to transport and install because the yards and docks do not have the capacity to manufacture and handle the bigger jackets. So for us it's a challenge to try and make them look at the bigger picture. The new CEO has mentioned that we need to deliver that EPCI-like consultant service on how to best stitch together a project. That was one part of our winning recipe before, not just delivering the jacket but also useful tips and hints on how to solve issues.

Have you considered going into a joint venture with someone to deliver a more substantial part of the value chain?

We see that of the larger EPCI contractors, some get almost no contracts while others get maybe every other contract and a few get many. So it would be difficult to find the right partner for us, and with being independent we can collaborate with all the larger companies in the industry.

But yes, it is a possibility filled with risk since you place all your eggs in one basket.

Many new ventures face a lack of resources, how did the company deal with this issue?

In the beginning it was just the two founding entrepreneurs, and they had the finances to start for themselves. They were not afraid to speak their mind and had a great network because of their extensive experience. And the concept was superior with the 25 years of experience they had from that segment of offshore installations. But it took a bit of time before learned how the industry worked, it was and is still an immature industry, and there is also negative impacts to be seen from the oil and gas industry. They manufacture few foundations and have vastly different budgets. In Norway they are sponsored with 78% tax deductions as well, and so cost is not that important. I have myself worked in the oil/gas industry and eventually stopped giving advice on how to save money unless it amounted to over a million NOK, they just did not have time to process those ideas.

How was the process in developing the end product or service?

They looked at a lot of different things in the beginning. One was a gravitation-based solution in which you cast a foundation and create a jacket with a column up to where the turbine is attached. So they looked into all different ways one could do this, but focused more on jacket solutions. In the beginning they had both three legged and four legged solutions, but what ended up as the technical winner was the four-legged jacket. And this is the jacket that has been outcompeting the others. At the same time we have tried to deliver a solution, not necessarily force the four-legged jacket on customer. The spacer between the jacket and the turbine is something we have had made differently over time. And so when customers look at our portfolio of former products, they are not necessarily aware of the innovative process we have and our new solutions. Some customers might come to us and say that want a three-legged jacket, and we will say that what they should go for is a four-legged jacket. At that point they may not call back and we figure out that they have gone for a three-legged jacket because of logistical considerations. And so by not telling us that a vessel was picked, an unusual situation compared to other projects, we advocate our four-legged solution without knowing that they needed a three legged one. And so in that particular project, they started with the vessel. Even though our four-legged jacket is the best, our three-legged jacket would be much better then the three-legged jacket they used for that particular project.

So choosing strategy in accordance to the challenge is very important. In the beginning we were a small company with two employees and so to grow gradually and do more and more in-house is a challenging aspect since you have to consider altering your strategy.

Do you have any international markets that you focus more on?

The focus has been on; Korea, other Asian countries, English channel, north sea, east coast of the US and the Mexican gulf. But it varies in which of those regions are topical or not depending if the factors necessary are aligned.

What do you think about the Norwegian market situation? There seems to be outspoken political will at least?

I think that political will has been quite hollow in my opinion. I am not confident that this is something that will change in the time to come either. If you travel along the coast in Sweden you see a lot of windmills on shore, but in Norway there is almost none, and so there is a great difference in what the countries has chosen to focus on. So it is not impossible, and there is some movement but I don't believe Norway will be a market we can depend on in the near future. What we have some faith in is the different test and prototype projects, and there are 3-4 planned test sites planned along the coast, so we do follow those closely.

One thing as a Norwegian company to be a part of this industry is that you have to be present, you have to travel and meet people or be available by video conferencing.

How has internationalizing been as a small foreign company competing against possibly domestic companies that can offer similar products and solutions?

It has been mixed, and varies from country to country. We meet cultural differences almost everywhere since we are Norwegians that do not understand foreign cultures too much. Often we are not considered as competitors because we only provide a small amount of the value chain. That makes us a small engineering concept that can make a project feasible instead of inhibiting it. So the bigger work numbers go into manufacturing and installing, and the concern of domesticating production is more directed towards those processes, not design.

Many may feel that they want things to be built locally to have the most control. But in this industry that is not something you always have the luxury of, and so competing internationally we feel that being from far away Norway is not necessarily negative.

Norwegians also has a good reputation as business partners and service providers so that has been a plus for us.

How do you protect your design and products in terms of intellectual property?

We have several patents on different parts of the jacket. Especially the spacer we talked about and the detailed part of the leg socket, the actual stop ring is patented. In fact pretty recently a bigger project contacted us to ask if their design infringed our patents.

How do you look at the future for the market?

It looks promising, especially from 2015-16 onwards. We also see that there will be a lack of installation capacity, and so you have to be more thoughtful about how you design and combine each part of the project.

We are dependent on the larger contracts, as we are not paid by the hour but by the project. We are one of few that have delivered on cost, on time and without quality issues. And innovation is more incremental in this industry as you have to have a proof of concept before anyone will buy your product. So the fantastic new invention that has not been proved will not be purchased and will not be able to prove their concept. So we are proud of our own inventions, but the market is poor and full of unproved "genius" new solutions.

How are major strategic decisions made in the company?

The difficult thing about going from a small company of two to a larger one is defining who does what and when. In 2012 49% of the company was procured, and so that has changed the infrastructure of the company. There is a very different professionalization, new rules and procedures and quality control over the work that is done. And so one can discuss if this has been positive for the company and its success or not in relation to what we talked about earlier on strategies for gaining contracts. Another aspect is the position we gain in the market. With a larger owner we gain more respect and reputability, and so this gives momentum one has to utilize.

As an innovative company ahead of the competition one can also experience that other companies look at ideas we have had a long time ago that was discarded. And so in being innovative you can also be too self confident and then realize you have to play catch up on previous ideas. In that way you are not always best advised to follow the best technology and solution, but be aware of what the market push tells you. But we have always been focused on being a company that does not just follow the trend, but makes projects successful and at the lowest cost. One of the trends in 2013 was using line pipes, where you get standard steel from steel producers and just weld together a jacket. Even if this means a thicker pipe construction,

the cost of construction is cheaper. But many of these constructions have not calculated everything correctly and for example the cost of weld deposits will increase exponentially with pipe thickness. And so again we see the problem with companies unable to look at the bigger picture, and only concern them with the task they are granted.

We also contribute to research, and one of the interesting subjects right now is what kind of steel is best for jacket construction. Calculating the lowest levelised cost of energy takes a lot of careful consideration with a lot of movable parameters, so this is an interesting subject.

One of the many experiences we have made during our history is that there is almost never a final yes. You have to stick with it to the bitter end and make sure the project and contract is fulfilled. Every major contract that we have one has been a last minute thing; the project is in crisis and needs some "miracle" to proceed. So you never give up if there is a project that you think you can contribute to, and so the larger the company the less personal the interaction is and have more define roles.

8. Interview, INTPOW

INTPOW is a Norwegian networking organization with a main purpose of promoting cooperation between Norwegian and foreign actors in the renewable energy industry. It is a joint venture between the renewable industry and the Norwegian Government. They have published extensive reports on the offshore wind market in Norway.

This interview was not done in the same way as the other interviews, and the premade sheet of questions was not used to guide us in posing questions. Instead this interview was unstructured and meant to examine their point of view of the Norwegian offshore wind industry. Our methodology dictates that the unit of analysis is the firm, and so the information gathered from this interview was treated analytically separate from the others. The information was more used to highlight our assumptions about the industry and that companies are forced to think internationally from the start. The interviewee was the managing director of INTPOW and the findings are presented below. The interview was not taped due to the structure of the interview and allowing a free-spoken conversation.

It seems that after the financial crisis, offshore wind was seen as an opportunity for many of the larger oil and marine companies. It was something they could develop and expand their interests in. A large Norwegian industrial company diversified their operations and invested in building jacket installations for offshore windmills. They were granted a large contract to deliver 13 of these substructures, but the project became a failure.

Although offshore wind was seen as promising, the progress was slow. The high synergy with offshore and marine industry meant that Norway had a lot to build on. However, when new oil fields were discovered and the petroleum industry stabilized after the financial crisis, the companies that had invested in offshore wind focused their attention back on their core business.

Investinor is mentioned as a Norwegian investing company that focuses on renewable energy and has previously invested in companies related to offshore wind. In addition their focus is on Norwegian companies with international ambitions. However, the risk involved in offshore wind can inhibit eagerness to invest. The risk is even higher for floating offshore wind projects, since creating prototypes are expensive, and the industry is not as well developed as the fixed wind projects.

INTPOW believes there are two important things for a startup in offshore wind to focus on. One is finding an industrial partner and the other is finding someone willing to invest. The costs of developing the technology are enormous, and the risk of failure is high. In addition, the investors need to hold on for a long time, technology development and commercialization will not be done in one swift movement after investing money. However, finding someone willing to invest without already established industry partners might be difficult, and visa versa. Expanding your network is important, and this is something INTPOW tries to accommodate, but at a cost. So smaller startup companies might deem the price of membership to steep.

It is also mentioned that more and bigger test sites domestically might make it easier for Norwegian companies to prototype before expanding internationally. It might be more difficult to prototype in foreign locations, while trying to keep some of the company in Norway.

Korea is mentioned as a strong competitor to the Norwegian industry. Like Norway, they have a strong synergy from oil and marine industries. In addition, they will also build offshore wind domestically, possibly giving them an advantage in developing a stronger foothold in the international market.