UNIVERSITY OF AGDER

Knowledge Transfer between Industries

How to transfer offshore experiences to the offshore wind industry within the Norwegian sector?

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This Master's Thesis is carried out as a part of the education at the University of Agder and is therefore approved as a part of this education. However, this does not imply that the University answers for the methods that are used or the conclusions that are drawn.

University of Agder, 2011

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ACKNOWLEDGEMENTS

The Master Thesis is the final step towards my M.Sc degree in Business Administration at the University of Agder. The Master Thesis counts for 30 ECTS, and is written over a full semester. The main objective of the Master Thesis is to apply scientific methods to a specific problem. The research problem of the Master Thesis should be related to the student's specialization, in my case; International Management and Strategy.

The topic of the Master Thesis was chosen on the basis of the writer's interest in the field of renewable energy, as well as the theoretical field of strategy. The process started briefly in December 2010, and January 2011 the problem formulation was set. It has been an interesting journey with a lot of challenges on its way. The working process has given me new knowledge and understanding of both theoretical literature and application in practice. The Master Thesis is due 1st of June 2011.

I would like to use this opportunity to give my special thanks to Mr. Farshad Tehrani, and the company Flochem, for giving me the opportunity to write this thesis. He has been very helpful in providing me with useful information and support.

Secondly, I would like to thank my supervisor Professor Joyce Falkenberg. She has guided me with her wisdom and questions. The thesis would not have been the same without her valuable advice and constructive feedback

Thirdly, I would like to thank the employees at NORWEA, especially Øyvind Isachsen, Øistein Schmidt Galaaen and Andreas Thon Aasheim, for providing me with valuable insight in the offshore wind industry, and attendance at the NORWEA annual conference.

I would also like to thank the respondents of my in-depth interviews; Anne Strømmen Lycke, Asle Lygre, Haakon Alfstad, Kjell O. Johannessen, Marianne Tonning Kinnari and Petter J. Karal for providing me their valuable time.

Finally, I would like to thank Linn-Therese A. Bjugan for comments and proofreading, my uncle Arild for proofreading, and my mom and dad for their support throughout the process.

Hanne A. Hodnungseth

Kristiansand, May 2011

ABSTRACT

Title	Knowledge Transfer between Industries
Sub-title	How to transfer offshore experiences to the offshore wind industry within the Norwegian sector?
Author	Hanne Anita Hodnungseth
Supervisor	Professor Joyce Falkenberg
Location	University of Agder, 2011
Key concepts	Knowledge, knowledge transfer, knowledge transfer between industries, experiences, offshore wind, offshore oil and gas, network

Background Norway has more than 40 years of experiences in offshore oil and gas. These experiences, together with experiences from shipping, maritime industry, concrete industry, cables, remote operations at sea and, meteorology represents a potential competitive advantage for the offshore wind industry.

Problem To be able to exploit the potential competitive advantage, the valuable knowledge needs to be available to the ones in position of taking advantage if it. Since most of the relevant knowledge lies within the offshore oil and gas industry, there needs to be a knowledge transfer from the offshore oil and gas industry to the offshore wind industry..

Purpose The main purpose is to identify how to transfer offshore experiences to the offshore wind industry. In order to answer this question, it needs to be defined how to transfer knowledge from one industry to another. The thesis will therefore aim to develop a suggested framework on knowledge transfer between industries. Knowledge transfer between industries will be defined to have taken place when industry A is affected by the experiences of industry B.

Research Methodology The research process will be qualitative. The main data collection will arise from six in-depth interviews. The respondents represents three different perspectives; the "sender" (industry A), the "receiver" (industry B), and an "outsider's" overall view. The interviews will focus on the following subjects; national competitiveness due to offshore experiences, what knowledge that is transferred / relevant to transfer, how to transfer knowledge from one industry to another, and why the "sender" should engage in knowledge transfer.

Findings A preliminary framework is suggested including the following factors; cross-industry network ties, career imprinting, cluster development, absorptive capacity, and cross-industry competition. Four of these factors were supported by the research; cross-industry network ties, career imprinting, absorptive capacity, and cross-industry competition. Cluster development was not supported. An "X" factor, cross-industry cooperation, was identified in the research process.

Conclusion The research showed that informal networks and formal cross-industry cooperation was especially important in terms of knowledge transfer between industries. This may be linked to the terms; trust, control and risk.

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Chapter 1 – Introduction

1 INTRODUCTION

This chapter will give the reader an introduction to the background of the research problem. There will be a problem discussion where the research question of the thesis will be presented. Furthermore key concepts, limitations, definitions and disposition for the thesis will be presented.

1.1 Background

Norway has a huge potential within offshore wind energy. Offshore wind resources combined with strong technical environment, know-how within the maritime and offshore sector, and financial resources creates huge opportunities for Norway in terms of competitiveness. (Energirådet, 2008). Norway can benefit from years of experiences within offshore oil and gas, shipping, maritime industry, concrete industry, cables and remote operations at sea, as well as meteorology (Energi 21, 2010; NCE Maritime, 2010; Statoil – Doggerbank, 2010. The fact that Norway is a world leader in many of the industries mentioned above potentially makes Norway a superb place for offshore wind energy compared to other developed nations (Sintef, 2009).

One of the main problem areas for the offshore wind is the high costs. Despite this, one has seen a rise in cost the last couple of years, even though technology development is moving forward. The rise in costs is mainly due to higher costs of input/raw material and manpower, as well as more complex situations in terms of project positioning (NVE, 2010). In order for offshore wind energy to become competitive against other renewable energy technologies, the total cost cycle needs to be cut by approximately 30 % (NVE, 2010). Norway, with its potential competitive advantage from years of experiences, may have an advantage in the race of developing competitive technological solutions.

The offshore wind technology is still in an immature stage, but is continuously developing towards becoming a more stable and complete technology. As of today Norway is situated behind the pioneers such as Germany and Denmark (Oterhals, et. al., 2010). If the domestic development of technology and human capital in offshore wind is not emphasized, technology

project execution will most likely see its main development in other nations. Thereby Norway might lose its potential of establishing a high-value industry within offshore wind technology and energy.

1.2 Research problem

1.2.1 Problem discussion

The many relevant offshore experiences Norway has are of valuable source of competitive advantage. Though, to exploit the potential competitive advantage, the valuable knowledge needs to be available to the people in charge. Since most of the relevant knowledge lies within the offshore oil and gas industry, there needs to be a knowledge transfer from the offshore oil and gas industry to the offshore wind industry. Hence, knowledge sharing between industries needs to take place. A knowledge transfer process will be defined to include the questions; what, how and why?

First, the relevant knowledge (experiences) Norway has, with respect to offshore wind, needs to be identified. *What* needs to be transferred? Sintef (2009), NCE Maritime (2010) and Statoil (Statoil – Doggerbank, 2010) has identified the following;

- **Offshore oil and gas**
- Shipping
- Concrete industry
- Cables
- Remote operations at sea
- Meteorology

Secondly, the question of *how* to transfer these experiences from the ones in position of it, to the ones that can take advantage of it, has to be identified. This will be the main focus of this thesis. Particularly looking into the following terms:

- How is knowledge transferred?
- What factors facilitates the knowledge transfer?
- What type of challenges and obstacles will occur?
- Are there any knowledge transfers of offshore experiences to the offshore wind industry existent today?

Lastly, the question is not only how, but also*; why*? This question arises in terms of why the party representing the "sender" should engage in knowledge transfer. What is in it for them?

1.2.2 Research Question

How to transfer offshore experiences to the offshore wind industry within the Norwegian sector?

- ***With a focus on knowledge transfer between industries***

1.2.3 Purpose

Many speak of the great advantage Norway has due to its offshore experiences. The 40 years of experiences from the offshore oil and gas creates a competitive advantage for Norway (Henriksen, 2010). Many recognize it as a huge potential for a national competitive advantage within offshore wind, but few knows how to take advantage of it. It is considered important that Norway is able to utilize these advantages soon. If not, it might be too late. (NCE Maritime, 2010). This thesis will emphasize on clarifying the term; how.

In the search of defining the question how, this thesis aims to develop a framework on the transfer of knowledge between industries. The development of such a framework will be built upon past related theories, but applied in a new context. A qualitative study will be performed in order to discover new dimensions, and further develop the framework.

1.2.4 Target group

This thesis is written in assistance with the Norwegian company Flochem AS, as a part of a project on life cycle cost reductions.

The research done is relevant to parties within the offshore wind industry, thus giving an insight into how knowledge and relevant experiences can be transferred to the offshore wind industry. Affected parties might find the research useful to what the industry itself considers as important factors for a potential knowledge transfer, as well as how knowledge is being transferred today.

This thesis may also have relevance to other sectors within offshore oil and gas, shipping, and other industries related to offshore wind, as it might help them answer the question on how to utilize their knowledge (in-house as well as external attained knowledge) to enter a new industry such as the offshore wind.

Thus, the main purpose will be to develop a framework on knowledge transfer between industries. This thesis will therefore be relevant in terms of the ones interested in the theoretical perspective.

1.2.5 Limitations

This is a Master Thesis for the Master of Science in Business Administration degree, and therefore aims to highlight and analyze the business perspective of knowledge transfer between industries. The engineering perspective will not be the main focus.

It should also be taken into account that the author of this thesis has limited engineering or other technical background; it will therefore be limitations on the technical specifications given in this thesis.

1.3 Key concepts

- Knowledge
- Knowledge Transfer
- Knowledge transfer *between* industries
- Experiences
- Offshore wind
- Offshore oil and gas
- Network

1.4 Definitions

1.4.1 Offshore experiences

In this thesis the offshore experiences will be defined as all experiences gained from offshore oil and gas, shipping, maritime industry, concrete industry, cables and remote operations at sea, as well as meteorology. The experiences emphasized will be limited in terms of primarily including the experiences that has the potential to produce a competitive advantage in the offshore wind industry through knowledge transfer.

1.4.2 Measurements

1 TW (Terrawatt)

= 1000 GW Gigawatt)

= 1 000 000 MW (Megawatt)

= 1 000 000 000 kW (kilowatt)

Wh = Watt hour (one Watt consumed in a one hour timeframe)

Referring to the explanation by Wikipedia (Wikipedia.org/watt); “100 Watt hours is the same amount of energy that would light a 50-watt bubble for 2 hours” and “A kilowatt-hour is the amount of energy equivalent to a steady power of 1 kilowatt running for 1 hour”.

1.5 Disposition

Ch. 1 Introduction	The research problem is presented.
Ch. 2 Industry Background	The aim is to give the reader the necessary background understanding of the offshore wind industry, as well as a brief introduction of the offshore and oil and gas industry.
Ch. 3 Theoretical Framework	Theory on resources as competitive advantage, knowledge and knowledge transfer is presented. A preliminary framework for "Knowledge transfer between industries" will be presented.
Ch. 4 Research Methodology	The research methodology for the thesis is presented. In this chapter the research process and choice of method will be explained.
Ch. 5 Findings	This chapter presents the findings from the data collection. These are findings mainly from the in-depth interviews, but also the informal interviews.
Ch. 6 Discussion	The findings will be discussed. Findings that support, does not support, as well as findings that supplement the preliminary framework. A suggested framework on "Knowledge transfer between industries" will be presented.
Ch. 7 Conclusion	This chapter will draw a conclusion based upon the research performed. Limitations of the research will be discussed.
Ch. 8 Further Research	Suggestions for further research based upon potential research questions discovered during this thesis research, and the thesis' limitations.

1.6 Preliminary summary

Norway, with its offshore experiences, has a huge potential within the offshore wind industry. The key is to define how to transfer the relevant experiences, so they can be exploited. This thesis will explore the question; *how.* How to transfer offshore experiences from one industry to another?

The thesis' main purpose will be to draw on past theory, but applying it in a new context, and further developed through qualitative research studies. The aim is to suggest a framework for "knowledge transfer between industries". The framework will define the factors that influence a knowledge transfer between two industries; both the factors that facilitate a knowledge transfer, as well as the factors that represents obstacles and/or challenges for knowledge transfer.

Chapter 2 – Industry Background

2 INDUSTRY BACKGROUND

This chapter will give the reader an introduction to the offshore oil and gas industry, and the offshore wind industry. The background will give the reader the necessary insight in order to understand the purpose and underlying reasons of the research problem.

2.1 The offshore oil and gas industry

The Norwegian "oil adventure" started in 1969, with the discovery of the Ekofisk oilfield. The production was up and running already the 15th of June in 1971. By the year 2009 the petroleum sector represented 21% of the total value creation in Norway. (Regjeringen.no/petroleum).

Through more than 40 years of oil and gas production in Norway, technology and knowledge has been gained. Today the oil and gas industry is one of the key industries in Norway. On an international perspective, Norway is categorized as an industry leader. (Regjeringen.no/petroleum; Sintef, 2009).

In order to develop such a substantial industry, good relations with different parties have been important. Oil companies, suppliers, engineering and technology companies, and competence/educational institutions have had close linkages. This has facilitated for growth of research and technology development in Norway (KonKraft-rapport 7, 2009).

Today the Norwegian supplier industry has superior knowledge on several areas such as design and construction of installations, drilling, and floating productions (KonKraft-rapport 7, 2009).

The oil and gas industry is also the origin of large energy companies, such as Statoil, which today are some of the large contributors to the development of the offshore wind sector.

2.2 The offshore wind industry

Norway is a country with great wind resources, as well as superior offshore experiences. This combination creates a good starting point for offshore wind development. Countries like Denmark have been actively involved in the development of the offshore wind industry since the 1980s, while Norway recently entered in the early 2000s. The leading nations within offshore wind energy are, as of today, Germany, Netherlands, UK and Denmark. (Oterhals, et. al., 2010).

In 2008 Norway received the consent of the Havsul 1 project. Havsul 1 is Norway's first large scale offshore wind farm, and will be located in Sandøy, Møre og Romsdal. The offshore wind farm will be built with bottom-fixed technology. (NVE, 2010). This symbolizes a step in the right direction concerning offshore wind development in Norway. But there are still substantial obstacles needing to be considered.

In order for Norway to become a leader in the offshore wind industry, the development of offshore wind energy needs to be both more focused and emphasized. This can be achieved by better governmental support, better industry focus with their own R&D budget, and use of university-based research. (Energirådet, 2008).

Enova's report mapping the potential of ocean based energy in Norway (Enova, 2007) has defined the main factors important for the development of ocean based energy, such as offshore wind energy. The different factors are divided into three groups; technology, economy and other conditional factors.

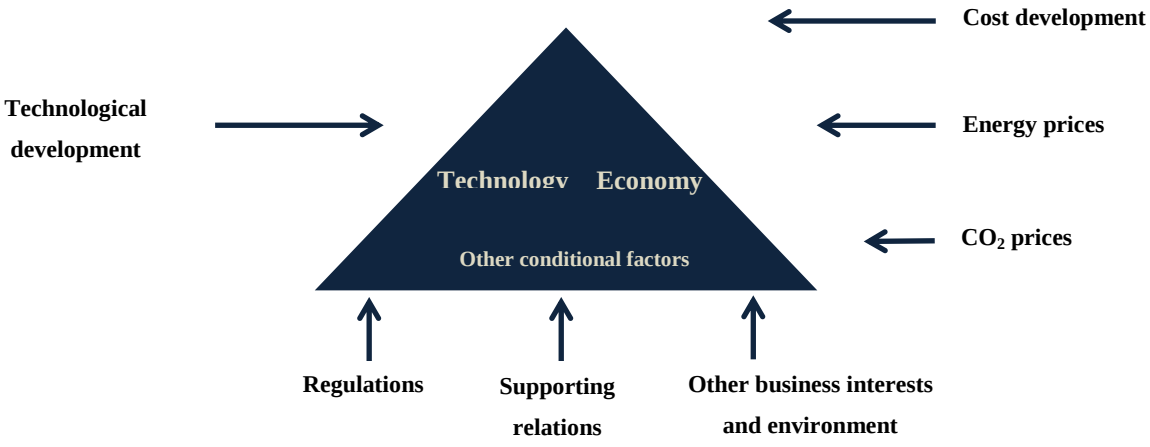


Figure 1. Drivers for development of ocean based energy (source: Enova , 2007, p. 67).

- The t*echnology* factor focuses on the development of the technology itself. The technology is, as of today, labeled immature, and is both costly to develop, and risky to invest in. Within offshore wind energy generation the market standards are yet to be defined. For example; the world's first full-scale floating turbine, Hywind by Statoil, has just been installed outside Karmøy, Norway. Bottom-fixed turbines (non-floating turbines) have a longer track record, but optimal technology has not yet been defined / developed (NVE, 2010). This is just some of many areas within technology which needs further development in order to be competitive in the market.

- Considering the *economy* side, the three factors; cost development, energy prices and CO_2 prices have been identified. First, the *costs* need to be reduced by as much as 30 % if offshore wind power generation is to be competitive against other energy sources (Sintef MRB, 2010). Second, because of volatile oil prices, due to global economy fluctuations and conflicts, other energy substitutes, such as offshore wind, will become more attractive as oil reserves become scarcer. Lastly, due to increasing CO_2, environmental friendly solutions will become more competitive compared to coal-based energy generation. A report by Energiraådet (2008) has stated that 1 TWh produced from renewable energy sources will reduce the CO_2 emissions by as much as 500 000 to 550 000 metric tons as it stands today.

- *Other conditional factors* consist of regulations (both in terms of reductions of CO_2 emissions and resistance to use of nuclear-based power), supporting relations and other business interests, and the conservation of the environment. Regulations come into play in terms of government subsidizing in renewable energy, EU targets of having 20% of its electricity to come from renewable energy sources by the year 2020 (Forskningsrådet, 2007). The supporting relations in renewable energy can be seen in terms of corporate R&D, academia research, and so on. Other factors are related to the popularity for companies to "go green" as well as promoting themselves as "green" companies. (Enova, 2007).

2.2.1 Future potential

Norway's huge market potential within offshore wind (see appendix 9.2), makes it possible for Norway to position itself as an electricity hub. With the offshore wind resources available,

Norway has great opportunities in the export industry of both energy and technology advancement. If the resources are taken advantage of, electricity can be exported to Europe, boosting Norway's economy as well as increasing the European Union's green energy. Though, this will depend upon large investments in domestic offshore wind farms, as well as an intensive cabling system between Norway and other parts of Europe. (Forskningsrådet, 2007).

With the existing technology knowledge and expertise in Norway, there is a big potential of a new and highly lucrative type of business. Norway's highly skilled people with relevant experiences in offshore technology are likely to be very sought-after by foreign companies developing offshore wind farms and technologies in the future. Norway has therefore the potential to position itself in an up-and-coming knowledge intensive technology supply industry in offshore wind power generation.

2.2.2 The value chain

The offshore wind industry is still developing as the technology is not mature yet. A value chain for offshore wind has been developed by Sintef, mapping the main operations of development and operation of an offshore wind farm. See Figure 2.

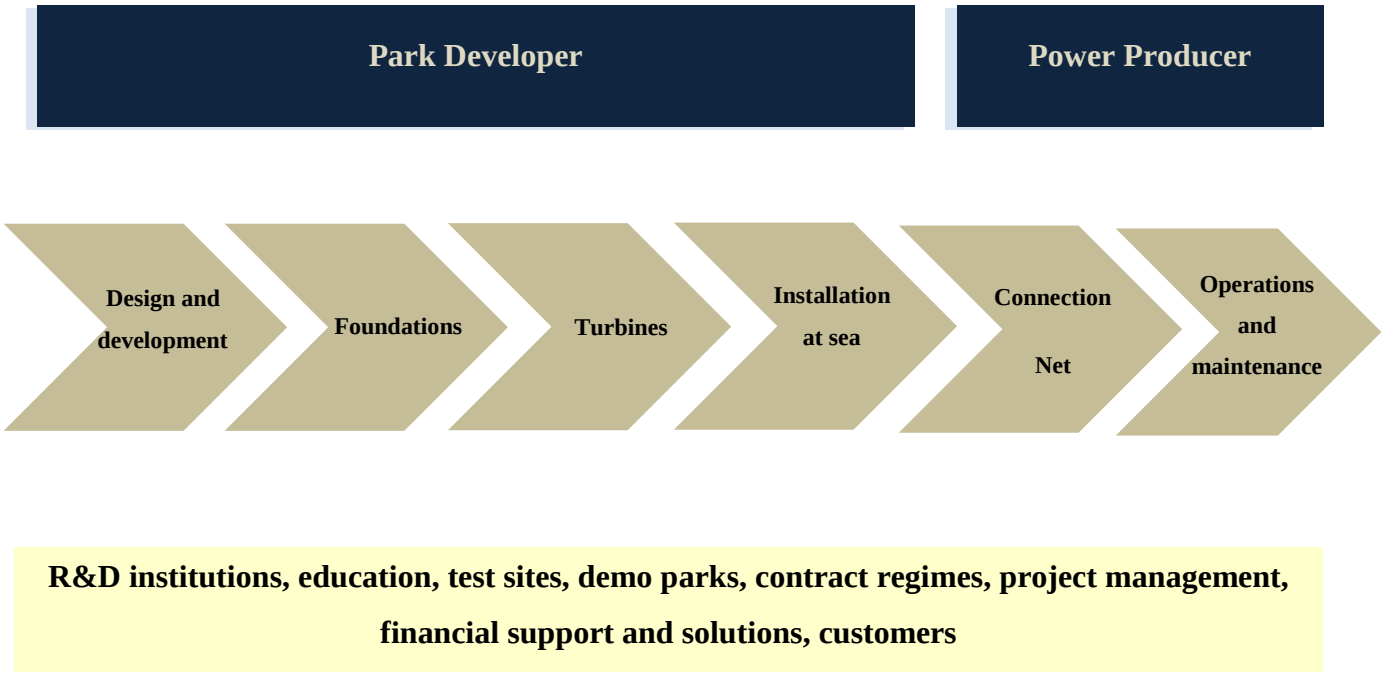


Figure 2. The value chain for Offshore Wind Energy (source: Sintef, 2009, p. 13).

The model divides the main operations into two responsible parties; energy park developer and power producer. The distinction between these two is not always distinguished, as some large power producing companies also develops the farms themselves. Further on, the operations are divided into six different groups; design and development, foundations, turbines, installation at sea, net connection, and operations and maintenance. The net connection, operations and maintenance are usually the responsibility of the power producers. The last section(s) includes the "supporting activities", and is usually relevant for the whole value chain. The six operations mentioned, are often viewed as the "supplier industry". This is due to the fact that different parts of these processes are usually bought through different suppliers (although some companies may get a hold of the products in-house). (Sintef, 2009).

2.2.3 Cluster potential

Michael Porter (1998) defines a cluster as "a geographic concentration of inter-connected companies and institutions working in a common industry". Within a specific cluster, informal knowledge and information usually floats more freely between members of the cluster. A cluster also fosters cooperation and competition, both healthy for the sector development. (Porter, 1998).

Today there is no complete offshore wind cluster in any country, the nation leading the race is Germany with its cluster in Bremerhaven (North-West Germany) (Sintef, 2009). Norway has fostered two clusters; one for offshore wind specifically (Arena NOW, 2011), the other for wind energy in general (Windenergy, 2011).

Windcluster (Mid-Norway)

Windcluster Mid-Norway (in Norwegian referred to as "Arena Vindenergi") is a cluster of more than 40 business and research institutions. The cluster is categorized as a strategic cooperation in order for the participants to position themselves as *suppliers* in the great development of renewable energy in Europe towards 2020. The Mid-Norwegian region had a lot of experiences within the oil and gas industry, as well as the hydro industry. (Windcluster.no, 2011)

Arena Norwegian Offshore Wind (NOW)

Arena NOW is Norway's offshore wind cluster. The cluster already counts approximately 50 players, and covers approximately the whole offshore wind value chain. Arena NOW has a vision to become "a leading Norwegian based and internationally competitive cluster of suppliers and operators projecting and delivering complete wind farm systems in shallow, medium and deep waters to the global market." (Arenanow.no, 2011). The cluster participants already deliver solutions to development projects internationally, such as in the UK and Germany.

Arena NOW focuses on creating a cooperation and interaction with businesses, public authorities and research institutions. It is actively involved in the development of a national test and demonstration program for offshore wind in Norway (Havsul 1). (Petroleumnorway.com, 2011; Arenanow.no, 2011).

2.3 Preliminary summary

Through more than 40 years of experience from the oil and gas industry Norway has developed a substantial knowledge base. The knowledge (experiences) which can be exploited in the offshore wind, combined with Norway's huge natural resource of wind, creates great potential for the offshore wind industry in Norway.

Despite the great potential, Norway is today situated behind the pioneers. Several challenges need to be overcome, both in terms of technical, economical, and other conditional factors.

Chapter 3 – Theoretical Framework

3 THEORETICAL FRAMEWORK

This chapter explains the concepts of resource based view and knowledge. Different theories on knowledge transfer will be presented.. First the concepts will be explained, then the limitations of the theory with a following preliminary conclusion. Last, a preliminary framework on "Knowledge transfer between industries" will be presented.

3.1 Resource Based View

A firm's resources represent potential strengths for the firm (Learned, et. al., 1969; Porter, 1981). Although, not all resources lead to strengths, some resources rather prevent valuable strategies to be implemented (Barney, 1986a). Wernerfelt's (1984, p. 172) definition of resources*; "*anything which could be thought of as a strength or weakness for a given firm*"* - will therefore be considered a good definition of the term resources.

Resources can be classified into three categories; organizational capital resources, physical capital resources and human capital resources (Barney 1991; Tomer, 1987; Williamson, 1975; Becker, 1964). Barney (1991) includes training, experience, judgment, intelligence, relationships, and insights of individual manager and workers in a firm in the concept *human capital resources*.

Human capital resources have become an increasingly important source of competitive advantage for companies, as it is a resource highly difficult to duplicate. Because of the differences in human capital resources, no two companies are similar. Collis and Montgomery (2008) explain this by pointing at differences in skills, assets, experiences and organizational culture.

Because of the differences in resources and combination of resources, it is important to be aware of what is or may be potential valuable resources, and where they may be found.

Resources are a critical source for a competitive advantage. Barney (1991) emphasizes that for a competitive advantage to be sustainable it needs to meet the following four criteria;

But what differentiates a sustainable competitive advantage from a competitive advantage? Referring to Barney (1991, p. 102) a *competitive advantage* is "when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors". A *sustainable competitive advantage* is present when "it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors, and when these other firms are unable to duplicate the benefits of this strategy".

In other words, whether or not the competitive advantage is able to be sustained depends upon the degree of possible duplication. One should ask one self how difficult the resource(s) are to duplicate by one's competitors.

When one preserve a sustainable competitive advantage it is important to keep in mind that it will not "last forever" (Barney 1991). Constant changes influence both the value of the certain resources for the firm, as well as the development of new and competitive resources among competitors. Barney (1991) also emphasizes that what was characterized as valuable resources in one industry, might not be so in another industry, he states that the resources may be considered as a weakness or irrelevant for another industry.

3.2 The VRIO framework

Resources that represent a sustainable competitive advantage has to be; valuable, rare, inimitable and organizational (Barney, 1991). These factors represent the framework of VRIO. It is important to take into consideration that the framework is based upon the expectation of resource immobility and resource heterogeneity (Barney, 1991; Mata et al,

1995). Resource immobility refers to that the differences in resources may be long lasting. Resource heterogeneity refers to that the resources and capabilities possessed may differ. (Barney, 1986a; 1991; Rumelt, 1984; Wernerfelt, 1984).

3.2.1 Value

Resources have to be of value to the firm. Value means that the resources are able to "conceive or implement strategies that firms are able to improve its efficiency and effectiveness". (Barney, 1991, p. 106).

3.2.2 Rare

The resources have to be rare to create a sustainable competitive advantage. If the resource is possessed by several parties, it will not create competitive advantage for the ones that possess it. A resource does not make you special if everyone has it. But if you have a resource that no one else has, it gives you a competitive advantage. (Barney, 1991).

3.2.3 Inimitability

Inimitability is also referred to as imperfectly imitable (Lippman & Rumelt, 1982; Barney 1986a; Barney, 1986b). This factor refers to that a resource needs to be hard to imitate in order to represent a sustainable competitive advantage. For a resource to be imperfectly imitable it should possess one or a combination of the following (Barney, 1991, p.107);

- "the ability of a firm to obtain a resource is dependent upon unique *historical conditions*"
- "the link between the resources possessed by a firm and a firm's sustained competitive advantage is *causally ambiguous*"
- "the resources generating a firm's advantage is *socially complex*"

3.2.4 Organizational

For a resource to be of sustained competitive advantage there must be "no strategically equivalent valuable resources that are themselves either not rare or imitable" (Barney, 1991, p. 111) "…resources are strategically equivalent when they each can be exploited separately to implement the same strategies" (Barney, 1991, p. 111). There are direct and indirect forms of substitution. As for indirect substitution, there are two main forms (Barney, 1991, p. 111);

- Even though it might "not be possible for a firm to imitate another firm's resources exactly, it may be able to substitute a similar resource that enables it to conceive of and implement the same strategies".

- "Very different firm resources may also be a source to strategic substitutes, depending on e.g. vision and formal planning in terms of developing strategically equivalent resources."

For any resource to represent a potential for sustained competitive advantage it has to fulfill the four mentioned criteria; create value, be rare, inimitable and difficult to substitute. With the underlying assumption of resource heterogeneity and immobility, the figure below gives an overview of the relationship between the different factors, and how it leads to creating a sustainable competitive advantage for a firm.

Figure 3. Relationship between resource heterogeneity and immobility, VRIO and SCA (source: Barney, 1991, p. 112).

3.3 Knowledge

It is difficult to define exactly what knowledge is. In the Great Norwegian Encyclopedia (Alnes, 2011) knowledge is defined as "knowing, learning and insight". In other academic articles there are different definitions. Sirec-Rantasâ (2004, p. 25) defines knowledge as; "Knowledge is a living asset, dynamic and volatile, often difficult to understand. Unlike information, it is not final and stored, but emerging and being constantly recreated and socially reconstructed in particular work contexts".

Knowledge is often considered as one of the most important sources to competitive advantage (Gupta & Govindarajan, 2000). But for knowledge to create a sustainable competitive advantage, it needs to be difficult for others to copy it, as well as to develop new knowledge quickly (Lubit, 2001).

There are two main types of knowledge; tacit knowledge and explicit knowledge (Polanyi, 1966). Sirec-Rantasâ (2004, p. 24) refers to tacit knowledge as "knowing how", and explicit knowledge as "knowing that". Tacit knowledge is the kind of information that is difficult to express, formalize and share (Sirec-Rantasâ, 2004). Polanyi (Haldin-Herrgard, 2000, p. 358) has expressed that "we know more than we can express" which makes it especially difficult to share knowledge that is intangible.

Lubit (2001, p. 166) has further defined four categories of tacit knowledge:

- **Hard-to-pin-down skills** ("know-how")
- **Mental models** (how one determine and understand situations)
- **Ways of approaching problems**
- **Organizational routines**

Sirec-Rantasâ (2004) summarizes that tacit knowledge can be a good source of competitive advantage due to its uniqueness, imperfectly mobility, imperfectly imitability and as it is difficult to substitute. In others words, that it meets the criteria of the VRIO framework (Barney, 1991).

The downside is that due to the qualities that make tacit knowledge a source to competitive advantage; it also makes tacit knowledge difficult to transfer to other parties. This is mainly because the knowledge usually depends upon specific relationships, and cannot be "clearly and completely communicated to someone else through words or other symbols" (Sirec-Rantasâ, 2004; Badaracco, 1991, p. 82).

Another problem of tacit knowledge is that one may be unaware of what knowledge resources one holds (Reed & DeFillippi, 1990). If you are not conscious of what knowledge resources you might hold, it is extremely difficult for others to be able to take advantage of it through knowledge sharing.

3.3.1 Knowledge at the industry level

Knowledge is mainly discussed on the individual level concerning past academic theory. As this thesis discusses the phenomena of knowledge transfer *between* industries, the term knowledge needs to refer to knowledge on another (higher) level than the ordinary, individual level. Hence, the term knowledge needs to be transferred to a collective (industry) level.

The individual level of knowledge is of course the core of where knowledge is situated, as well as created. But in order to get an overview of the bigger picture of knowledge transfer from one industry to another, the individual differences needs to bend for the collective view of knowledge in a group.

According to Durrance (1998), Nonaka and Takeuchi (1995) and Nonaka, Umemoto & Sasaki (1998) individual tacit knowledge is different from collective tacit knowledge. The more individuals who share the tacit knowledge, the further it moves towards becoming explicit knowledge. This is because the knowledge automatically will be further developed and "crystallized", and therefore becomes more mature when moving towards a collective level. Hence, the more individuals who share the tacit knowledge, the less of a competitive advantage it might become. This is because explicit knowledge does not represent the same source of competitive advantage as tacit knowledge does. But does this mean that the competitive advantage will fade out as the knowledge becomes shared on a collective level? In some cases this might happen, in others not. Each case is different, both in terms of the type of tacit knowledge, the people and the procedures involved.

3.3.2 Knowledge Diamond

Defilippi, Arthur and Lindsay (2006) has presented a framework for knowledge flow and industry learning; *the knowledge diamond*. The framework shows the interaction of the industry and three other participants; the individual, the community and the organization. In this framework the concept of knowledge is taken to another level, and therefore shows the interaction between knowledge and the different levels where knowledge is accumulated.

It is important to keep in mind that it is not set that each participant has equal influence on each of the other participants in the knowledge diamond. One also has to take into consideration that the knowledge diamond is not a closed system, and hence, the participants are influenced by other participants outside the diamond. (DeFillippi, Arthur & Lindsay, 2006).

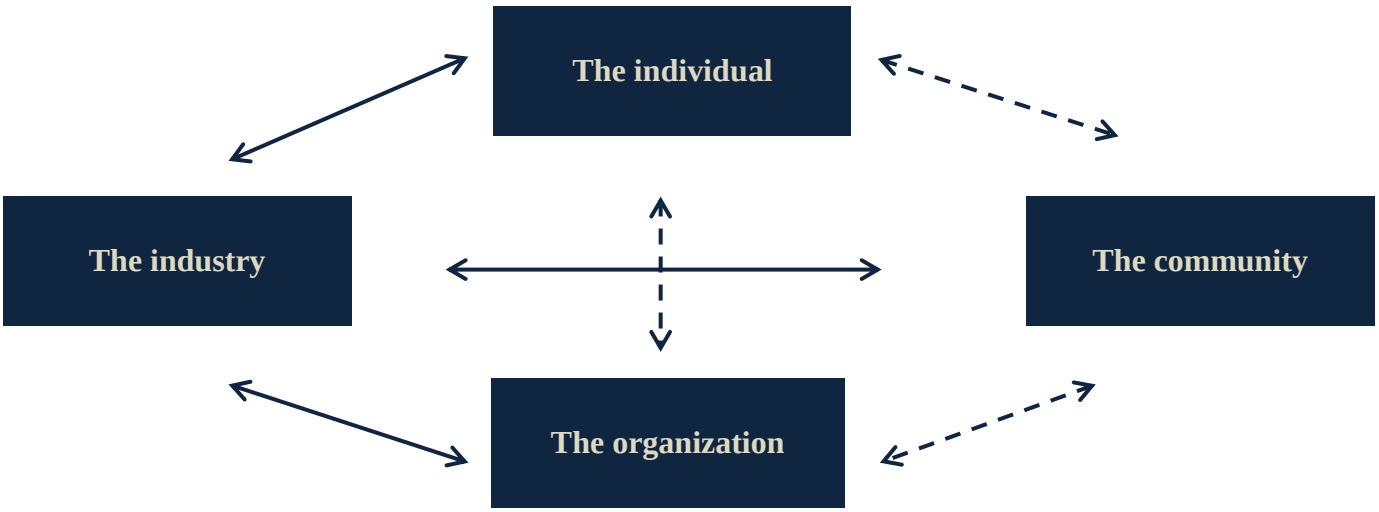


Figure 4. Knowledge Diamond, "*Knowledge at work*" (source: Defillippi, Arthur, Lindsay, p. 114).

The individual

The individual is the one who brings knowledge to the group. The individual is also the one who can take knowledge from the group, and share with others. (DeFillippi, Arthur & Lindsay, 2006, pp 17-18).

The community

A community is collaboration among individuals. Communities often facilitate for knowledge flow, as the individuals in a community are closely interlinked. A community may also facilitate for newcomers, in terms of them being taken care of and included by other members of the same community. (DeFillippi, Arthur & Lindsay, 2006, pp 17-18).

The organization

Organizations usually provide the infrastructure so the work gets done. The organizations cooperate with each other, as well as with the individuals and the communities. (DeFillippi, Arthur & Lindsay, 2006, pp 17-18).

The industry

The industry is also an important contributor to the facilitation of knowledge. Some industries benefit from a well developed cluster formation. Well developed industries, especially clusters are a good facilitator for knowing and learning practices. (DeFillippi, Arthur & Lindsay, 2006, pp 17-18).

3.3.3 Knowledge hubs

The last ten years the focus of networks has increased substantially, and the influence of social ties, professional ties and purely transaction oriented ties have been examined. (Reve, Sasson & Jakobsen, 2009). Recently the focus has been turned towards the term knowledge hubs. A knowledge hub is defined as "local innovation systems that are nodes in networks of knowledge production and knowledge sharing" (Evers, 2008, p. 12). The knowledge hubs are measured by "the number of knowledge workers and their products, such as patents, papers and software" (Evers, 2008, p. 12).

Torger Reve (2010) has performed a study on global knowledge hubs ("A knowledge based Norway"). Identifying what factors that influences the competitiveness of a knowledge hub. The following six factors have been identified; cluster attractiveness, educational attractiveness, R&D attractiveness, talent attractiveness, ownership attractiveness and environmental attractiveness. These six factors together influences how competitive the knowledge hub will be in global terms.

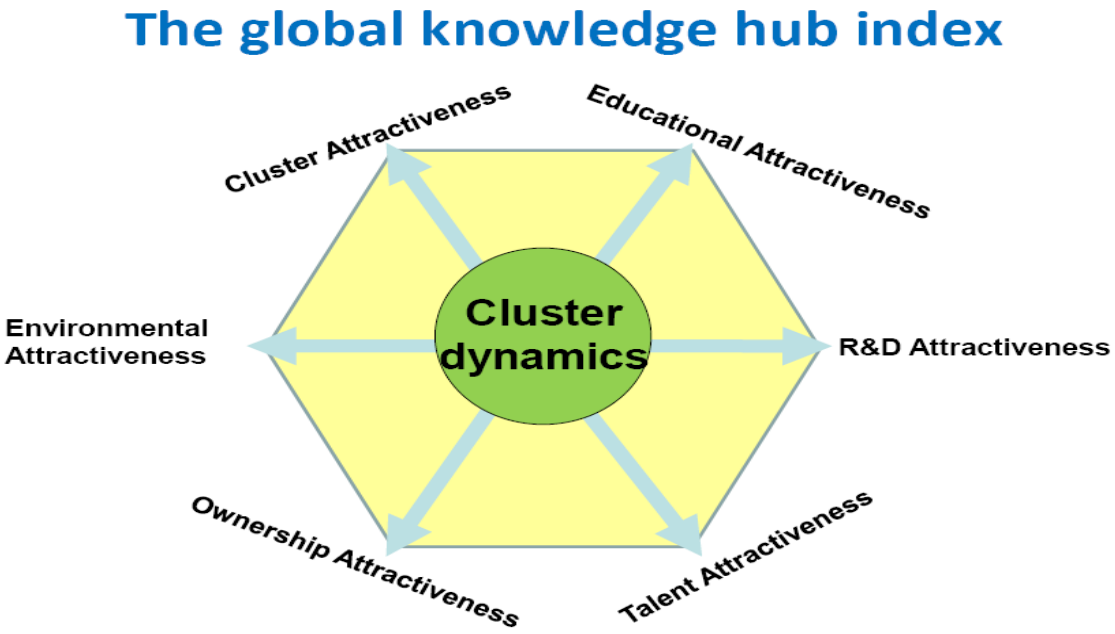


Figure 5. Global knowledge hub index (source: Reve, 2010).

In industries where one competes on knowledge, it is important that the country/location scores high on the six factors mentioned above. The higher the score, the more competitive the hub will be on a global scale. A well functional knowledge hub has a good float of knowledge within the hub, and operates with good cluster dynamics in order to share important knowledge; which in turn facilitates for a further development and competitiveness.

Torger Reve (2010) has further summarized seven points that characterizes a global knowledge hub:

- Large concentration of research and education with international knowledge workers
- Large concentration of international knowledge companies with centers of excellence, departments of development and test facilities
- Large concentration of competent capital with strong ties to the knowledge environments, as well as short distance to commercialization
- Competing universities with strong networks to the industries
- Competing innovation- and commercialization centers
- Well developed infrastructure and active knowledge networks
- Great cultural activity and a creating experience-based economy

3.4 Knowledge Transfer

Singley and Anderson (1989, p.1) defined knowledge transfer at the individual level as "how knowledge acquired in one situation applies (or fails to apply) to another". Dougherty (1999, p. 262) explains knowledge transfer as "connection not collection and that connection ultimately depend on choice made by individuals".

In order to facilitate for sharing of knowledge, time has to be taken from other responsibilities which might have a higher priority (Sirec-Rantasâ, 2004). Another factor is that in many cases knowledge is a basis for "power and respect", thereby making knowledge sharing a disadvantage for the person(s) that hold the knowledge (Sirec-Rantasâ, 2004). A third factor

mentioned by Sirec-Rantasâ (2004), is the "not invented here" syndrome. People have to be willing to adapt, take in and use knowledge from others, which they self are not familiar with.

The degree of knowledge transfer is often influenced by the degree of interdependence. Interdependence arises from complementarities of need and resources (Barney, 1991). A high degree of interdependence between parties makes it easier to share knowledge, as the part who is suppose to share information knows and trusts the other part.

When discussing knowledge transfer, it is important to take into consideration that the distinction between the knowledge transfer and creation of new knowledge may not always be apparent. When one is exposed to new knowledge the receiver will often do its own modifications and/or develop the knowledge retrieved further. In the end the knowledge retrieved from the other party is not the same knowledge as the "sender" holds (Bresman, Birkinshaw & Nobel, 1999; Nonaka & Takeuchi, 1995; Zander, 1991).

3.5 Knowledge transfer between industries

Knowledge transfer takes place when one unit is affected by the experiences of another (Argote & Ingram, 2000). In terms of knowledge transfer between industries, the knowledge transfer will be defined to have taken place *when industry A is affected by the experiences of industry B.*

In cases of knowledge transfer, it is the individual who holds the tacit knowledge, and also the individual who passes it on to the receiver. In terms of knowledge transfer from one industry to another, the main knowledge sharing will take place among individuals. But since an industry includes numerous individuals, the term knowledge transfer between industries has to consider the collective level of knowledge in an industry.

Although there has not yet been done any extensive research on knowledge transfer from one industry to another, there is some past research that might be of interest. Similarities in the situations may create similarities on potential influential factors.

3.5.1 Social identity

Past studies have shown that knowledge floats more freely when the "sender" and the "receiver" share a social identity. This is because a shared social identity usually makes one more trustworthy and honest in the eyes of the other. (Kane, Argote & Levine, 2005; Tajfel & Turner, 1979; Tajfel & Turner, 1968). Social identity is defined as "a sense of belonging to a social aggregate" (Kane, Argote & Levine, 2005, p.57). The less the two parties have in common, the less of a social identity they usually share. Hence, one should seek to develop a common social identity with the part holding relevant knowledge.

3.5.2 Industry associations

Knowledge sharing in industry associations is recognized as an important source of learning *across* industries (DeFillippi, Arthur & Lindsay, 2006). An industry association usually builds and strengthens important networks. These networks may be of a cross-industry nature, as some parties operate or have a presence in more than one industry. Industry association may also have close connections with other relevant industry associations.

3.5.3 Trust, risk and control in partnerships

Cooperation may create knowledge sharing. For example; the knowledge generated in a joint venture creates new knowledge for the parties, which they can take "home" (Inkpen & Currall, 2004). Though, cooperation creates the risk that the parties may perform differently in the relationship. Drawing a line to strategic alliances, where two (or more) parties are in an inter-relationship, one find the factors; trust, risk and control, which affect the relationship. (Das & Teng, 2001).

"Trust requires familiarity and mutual understanding and, hence, depends upon time and context" (Inkpen & Currall, 2004, p. 599; Nooteboom et. al., 1997). According to Das and Teng (2001) lack of trust can create two types of risks; relational risk and performance risk. Relational risk "arises because of the potential for opportunistic behavior" (Das & Teng,

2001, p. 253). Performance risk is "the probability and consequences that alliance objectives are not achieved, despite satisfactory cooperation" (Das & Teng, 2001, p. 253).

Gulati (2005) has suggested that trust may be substituted by contractual safeguards in the case of repeated alliances. Das and Teng (2001) suggest that when it is difficult to rely on trust, more control may lower the risk. Though, "effective control in an alliance will require a certain level of trust between the parties" (Das & Teng, 2001, p. 590; Goold & Quinn, 1990).

Inkpen and Currall (2004) present four different forms of control; formal, social, strategic and operational. Formal control evolves around procedures, regular manager meetings, etc. Social control is gained through e.g. training and social interaction. Strategic control arises from collaborative objectives and performance guidelines defined by the partners together, operational control is again based upon these two terms.

3.5.4 Other related research

A study by Keeble and Wilkinson (1999) managed to identify three mechanisms of knowledge transfer *within* an industrial district;

- Inter-firm mobility of the labor force within the district
- Interactions between suppliers and customers, and the makers and users of capital equipment
- Spin-off of new firms from existing firms, universities, and public sector research laboratories

A study by Gupta and Govindarajan (2000) focusing on knowledge inflow to subsidiary, managed to identify three factors which had positive association with the inflow of knowledge. The factors were as follows;

- Richness of transmission channels
- Motivation to acquire knowledge
- Capacity to absorb incoming knowledge

On studies of knowledge transfer between universities and industry there are several different findings. Bekkers and Freitas (2008) have described the following factors as effective ways of transferring knowledge;

- Publications, patents and other codified outputs (Narin et al., 1997; McMillan et al., 2000; Cohen et al., 2002).
- Collaborative and contracted research activities (Kingsley et al., 1996; Meyer-Krahmer & Schmoch, 1998; Monjon & Waelbroeck, 2003)
- Employment of university researchers (Zucker et al., 2002; Gübeli & Doloreux, 2005).
- Informal contacts (Meyer-Krahmer & Schmoch, 1998; Cohen et al., 2002).

The above mentioned studies did not focus on knowledge transfer *between* industries, but the identified factors might have similarities with the factors that would influence on an industry to industry level. They will therefore be taken into account in the development of the framework for knowledge transfer between industries.

3.6 A preliminary framework: "Knowledge transfer between industries"

Further on, a framework for knowledge transfer between industries will be presented. Since there is no previous framework or theory on this subject, the framework presented will be a preliminary suggestion. The framework will be further developed throughout the research process of this thesis.

It has been identified five different factors, which is suggested to have an impact on a potential knowledge transfer from industry A to industry B. First, the five factors will be presented and discussed, followed by the complete framework.

3.6.1 Factor 1 – Cross-industry network ties

Network creates access to knowledge and resource flows (Uzzi, 1996; Powell, Koput & Smith-Doerr, 1996). The tighter the network is the easier knowledge and resources flow between the different parties in the network. Also; the stronger the network ties are, the more

effective they are in providing useful knowledge. This is because strong ties are associated with trust. (Levin, Cross & Abrams, 2002; Tsai & Ghoshal, 1998).

Different networks represent opportunities for deriving different knowledge. Thereby the type of network between the "receiver" and "sender" determines what kind of information and knowledge may be shared. (Tsai, 2001). Granovetter (2005) suggests that weak ties provide more novel information than strong ties. This is based upon that strong ties, such as friends, are in the same social circles. While weak ties have linkages with people outside one's own network, and thereby have access to more novel information.

In order to facilitate for knowledge sharing between two parties, in this case; two different industries, network ties between industry A and industry B should be developed. It should be of focus to nurture a *tight and strong network* between A and B. This is suggested to minimize the distance between the parties, and thereby ease the knowledge float.

A strong network may also help to "communicate" what type of knowledge the "receiver" seek, as well as what knowledge the "sender" is able to share. The more informal information the two parties know about each other, the better they will be to understand each other's needs and wants.

3.6.2 Factor 2 – Career imprinting

Career imprinting is defined to be an effective way of transferring knowledge within or *between* industries. The term career imprinting means to transfer similar career experiences from one unit to another. (DeFillippi, Arthur & Lindsay, 2006). How the career imprinting takes place is the question. Personnel movement is a common solution, and is considered to be an effective facilitator for knowledge sharing (Almeida & Kogut, 1999). In terms of complicated knowledge or know-how, career imprint eases the process of transfer. Transferring personnel from industry A to industry B, e.g. hiring a person with past experience from industry A, is a successful method of getting hold of know-how.

It is important to take into consideration that it is not as simple as to move a person to another surrounding. Social influence may also play an important part. When a person is moved out of its own context, and hence, becomes a minority in the new group, it might affect the potential knowledge transfer negatively. (Gruenfeld, 2000).

A study by Boeker (1997) shows that firms which have recruited a top manager with experience from another market, are more likely to enter this particular market in the future. The new knowledge the firm now has in-house, makes the firm more compatible for the new market entry. Hence, the personnel movement has resulted in a central knowledge transfer.

Career imprinting will be considered as an important factor for knowledge transfer between industry A and industry B. In terms of getting a hold of the knowledge, such as know-how and experiences, career imprinting will be suggested as an effective method.

3.6.3 Factor 3 – Absorptive capacity

Absorptive capacity can be defined as the "ability of any firm to acquire, assimilate, adapt and apply new knowledge" (Zahra & George, 2002, in Tallmann et. al., 2004, p. 262), as well as the "ability to recognize the value of new external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128). A transfer involves two main parties, the "sender" and the "receiver", and both parties play a key role in order to complete a successful transfer. In a knowledge transfer process it is of key importance that the "receiving" part has the necessary absorptive capacity; one "must have the capacity to absorb inputs in order to generate outputs" (Cohen & Levinthal, 1990). Minbaeva, Pedersen, Bjørkman, Fey & Park (2003, p. 2) has argued that the key is not the underlying knowledge transfer, but the "extent to which the receiver acquires potentially useful knowledge and utilizes this knowledge in own operations".

A well developed network is said to create important access to new knowledge, but if the unit is not able to absorb the new knowledge, due to lack of absorptive capacity, the transfer will not be successful. Hence, absorptive capacity is an essential factor in facilitating a complete knowledge transfer from A to B. (Tsai, 2001).

Zahra and George (2002) have expressed that even though one is able to acquire and assimilate the knowledge, one might not be able to transform and exploit the knowledge. And will thereby not be able to take advantage of the new knowledge gained.

It is suggested that one's absorptive capacity depends upon one's prior knowledge in the same field (Cohen & Levinthal, 1990). Individuals have a larger absorptive capacity of a special technical knowledge if they have related background knowledge on the specific area. Taking

it a step further, to firm level, a firm with relevant knowledge in-house will usually have a better absorptive capacity to take advantage of a potential knowledge transfer.

With related educational background, experiences, etc., the absorptive capacity increases and, hence, the potential of a successful knowledge transfer is enlarged. It is the receiving part's skills in acquiring new knowledge and knowing how to take advantage of the knowledge that determines how he/she will be able to utilize it.

Absorptive capacity has been identified as the most important determinant of successful knowledge transfer within a MNC (Gupta & Govindarajan, 2000). It will in this thesis be suggested that absorptive capacity is an important determinant for successful knowledge transfer between two industries; in terms of the different parties in industry B's ability to acquire, assimilate, adapt and apply new knowledge.

A unit with high absorptive capacity is assumed more likely to apply new knowledge and, hence, improve it business operations (Tsai, 2001). Therefore a high degree of absorptive capacity among the different parties in industry B is important in order for the knowledge transferred from industry A to reach industry B, as well as to be utilized to its full extent.

3.6.4 Factor 4 – Cluster development

The interface between firms, customers and suppliers is an important source of competitive advantage (Porter, 1990). In some views the geographical proximity is one of the main mechanisms that create competitive advantage in clusters (Greve, 2009). The diamond framework, developed by Michael Porter (1990), is today seen as one of the most influential theories of clusters. The diamond includes the four factors; firm strategy, structure and rivalry, demand conditions, related and supporting industries, and factor endowments.

A cluster creates strong linkages between the cluster-members, a cluster also facilitates for knowledge and information float within its boundaries. Thereby, when knowledge has reached inside the cluster, it is more easily shared between the members.

Cluster development in industry B will be considered an important factor for a successful knowledge transfer from industry A to industry B. This assumption focuses on the knowledge spread in industry B, and in terms of taking advantage of the new knowledge retrieved in

industry B to its full extent. It will be assumed that when important knowledge is transferred from industry A to a single party in industry B, it will be better utilized if there is a strong cluster mindset. A strong cluster mindset is anticipated to facilitate for sharing of the new knowledge to the members that are able to utilize it.

3.6.5 Factor 5 – Cross-industry competition

If the two industries of interest operate in the same market, directly or indirectly, it might create substantial blockage of a potential knowledge sharing. Why transfer knowledge that might be a source of competitive advantage to your competitor?

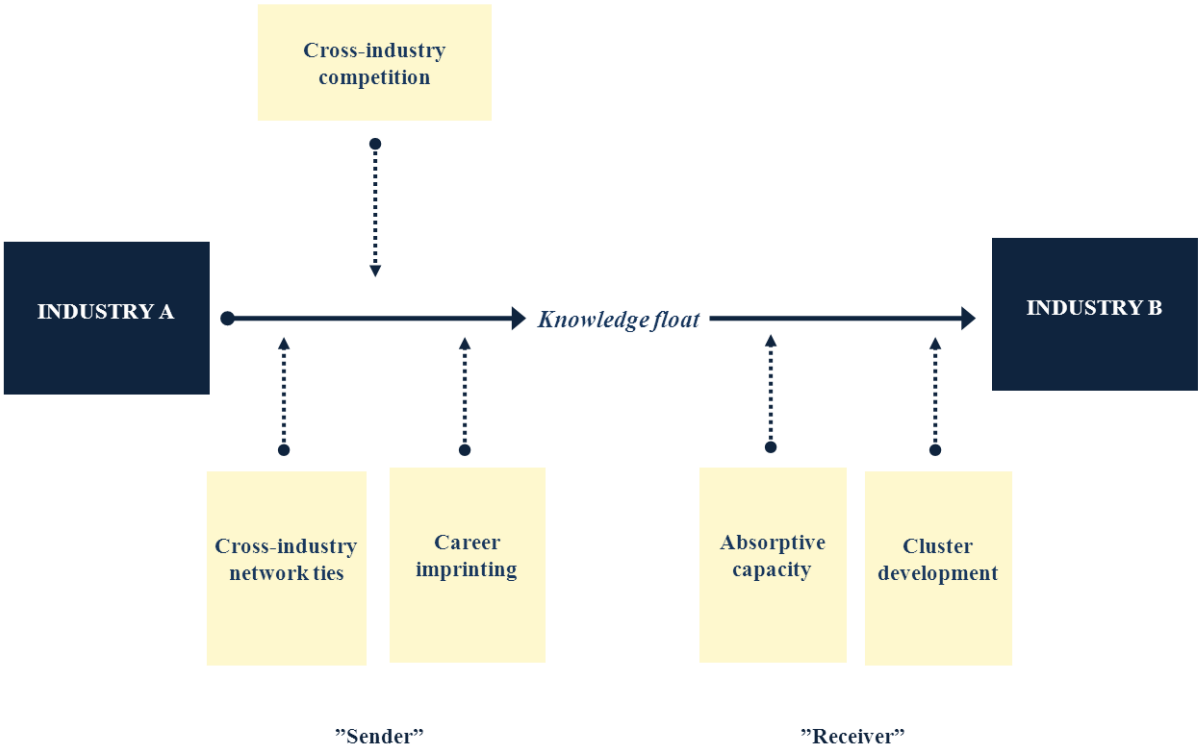
It has been identified that "a major barrier to informal exchange of knowledge in an industrial district is the risk that the receiver of such knowledge may use it against the interest of the sender" (Inkpen & Tsang, 2005, p. 13). Even in situations where the two parties are partners in an alliance, competition has been seen as a strong obstacle of knowledge sharing between the parties. This also counts for situations where the alliance partners have a strong social interaction. (Inkpen & Tsang, 2005).

Resources may represent a competitive advantage for a party, in some circumstances a sustainable competitive advantage. This may be a reason why participants in industry A does not wish to share their knowledge to external parties; the fear of wasting their (sustainable) competitive advantages.

Cross-industry competition will therefore be regarded as the factor "putting the lid" on the knowledge sharing. The stronger and more direct the competition is regarded; the more resources will be used to prevent sharing of knowledge, instead of facilitating it.

3.6.6 The preliminary framework: "Knowledge transfer between industries"

In Figure 6 the preliminary framework is presented. The framework is divided into two stages, the first stage focuses on the outbound knowledge float ("sender"), and the second stage focuses on the inbound knowledge float ("receiver").



Figur 6. The framework "Knowledge transfer between industries". (source: Own).

3.6.6.1 Stage 1 – The outbound knowledge float

The first stage focuses on the factors that facilitate or prohibit a knowledge transfer. Stage one is the outbound knowledge float, in other words; the knowledge transfer located at the "sender's" half of the field.

Cross-industry network ties and career imprinting are identified as the two main factors facilitating knowledge transfer. The stronger the network ties, the more willingness to share knowledge, as well as the more channels available for knowledge sharing.

Cross-industry competition, on the other hand, is identified as a possible obstacle for knowledge transfer. Competition, direct or indirect, between the two industries would imply a huge challenge for knowledge transfer.

3.6.6.2 Stage 2 – The inbound knowledge float

The second stage focuses on the factors that facilitate for the inbound flow of the knowledge transfer. When the knowledge is shared, it is dependent upon industry B (the "receiving" party) how well situated it is to abstract the knowledge.

Absorptive capacity is the first factor identified, and cluster development in industry B is the other. Absorptive capacity is important in terms of how well the "receiving" part absorbs, adapts and exploits the knowledge available.

Cluster development is important in terms of how well the knowledge is exploited within industry B. Since knowledge, especially experiences, often is transferred between individuals it is important that the industry receiving the knowledge is able to share it within, in order to take full advantage of it. The more similarities the industry share with a cluster, the better knowledge and information floats between the industry participants.

3.7 Discussion of the preliminary framework

The framework focuses on knowledge transfer, more specific; how to transfer offshore experiences to the ones that it represents a competitive advantage for. When resources represent a potential competitive advantage for another party, in this case; another industry, the transfer process becomes crucial. If the resources are not transferred successfully, the competitive advantage can not be exploited.

This leads back to the VRIO framework and the resource based view. Resources represent no *value* when they are not transferred, even though they are *rare*. If the resources are *inimitable* as of today, it is not considered to last forever. This is based upon the assumption that competitors may copy the advantage. A resource that would represent a competitive advantage in another industry, which is considered valuable and rare, must be transferred successfully within a time limit. If not, the resource may be imitated by other parties. It also has to be difficult to substitute (*organizational*). (Barney, 1991).

When a resource, such as offshore experiences, represents a competitive advantage, it needs to be transferred successfully and within a limited time range. If it is not transferred successfully, it will not represent a competitive advantage. Also, if it is not transferred within the period of time when it would represent a competitive advantage, it may be substituted or imitated by other parties. Hence, the advantage the experiences represent diminishes. (Barney, 1991).

The preliminary framework on "Knowledge transfer between industries" includes five different factors; cross-industry network ties, career imprinting, absorptive capacity, cluster development and cross-industry competition. There are several characteristics with each factor, all are not considered to its full extent in this thesis. This is because the factors themselves will not be studied in depth, as the overall framework is of main interest.

Since there is no past theory on the specific area of knowledge transfer *between* industries, the framework presented has taken root in previous theory on related areas, and been developed from there on. Therefore, the framework might not be as close to reality as it would have been if more relevant and closely related theory were available.

The framework; "Knowledge transfer between industries", is meant to fit different scenarios of knowledge transfer between industries (meaning industry A and industry B are optional, and not set, hence, the framework can be used with different industries of focus). Though, the

framework is developed with regards to knowledge transfer of offshore experiences, where the offshore wind industry represents industry A and the offshore wind industry represents industry B. The framework might therefore suffer from a "narrow" point of view in some terms.

3.8 Preliminary Summary

Resources are a source of competitive advantage. In some cases resources needs to be transferred to another party in order to represent a competitive advantage. The case of this study is to transfer resources (knowledge/experiences) across industries, in order to utilize its competitive advantage.

Theories on knowledge and knowledge transfer has been described and discussed, with the aim to develop a preliminary framework of "Knowledge transfer between industries". The subject of knowledge transfer between industries has not yet been of focus in academic theory; the development of a preliminary framework has therefore had little theory to be based on.

Five factors have been suggested to have an impact on the knowledge transfer; cross-industry network ties, career imprint, cross-industry competition, absorptive capacity, and cluster development. The factors are divided in two stages; stage one considers the "sender" (the outbound knowledge float), while stage two considers the "receiver" (the inbound knowledge float). The purpose of dividing the framework into different stages is to differentiate the outbound process, and the inbound process of a knowledge transfer. A transfer is not successfully complete unless both the "sender" and "receiver" are fully stimulated to perform the transfer.

Chapter 4 – Research Methodology

4 RESEARCH METHODOLOGY

This chapter is to give an overview of the methodology used, and reasons for choosing this exact methodology. The procedure of collecting primary data is described, then the analysis process is presented, last the trustworthiness of the thesis is taken into consideration.

4.1 How the Master Thesis has been carried out

The main objective of this thesis is to answer the research question; "How to transfer offshore experiences to the offshore wind industry within the Norwegian sector?" In order to answer the question, it needs to be identified how to transfer knowledge from one industry to another.

The research process has gathered information from the following sources:

- Interviews with key people in the two industries of interest. The people chosen should represent different companies, different levels of the supply chain, and hence different knowledge bases.
- Informal interviews with NORWEA (the interest organization for wind, wave and tidal energy in Norway), as well as other people within the offshore wind industry.
- Information retrieved attending NORWEA's annual conference 2011.
- Attendance as observer in meetings with Flochem, Statkraft, Ovento, EMAS, and Larsen & Toubro Limited.
- Reports on offshore wind energy development, the offshore wind industry, knowledge transfer processes between the oil & gas industry and the offshore wind industry, etc.

The interviews represent the main source of new information, and will lay the grounds for answering the research question. Informal interviews, meeting observations, academic articles and reports represent the basis for the author's problem understanding and knowledge of previous research and findings.

First objective of the data collection is to map what offshore experiences Norway has that is of value to the offshore wind industry, as well as if industry participants acknowledge these experiences to represent a competitive advantage for Norway. *The second, and main objective,* will be to define how to transfer these experiences, and what factors that may facilitate the knowledge. The knowledge transfer will be defined as a transfer from industry A to industry B.

4.2 Research Design

There are different types of research instruments to use in order to conduct business research. The main separation is between qualitative and quantitative methods. (Zikmund et al., 2009). Quantitative methods are "business research that addresses research objectives through empirical assessments that involve numerical measurement and analysis approaches (Zikmund et al., 2009, p. 134). Qualitative methods focus more on "observing, listening and interpreting" (Zikmund et al., 2009, p. 135), the focus is to discover "true inner meanings and new insight" (Zikmund et al., 2009, p. 133). Qualitative research is often influenced by the researcher, both in the process of information gathering, and determining a conclusion. Since qualitative research is categorized as subjective, "different researchers may reach different conclusions based on the same interview".(Zikmund et al., 2009, p. 135). The researcher's awareness on its own subjective influence is therefore important in order to accomplish as valid and credible results as possible.

This thesis is based upon qualitative studies. This is because the research question needs an exploratory orientation in order to be answered. According to Jacobsen (2005) explorative research problems often need a method which is able to discover unexpected conditions. A process which goes in–depth with few research entities is usually appropriate. The goal is to "discover true inner meanings and new insight" as Zikmund et al. (2010, p 133) explains it.

Since knowledge transfer *between* industries has not yet been a discussed research topic, the outcome of this study needs to be explorative in order to discover new insight. A qualitative study enables the researcher to explore potential interesting topics that may arise during interviews, as well as facilitate for a two-way communication if needed. It will also enable a better mutual understanding between the interviewer and respondent of the main objective or the particular question as the subject of knowledge transfer between industries might be unknown to many.

4.3 Data collection

Yin (2003) recommends using multiple sources for the data collection, although this in the end depends upon the thesis' authors' understanding of what sources that are most suitable to answer the research question. The data collection process of this thesis has focused on both primary and secondary data, where the secondary data has played a complementary role for the primary data. As for the primary data, there are three different sources of data collection, all presented below. It should be emphasized that the in-depth interviews will be defined as the main source of new data; and therefore the data most weighted.

4.3.1 Primary data

4.3.1.1 In-depth interviews

The primary data will mainly consist of in-depth interviews. It will be emphasized throughout the data collection to get input from people representing different views, different industries, as well as different levels of the industry value chain. As the "*knowledge transfer between industries"* perspective is a quite immature term, it will be of special emphasize to get in contact with people who have experienced or taken part in this kind of knowledge transfer.

There are endless people within the relevant industries; therefore the process of defining the right sample has been important, and hence time consuming. Informal conversations and discussions with the employees at NORWEA have been of great importance in order to allocate the key people who attain the "right" information/knowledge. Relevant newspaper

articles have also been an indicator of where the knowledge soughed may be located (both in terms of people and companies).

The people conducted interviews with should be representative for the broader understanding in the industries, as well as represent different point of views, to the extent possible. The researcher has defined three different perspectives (see below). These perspectives will be used throughout this thesis.

The "sender"	Represents industry A (the offshore oil and gas industry)
The "receiver"	Represents industry B (the offshore wind industry).
The "outsider's" overall view	Represents parties not directly involved in either industry A or industry B, but they have a type of involvement. They are assumed to have a good overall view of the two industries.

It will be conducted six in-depth interviews. The respondents will be chosen on the basis of the perspective they represent. There will be two respondents representing each perspective. Thereby ensuring a more representative sample, since the two respondents representing the same perspective can be compared in terms of their response.

The reason for a sample of six respondents, and not nine, is due to the limited resources in terms of the researcher's time and capacity. It is considered important that the researcher has enough time and resources to perform an extensive analysis of the data collected.

The in-depth interviews will be conducted through telephone conferences. All interviews will be one-to-one interviews excluding any disturbing factors or interference. It will be emphasized on creating a trusting dialogue with the respondent, in order to "dig deeper" into his/her thoughts on the relevant subject. Below a table with the interview objects is presented. For more information on the companies, see appendix 10.4.

Company	Name	Position	Location	Industry
NODE NCE	Kjell O. Johannessen	Project Manager	Kristiansand	Offsh. O&G (Drilling)
Statoil	Anne Strømmen Lycke	Director Wind power	Oslo	Offsh. O&G (Offsh.Wind)
Statkraft	Haakon Alfstad	Director Wind power	Oslo	Offsh.Wind
Seatower	Petter J. Karal	CEO	Oslo	Offsh. Wind (Foundations)
Arena NOW	Asle Lygre	Managing Director	Bergen	Offsh.Wind Cluster
Innovation Norway	Marianne Tonning Kinnari	Ocean and wind, Rogaland District	Stavanger	Consultancy

Table 1. List of in-depth interview objects.

For each of the interviews an interview guide will be followed. Since each respondent has been chosen because of his/her background, company and industry, there will be amendments to the interview guide from respondent to respondent, this in order to be able to abstract as much relevant information as possible.

The interview guide for each interview will consist of three parts;

1. Questions related to the specific company, its background and knowledge transfer
2. General questions on knowledge transfer (between industries)
3. General questions on national competitiveness

Part 2 and 3 are equal for all the respondents, while part 1 will be developed individually for each respondent/company. The purpose of this is to have one set of questions (Part 2) on knowledge transfer which is similar to all respondents, and thereby secures that the core questions are asked/presented in the same way to all respondents. The company specific

questions (Part 1) are meant to secure the ability to derive as much knowledge the specific respondent contains due to his/her particular background and insight.

The interview guide will mainly consist of open questions, thereby ensuring that the respondent can express his/her own opinion on the topic. The interviewer will be careful in terms of suggesting factors for knowledge transfer between industries, this is because it is sought to avoid guiding the respondent's answers. The focus will rather be to challenge the respondent's thoughts on the subject of knowledge transfer between industries. Though, suggestions of factors will be given to the respondent, in terms of exploring their thoughts on the five factors in the preliminary framework, if they are not mentioned by the respondent.

The interview guides will be used as "the road to follow", and will be followed to the extent possible, but follow up questions will be asked where needed. The interview guides are attached in the appendix. Appendix 10.5 is the translated version (English version), while the original (Norwegian version) is attached in appendix 10.6.

Justification of the choice of telephone conferences

The interviews are all conducted by telephone. According to Zikmund (2000) telephone interviews are comparable to personal interviews concerning the quality of data. By conducting the interviews through a telephone conference bias may be prevented in terms of the respondent not being influenced by the appearance and body language of the interviewer. On the other side, the interviewer does not get to observe the respondent, and hence, is not able to count for the respondent's body language in terms of interpreting the true inner meanings of the answers given (Bryman & Bell, 2007). There are three main reasons for the choice of telephone conference as the main interview method:

- As all interview objects are external, and not directly related to the thesis, they had no obligation to take part in the interview process. Hence, the bargain power was not on my side. In terms of making it as easy and convenient for them to participate, telephone conferences where chosen as method. (In the process of defining the respondents, one of the potential respondent declined to participate due to lack of time, and therefore had to be replaced.)

- The author of the thesis chose to take time to participate in NORWEA's annual conference (Oslo), attend two meetings (Oslo) as an observer, as well as spend one day at the NORWEA office (Oslo). The attendance at these meetings was considered important in terms of retrieving crucial background understanding and underlying insight early on in the data collection process. Thereby being able to develop theory and interview guides further, before performing the in-depth interviews which are considered as the main data for this thesis.

- The interview objects are located in different cities; Oslo, Bergen Stavanger and Kristiansand. Conducting physical meetings would therefore involve a great deal of travelling, as the author of the thesis was situated in Gol (home town) in this period of time. Travelling is both time-consuming and cost-intensive, and therefore had to be opted out for a more efficient method. Some interviews with respondents based in different locations were also scheduled on the same date, as the respondent had an opening in his / her calendar that day. Thereby making physical presence impossible in some of the cases, due to long distances.

4.3.1.2 Informal interviews with the employees at NORWEA

During the research process the researcher has been in contact with NORWEA, which have been very helpful in providing an overview of the offshore wind industry. NORWEA is the interest organization for wind, wave and tidal energy in Norway, and was established in 2006 (Norwea.no, 2011). The total of 5 hours on Thursday 31st of March was spent at NORWEA's office, located in Oslo. In table 2 the informal interview objects are presented.

Name	Position
Øyvind Isachsen	Managing Director
Øistein Schmidt Galaaen	Director
Andreas Thon Aasheim	Advisor Net

Table 2. List of informal interview objects.

The intention of these informal interviews was to gain a deeper insight into the offshore wind industry, as well as the general thoughts on knowledge transfer from oil and gas to offshore wind. The researcher got the opportunity to discuss different hypothesis, thereby being able to gain a better and more precise focus for the further development of the preliminary framework.

NORWEA was also very helpful in terms of identifying which companies (and people) to select for the in-depth interviews. This was very valuable to the researcher, as it was considered critical to identify the persons that would hold the right information/knowledge.

4.3.1.3 Observer at business meetings and conference attendance

Meeting observation

The researcher has had the opportunity to attend two meetings as an observer at Flochem's office, Oslo.

Meeting 1: Flochem (Norway), Statkraft (Norway), Ovento (Canada), and Larsen & Turbo Limited (India)

Meeting 2: Flochem (Norway), Ovento (Canada), and EMAS (Singapore, Norway)

Conference attendance

The 30th of March I attended the annual conference of NORWEA. This is a large conference, with guest covering the most of the companies involved in the offshore wind industry in Norway.

Description	Observation Purpose	Purpose of use
Observer at business meetings	- How the concept of knowledge transfer was defined - How knowledge transfer was weighted as an important factor - Conscience and identification of their own experiences relevant for offshore wind	- Define important factors and perspectives for the development of the question guide, and further development of preliminary theoretical framework
Conference attendance	- Informal individual opinions (the individual perspective) - Individual background, and the potential advantage of it - Their emphasize (and personal opinion) on potential gain from knowledge transfer	- Define important factors and perspectives for the development of the question guide, and further development of preliminary theoretical framework

Table 3. Purpose and use of business meeting observations and conference attendance.

4.3.2 Secondary data

Secondary data is retrieved from several different sources, ranging from market reports, websites of industry associations and companies, to newspaper articles. The secondary data is mainly used as a source for the author's background understanding of the market and industry. But also an important part of the development of the interview guide, and insight on thoughts of potential knowledge transfer as of today, and in the future. Secondary data has also been useful in order to "dig deeper" into insights gained in some of the interviews. Below the reports most weighted for this thesis are listed.

Author	Published	Title
Douglas-Westwood	2010	Offshore Wind Assessment for Norway
NVE	2010	Havvind: Forslag til utredningsområder
Sintef	2009	Vindkraft offshore og industrielle muligheter
Energirådet	2008	Vindkraft offshore: industrielle muligheter for Norge
Enova	2007	Potensialstudie av havenergi i Norge
Forskningsrådet	2007	Foresight Rapport: Offshore Vindenergi

Table 4. List of reports.

4.4 Data analysis

The data analysis of the in-depth interviews will be described thoroughly according to Jacobsen's (2005) three steps for qualitative data; describe, categorize and combine. Thereafter the data analysis of the remaining primary data collection will be described in section 4.4.4.

4.4.1 Describe

After each interview the notes will be written into a full document including both the questions asked and the respondent's respective answers. All the interviews will be conducted in Norwegian, which is the mother tongue of the respondents, and will afterwards be translated to English by the author of this thesis (which also is the interviewer) in the full document. Each of the full documents will be marked with company name, the name of the

respective respondent, and their location. Date, time and duration, as well as the "perspective" the respondent was representing will also be included.

4.4.2 Categorize

In the full document the answers is sorted by questions. Since the data collection will be performed through qualitative methods, it is likely that the respondents will elaborate beyond the respective question in their answers. It will therefore be expected that the information given in each question may contain valuable input for other areas as well. The categorization process will therefore be performed without respect to the question, but to the content in the answers.

During this step of the analysis process it will also be a data reduction process. A data reduction process "sharpens, sorts, focuses, discards and organizes data" in order to simplify the process towards a conclusion (Miles & Huberman, 1994). Information irrelevant to the thesis will be disregarded, in order to develop a stronger picture of the information relevant to the research question, and the development of the framework. What information that is irrelevant will be considered thoroughly in order to be sure that only information not relevant to this thesis is cut.

First, the full document will be examined for the five factors suggested by the preliminary framework; cross-industry network ties (F1), career imprinting (F2), absorptive capacity (F3), cluster development (F4), and cross-industry competition (F5). When one of the factors is identified in the full document, the relevant text will be marked in yellow and the factor symbol (the symbol is equal to the square listed in the factor column in the overview scheme, see Figure 7) will be placed in the side margin. Thereby, it will give a good overview of what factors identified, what text relevant, as well as the frequency of the factor.

Secondly, the full document will be analyzed for potential "X" factors. "X" factors are factors that are not suggested on beforehand, but first discovered during the data collection. When an "X" factors is identified in the full document, the relevant text will be marked in yellow, and a factor symbol will be placed in the side margin. The factor symbol for "X" factors will be FX, FY, FZ, Fi, Fii, and so on.

When all six of the full documents are examined for potential factors (F1 to F5, and "X" factors), the focus will be on further exploration on the "X" factors. The different "X" factors will be sorted, and it will be looked into if there are similarities between the "X" factors discovered in the different full documents. Strong "X" factors should be present in more than one of the full documents, in order to have the necessary support for further consideration.

Thirdl, when all potential factors have been identified and sorted, they will be placed into a new sheet (the Overview Scheme). The intention of the scheme is to represent an overview of the interview analysis, thereby making it easier to remember and to separate the content of each of the six interviews. Below is an excerpt of the scheme.

Factor	Present (v), Not present (x) More important than expected (+) Less important than expected (-)	Comments
F1	V	NETWORK (insert text)
F2	V(+)	CAREER IMPRINT (insert text)

Figure 7. Excerpt of the Overview Scheme.

In this sheet the factors are categorized according to low, medium or high influence, and there is also a field for comments where characteristics of the factor, discovered during the interview, will be written. The categorization of low, medium and high suggested influence will be determined on the basis of the respondent's recognition of the factor, how important the factor is considered by the respondent, and the frequency of appearance in a knowledge transfer context. The comments will mainly be key words/sentences of all the important statements in the full document, in order to capture the main core of the full document.

Last, the findings will be sorted into the Analysis Scheme. In this scheme the findings will be categorized by the following subjects:

Figure 8. Content of Analysis Scheme.

Quotes from the full document will be inserted into the Analysis Scheme under the respective category. Each quote will be marked with the company name of the company the respondent represents, thereby making it easy to identify who said what. When all the relevant data is sorted into the Analysis Scheme, the researcher will start analyzing the data.

4.4.3 Combine

First, statements representing the same factor will be combined with regards to the respondent's perspective; if he/she is representing the offshore oil and gas industry ("sender"), the offshore wind industry ("receiver"), or an overall view. It is considered important in

terms of being able to consider the statements *together* with the background and insight of the respondent. It is assumed that due to the respondents different background and involvement in offshore wind and/or offshore oil and gas, their insight differ. Afterwards, the statements representing the same factor will be combined without respect to the respondents' perspective. Thereby the larger picture of the factor can be discovered.

The factors will be presented with the relevant findings starting with factor F1 to factor F5. Thereafter the potential "X" factors will be presented. Relevant findings on *if* and *how* knowledge is transferred today, and what offshore experiences that would represent an advantage, will also be presented.

4.4.4 Data Analysis of the remaining primary data collected

The informal interviews were written into notes afterwards. These notes were used to confirm or challenge the researcher's previous assumptions on knowledge transfer between industries. Thereby it was possible to further develop the preliminary framework of knowledge transfer between industries. It is considered that the information and insight gained through the informal interviews have been critical in terms of being able to develop a realistic preliminary framework. On the basis of this, the researcher was able to focus the in-depth interviews more precisely, and hence, gain more critical information.

The information gained through business meeting observations and the conference attendance was written into notes as well. This information was in particular valuable in terms of defining how the questions in the interview guide should be presented in terms of achieving a mutual understanding of the question's underlying objective.

4.5 Looking back at the process

4.5.1 The interviews

There were six in-depth interviews in total, all with a time range of 30 minutes to 1 hour. The respondents all represented different companies/organizations. The number of respondents

was decided on the basis of the perspectives the researcher wanted to include in the research; "sender", "receiver", and the overall view. There were two respondents representing each of the three perspectives.

There were two companies that the researcher of this thesis was not able to get to participate in the interviews. One declined due to lack of time, the other one the researcher was unable to reach. These two companies were replaced by two other companies which represented the same perspectives. There were identified several potential respondents on beforehand, to be secured in case of companies declining to participate. It is therefore argued for that the sample still is representative.

All the respondents answered all the questions in the interview guide. There were cases in all the interviews where the respondents answered several questions from the interview guide in one answer, as they all were very talkative. The question related to more critical subjects was though sometimes asked later on, when they actually appeared in the interview guide, in order to assure that the correct answer was identified by the interviewer.

The six in-depth interviews were conducted successfully, and the output of the interviews corresponded with the amount of information the researcher was hoping for. The researcher thereby regarded the six in-depth interviews as representative for further discussions of a suggested framework on knowledge transfer between industries.

4.5.2 The analysis

As the interviews were completed, the information was analyzed and inserted into the analysis scheme. The scheme was helpful in terms of creating a picture of each respondent, and its viewpoint on the different factors of interest.

There were discovered "X" factors in the full documents. When they were further explored, and compared with each other, it was discovered that there was one factor which was repeatedly mentioned in several of the full documents. This factor was categorized as FX.

4.6 Trustworthiness

Eisner (1991, p. 58) describes a good qualitative study as a study which can help one "understand a situation that would otherwise be enigmatic or confusing". A good qualitative study needs to have a good quality and be trustworthy. Though, there has been argued that reliability and validity is difficult to measure on a qualitative study, therefore both the reliability and the validity will be of focus during the development of the study, and throughout the whole process. The reliability of a qualitative study has been considered to be one of the most relevant problems, due to that it accounts for the stability of the measurement (Bryman & Bell, 2007).

4.6.1 Reliability

Reliability depends upon the internal consistency of the measurement (Zikmund et al 2000). The more consistent the results are over time and the more accurate it represents the entire population; the more reliable the study can be considered (Golafshani, 2003) Kirk and Miller (1986) has identified three different types of reliability in a qualitative study; the degree to which the measurement remains the same, the stability of the given measurement over time, and the similarity of measurements within a given period of time.

There has been argued that the term reliability is irrelevant in qualitative studies, as a qualitative study is meant for the "purpose of explaining" (Stenbacka, 2001, p. 551). Stenbacka (2001, p. 552) takes it as far as expressing: "the concept of reliability is even misleading in qualitative research. If a qualitative study is discussed with reliability as a criterion, the consequence is rather that the study is no good"

As the reliability is said to depend upon consistency (Zikmund et al, 2000), precautions have been made in terms of internal consistency. Zikmund et al (2000, p. 306) explains internal consistency as "a measure's homogeneity".

Internal consistency is achieved by "asking several similar but not identical questions" (Zikmund et al, 2000). This has been done by asking questions such as:

1a) What kind of offshore experiences is of value to the offshore wind industry?
1b) What do you consider as the most important knowledge/experiences to transfer to the offshore wind industry?

2a) What are the biggest challenges concerning knowledge transfer of offshore experiences to the offshore wind industry?
2b) What are the biggest obstacles for a potential knowledge transfer?

Actions have also been done in order to facilitate replication. The interview guides designed for the different interviews, was, to the extent possible, followed during the interview process. Thereby it could be argued that similar findings will be discovered if conduction the interviews once again. Though, this cannot be said for sure as it highly depends upon the respondent. Qualitative studies are said to be very hard to replicate, as they are considered highly complex (Saunders et al, 2007).

4.6.2 Validity

Zikmund et al (2000. P. 307) describes validity as "…accuracy of a measure or the extent to which a score truthfully represents a concept. In other words, are we accurately measuring what we think we are measuring?" Joppe (Golafshani, 2003, p. 599) defines it as hitting the "bull's eye"

In order to build on accuracy, the framework developed has been built on, as well as related to past valid theory, to the extent possible. The respondents have been chosen with care, in order to get a sample as representative for the population as possible. Though, external validity is hard to fully accomplish, as there will be a limited number of respondents involved. The main purpose of this thesis was to determine how to transfer offshore experiences to the offshore wind industry, in terms of developing a framework on knowledge transfer between industries.

The framework presented will therefore be developed in terms of a specific industry A and industry B, and not in general.

Throughout the whole research process the author of this thesis has had a continuous awareness on whether what that is supposed to be measured, is what is actually measured. There has also been a focus on reviewing the information and process critically throughout each step.

At the beginning of the data collection the author of the thesis will usually have an opinion on what things mean, and the purpose of the thesis. It will therefore be of focus that the author manages to hold an openness and skepticism on the information gathered along the path of the thesis. The aim is to develop an explicit and grounded conclusion, which will be final at the end of the thesis. (Miles & Huberman, 1994).

4.6.3 How to improve the reliability and validity

Triangulation is a method to improve the reliability and validity of a research study. Patton (2001, p. 247) states that "triangulation strengthens a study by combining methods. This can mean using several kinds of methods or data, including using both quantitative and qualitative approaches". By using a triangulation method it will further enhance the study to have "…a more detailed and balanced picture of the situation" (Altrichter et al., 1996, p. 117).

There are different types of triangulation; in this thesis the methodological triangulation will be used. Methodological triangulation involves the use of several qualitative and/or quantitative methods. As there is no academic theory / framework on the subject knowledge transfer between industries, several qualitative methods will be used to get a more holistic and better understanding of the phenomenon during the research process, as well as to secure a valid and reliable research outcome. The impressions gained during observations and informal interviews/ will be compared to the main results that arise from the in-depth interviews.

4.6.4 Potential errors

There have been identified possible sources of errors, they are as follows:

- The author of this thesis has little experience in performing in-depth interviews. A person holding a lot of experience in conducting interviews might be able to derive better results from the interview process.

- As the respondents are external parties, not directly involved in the research process, they might not give their full attention to the in-depth interviews. They may also hold back information which they are not willing to share with an external party.

- The respondents may have difficulties to consider the term knowledge transfer on a broader perspective, than the micro transfer which they themselves are affected by. Hence, the underlying focus of the thesis and the respondent's understanding may not correlate.

4.7 Preliminary Summary

The main data collection will arise from six in-depth interviews. The respondents should represent different companies and industries, in order to be considered a representative sample. The interviews will afterwards be analyzed for the five factors suggested by the preliminary framework "Knowledge transfer between industries", as well as potential "X" factors.

Chapter 5 – Findings

5 FINDINGS

In this chapter the findings from the interviews (mainly the in-depth interviews) will be presented. First, the findings on national competitiveness will be presented, followed by the findings on knowledge transfer, and findings on why transfer knowledge. Lastly, there will be comments on the findings.

5.1 Brief background introduction

It has been performed six in-depth interviews, all which represented different companies / organizations. Hence, six different points of views were captured. Some of the respondents share characteristics on the basis of their industry representation, and their perspective.

Two of the respondents expressed that they wanted to be anonymous; the findings from all six interviews will therefore be presented anonymously in order to secure the respondents' anonymity. Quotes from the respondents will however be presented together with the perspective he/she represents, as this is considered useful information to the reader. It is considered that this information will not reveal the true identity of the respondent, and that anonymity will still be intact. Each respondent represents one perspective only; all together they represent the three following perspectives: "sender", "receiver", and the overall view.

5.2 Findings on National Competitiveness

5.2.1 Competitive Advantage

The respondents, both in the in-depth and the informal interviews, were all asked if they consider Norway's offshore experiences to represent a competitive advantage within the offshore wind. All respondents answered with a clear "yes". All had the same opinion; Norway's relevant experiences create a competitive advantage, which no other country has.

"Definitely. The more advanced the technology is, the greater competitive advantage Norway has. This is because of our relevant experiences." (Receiver)

"We are not the cheapest, that's a fact, and we will never be since Norway is a high cost country. But our solutions will be competitive on life cycle costs. Our solutions have a higher standard and better quality, and will therefore minimize the costs on a long term perspective. For example in terms of maintenance costs." (Overall view)

The respondents considered the relevant experiences to represent a competitive advantage, but not a sustainable competitive advantage. If the potential competitive advantage was not utilized in near future, it might not represent a competitive advantage anymore. They considered that people attained experiences, and since human labor is mobile, their knowledge could just as well be exploited elsewhere.

"You can say that the experiences lie in the hands of the engineers. …But an engineer is not stationary; he/she can be moved. Therefore, the competences can be exploited in other countries. It is, for an example, a reason why the offshore wind development in the UK want Statoil to take part; due to their North Sea competences." (Informal interview)

5.2.2 Experiences that represents a Competitive Advantage

All the respondents emphasized that it is the long time experiences from oil and gas that represents the main competitive advantage. For those that went into more details, experiences such as; design, construction, material knowledge, procedures, installations, surface treatment, logistics, project management, maintenance, and HSE[1] were mentioned. Design was especially emphasized.

> *"The knowledge of how to design structures that is able to stand offshore for about 30 years, and can cope with harsh weather, waves, and so on." (Receiver)*

5.2.3 Domestic Market

The respondents' opinions differed concerning development and importance of a national market of offshore wind, as well as the importance of a pilot project (offshore wind farm) on the Norwegian shelf.

None of the respondents believed in a domestic market in the near future; some did not even believe in a domestic market and could not see the importance of it. Others again did not believe in a domestic market as the situation is today but, saw the importance of a future development.

> *"No. I do not believe in a domestic market in offshore wind. Not now or in the future. We have a well developed hydropower sector, which is very competitive. If we need to produce more electricity, we will probably build more hydropower stations." (Overall view)*

[1] Health, security and environment.

"No. Not now. The government needs to give it more focus first. Without a domestic market, the offshore wind will be built in other countries. Hence, the potential synergy Norway could have had between oil and gas, and offshore wind will be gone. On a long term perspective we need a home market" (Overall view)

"Maybe after 2030. We do have the natural resources. But there is a trade barrier to the EU, subsidizing needs to enter Norway. Or, the offshore wind needs to reduce its costs. Then one does not need to subsidize." (Sender)

A pilot project on the Norwegian shelf was recognized as important. Though, the large and well established companies did not see the importance of a location on the Norwegian shelf.

"In order to prove technology, yes. But it is not always important that it is located in Norway". (Sender)

The other respondents had a more conservative opinion:

"Absolutely, it is crucial. We need to demonstrate our technology, or else there will be no Doggerbank for us." (Overall view)

"Maybe, but then again; how many players can be included in that project? Everyone asks for proven technology, so in terms of reaching that stage, it is important." (Receiver)

The pilot project of an offshore wind farm on the Norwegian shelf was considered a door opener for the smaller and less established companies. A pilot project would enable to prove new technology, and thereby opening up for new opportunities on the international market.

Even though different opinions, all respondents agreed that Norway has a competitive advantage because of the relevant offshore experiences. The respondents had a common understanding that these experiences represents a competitive advantage, and that the main focus lies with experiences related to offshore oil and gas.

As the respondents understanding of what they consider valuable experiences for the offshore wind industry, and their opinion on if these experiences represent a competitive advantage is identified. It leads to the question of how to transfer the offshore experiences to the offshore wind industry?

5.3 Findings on Knowledge Transfer

In this section findings on knowledge transfer will be presented. The findings will be presented factor by factor, starting with the five factors suggested in the preliminary framework; cross-industry network ties, career imprinting, absorptive capacity, cluster development and cross-industry competition. Thereafter, a "X" factor discovered during the data collection will be presented.

5.3.1 Cross-industry network ties

The respondents identified network as an important source of knowledge transfer, and they had a good understanding of the value network creates. Network was a common method of deriving new knowledge. It was considered important to have access to networks that could provide you with the information and knowledge you needed.

> ***"****The network of employees is often the place where most input arises from, both relevant input and less relevant." (Receiver)*

"Yes, they do have a dialogue with other companies, mostly companies in the oil and gas industry. It is important because of the transfer value it creates." (Overall view)

"We had to learn it ourselves; it was a steep learning curve. We established close relations with suppliers, partners, and other kinds of network. I think I was out talking almost half the week. Establishing connections with relevant people holding offshore experiences is important." (Sender)

"You cluster to the companies that have something which is relevant for you, in other words; you choose your network after own needs." (Receiver)

The respondents emphasized that valuable networks, in a knowledge transfer context, often was location based. Players located near-by each other often had the opportunity to participate in informal gatherings, thereby lowering the barriers of asking for help. It was also emphasized that the valuable networks were between individuals, and not companies. Close, informal network ties were a good source for knowledge sharing, and was where sharing often took place in terms of "helping each other out".

"To retrieve new knowledge we use our network. Networks are linked through persons, independent of company. The networks are not between companies." (Receiver)

"Some connections handle distances, for example through phone calls, but others require localizations as well. Frequent mingling; like taking a beer after work." (Receiver)

5.3.2 Career imprinting

Career imprinting was the most recognized factor facilitating for knowledge transfer by the respondents. It was in particular mobility of labor with relevant experiences that was highly valued. Knowledge transfer through hiring new personnel or by hiring in consultants was frequently mentioned.

"…the people are the ones that attain the experiences. One could hire engineers with relevant experiences." (Overall view)

"Employ new people. But the offshore wind is not as capital intensive as the oil and gas, hence, they are not able to pay competitive salaries. Most companies are small, with little financial capital." (Overall view)

"Hire in consultants, or hire a new person that knows this field. Though, we cannot hire a new person every time we enter an unknown field." (Receiver)

"Hire people with oil and gas background. But then the offshore wind needs to pay more. All highly competent people rather enter the oil and gas, since this is where the money is." (Sender)

"Though, they are mostly small companies, and therefore have limited with competences in-house. They therefore often need to reach out through other solutions, such as hiring in expensive consultants." (Overall view)

The respondents also emphasized the ability to take advantage of own experience in a new industry. Examples were people that started up a new company based on technology developed from experiences they had gained in e.g. the offshore oil and gas industry. It was also examples of companies based in the offshore oil and gas industry, which changed industry. Thereby they brought with them relevant experiences from the offshore oil and gas industry.

"…, people that enter the offshore wind, and starts up a new company." (Overall view)

"Direct transfer. You have for an example Aker Verdal. They have taken their own competences from oil and gas and exploited it in the offshore wind." (Sender)

"When oil and gas companies enter the offshore wind, they automatically help out the offshore wind industry." (Overall view)

"There are close relations between oil and gas, and offshore wind. This creates knowledge transfer. Since companies from the oil and gas industry enters the offshore wind." (Receiver)

5.3.3 Absorptive capacity

Absorptive capacity was identified by the respondents. The respondents showed a good understanding of the need to adapt new knowledge in a way that would enable them to utilize it in a new context.

> *"We need to relate our competences to the offshore wind, and understand how to combine them. We also need to understand the underlying demands as well as other factors in the offshore wind industry." (Overall view)*

> *"...Modifications have to be done. The offshore wind does not operate in the same way as the oil and gas industry does. It is important to be aware of this." (Overall view)*

> *"We have to think new, in a new way. There is a need for a mental transformation, from oil and gas, to wind." (Receiver)*

The respondents also acknowledged the value of the potential gain of utilizing new knowledge and experience among their personnel. They displayed a consciousness and awareness of their own responsibility to derive and take advantage of new knowledge within their own reach.

> *"After a project we get new experiences we can take "home". ... When those people get back to (company name), we get new knowledge." (Receiver)*

5.3.4 Cluster development

Cluster development in industry B as a factor facilitating for knowledge transfer of offshore experiences was not particularly recognized among the respondents. It was emphasized that the cluster was relatively young (established in 2009); therefore trust was not considered fully developed among the cluster members.

> *"It takes time to get things started. Get a big enough number of members. But not at least, building trust among the members. At the moment things are starting to happen."(Overall view)*

> *"One could ask if the Arena NOW is a cluster or not, a cluster has a real exchange between the member companies, I'm not sure if that is the case in Arena NOW." (Receiver)*

> *"Arena NOW facilitates for knowledge transfer, as the members get to meet on a set arena. But we are far from reaching the goal of having a heavy cluster." (Receiver)*

5.3.5 Cross-industry competition

All the respondents pointed out cross-industry competition as huge challenge for knowledge transfer. The respondents explained different types of cross-industry competition. These have been divided into the following sub-factors; competition of resources, competition of labor with relevant experiences, and competition affecting cooperation. All three factors were defined as indirect competition.

5.3.5.1 Competition of resources

The challenge arising from competition of resources was highly emphasized by all the respondents. The oil and gas industry was defined as a strong competitor, both in terms of a good market, and the industry's liquidity. Since the offshore wind companies were defined unable to compete on those two terms, they also failed to get the oil and gas companies' attention.

> *"Oil and gas is a competitor. The market there is too good compared to offshore wind". (Receiver)*

> *"The companies with the knowledge and experiences valuable to the offshore wind have their hands full with for example the oil and gas market. They therefore do not have the extra resources needed to enter the offshore wind market as well." (Overall view)*

The respondents that represented the offshore oil and gas acknowledged that money and uncertainty was two of the main reasons for their lack of interest and involvement in the offshore wind industry.

> *"The offshore wind is secondary to large oil and gas companies. Some are discussing if they should enter offshore wind, but they want to wait until the market has grown bigger. The oil prices are so good, so there is no need to enter another market. They do not have enough capacity." (Sender)*

> *"This market needs to get a bigger potential." (Sender about the offshore wind market)*

> *"At the moment the companies have a lot to do in their own market, which is where they are very good, and have well recognized products -today. Due to the political uncertainty in renewables, many do not wish to commit, due to the unpredictability. The companies do not dare to use their money there." (Sender)*

Because of the uncertainty in the offshore wind, the respondents defined that involvement from the oil and gas companies' side would have to imply a strategic decision on management level. Therefore, they defined it to be a long-term process.

> *"In order for traditional oil and gas companies to enter the offshore wind industry, the decision has to be done on a strategic level. This I consider to be on a long-term perspective, as it does not seem like no one dare to go for it as of the situation today." (Overall view)*

> *"… Both the Norwegian and the international ones have their hands full serving that market. And they do not need "any more feet to stand on"/to diversify. For companies to enter the offshore wind it depends upon strategic decision making on management level. At the moment the oil and gas market is to good and therefore hard to compete with. For companies to enter the offshore wind, they need to be willing to consider the alternative strategy of entering a parallel market. This requires both resources and time, which is a challenge." (Overall view)*

> *"That one dares to put its stakes out there, strategically, so we can take advantage of our core competences from oil and gas, but this is a long term perspective." (Overall view)*

The respondents defined the financial crisis as a period of growth for the offshore wind industry; when the oil and gas industry experienced a decline during the financial crisis, they had left over capacity to engage in the offshore wind. Thereby the financial crisis accounted for a period which facilitated knowledge transfer. But, when the financial crisis was over, the oil and gas companies shifted their focus back to their original industry.

> *"Capacity. During the financial crisis, the order books got smaller, and then it opened up for contracts from the offshore wind. As the economy is getting back to normal, the oil and gas are again filling up the order book, since they pay more. Hence the offshore wind suffers." (Overall view)*

> *"Since the financial crisis created calmer times for the oil and gas companies, they had time to enter the offshore wind. Also, many sub-suppliers turned; and started delivering to the offshore wind. But as the market went up again, it became too much to do in the oil and gas. Since the offshore wind does not pay as good, and is not able too either because of lack of resources, the order books are filled by the big orders from the oil and gas companies. -And there is therefore no room for any orders from the offshore wind." (Overall view)*

> *"The oil and gas is blossoming again, which is a factor of competition for the offshore wind. As oil and gas pays more." (Receiver)*

> *"Now, as the financial crisis is over, the large orders are back. They therefore do not use a lot of time and effort on areas they do not know a lot about." (Sender)*

5.3.5.2 Competition of labor with relevant experiences

The respondents defined labor mobility as one of the most common ways of knowledge transfer of offshore experiences to the offshore wind industry. The career imprints was considered valuable. The respondents also recognized labor to be the most accessible way of deriving new knowledge. But, there was a challenge to reach the labor with relevant experiences. Again, it was the difference in liquidity between the oil and gas industry, and the offshore wind industry that was the obstacle. Since the offshore wind industry was not able to offer competitive salaries, they were not able to attract valuable human resources. Hence, they automatically missed out of valuable knowledge transfer.

> *"We need access to relevant competences." (Receiver)*

> *"There is already a shortage of engineers, and since the oil and gas industry pays very well, the offshore wind industry is not able to offer a competitive salary. Therefore, the offshore wind industry is not appealing enough for the engineers which have a lot of valuable experiences. Instead engineers with little experience, and graduates, are the ones who enter the offshore wind industry. Hence, one misses out on the knowledge transfer since the industry misses out of a lot of competent personnel." (Overall view)*

5.3.5.3 Competition affecting cooperation

Some of the respondents implied that there was a power play, which was a challenge for knowledge transfer. Players in the offshore wind industry were afraid that their competences and experiences would be superfluous if they opened up the doors for the ones holding offshore experiences.

"The offshore wind was first entered by the onshore wind companies which just moved their technology offshore. This did not work too well, as there are other principles offshore, as it includes water. But the "old" wind players wanted to keep the oil and gas players outside. This is probably because they were afraid that their own knowledge and experiences would not be needed anymore -when the offshore players "took over". There are many of these "old" people still left in the business. You do not need to reinvent the wheel all over again. A better cooperation and openness between onshore wind and the oil and gas would certainly be beneficial." (Receiver)

5.3.6 Factor "X" – Cross-industry cooperation

Cross-industry cooperation was defined as a useful method of knowledge transfer between industries. Some examples of formal cooperation were research and development projects, and consortiums. The respondents representing the "receivers" acknowledged formal cooperation as a good source of knowledge transfer. This was based on the high presence of openness and willingness to share knowledge between the parties existent in a formal cooperation.

"…on the maritime/offshore field we are quite blank. Therefore we needed to partner up with someone who had that knowledge, in order to build up our internal knowledge base on that field. This is how we took advantage of Norway's 40 years of experiences in oil and gas." (Receiver)

"We share freely between us; there is a great deal of openness." (Receiver about formal cooperation)

"Cooperate with companies that know the relevant field." (Receiver)

"For example; when the supplier has an interest in the offshore wind. Formal cooperation and industrial research and development projects are a common way of knowledge transfer. " (overall view)

"…as competitors they are unwilling to share information, and therefore acts a bit reserved in the beginning. But in short time they see that cooperation creates synergies." (Overall view)

The respondents representing industry A, the "senders", expressed a willingness to share knowledge and experiences to parties across industries when it was through a formal cooperation. In a formal cooperation they saw a bigger opportunity of own gain.

"They knew a lot about onshore wind, we knew a lot about offshore operations. So, concerning offshore wind we had a lot to contribute with." (Sender)

"We use our background knowledge and experiences from (company name). All knowledge is shared freely between the parties within the (name of formal cooperation)." (Sender)

5.4 Findings on why transfer

Some of the respondents, in particular the "senders" and the ones representing the overall view, expressed challenges concerned why parties in the oil and gas industry should engage in knowledge transfer.

> *"I get a feeling from your questions that it is called for more involvement and engagement from our sector. But there is not enough incentives provided for that." (Sender)*

> *"But, how interested are the oil and gas companies in the offshore wind?" (Overall view)*

It was a common understanding that in order to share knowledge and experiences, you would want something in return. In other words; the knowledge transfer should benefit you as well. Though, none of the respondents could define exactly why parties in industry A should want to engage in knowledge transfer. The "receivers" were more focused on their own potential gain from a knowledge transfer, than why the "senders" should engage in a knowledge transfer in the first place.

5.5 Comments on findings

The factor; cluster development, was only supported by the two respondents representing the overall view. It is presumed that one of these two respondents may be biased, on the basis of their own background.

Absorptive capacity got medium support by the respondents. But since the factor was supported by both of the "receivers", which are the parties representing the ones affected by

this factor, their support will be emphasized. Table 5 shows the relationships between the different factors and the six respondents

Non support	0
Support	1

Respondent / Factor	Sender A	Sender B	Receiver A	Receiver B	Overall view A	Overall view B	Total score
Cross-industry network ties	1	0	1	1	1	1	**5**
Career imprinting	1	1	1	1	1	1	**6**
Absorptive capacity (Industry B)	1	0	1	1	0	1	**4**
Cluster development (Industry B)	0	0	0	0	1	1	**2**
Cross-industry competition	1	1	1	1	1	1	**6**
Factor "X" – Cross-industry cooperation	1	1	1	1	1	0	**5**
Total score	**5**	**3**	**5**	**5**	**5**	**5**	

Table 5. Findings on Knowledge Transfer.

Chapter 6 – Discussion

6 DISCUSSION

This chapter will connect the findings with the literature and theory on the field. First, the findings that support the framework are presented. Secondly, the findings that do not support the framework are presented. Last, the findings that supplement the framework are presented. Afterwards the preliminary framework presented in chapter 2 will be critically reviewed on the basis of the findings with the aim to develop a representative/suggested framework on "Knowledge transfer between industries".

6.2 Findings that support the framework

First the factors where the findings support the theory will be presented. Afterwards each factor will be discussed in depth by drawing on theory, with the aim to add and further develop theory on this particular field.

Factor	Theory	Findings
Cross-industry network ties	Network creates access to knowledge and resource flows (Uzzi, 1996; Powell, Koput & Smith-Doerr, 1996).	"Yes, they do have a dialogue with other companies, mostly companies in the oil and gas industry. It is important due to the transfer value it creates. " (Overall view) **"**The network of employees is often the place where most input arises from, both relevant input and less relevant."(Receiver) "To retrieve new knowledge we use our network. Networks are linked through persons, independent of company. The

		networks are not between companies." (Receiver)
	The tighter the network is the easier knowledge and resources flow between the different parties in the network. The stronger the network ties are, the more effective they are in providing useful knowledge. (Levin, Cross & Abrams, 2002; Tsai & Ghoshal, 1998).	"Some connections handle distances, for example through phone calls, but others require localizations as well. Frequent mingling; like taking a beer after work." (Receiver)
	Different networks represent access to different types of knowledge (Tsai, 2001).	"You cluster to the companies that have something which is relevant for you, in other words; you choose your network after own needs." (Receiver) "… Establishing connections with relevant people holding offshore experiences is important." (Sender)
Career imprinting	Career imprinting is an effective way of transferring knowledge between industries (DeFillippi, Arthur & Lindsay, 2006).	"Direct transfer. You have for an example Aker Verdal. They have taken their own competences from oil and gas and exploited it in the offshore wind." (Sender) "When oil and gas companies enter the offshore wind, they automatically help out the offshore wind industry." (Overall view)

	Personnel movement is an effective way of knowledge transfer (Almeida & Kogut, 1999).	"…the people are the ones who attain the experiences. One could hire engineers with relevant experiences for the offshore wind" (Overall view) "Hire in consultants, or hire a new person that knows this field. Though, we cannot hire a new person every time we enter an unknown field". (Receiver)
Absorptive capacity	"Ability to recognize the value of new external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128).	"We need to relate our competences to the offshore wind, and understand how to combine them. We also need to understand the underlying demands as well as other factors in the offshore wind industry." (Overall view) "After a project we get new experiences we can take "home". … When those people get back to (company name), we get new knowledge." (Receiver)
	Even though one is able to acquire and assimilate the knowledge, one might not be able to transform and exploit the knowledge (Zahra and George 2002,)	"...Modifications have to be done. The offshore wind does not operate in the same way as the oil and gas industry does. It is important to be aware of this." (Overall view) "We have to think new, in a new way. There is a need for a mental transformation, from oil and gas to wind." (Receiver)

Cross-industry competition	**Competition of resources**	"The companies with the knowledge and experiences valuable to the offshore wind have their hands full…." (Overall view) "The offshore wind is secondary to large oil and gas companies. … They do not have enough capacity." (Sender) "This market needs to get a bigger potential." (Sender about the offshore wind market) "That one dares to put its stakes out there, strategically, so we can take advantage of our core competences from oil and gas, but this is a long term perspective." (Overall view) "Now, as the financial crisis is over, the large orders are back. They therefore do not use a lot of time and effort on areas they do not know a lot about." (Sender)
	Competition of labor with relevant experiences	"We need access to relevant competences." (Receiver) "There is already a shortage of engineers, and since the oil and gas industry pays very well, the offshore wind industry is not able to offer a competitive salary. … Hence, one misses out on the knowledge transfer as the industry misses out of a lot of competent personnel." (Overall view)
	Competition affecting cooperation	"… the "old" wind players wanted to keep the oil and gas players outside. This is probably because they were afraid that their own knowledge and experiences would not be needed anymore when the offshore players "took over". …." (Receiver)

6.2.1 Cross-industry network ties

Network creates access to knowledge and resource flows (Uzzi, 1996; Powell, Koput & Smith-Doerr, 1996). The research supports this theory, and has identified network to be important in terms of creating access to knowledge and resources in an industry to industry context. Networks represent a transfer value, and were a frequently used channel for knowledge transfer.

Different networks represent a source of different knowledge. According to Tsai (2001) the type of network between the participants determines what kind of information and knowledge that will be shared. This theory was supported by the research. One should choose networks based on needs. Different people and companies represent different sources of knowledge.

6.2.1.1 Informal network

It is not only in terms of what knowledge the "sender" holds the networks differentiates, but also in terms of the type and strength of the network. Theory suggests that tighter networks facilitate for a better flow of knowledge and resources, and stronger networks provide more useful knowledge (Levin, Cross & Abrams, 2002; Tsai & Ghoshal, 1998). The research identified network strength as an important aspect, in terms of the value the network represented. Strong and tight networks, especially *informal networks*, were identified as an efficient source of knowledge sharing.

The respondents associated strong, informal networks with location. Frequent mingling among the network participants strengthened the network, and thereby lowered the barrier of asking each other for help. This can be explained by the degree of trust developed among the parties. Theory states that strong ties are associated with trust (Levin, Cross & Abrams, 2002; Tsai & Ghoshal, 1998). Parties that share a strong tie, and socialize frequently, develop a shared social identity. According to Kane, Argote & Levine (2005) the shared social identity makes the parties more trustworthy and honest in the eyes of each other.

To some extent, the informal networks could be compared to networks on a "friendship-level". A shared social identity, high degree of trust, and frequent mingling, creates strong and tight ties between the parties. The process of knowledge sharing was often categorized as "helping each other out", which could be interpreted as an act of friendship, to some degree.

Thereby it indirectly answers the "sender's" question of "what is in it for me?", One helps each other out, because a favor in return is expected in the future.

Strong and tight informal networks had a good float of information sharing between the parties. Thereby, the needs and wants of the network parties are assumed to be available information in the network.

Granovetter's (2005) theory that weak ties provide more novel information was not identified in the research. It was more important to have trust and shared identity, in order to facilitate for a knowledge sharing in the first place.

6.1.2 Career imprinting

DeFilipi, Arthur and Lindsay (2006) have defined career imprinting as an effective way of transferring knowledge between industries. This was supported by the research. All six respondents defined movement of company, or labor, as an easy accessible method of getting a hold of knowledge across industries. It was also recognized as one of the main methods practiced as of today.

Knowledge transfer through career imprints was identified in both an indirect and direct matter. Indirect knowledge transfer referred to the mobility of labor. Knowledge was transferred by hiring new persons, or consultants that attained the knowledge sought. In this context, the term social influence comes into play. Moving a person out of its context may affect the potential knowledge transfer negatively; if the person now becomes a minority (Gruenfeld, 200). Though, this was not identified as a challenge by the respondents. The two industries share a lot of similarities, especially concerning the engineering perspective; this may be one of the reasons why social influence was not of any concern.

Knowledge transfer in a direct matter was defined as when a company changes industry focus, e.g. from offshore oil and gas to the offshore wind industry. Another method was when people with experiences from e.g. offshore oil and gas started up a new company within offshore wind. They would now feed on their background knowledge and experiences in order to establish a new business and/or develop new technology within the offshore wind industry.

The respondents had a mutual understanding of that the experiences were attained by individuals. It was the individual person that acquired experiences, and thereby also the individual which brought new experiences into a new group or unit. This corresponds with the individual, and the individual's role presented in the knowledge diamond by DeFilippi, Arthur & Lindsay (2006).

Though, this thesis focuses on knowledge at the industry level. The term "experiences" therefore has to be acknowledged in a more explicit form, according to Durrance (1998), Nonaka and Takeuchi (1995), and Nonaka, Umemoto and Sasaki (1998). Since many of the respondents regarded this viewpoint as unusual, and sought to hold on to the individual focus, transfer of knowledge was to some extent recognized to take place through transfer of individuals.

6.1.3 Absorptive capacity

Absorptive capacity is the ability to acquire, assimilate, adapt, and apply new knowledge, as well as the ability to recognize the value of new knowledge (Zahra & George, 2002; Cohen & Levinthal, 1990). Absorptive capacity plays an important part in a knowledge transfer, because it influences the "receiver's" ability to acquire and exploit new knowledge.

The research has shown a good support of absorptive capacity, both functionality in practice and awareness of its importance. The support has mainly showed itself from the "receivers" perspective. The respondents representing the "receivers" understood that they needed to relate, understand, as well as modify new knowledge. They also demonstrated awareness of the potential experiences gained from external projects for the company in total.

Absorptive capacity depends upon prior knowledge in the same field. The more related background knowledge a person has in the specific area, the larger absorptive capacity he/she is assumed to have. (Cohen & Levinthal, 1990). The two industries of interest; the offshore oil and gas, and the offshore wind, have several similarities. Especially in terms of the technical perspective, the similarities are present; many of the same fundamental aspects within engineering are central in both industries. These similarities represent an advantage for knowledge transfer, since it eases the process.

The high awareness of the importance of absorptive capacity among the "receivers" demonstrates a healthy image of the knowledge transfer process. The "receivers" are well aware of their responsibility in the process. They displayed an awareness of the potential advantage they could gain, if they were able to utilize the knowledge.

6.1.4 Cross-industry competition

In the preliminary framework it was suggested that cross-industry competition would imply a blockage for knowledge transfer. The suggestion was based upon previous theory on knowledge sharing in an industrial district by Inkpen and Tsang (2005). In that case it was the risk that the "receiver" might use the knowledge gained against the interest of the "sender", which represented the competition.

Through the research process it has been discovered that competition does create a barrier for knowledge transfer between industries. All respondents emphasized that the competition between the offshore oil and gas, and the offshore wind did create great challenges for knowledge transfer.

The competition appeared in different ways, and has been divided into three sub-factors; competition of resources, competition of labor with relevant experiences, and competition affecting cooperation. Each of the three sub-factors will be discussed below.

6.1.4.1 Competition of resources

A company has limited resources, and the resources available should be used optimally in order to secure further operations and growth. This often indicates that resources will be invested where they will yield the highest return. In the case of offshore oil and gas, and offshore wind, the oil and gas is a highly competitive and capital intensive industry. Hence, the offshore wind industry comes second.

According to Sirec-Rantasa (2004), for a knowledge transfer to take place, time has to be taken from other responsibilities. In some cases these other responsibilities may have a higher priority. In the case of a transfer of offshore experiences, oil and gas players needs to align some resources from their current operations, and focus these towards the offshore wind.

Since the oil and gas "pays more" (according to the respondents), it will, in most cases, be assigned a higher priority than the offshore wind.

In the case of the oil and gas companies, they had their "hands full" serving their own market. This market gave high returns, so the players saw no need to look for a second market. The oil and gas market was also where their technology was proven, as well as demanded.

6.1.4.2 Competition of labor with relevant experiences

A common method of knowledge transfer is by career imprinting, especially in terms of mobility of labor. When labor with relevant offshore experiences shifts over to the offshore wind industry, they automatically bring with them their experiences. Hence, a knowledge transfer from industry A to industry B takes place.

But, valuable labor is not unlimited. Since the oil and gas industry is a capital intensive industry, which pays very well, the offshore wind industry suffers in the fight over the valuable labor. Because of the harsh competition of labor, the offshore wind misses out on valuable knowledge.

6.1.4.3 Competition affecting cooperation

The research also identified that competition may affect the willingness of industry B to let industry A in. According to Sirec-Rantasa (2004) knowledge can be a source of power. Holding valuable knowledge which represents a source of power, knowledge sharing would imply to potentially loose out on this position. Thereby the party in industry B would not be as open for cooperation as it should have been.

As the onshore wind parties relocated offshore, they brought with them their experience in onshore wind. Though, it came apparent that offshore experiences were necessary to success in offshore wind. Even though the offshore knowledge was needed, it has been suggested that the participants in industry B was hesitant to "let them in". The onshore wind parties in industry B hold a power position, as they have gained a lot of experiences on the wind industry. If they were to cooperate with parties holding offshore experiences, knowledge would be shared, - *both ways*. Thereby, the onshore wind players, which previously were the

only ones with knowledge on the wind industry, would now be competing in knowledge with the ones with offshore experiences. Hence, their own experiences might not be needed anymore. This may also be influenced by the importance of offshore experiences in the offshore wind industry, compared to wind industry experiences.

6.2 Findings that do not support the framework

The factor not supported by the research will be presented. It will be emphasized to explain, based on theory, why the particular factor does not have an impact on knowledge transfer between industries.

Factor	Theory	Findings
Cluster development	Assumption: "The degree of cluster development in industry B will be considered an important factor for a successful knowledge transfer from industry A to industry B. The factor will influence in terms of the knowledge spread in industry B, and in terms of taking advantage of the new knowledge retrieved in industry B to its full extent. "	"One could ask if the Arena NOW is a cluster or not, a cluster has a real exchange between the member companies, I'm not sure if that is the case in Arena NOW." (Receiver) "Arena NOW facilitates for knowledge transfer, as the members gets to meet on a set arena. But we are far from reaching the goal of having a heavy cluster." (Receiver)

6.2.1 Cluster development

The factor, cluster development, was suggested to have an impact on the knowledge assimilation and utilization. Though, it was not supported by the research. First of all, the cluster was considered too young (established in 2009). It was also suggested that the cluster did not include all the relevant areas in order to be considered a complete cluster.

Because of the cluster's relative immature status it was emphasized by the respondents that there was a lack of trust between the members. It takes time to build trust among parties. Trust evolves from strong ties and a shared social identity, as well as history (Kane, Argote & Levine, 2005; Levin, Cross & Abrams, 2002; Tsai & Ghoshal, 1998). Therefore lack of trust will be an essential obstacle of knowledge sharing in this case.

The offshore wind industry participants indicated a greater interest in other participants holding relevant offshore wind experiences, rather than other offshore wind companies. This may be explained by the industry's relative immatureness. It creates a greater value to interact with well established companies, that hold relevant offshore experience and has a well developed and relevant network.

For further discussions it will be concluded that it is too early to determine if this factor may have an effect or not, based on the fact that the cluster is immature. The research has also revealed that the factor, cluster development, would not be as directly involved in the knowledge transfer process as it first was assumed. Therefore the the cluster development factor will be excluded from the suggested framework on "Knowledge trnasfer between industries".

6.3 Findings that supplement the framework

In this section findings that supplement the preliminary framework will be presented. The factor will be discussed in-depth. Explanations for the findings will be suggested, based on theory.

Factor	Sub-factor	Findings
Cross-industry cooperation	**Formal cooperation**	"… Formal cooperation and industrial research and development projects are a common way of knowledge transfer. " (overall view) "…as competitors they are unwilling to share information, and therefore acts a bit reserved in the beginning. But in short time they see that cooperation creates synergies." (Overall view) "We share freely between us; there is a great deal of openness." (Receiver about formal cooperation) "They knew a lot about onshore wind, we knew a lot about offshore operations. So, concerning offshore wind we had a lot to contribute with." (Sender)

6.3.1 Cross-industry cooperation

Cross-industry cooperation was defined as a factor facilitating for knowledge transfer between industries. It was in particular formal cooperation that was identified by the respondents. Examples where research and development projects, consortium, and cooperative agreements. In these cases knowledge was shared openly (more or less) between the parties. Each party

provides their expertise in the cooperation, and they work together towards achieving common objectives.

6.3.1.1 Formal cooperation

Knowledge is usually shared in surroundings where there is trust among the members. In an industry to industry context, there is assumed that it is less interaction between the parties, due to the size of context. Therefore it may be a lack of trust among the parties.

Formal cooperation can be a substitute for the lack of trust (Gulati, 2005). In a formal cooperation each party's role is defined; the objective of the cooperation, what to share, and what not share. Control mechanisms are recognized to lower the risk, when there is a lack of trust between the parties (Das & Teng, 2001). Formal cooperation between parties operating in different industries seems to compensate the lack of trust, thereby lowering the risk.

Risk is identified on several terms. First of all, the parties operate in different industries and, hence, may have different objectives on what they sought to achieve. Since the parties operate in different industries, the factors of what creates value to the parties in their industry are different. There is also the risk of opportunistic behavior among the parties. In an industry to industry context, risk could be minimized through strategic control mechanisms such as developing clear guidelines and main objectives of the cooperation. Thereby the main intention of the cooperation is defined, as well as each party's role and responsibility.

The research has shown that formal cooperation facilitates for knowledge sharing between industries. The formality is assumed to substitute the lack of trust among the parties, and thereby also lower the risk. The "security" therefore makes a formal cooperation a more desired context in terms of knowledge sharing.

Another factor which may favor formal cooperation is the establishment of main objective of the cooperation. Thereby both the "sender" and the "receiver" in the cooperation can, on beforehand, assure that the cooperation will yield desired returns.

6.4 A suggested framework: "Knowledge transfer between industries"

In chapter 2 a preliminary framework on "Knowledge transfer between industries" was presented. It was then identified five different factors that were suggested to have an impact on the transfer process; cross-industry network ties, career imprinting, absorptive capacity, cluster development, and cross-industry competition. The latter one was a factor that would represent an obstacle for knowledge transfer, while the four other factors would operate as facilitators. Through the research process four of these factors; cross-industry network ties, career imprinting, absorptive capacity, and cross-industry competition, were supported.

Cross-industry competition appeared through other channels than what previously expected. The factor was suggested to influence the knowledge transfer by preventing industry A from wanting to engage in the process. This was based on an assumption that industry A would want to protect its own resources. Though, this assumption was not supported by theory. Even though competition appeared through other channels in the research, it was identified as a huge challenge of knowledge transfer between the industries of focus. The factor was identified trough the following three sub-factors:

- **Competition of resources**
- **Competition of labor with relevant experiences**
- **Competition affecting cooperation**

The factor of cluster development was not supported by the research, and is therefore excluded from the framework. Although, the cluster was relatively young, and thereby might be more active and well functional in the future, it is decided to exclude it fully.

Cross-industry cooperation appeared as an "X" factor in the research process. Cooperation in formal settings was a good facilitator for knowledge transfer. The formality may substitute for the lack of trust between the parties, and therefore reduce risk.

In chapter 2, the framework was divided into two stages; the outbound knowledge float and the inbound knowledge float. The separation has shown to be too distinct in terms of how the process operates in real life. It is considered important that both the "sender" and the

"receiver" are actively involved in the process, as a successful knowledge transfer includes both parties. But, in terms of distinguishing between the inbound and outbound process, it appears quite difficult to draw a clear line between the two. Therefore, the process will have a "sender" and a "receiver", but the actual process will not be divided into separate stages.

The research has also shown that in the knowledge transfer process, from industry A to industry B, there will be a sharing of knowledge both ways. Even though industry A has the role as "sender" and industry B has the role as "receiver", industry A will be exposed to new knowledge from industry B. The knowledge float will therefor go both ways.

6.4.1 The suggested framework: "Knowledge transfer between industries"

The final framework on "knowledge transfer between industries" is suggested based upon the preliminary framework and the research process.

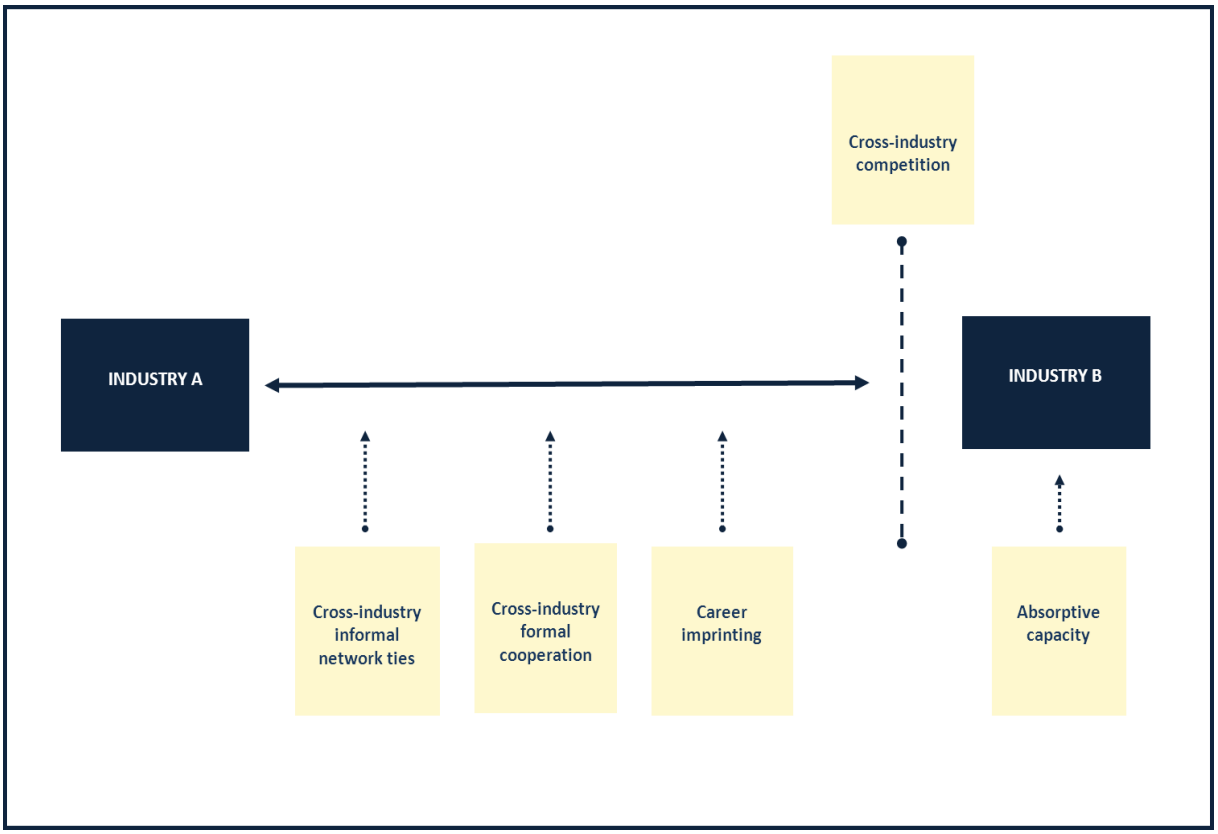


Figure 9. The suggested framework "Knowledge transfer between industries" (source: Own).

Chapter 7 – Conclusion

7 CONCLUSION

In this chapter there will be a summary of the problem background, and the purpose of this thesis. Thereafter, the most important findings will be summarized, and a conclusion on a potential framework on "Knowledge transfer between industries" will be drawn. Last, the limitations of the research will be discussed.

More than 40 years of experiences in offshore oil and gas has resulted in substantial amounts of valuable knowledge for Norway. These offshore experiences are valuable to the offshore wind industry, and are considered a source of competitive advantage. Though, in order to exploit the advantages, the relevant experiences need to be transferred, from the offshore oil and gas industry to the offshore wind industry. The question is *how*?

In search of the answering the research question, it has been of focus to define what influences knowledge transfer *between* industries. Through a qualitative study the preliminary framework was further developed, and findings were added to theory.

What

The offshore experiences were considered to represent a competitive advantage by the respondents, though, not a sustainable competitive advantage. It was considered important that the offshore experiences were exploited in near future, before it would be substituted or imitated by other nations.

How

A suggested framework on "Knowledge transfer between industries" was developed. The factors cross-industry network ties, career imprinting, absorptive capacity, and cross-industry cooperation was identified to facilitate knowledge transfer between industries. Cross-industry competition was defined as a huge obstacle for a potential knowledge transfer.

Cross-industry network ties	Networks represented a good source of knowledge sharing between industries. It was especially strong and tight networks that represented knowledge sharing. The networks were informal, and sharing often took place in terms of "helping each other out"
Career imprinting	Career imprinting was one of the main methods of knowledge sharing as of today. Mobility of labor through hiring new employees or consultants, feeding on their own offshore experiences, was some of the most recognized ways of knowledge transfer. Also, companies that changed industry focus contributed to knowledge sharing.
Absorptive Capacity	Awareness of the importance of absorptive capacity was identified. The value of knowing how to gain and exploit knowledge was present. The related experiences which the industry participants attained also eased the process of knowledge transfer.
Cross-industry cooperation	Formal cooperation was identified as the "X" factor in the research process. The formality of the cooperation substituted the lack of trust between the parties, thereby lowering the risk. This resulted in openness and willingness to share knowledge between the parties.
Cross-industry competition	Cross-industry competition was defined through three factors. (1)Competition of resources, which focused on the lack of extra capacity in the offshore oil and gas industry, in order to focus on the offshore wind industry. (2)Competition of labor with relevant experiences, which focused on the difficulties of attracting human capital resources with valuable offshore experiences. (3)Competition affecting cooperation, which focused on the "power of knowledge" aspect, where parties in industry B was reluctant to let in parties from industry A.

The factor; cluster development, was excluded from the preliminary framework since it was not supported by the research. This may be explained, to some extent, by the immatureness of the cluster. The factor therefore may have an impact in the future.

Why

The question of why one should engage in knowledge sharing was found difficult to define by the respondents. The "senders" stated that one would want something in return; what is in it for me? As long as the offshore oil and gas market was as good as it is today, they had no incentives to change focus. The "receivers" were more focused on how and where to gain valuable knowledge, instead of why the "sender" should engage in the knowledge transfer.

Limitations

The suggested framework on "Knowledge transfer between industries" is developed based on data from the offshore wind industry and the offshore oil and gas industry. It can therefore not be considered representative as a framework on knowledge transfer between industries in general.

A sample of six respondents, where two respondents represent each industry, cannot be considered representative for the whole industry in general. Though, the sample needed to be of that size due to the explorative type of study, the limited time (one semester) and resources available.

The offshore wind industry and the offshore oil and gas industry share some similarities in terms of e.g. technology, engineering perspectives, location offshore. It is considered that these parallels may influence the knowledge transfer between the industries (for example in terms of absorptive capacity).

The offshore wind industry is an immature industry, while the offshore oil and gas industry is well established. The degree of industry development may have an influence on the knowledge transfer between the two industries.

Chapter 8 – Further Research

8 FURTHER RESEARCH

This chapter will suggest topics for further research. Topics not included in this thesis, as well as topics discovered during the research process and analysis of this thesis' research question.

Larger sample - qualitative study

It was some differences in the response from the respondents representing large, international companies, and the small- and medium companies. It would be interesting to do the same qualitative study with a larger sample. Then other factors, such as potential differences in the responses of the small and large companies, could be identified.

Quantitative study

It should be performed a quantitative study, measuring the significance of the five factors in the suggested framework; thereby achieving results that can be representative for the population in general.

Informal networks and Formal cooperation

The research process identified informal networks and formal cooperation as two important factors for knowledge transfer *between* industries. It would be interesting to look further into these two factors, in order to study their importance further, as well as to compare these findings with other theory on knowledge transfer. One example could be to look into the differences in the factors that influences knowledge transfer on a between industry context, as well as knowledge transfer on a between company context.

Other industries – does the same factors have equal influence?

The development of the framework "Knowledge transfer between industries" is based upon data collected from the offshore oil and gas industry (industry A) and the offshore wind industry (industry B). It would be interesting to do the same study, but with different industries of focus. Are the same results achieved? If not, what differentiates, and why?

9 REFERENCES

Almeida, P. & Kogut, B. (1999). Localization of knowledge and the mobility of engineers in regional networks. *Management Science*, 45, 905-9017.

Alnes, J. (2011). *Great Norwegian Encyclopedia*. Retrieved 07.02.2011, retrieved from: http://www.snl.no/kunnskap

Altrichter, H., Posch, P. & Somekh, B. (1996). *Teachers investigate their work; an introduction to the methods of action research*. London. Routledge.

Arenanow.no. (2011). Retrieved 21.04.2011, retrieved from http://www.arenanow.no.

Argote, L. & Ingram, P. (2000). Knowledge transfer: a basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, 82, 150-169.

Badaracco, J.L. (1991). *The Knowledge Link*. Boston:Harvard Business School press.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management,* 17(1), 99–120.

Barney, J. (1986a). Organizational culture: Can it be a source of sustained competitive advantage?. *Academy of Management Review,* 11, 656-665.

Barney, J. (1986b). Strategic factor markets: expectations, luck, and business strategy. *Management Science,* 42, 1231-1241.

Bates, H., & Slack, N. (1998). What happens when the supply-chain manages you? A knowledge-based response. *European Journal of Purchasing & Supply Management*, 4(1), 63–72.

Becker, G.S. (1964). *Human Capital*. New York: Columbia.

Bekkers, R. & Freitas, I., M., B. (2008). Analysing knowledge transfer channels between universities and industry: to what degree do sectors also matter?. *Research Policy*, 37, 1837-1853.

Bellona.no. (2011) Retrieved from http://www.bellona.no/subjects/Groenne_sertifikater, retrieved 20.04.2011.

Boeker, W. (1999). Executive migration and strategic change: The effect of top manager movement on product-market entry". *Administrative Science Quarterly*, 42, 213-236.

Bryman, A. & Bell, E. (2007). *Business Research Methods*. Oxford. Oxford University Press.

Cohen, W., M. & Levinthal, D., A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128–152.

Cohen, W.M., Nelson, R.R. & Walsh, J.P. (2002). Links and impacts: the influence of Public research on industrial R&D. *Management Science*, 48(1), 1–23.

Das, T., K. & Teng, B. (2001). Trust, control, and risk in strategic alliances: an integrated framework. *Organization studies*, 22(2), 251-283.

Defilippi, R.J., Arthur, M.B. & Lindsay, V.J., (2006). *Knowledge at work: creative collaboration in the global economy*. Blackwell Publishing.

Dougherty, V. (1999). Knowledge is about people, not databases. *Industrial and Commercial Training*, 31(7), 262-266.

Douglas-Westwood. (2010). *Offshore Wind Assessment for Norway*. Initiated by The Research Council of Norway, and commissioned by Douglas Westwood Ltd. 24th March 2010.

Durrance, B. (1998). Some explicit thoughts on tacit learning. *Training & Development*, 52 (12), 24-30.

Dussauge, P., Garrette, B., & Mitchell, W. (2000). Learning from competing partners: Outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal*, 21(2), 99–126.

Dyer, J. H., & Nobeoka, K. (2000). Creating and managing a high-performance knowledge-sharing network: The Toyota case. *Strategic Management Journal*, 21(3), 345–367.

Eisner, E., W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. New York. Macmillan Publishing Company.

Energi 21. (2010). *Innsatsgruppe fornybar kraft: Rapport fra vindkraftgruppen*. Retrieved 10.02.2011, retrieved from http://www.haugaland-vekst.no/Uploads/Documents/100528_Fornybarkraft-vindkraft,%20rapport%20fra%20energi21.pdf.

Energirådet. (2008). *Vindkraft offshore: industrielle muligheter for Norge*. Retrieved 10.02.2011, retrieved from http://www.regjeringen.no/upload/OED/Rapporter/Vindkraft%20offshore%20-%20industrielle%20muligheter%20for%20Norge%20260508.pdf.

Enova. (2007). *Potensialstudie av havenergi i Norge*. Initiated by ENOVA SF. Report by SWECO Grøner, ECON and Kjeller Vindteknikk. 23rd October 2007. Retrieved 10.02.2011, retrieved from http://www.enova.no/file.axd?fileID=537.

Evers, H. (2008). *Knowledge hubs and knowledge clusters: designing a knowledge architecture for development*. Retrieved 10.03.2011, retrieved from http://mpra.ub.uni-muenchen.de/8778/1/MPRA_paper_8778.pdf.

Forewind.co.uk/dogger-bank/. (2011). Retrieved 24.04.2011, retrieved from http://www.forewind.co.uk/dogger-bank/.

Forskningsrådet. (2007). *Foresight Rapport: Offshore Vindenergi*. Oslo. September 2007.

Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative report*, 8(4), 597-606.

Goold, M., Quinn, J. (1990). The paradox of strategic controls. *Strategic Management Journal*, 11, 43-57.

Greve, H., R. (2009). Bigger and safer: the diffusion of competitive advantage. *Strategic Management Journal*, 30, 1-23.

Granovetter, M. (2005). The impact of social structure on economic outcomes. *Journal of Economic Perspectives*, 19(1), 33-50.

Gruenfeld, D. H., Martorana, P. V., & Fan, E. T. (2000). What do groups learn from their worldliest members? Direct and indirect influence in dynamic teams. *Organizational Behavior and Human Decision Processes*, 82, 45–59.

Gulati, R. (1995). Does familiarity breed trust? The implications of repeated ties for contractual choices in alliances. *Academic Management Journal*, 38. 85-112.

Gupta, A. & Govindarajan, V. (2000). Knowledge flows within MNCs. *Strategic Management Journal*, 21, 473–496.

Gübeli, M.H. & Doloreux, D. (2005). An empirical study of university spinoff Development. *European Journal of Innovation Management*, 8(3), 269–282.

Haldin-Herrgard, T. (2000). Difficulties in Diffusion of Tacit Knowledge in Organizations. *Journal of Intellectual Capital*, 1(4), 357-365.

Henriksen, P., R. (2010). *Offshore vindkraft – Muligheter og utfordringer*. Retrieved 15.05.2011, retrieved from http://www.regjeringen.no/nb/dep/oed/aktuelt/taler_artikler/politisk_ledelse/taler-og-artikler-av-statssekretar-per-r/2010/offshore-vindkraft--muligheter-og-utford.html?id=620423.

Inkepen, A., C. & Currall, S., C. (2004). Coevolution of Trust, Control and Learning in Joint Ventures. *Organizatio Science*, 15(5), 586-599.

Inkpen, A., C. & Tsang, E., W., K. (2005). Social capital, networks, and knowledge transfer. *Academy of Management Review*, 30(1), 146–165.

Innovasjonnorge.no. (2011). Retrieved 10.04.2011, retrieved from http://innovasjonnorge.no/Om-oss/.

Jacobsen, D., I. (2005). *Hvordan gjennomføre undersøkelser? Innføring i Samfunnsvitenskapelig metode*. Høyskoleforlaget.

Kane, A., A., Argote, L. & Levine, J., M. (2005). Knowledge transfer between groups via personnel rotation: effects of social identity and knowledge quality. *Organizational Behavior and Human Decision Processes*, 96, 56-71.

Keeble, D., & Wilkinson, F. (1999). Collective learning and knowledge development in the evolution of regional clusters of high technology SMEs in Europe. *Regional Studies*, 33, 295–303.

Kingsley, G., Bozeman, B. & Coker, K. (1996). Technology transfer and absorption: an 'R& D value-mapping' approach to evaluation. *Research Policy*, 25, 967–995.

Kirk, J. & Miller, M., L. (1986). *Reliability and validity in qualitative research.* Beverly Hills. Sage Publications.

KonKraft-rapport 7. (2009). *Ringvirkninger av petroleumsvirksomheten*. Retrieved 22.05.2011, retrieved from http://www.konkraft.no/postmann/dbase/bilder/Konkraft%20rapport%207%20Ringvirkninger%20av%20petroeumsvirksomheten.pdf.

Learned, E.P., Cirstensen, C.R., Andrews, K.R., & Guth, W. (1969). *Business Policy*. Homewood, IL: Irwin.

Levin, D., Z., Cross, Abrams, L., C. (2002). The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer. [Under review], *Academy of Management Journa.* August 19, 2002.

Lippman, S. & Rumelt, R. (1982). Uncertain inimitability: An analysis of interfirm differences in efficiency under competition. *Bell Journal of Economics*, 13, 418-438.

Lubit, R. (2001). The keys to sustainable competitive advantage: tacit knowledge and knowledge management. *Organizational Dynamics*, 29(3), 164-178.

McMillan, G.S., Narin, F. & Deeds, D.L. (2000). An analysis of the critical role of public sciencen innovation: the case of biotechnology. *Research Policy*, 29, 1–8.

Meyer-Krahmer, F. & Schmoch, U. (1998). Science-based technologies: university–industry interactions in four fields. *Research Policy*, 27, 835–851.

Miles, M., B. & Huberman, A., M. (1994). *Qualitative Data Analysis: an expanded sourcebook.* 2nd Edition. SAGE Publications Inc.

Minbaeva, D., Pedersen, T., Bjørkman, I., Fey, C., F. & Park, H., J. (2003). MNC knowledge transfer subsidiary absorptive capacity, and HRM. *Journal of International Business Studies*, 34, 586-599.

Monjon, S. & Waelbroeck, P. (2003). Assessing spillovers from universities to firms: evidence from French firm-level data. *International Journal of Industrial Organization*, 21, 1255–1270.

Narin, F., Hamilton, K.S., & Olivastro, D. (1997). The increasing linkage between U.S. technology and public science. *Research Policy*, 26, 317–330.

NCE Maritime. (2010). *Offshore windpower in Germany and the rest of Europe: with inside information!* Initiated by NCE Maritime. Commissioned by SINTEF MRB and Navitas Network.

Nodeproject.no. (2011). Retrieved 10.05.2011, retrieved from http://www.nodeproject.no/?articleid=465.

Nonaka, I., Umemoto, K., & Sasaki, K. (1998). Three tales of knowledge creating companies. In G. van Krogh, J. Roos and D. Kleine (eds.), *Knowing in firms*. London: Sage.

Nonaka,I., & Takeuchi, H. (1995). *The knowledge creating company*. NY: Oxford University Press

Nooteboom, B., H. (1997). Effects of trust and governance on relational risk. *Academic Management Journal*, 40, 308-338.

Norwea.no. (2011). Retrieved 25.04.2011, retrieved from http://norwea.no/Default.aspx?ID=2.

NVE. (2010). *Havvind: forslag til utredningsområder.* Oslo. October 2010.

Oterhals, O., Hervik, A., Tobro, R. & Bræil. (2010). *Markedskarakteristika og ogistikkutfordringer ved offshore Vindkraftutbygging*. Written for Møreforsking Molde AS. July 2010.

Pareto Securities. (2011). Sale of Statoil's onshore wind power portfolio. Presentation by Lars Ove Skorpen, Director Power & Renewable Energy, Corporate Finance, Pareto Securities AS. Presented at Norwea's annual conference 2011. Presentation retrieved 10.05.2011, retrieved from http://www.mynewsdesk.com/no/pressroom/norwea-norsk-vindkraftforening/document/view/sale-of-statoil-s-onshore-wind-power-portfolio-13118.

Patton, M., Q. 2(002). *Qualitative evaluation and research methods*. 3rd Ed. Thousand Oaks, CA. Sage Publications, Inc.

Petroleumnorway.com. (2011). Retrieved 21.04.2011, retrieved from http://www.petroleumnorway.com/en/node/1267.

Polanyi, M. (1966). *The Tacit Dimension*. London: Routledge & Kean Paul.

Porter, M. (1981). The contributions of industrial organization to strategic management. *Academy of Management Review*, 6, 609-620.

Porter, M. (1990). *The competitive advantage of Nations*. Free Press, New York.

Porter, M. (1998). Clusters and the new economics of competition. *Harvard Business Review*, 77-90.

Powell, W.W., Koput, K.W. & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly*, 41, 116-145.

Reed, R. & DeFillippi, R.J. (1990). Casual Ambiguity Barriers to Imitation and Sustainable Competitive Advantage. *Academy of Management Review*, 15(1), 88-102.

Regjeringen.no. (2011). Retrieved 20.04.2011, retrieved from http://www.regjeringen.no/nb/dep/oed/tema/fornybar-energi/hva-er-gronne-sertifikater.html?id=517462.

Regjeringen.no/petroleum. (2011). Retrieved 21.05.2011, retrieved from http://www.regjeringen.no/nb/dep/oed/tema/olje_og_gass/norsk-oljehistorie-pa-5-minutter.html?id=440538.

Reve, T. (2010). *Et kunnskapsbasert Norge: Hvilken rolle spiller fornybar energi*?. Energirådet, Oslo, 28.09.2010.

Reve, T., Sasson, A. & Jakobsen, E., W. (2009). Et kunnskapsbasert Norge: Prosjektbeskrivelse. Retrieved 21.04.2011, retrieved from http://uter.idium.no/vieb4334.tmp/hXGXynMZLQ3l.49.idium.

Rumelt, R.P. (1984). Towards a Strategic Theory of the Firm. *Competitive Strategic Management*, R.B. Lamb. Prentice Hall, Englewood Cliffs, NJ, 566-570.

Saunders, M., Lewis, P. & Thornhill, A. (2007). *Research Methods for Business Students.* 4th Ed. Harlow. Financial Times / Prentice Hall.

Seatower.no/about. (2011). Retrieved 05.05.2011, retrieved from http://seatower.no/about.html.

Seatower.no/story. (2011). Retrieved 05.05.2011, retrieved from http://seatower.no/story.html.

Seatower.no/team. (2011). Retrieved 05.05.2011, retrieved from http://seatower.no/team.html.

Singley, M. K., & Anderson, J. R. (1989). *The transfer of cognitive skill.* Cambridge, MA: Harvard Univ. Press.

Sintef MRB. (2010). *Markedsanalyse: offshore vindkraft*. 14th. April 2010.

Sintef. (2009). *Vindkraft offshore og industrielle muligheter.* Initiated by Norsk Inudstri. Written by Volden, G., H., Bull-Berg, H., Skjeret, F., Finne, H. & Hofmann, M. 18th September 2009.

Sirec-Rantasâ, K., (2004). The importance of tacit knowledge for sustaining a competitive advantage. *Review paper* 3-4/2004, 24-30.

Statkraft.no. (2011). Retrieved 10.05.2011, retrieved from http://www.statkraft.no/om-statkraft.

Statnett. (2010). *Notat: Årsrapport: det nordiske kraftmarkedet med norske øyne 2009*.

Statoil – Doggerbank. (2010). *Doggerbank: muligheter for leverandørindustrien*. Presentation by Vera Ingunn Moe, Business Development, Wind, New Energy, Statoil. 29th June 2010.

Statoil.com/doggerbank. (2011). Retrieved 10.05.2011, retrieved from http://www.statoil.com/no/TechnologyInnovation/NewEnergy/RenewablePowerProduction/Offshore/DoggerBank1/Pages/DoggerBank.aspx.

Statoil.com/hywind. (2011). Retrieved 10.05.2011, retrieved from http://www.statoil.com/no/TechnologyInnovation/NewEnergy/RenewablePowerProduction/Offshore/Hywind/Pages/HywindPuttingWindPowerToTheTest.aspx.

Statoil.com/shreinghamshoal. (2011). Retrieved 10.05.2011, retrieved from http://www.statoil.com/no/TechnologyInnovation/NewEnergy/RenewablePowerProduction/Offshore/SheringhamShoel/Pages/default.aspx.

Stenbacka, C. (2001). Qualitative research requires quality concepts of its own. *Management Decision*, 39(7), 551-555.

Tajfel, H. & Turner, J., C. (1968). The social identity theory of intergroup behavior. *Psychology of intergroup relations*. 2nd Ed, 7-24.

Tajfel, H. & Turner, J., C. (1979). An integrative theory of group conflict. *The social psychology of intergroup relations*, 33-47.

Tallmann, S. et. Al. (2004). Knowledge, clusters and competitive advantage. *Academy of Management Review,* 29(2), 258-271.

Tomer, J.F. (1987). *Organizational capital: the path to higher productivity and well-being*. New York: Praeger.

Tsai, W. & Ghoshal, S. (1998). Social capital and value creation: the role of intrafirm networks. *Academy of Management Journal*, 41, 464-476.

Tsai, W. (2001). Knowledge Transfer in Intraorganizational Networks: effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. *The Academy of Management Journal,* 44(5), 996-1004.

Uzzi, B. (1996). The source and consequences of embeddedness for the economic performance of organizations: the network effect" *American Sociological Review*, 61, 674-698.

Wang, Y. & Lu, L. (2007). Knowledge transfer through effective university-industry interactions: Empirical experiences from China, *Journal of Technology Management in China*, 2(2), 119-133.

Wernerfelt, B. (1984). A Resource-based View of the Firm. *Strategic .Management Journal,* 5, 171-180.

Wikipedia.org/doggerbank. (2011). Retrieved 20.04.2011, retrieved from http://en.wikipedia.org/wiki/Dogger_Bank.

Wikipedia.org/watt. (2011). Retrieved 20.04.2011, retrieved from http://en.wikipedia.org/wiki/Watt.

Williamson, O. (1975). *Markets and hierarchies.* New York: Free Press.

Windcluster.no. (2011). Retrieved 21.04.2011, retrieved from http://www.windcluster.no/.

Yin, R., K. (2003). *Case Study Research, Design and Methods.* 3rd Ed. California. Sage Publications Inc.

Zahra, S.A. & George, G. (2002). Absorptive capacity: a review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185–203.

Zikmund, W. G., Babin, B.J., Carr, J.,C. & Griffin, M. (2009). *Business Research Methods.* 8th Edition. South-Western Cengage Leraning.

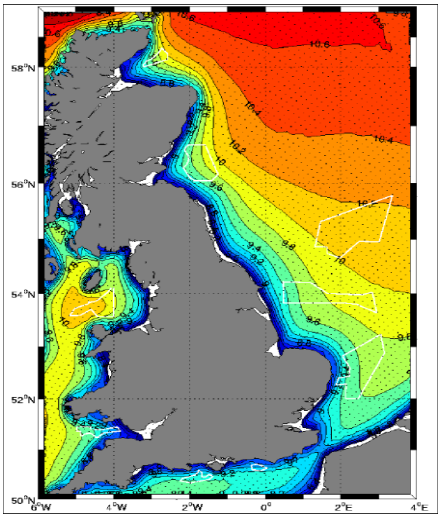
Zucker, L.G., Darby, M.R. & Armstrong, J.S. (2002). Commercializing knowledge: university science, knowledge capture, and firm performance in biotechnology. *Management Science,* 48(1), 138–153.

10 APPENDIX

10.1 Appendix 1 - Offshore wind potential: North Sea/Doggerbank area

The Doggerbank area is categorized as a large area of "shallow" water with a depth ranging from 18 to 50 meters. The area suited for offshore wind is about 8660 km^2 , the Doggerbank area in total is 17 600 $km^{2.}$ The wind speed is above 10 m/s, which means perfect conditions for offshore wind. Doggerbank suits today's offshore wind technology, with a depth enabling bottom-fixed turbines to be placed far offshore. The first rounds of development in Doggerbank, has been on bid by the UK. The Norwegian companies Statoil and Statkraft are key players in the Doggerbank zone today. The Doggerbank has an agreed target capacity of 9 GW. The full potential of the area is set to approximately 13 GW. (Statoil – Doggerbank. 2010. Wikipedia.org/doggerbank. Forewind.co.uk/dogger-bank).

Figur10. The Doggerbank Area (soruce: Wikipedia.org/doggerbank, 2011).



Figur 11.The white circled areas to the right of UK are the Doggerbank areas for offshore wind development, as of today. The numbers represent the wind speed
(source: Statoil – Doggerbank, 2010).

10.2 Appendix 2 - Offshore wind potential: Norway

The physical potential for offshore wind in Norway is close to unlimited, but is estimated at 14 000 TWh by ENOVA (Enova, 2007). Limitations are mainly set out by factors such as infrastructure and technology development (Energirådet, 2008). Considering the current technology proven, the approximate potential is 200 TWh (Energirådet, 2008). In comparison, Norway had a gross domestic consumption of 123,7 TWh in the year 2009 (Statnett, 2010).

A future prospect for year 2027, by Forskningsrådet (2007), assumes an installed capacity of 6000 MW offshore wind energy outside the coast of Norway, which will give an yearly production of 25 TWh. A production of this scale will represent a reduction of 18 million ton CO_2 each year (replacing coal and gas production in Norway).

In order for a large scale utilization of Norway's domestic market within offshore wind, both technology and infrastructure needs to experience substantial developments in the near future.

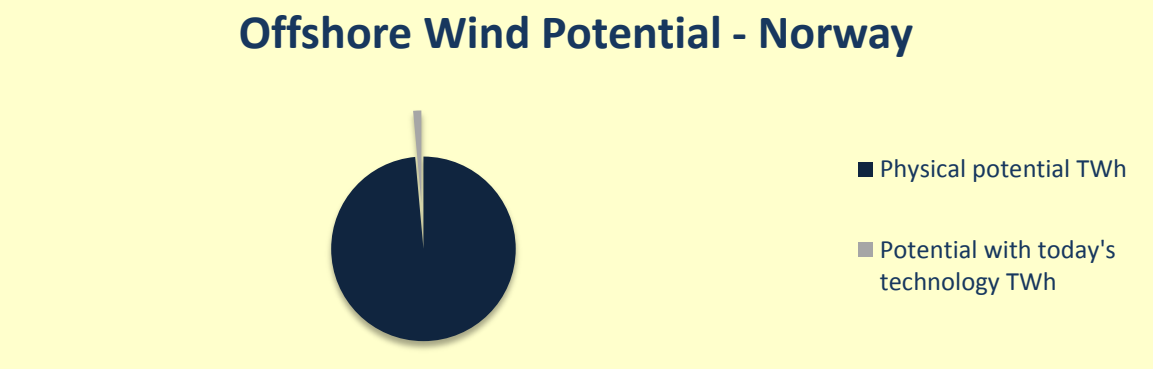


Figure 12. Offshore wind potential Norway (source: Enova, 2007; Energirådet, 2008).

10.3 Appendix 3 - Renewable Energy in Norway

Norway is differentiated from other European countries with its high percentage of energy produced by renewable energy sources. Due to this high percentage Norway has not had the pressure to engage in the development of other renewable energy sources, as has been the case with other European countries. This in turn has led to the fact that other countries have taken the lead in the technology development of the renewable offshore wind. (Douglas-Westwood, 2010).

The hydroelectric power generation in Norway constitutes approximately 99%, thereby making Norway almost self-sufficient in sustainable and renewable hydro power. Thermal power and wind power stands for approximately 1% each, respectively[2]. With hydro power as the main source of energy generation, Norway is vulnerable in times of low rainfall. Due to the correlation between rainfall and amount of water positioned in dams for energy generation, Norway moves between being a net exporter and a net importer, making the electricity prices volatile. Offshore wind can be a source to offset the periods of low rainfall, and hence, stabilizing the internal power balance. (Douglas-Westwood, 2010).

For many years the Norwegian Government has been working toward introducing "green electricity certificates", and the 8th of December 2010 Norway and Sweden agreed upon a collaborating electricity certificate market. The green certificates are provided the producers of renewable energy; the size of the certificates is calculated by the amount of renewable energy produced. The energy suppliers will be committed to buy a certain amount of the certificates, and hence, the certificate demand is created. The goal of the green certificates is to achieve a cost effective electricity production of renewable energy, as they tend to be a successful instrument in promoting development of green, renewable energy. The green certificates will be an additional source of income for the producers besides the main income from the actual sale of energy. (Bellona.no; Regjeringen.no.).

[2] The numbers 99%, 1% and 1% are correct according to Douglas-Westwood (2010).

10.4 Appendix 4 - Background information of the companies interviewed

10.4.1 Statoil

Statoil is one of the largest international players operating in the energy sector. They are committed in renewable energy, and in particular offshore wind. Their onshore wind portfolio is for sale; thereby they will have a future focus on offshore, since this is an area where Statoil can take advantage of their in-house competences of offshore operations (Pareto securities, 2011). Statoil is one of the four companies (Statoil, Statkraft, RWE Power, and Scottish and Southern Energy plc (SSE)) in the Forewind Consortium, which has been granted the Doggerbank contract (Statoil.com/doggerbank). Statoil, in cooperation with Statkraft, is also engaged in the Sheringham Shoal project (offshore wind farm outside England) (Statoil.com/shreinghamshoal). The world's first full scale floating wind turbine, Hywind, is developed by Statoil. Hywind is now under prototype testing with a 2,3 MW turbine (Statoil.com/hywind)

Statoil is chosen due to its long-time presence in the oil and gas industry. They thereby have a lot of in-house experiences relevant to the offshore wind. These experiences can and are transferred to the offshore wind industry.

10.4.2 Statkraft

Statkraft is the largest players within renewable energy in Europe (Statkraft.no). Statkraft has its main competences in energy production on-shore, as well as energy/electricity sales. Statrkaft is engaged in offshore wind in the Sheringham Shoal project, in cooperation with Statoil. Statkraft is also one of the four companies in the Forewind Consortium.

Statkraft is chosen due to its engagement in offshore wind. They have experiences with onshore wind, but in terms of offshore wind, Statkraft had to retrieve new knowledge on the offshore perspective.

10.4.3 Seatower

Seatower is a small company founded in 2007, and is located in Oslo. Seatower is an EPCI[3] supplier of foundations for offshore wind turbines and substations. Their technology, "Cranefree Gravity" foundations is based upon principles from the offshore oil and gas sector. (Seatower.no/story; Seatower.no/about).

Seatower is chosen due to their ability to exploit oil and gas experiences in offshore wind. They are also a member of the offshore wind cluster Arena NOW.

The respondent, CEO Petter J. Karal, is a successful entrepreneur in both the offshore and IT sector. He holds and MSc. in economics from NHH, and an MBA from MIT School of Management, he also attains previous experience from strategy consulting at McKinsey & Company. Mr. Karal has been chosen as a respondent on the background of his combination of technological and strategically understanding, as well being a key member in the management team who established Seatower in 2007. (Seatower.no/team).

10.4.4 NODE NCE

NODE NCE is a cluster within oil and gas, in particular drilling. Many of the companies in the cluster have experiences relevant for the offshore wind sector. There has recently been a focus on what possibilities the NODE companies may have in offshore wind. (Nodeproject.no).

As offshore wind has been a discussed subject with the NODE companies, it is assumed that they have some background understanding of offshore wind. And therefore might be able to have a better understanding of the potential knowledge transfer from oil and gas, to the offshore wind.

[3] Engineering, procurement, construction and installation contracts.

10.4.5 Innovation Norway

Innovation Norway is a global organization, with the aim to help and facilitate for innovation. They are also helpful consultants for companies in terms of increasing competitive strengths, financial support, etc. As the offshore wind industry is a quite new industry in Norway, many of the companies within this sector are small and relatively newly established. Hence, Innovation Norway has good contact and overall view of the players. Innovation Norway is also an organization who gets exposed to the offshore wind players' problem areas, as they offer consultancy services. (Innovasjonnorge.no).

10.4.6 Arena NOW

Arena NOW is an offshore wind cluster, and is mainly located in the areas of Hordaland and Rogaland. The cluster counts for approximately 50 players in total, and was established in 2009. (Arenanow.no) More information, see section 2.2.3.

Arena NOW was chosen as they are in position of an overall view of the offshore wind sector. They also have a good communication with its member companies. Their interference with a great share of the offshore wind companies gives them a good understanding of the industry.

10.5 Appendix 5 - Interview Guide: English Version

Arena NOW

1. What kind of background /previous experiences do the companies in Arena NOW have?
2. Is knowledge transfer present in the cluster? (if yes, to what extent?)
3. How does the cluster facilitate for a knowledge transfer between the cluster members?
4. Is there a strong will for cooperation between the cluster members?
5. Does the cluster have network(s) with R&D institutions?
6. Does the cluster of the cluster members have network ties with companies from other industries?
7. Does the cluster cooperate with other clusters in Norway?
8. To what extent are the networks (formal and/or informal) important for knowledge transfer? (elaborate)
9. What factors are important for a knowledge transfer?

Innovasjon Norge

10. What kind of background do the players who establish themselves on the offshore wind have?

11. To what extent are the companies in the offshore wind able to exploit knowledge transfer between internal parties? (elaborate)

12. To what extent are the companies in the offshore wind able to exploit knowledge transfer between external parties? (elaborate)

13. Where is there a shortage in the knowledge transfer?

14. Why are there experienced shortages at these areas?

15. What needs to be done in order to get a better float of knowledge transfer?

16. What networks do you consider important for the offshore wind sector in Norway?

17. What networks does the offshore wind sector have access to?

18. What networks do they not have access to, but should have had?

19. Does network represent an important source of knowledge transfer? (explain)

20. How can offshore wind players build important networks with external parties?

21. What is the most common way of creating a knowledge transfer?

22. What other ways than labor mobility (transfer of personnel) creates knowledge transfer as of today?

23. Are the offshore wind players conscious of the term knowledge transfer?

24. Do they take advantage of potential knowledge transfer?

25. Do you have any examples of successful knowledge transfers?

26. How does clusters (e.g. Arena NOW) facilitate for knowledge transfer?

27. Is the cluster considered as a contributor of knowledge transfer? (explain)

Statoil

28. How do you take advantage of your experiences from oil and gas within offshore wind?

29. How do you transfer this knowledge?

30. Does Statoil cooperate with other companies who hold offshore experiences (sub-suppliers)? (examples)

31. If yes, is there a knowledge transfer taking place between Statoil and the external party?

32. How is the knowledge transfer taking place?

33. How do Statoil facilitate for knowledge transfer within the company?

34. How do Statoil facilitate for knowledge transfer outside the company?

35. How do Statoil facilitate for knowledge transfer on a strategic level?

36. What obstacles do you meet in a knowledge transfer?

37. Considering the Forewind consortium (Statoil, Statkraft, SSE and RWE); how is knowledge transfer taking place in this group?

38. Are you open for a knowledge transfer between other players?

39. Do you wish to contribute, through knowledge transfer, in order to develop the offshore wind sector in Norway?

40. If yes, how would you engage in the knowledge transfer?

Statkraft

41. How do you take advantage of your previous experiences within offshore wind?

42. How do you transfer this knowledge?

43. Does Statkraft cooperate with other companies who hold offshore experiences (sub-suppliers)? (examples)

44. If yes, is there a knowledge transfer taking place between Statkraft and the external party?

45. How is the knowledge transfer taking place?

46. How do Statkraft facilitate for knowledge transfer within the company?

47. How do Statkraft facilitate for knowledge transfer outside the company?

48. How do Statkraft facilitate for knowledge transfer on a strategic level?

49. What obstacles do you meet in a knowledge transfer?

50. Considering the Forewind consortium (Statoil, Statkraft, SSE and RWE); how is knowledge transfer taking place in this group?

51. Are you open for a knowledge transfer between other players?

52. Do you wish to contribute, through knowledge transfer, in order to develop the offshore wind sector in Norway?

53. If yes, how would you engage in the knowledge transfer?

NODE NCE

54. What knowledge/experiences do the NODE companies have which is relevant for offshore wind?

55. How can these knowledge/experiences be transferred to the offshore wind sector?

56. Is the NODE players open to a knowledge transfer to offshore wind players? (elaborate)

57. If yes, what do they want in return?

58. Is knowledge transfer between NODE companies and offshore wind players taking place today? (give example)

59. Does NODE have networks (formal and/or informal) with offshore wind players (e.g. Arena NOW)?

60. Are there NODE companies who whish to enter the offshore wind sector? (elaborate)

61. If yes, how do they wish to enter the offshore wind sector?

a) Supplier of both markets

b) Supplier of the offshore wind market only

c) Other?

Seatower

63. What knowledge/experiences do you hold within the company relevant for offshore wind?

64. To what extent have you been able to take advantage of these experiences? (elaborate)

65. Has knowledge/experiences from the oil and gas been important part of the development of the company? (explain)

66. Do you contribute considering knowledge transfer in the offshore wind sector? If yes, how?

67. Where would you derive new knowledge from?

a) New labor/personnel holding that kind of knowledge?

b) Through network

c) Other?

68. What do you consider important in terms being able to exploit the new knowledge to the extent possible within the company?

69. To what extent do you sought to share knowledge in order to help other Norwegian players? (explain)

70. Have you been involved in knowledge transfer to help other parties besides your own company? (elaborate)

71. What is important in order for you to share knowledge with other players within offshore wind?

72. How would you share this knowledge?

73. How do you exploit the relevant offshore expeeinces you have within offshore wind? (strategically)

ALL: Knowledge Transfer

74. What kind of offshore experiences is of value to the offshore wind industry?

75. What do you consider as the most important knowledge /experiences to transfer to the offshore wind industry?

76. How is knowledge transfer taking place today?

77. What factors facilitate for knowledge transfer?

78. What do you consider as the most important factor for knowledge transfer?

79. What are the biggest challenges concerning knowledge transfer of offshore experiences to the offshore wind industry?

80. Do you have any (specific) examples of knowledge transfer?

81. What are the biggest obstacles for a potential knowledge transfer?

82. How to overcome these obstacles?

83. What do you consider to be important success criteria?

ALL: National Competitiveness

84. Do you believe Norway has a competitive advantage within the offshore wind due to the relevant offshore experiences? (e.g. the 40 years of expererience from oil and gas)? (elaborate)

85. How competitive du you recognize Norway to be within offshore wind (today, and in the future)? (elaborate)

86. What are the largest obstacles in order for Norawy to become a market leader wtihtin iffshore wind?

87. Do you believe in a national market for offshore wind in Norway? (elaborate)

88. (Will the "green certificate" have any influence on this)?

89. Is a national market important for development and growth of the offshore wind industry in Norway? (explain)

90. Do you believe that a pilot project (an offshore wind park) on the Norwegian shelf is important for the Norwegian offshore wind companies' competitiveness on an international scale? (explain)

91. What factors are important in order for Norway to be able to exploit its competitive advantage within offshore wind?

10.6 Appendix 6- Intervjuguide: Norwegian Version

Arena NOW

1. Hvilken bakgrunn / tidligere erfaringer har bedriftene i Arena NOW klyngen?
2. Er kunnskapsoverføring / erfaringsoverføring tilstedet innad klyngen? (Om ja, til hvilken grad?)
3. Hvordan tilrettelegger klyngen for kunnskapsoverføring / erfaringsoverføring mellom klyngemedlemmene?
4. Er det god samarbeidsvilje mellom klyngemedlemmene?
5. Har klyngen et godt nettverk med FoU institusjoner?
6. Har klyngen eller klyngemedlemmene nettverksbånd med bedrifter fra andre industrier?
7. Samarbeider klyngen med andre klynger i Norge?
8. I hvilken grad er de eksterne nettverkene (formelle og/eller uformelle) viktige for kunnskapsoverføring / erfaringsoverføring? (utdyp)
9. Hvilke faktorer er viktig for at en kunnskapsoverføring / erfaringsoverføring skal ta sted?

Innovasjon Norge

10. Hvilken bakgrunn har aktørene som etablerer seg innen offshore vind?

11. I hvilken grad er bedriftene i offshore vind i stand til å utnytte kunnskapsoverføring / erfaringsoverføring fra interne parter? (utdyp)

12. I hvilken grad er bedriftene i offshore vind i stand til å utnytte kunnskapsoverføring / erfaringsoverføring fra eksterne parter? (utdyp)

13. Hvor skorter det på kunnskapsoverføring / erfaringsoverføring?

14. Hvorfor skorter det på dette / disse områdene?

15. Hva må til for at kunnskapsoverføring / erfaringsoverføring skal få en bedre flyt?

16. Hvilke nettverk ser dere på som relevante for offshore vindsektoren i Norge?

17. Hvilke nettverk har offshore vindsektoren tilgang til?

18. Hvilke nettverk har de ikke tilgang til, men burde hatt?

19. Representerer nettverk en viktig kilde for kunnskapsoverføring / erfaringsoverføring? (Forklar)

20. Hvordan skal offshore vindaktører bygge viktige nettverk med utenforstående?

21. Hva er den vanligste måten å skape en kunnskapsoverføring / erfaringsoverføring?

22. Hvilke andre måter enn forflytning av arbeidskraft skaper kunnskapsoverføring / erfaringsoverføring per i dag?

23. Er aktørene innen offshore vind observante på kunnskapsoverføring / erfaringsoverføring?

24. Tar de nytte av potensiell kunnskapsoverføring / erfaringsoverføring?

25. Eksempler på aktører som har en vellykket kunnskapsoverføring / erfaringsoverføring?

26. hvordan tilrettelegger klynger (som Arena NOW) for kunnskapsoverføring / erfaringsoverføring?

27. Anses klyngen som bidragsyter til kunnskapsoverføring / erfaringsoverføring? (forklar)

Statoil

28. Hvordan utnytter dere tidligere kompetanse fra olje og gass innen offshore vind?

29. Hvordan overflyttes denne kunnskapen?

30. Samarbeider Statoil med andre selskaper innen offshore vind (underleverandører)? (Gi eksempel)

31. Om ja; er det kunnskapsoverføring / erfaringsoverføring mellom Statoil og den eksterne part?

32. Hvordan foregår denne kunnskapsoverføring / erfaringsoverføring?

33. Hvordan tilrettelegger Statoil for kunnskapsoverføring / erfaringsoverføring innad?

34. Hvordan tilrettelegger Statoil for kunnskapsoverføring / erfaringsoverføring utad?

35. Hvordan tilrettelegger Statoil for kunnskapsoverføring / erfaringsoverføring på et strategisk nivå?

36. Hvilke hindre møter dere ved kunnskapsoverføring / erfaringsoverføring?

37. Ang. Forewind konsortiet (Statoil, Statkraft, SSE og RWE); hvordan foregår kunnskapsoverføring / erfaringsoverføring i denne gruppen?

38. Er dere for kunnskapsoverføring / erfaringsoverføring mellom andre aktører? (utdyp)

39. Ønsker dere å bidra for å utvikle offshore vindsektoren i Norge ved kunnskapsoverføring / erfaringsoverføring?

40. Om ja; Hvordan ville dere gjort dette?

Statkraft

41. Hvordan utnytter dere deres tidligere kompetanse innen offshore vind?

42. Hvordan overflyttes denne kunnskapen?

43. Samarbeider Statkraft med andre selskaper som har offshore erfaringer (underleverandører)? (Gi eksempel)

44. Om ja; er det kunnskapsoverføring / erfaringsoverføring mellom Statkraft og den eksterne part?

45. Hvordan foregår denne kunnskapsoverføring / erfaringsoverføring?

46. Hvordan tilrettelegger Statkraft for kunnskapsoverføring / erfaringsoverføring innad?

47. Hvordan tilrettelegger Statkraft for kunnskapsoverføring / erfaringsoverføring utad?

48. Hvordan tilrettelegger Statkraft for kunnskapsoverføring / erfaringsoverføring på et strategisk nivå?

49. Hvilke hindre møter dere ved kunnskapsoverføring / erfaringsoverføring?

50. Ang. Forewind konsortiet (Statoil, Statkraft, SSE og RWE); hvordan foregår kunnskapsoverføring / erfaringsoverføring i denne gruppen?

51. Er dere for kunnskapsoverføring / erfaringsoverføring mellom andre aktører?

52. Ønsker dere å bidra for å utvikle offshore vindsektoren i Norge ved kunnskapsoverføring / erfaringsoverføring?

53. Om ja; Hvordan ville dere gjort dette?

NODE NCE

54. Hvilken kunnskap/erfaring har bedriftene innad i NODE som er relevant for offshore vindindustrien?

55. Hvordan kan denne kunnskapen/erfaringen overføres til offshore vindsektoren?

56. Er NODE aktører åpne for en kunnskapsoverføring / erfaringsoverføring til offshore vindaktører? (utdyp)

57. Om ja, hva ønskes i gjengjeld? (Hva ønsker de å få ut av det)

58. Har kunnskapsoverføring / erfaringsoverføring mellom NODE bedrifter og offshore vindaktører tatt sted per i dag? (Eksempel)

59. Har NODE nettverk (formelle og/eller uformelle) med offshore vindaktører (eks. Arena NOW)?

60. Er det ønskelig av NODE bedrifter å gå inn i offshore vindsektoren? (utdyp)

61. Om ja; hvordan ønsker de å innta dette markedet?

a) Leverandør til begge marked

b) Leverandør kun for offshore vindmarkedet

c) Andre?

Seatower

62. Hvilken kunnskap/erfaring har dere innad som er relevant for offshore vind?

63. I hvilken grad har dere klart/klarer dere å utnytte denne kompetansen? (utdyp)

64. Har kunnskap/erfaring fra bl.a. olje og gass vært en viktig del i deres (selskapets) utvikling? (forklar)

65. Bidrar dere med kunnskapsoverføring / erfaringsoverføring i offshore vindsektoren? Om ja; hvordan?

66. Hvor ville dere hentet ny kunnskap fra?

a) Ved å hente inn ny arbeidskrat/nytt personal med denne type kunnskap

b) Søke etter ny kunnskap gjennom nettverk

c) Andre?

67. Hva anser du som viktig for at den nye kunnskapen skal bli utnyttet fult ut innad?

68. I hvilken grad ønsker dere å dele kunnskap/erfaringer for å hjelpe andre norske aktører? (forklar)

69. Har dere delt kunnskap/erfaring for å hjelpe andre utover deres eget selskap? (Utdyp)

70. Hva er viktig for at dere skal ønske å dele kunnskap/ erfaring med andre aktører innen offshore vind?

71. Hvordan ville dere delt denne kunnskapen/erfaringen?

72. Hvordan utnytter dere den offshore relevante kunnskapen dere har innen offshore vind? (Strategisk)

ALLE: Kunnskapsoverføring (Erfaringsoverføring)

73. Hvilke erfaringer anses som verdifulle for offshore vindindustrien?

74. Hva anser du som de(n) erfaringene viktigst for offshore vindindustrien?

75. Hvordan tar kunnskapsoverføring / erfaringsoverføring sted i dag?

76. Hvilke faktorer tilrettelegger for kunnskapsoverføring / erfaringsoverføring?

77. Hva anser du som den viktigste faktoren for en kunnskapsoverføring / erfaringsoverføring?

78. Hva er de største utfordringene for en kunnskapsoverføring / erfaringsoverføring fra relevante industrier til offshore vindindustrien?

79. Har du noen (konkrete) eksempler på kunnskapsoverføring / erfaringsoverføring?

80. Hva er de største hindringene for en potensiell kunnskapsoverføring / erfaringsoverføring?

81. Hvordan skal man overvinne disse hindringene?

82. Hva anser du som viktige suksessfaktorer?

ALLE: Nasjonal Konkurranseevne

83. Vil du si at Norge har en konkurransefortrinn innen offshore vindindustrien p.g.a. våre relevante offshore erfaringer (f.eks. 40 år med erfaring fra olje og gass)? (utdyp)

84. Hvor konkurransedyktig anser du Norge å være innen offshore vind (per i dag og fremtidig)? (utdyp)

85. Hva er de største hindrene for at Norge skal kunne bli markedsledende innen offshore vind?

86. Har du tro på et hjemmemarked for offshore vind i Norge? (utdyp)

87. (Vil de grønne sertifikatene ha en innflytelse på dette?)

88. Er et hjemmemarked viktig for utvikling og vekst av offshore vindindustrien I Norge? (forklar)

89. Mener du at et pilotprosjekt (offshore vindpark) på norsk sokkel er viktig for Norges offshore vindselskaper konkurransedyktighet internasjonalt? (Forklar)

90. Hvilke faktorer er viktige for at Norge skal klare å utnytte sitt konkurransefortrinn innen offshore vind?