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THE ARCTIC  
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## **“The Norwegian Snow Crab Industry”**

A case study of opportunities and threats in the Norwegian snow crab industry

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## Foreword

As I am writing this, I realize that my days as a student are soon to be over. I have learned a lot through my time at the Norwegian College of Fishery Science and I am forever grateful for this opportunity.

I want to thank my advisor at the University of Tromsø, Bernt Bertheussen. Thank you for still agreeing to be my advisor even though I talked the entire time when I was in your class two years ago. For the last two semesters you have been nothing but positive and encouraging. I cannot express how grateful I am for your guidance and support.

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Lukas, my son, you were my motivation.

*Tromsø, May 2019*

*Ida Maria Ruiken*

## **Summary**

The Norwegian seafood industry is constantly growing and expanding. The snow crab entering the Barents Sea was an opportunity to create a new, profitable industry with a product well established on the world market.

Norwegian vessels entered the loophole and were joined by foreign vessels to catch snow crab. January 2017, Russia claimed sovereignty over the area and closed it for all foreign vessels, including the Norwegian ones.

The goal of this study was to determine which challenges and opportunities the entrepreneurs have met since entering the industry. The thesis is built on relevant theory and 7 interviews with key informants in the Norwegian-, and Alaskan snow crab industry.

The results of this thesis show that the Norwegian snow crab industry is in the early stages of the industry life cycle. The industry's profitability was challenged after the loophole was closed. The future of the industry is uncertain due to lack of governmental regulations.

The Alaskan snow crab industry has met similar challenges through their life cycle and the industry was successfully regulated to ensure profitability to its active vessels and fishermen.

# 1 Introduction

This chapter explains the background of the thesis, followed by the problem statement. After the problem statement the limitations of the study will be explained, and the chapter closed by an overview of the thesis' structure.

## 1.1 Background

Since 2008 the export value of Norwegian seafood has more than doubled. In 2018 the total export value was 99 billion NOK (Seafood.no, 2018). The Norwegian seafood industry is constantly growing, and new species are of interest for the expanding market.

The Norwegian snow crab industry (NSCI) is an emerging industry, which has existed for a few years. Since the first commercial catch in 2012, the snow crab has been studied on its biological aspects but not many studies have been made on the industry itself.

There are large snow crab fisheries around the world which contribute to their country's economy. When the first snow crabs were caught in the Norwegian zone the prognosis and possibilities were positive. In an article published in 2015, Jan Sundet at the Norwegian Institute of Marine Research, said that snow crab in Norway *“Can become a resource with the second largest value in the Barents Sea, after cod. So, a larger value than mackerel, herring and capelin and so on. There is a large potential for fishery”* (Eira & Lundgren, 2015).

The 2018 export value of cod was 9.4 billion NOK, and 3.4 billion NOK for mackerel (Seafood.no, 2018). The snow crab industry, with the potential to export a product with a value of more than 3.4 billion NOK annually seemed very attractive to investors. Several companies equipped vessels and got a temporary licence to fish snow crab.

In a press release from 2017, the then Minister of Fisheries, Per Sandberg, said that the snow crab was an *“Exciting new species that has the potential to become a valuable resource”* (Regjeringen.no, 2017). The same year, 3,061 tonnes snow crab were caught with a first-hand value of 146 million NOK. The earnings predicted in 2015 were still far away.

The first years the revenues of the companies owning the vessels were good. Since January 2017 the annual revenue of the companies has been negative, due to the change of fishing grounds.

## **1.2 Problem statement**

The NSCI had a good prognosis but has not lived up to its expectations. The investors entering the industry have faced many challenges. Possibly, they have gained some advantages from the early entry.

This thesis will look at entrepreneur's personal motivations and background that made them risk the entrance into this emerging industry. The thesis is a case study of the industry based on relevant theory and interviews of key informants.

Based on this background, the thesis has the following research question:

*“Which opportunities and threats have the entrepreneurs met since their entry into the Norwegian snow crab industry?”*

## **1.3 Limitations**

The limitations of this thesis are the available data. There is limited data about the industry available. The active fleet of vessels is small and each player easy identifiable. Therefore, the individual differences cannot be used in this study.

This study is one of the first steps into this field and factors that can have contributed to the results are not yet known or identified.

## **1.4 Structure of the thesis**

This thesis will start with presenting theoretical background for the study. Chapter 3 will present the empirical context including background information about the global snow crab industry and a more detailed description of the NSCI. Following in chapter 4, the choice of research design will be explained, and the choice of the qualitative approach defended. The results of the study will be presented in chapter 5 and discussed in the following chapter. The thesis will be closed by a conclusion and suggestion for further research.



## **2 Theory**

This chapter presents relevant theory and theoretical models. These can be used to identify opportunities and threats at different developmental stages of an industry. The first part of this chapter will present how to determine an industry's attractiveness by using Porter's five forces, followed by the industry life cycle and which forces dominate each stage. The second part of this chapter is about entrepreneurship followed by the resource-based view and how a firm can identify a competitive advantage.

### **2.1 Industry attractiveness**

Porter's five forces is a tool that can be used to determine how attractive an industry is. According to Porter (2008), to maintain long term profitability it is important to respond strategically to competition. By using the five forces, it is possible to gather information about the situation, and see the bigger picture to identify opportunities and threats.

The five forces are: threat of new entry, supplier power, buyer power and threat of substitution. These forces come from the outside of industry. Within the industry, there is the competitive rivalry amongst existing players. Figure 1 shows Porter's five forces and how they influence the strength of competitive rivalry within the industry.

The five forces can be used to analyse the industry and its underlying structures. If the forces are strong, it is difficult to get back the investments. It is possible to make short term earnings, but the long-term profits are dependent on the industry structure that are established in the forces (Porter, 2008). By understanding the forces and the underlying structure it is possible to determine the future profitability of the industry. There are obvious differences in industries profitability which should be analysed before investing in a new venture, to see if the industry is an attractive investment or not (Porter, 2008).



Figure 1: Porter's five forces (threat of new entry, supplier power, buyer power, threat of substitutions and competitive rivalry) which influence the attractiveness of an industry. Adapted from: Porter, M. E. (2008). *The five competitive forces that shape strategy*. Harvard business review, 86(1), p. 101.

The **threat of new entry** are competitors entering the industry and putting pressure on price and cost as the buyer has more suppliers to choose from. New entries also put a cap on profit due to the competition within the industry rising. How big the threat of new entries is to an industry is, depends on the barriers of entry, how difficult it is to enter, getting established and attracting buyers.

The **power of suppliers** is how much a supplier can charge for the product they deliver to the firm. If the supplier can charge a high price, or access of resources is low, the profitability of the industry will be limited.

The **power of buyers** determines how much the buyer can negotiate the price of the product. If there are many buyers and the product is in demand, the buyer power is low. The power of buyers heightens with increased saturation of product on the market.

The **threat of substitution** is present when the product can be substituted by another, similar product at a lower price. Substitutions limit the price that can be charged for a product. At a certain level the substitution will be more attractive to the buyer.

**Competitive rivalry** is the competition between the already established players in the industry. By identifying the strength of each force affecting the competitive rivalry the firm can develop a strategy to gain market shares (Porter, 2008).

Changes can be rapid and unexpected, analysing the surroundings carefully and constantly, will give the firm the opportunity able to make better long-term strategic choices based on the knowledge available. **The government and its power** are claimed by Porter (2008), as a factor that can affect the five forces in either way. The governmental policies can limit the barriers of entry to regulate an industry, but the government can also enforce a policy to strengthen the power of suppliers and by that, limit the profitability of the industry. As governmental policies can be established when either there are none, or the existing policies, this will affect the five forces. Policies can change the attractiveness of the industry. The government and its power are not controlled by the industry they affect.

## 2.2 The Industry Life Cycle

The industry life cycle (ILC) is the theory of industries and their firms following a similar developmental pattern. The cycle starts small in their development, followed by rapid growth and then enter a “shake out” period. In each stage of the ILC the five forces vary due to the circumstances in the industry and its surroundings (Johnson, Wittington, & Scholes, 2011).

The **development stage** has few rivals and the forces are low. There is no direct rivalry because the market is large enough for everyone. This is an opportunity for those who choose to enter. The threat at this stage is the profitability, which is often still low, due to the high investments made to enter the market. In the **stage of high growth**, the forces are weak and in addition, the power of buyers is low because there are few players. The opportunities for new entries are high because the barriers of entry are low. In the **shake-out stage**, more players have entered the market and it starts to be saturated. The forces are getting stronger. New entries are facing the biggest threats at this stage as they are not yet established in the market. In the **maturity stage**, barriers of entry increase, and the buyers get more power. They have more options to choose from, this limits the opportunities for the players. The profitability the business depends on the market share the firm holds. The forces at this stage are strong due to the high barriers of entry and the power of buyers. The **decline stage** is characterized by a threat of high competition, especially when the barriers of exit are high. Due to the strong forces, the competition between the players is extreme. The opportunity at this stage is to be the last firm standing and achieve a monopoly position (Johnson et al., 2011).

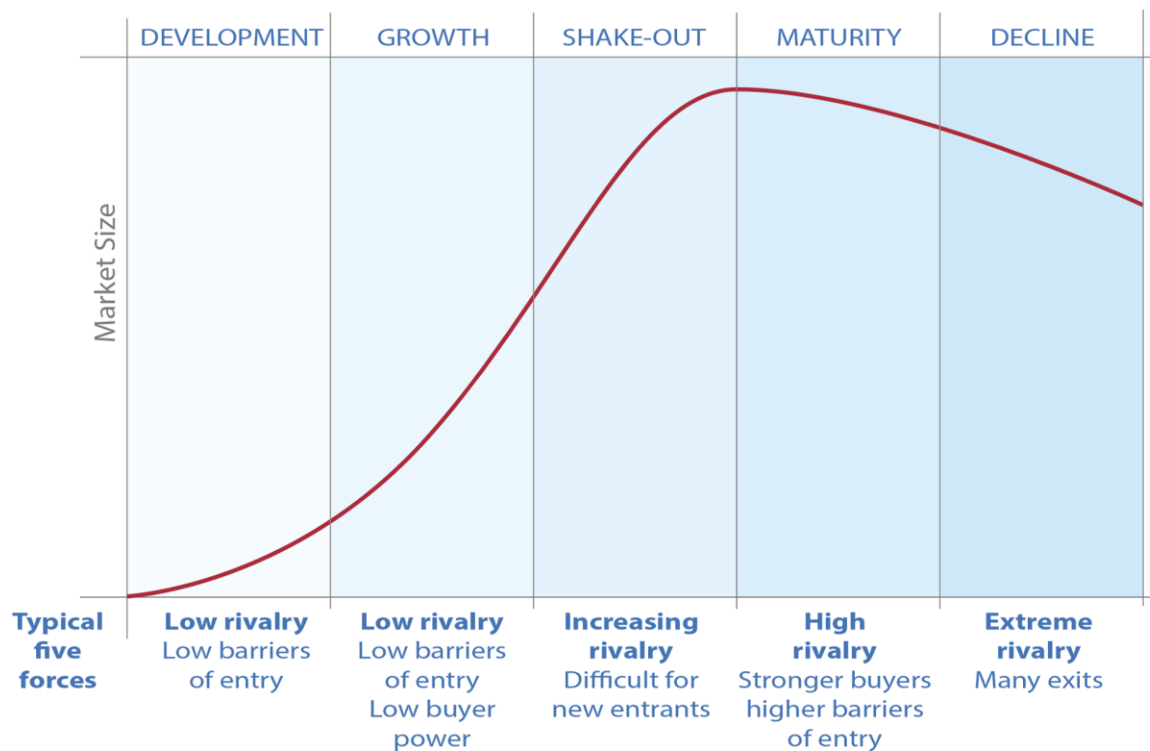


Figure 2: The stages of the industry life cycle (the development-, growth-, shake-out-, maturity-, and decline stage) with the forces (low rivalry, increasing rivalry, high rivalry and extreme rivalry) which dominate each stage. Adapted from: McGahan, A. M. (2000). How industries evolve. *Business Strategy Review*, 11(3), page 1.

In each stage the firm faces different threats and opportunities explained in figure 2 as each stage in the ILC has dominating forces. A firm in an emerging industry is facing other challenges than one in an established industry due to their stage in the ILC.

There are limitations and advantages to each model. The ILC is a theoretical model and must be treated as such (McGahan, 2000). The actual life cycle can differ from product and industry, but figure 2 gives an image on how the cycle can go.

### 2.3 Industry attractivity in developmental stage of the life cycle

In the developmental and growth stage, an industry is called an **emerging industry**. Emerging industries come with many challenges as they are difficult to calculate. Many are trying to “strike gold”, but instead end up failing at the attempt (Grønhaug & Grundvåg Ottesen, 2007). The reason why many invest in emerging industries is because it presents an opportunity to develop the firm.

If a new venture is creating a lot of money for the firm, others might follow and barriers of entry must be created (Alvarez & Barney, 2007). Sometimes, being the first in an industry

comes with advantages, called - “**first mover advantage**”. The first mover advantage is when a firm can “*acquire superior resources and capabilities*” (Lieberman & Montgomery, 1998) due to early entry.

## 2.4 Entrepreneurship

There have been several studies on entrepreneurship. The Austrian school, Kirzner, Barney and Schumpeter are some of the most established voices when it comes to explaining entrepreneur’s motives that drive their actions.

Entrepreneurship is about the discovery of new opportunities, and the following creation of new economic activity. This involves short-, and long- run activities (Jacobson, 1992). Entrepreneurial behaviour is the combination of risk-taking, innovation and proactiveness (Cuervo, Ribeiro, & Roig, 2007). Innovations are often costly and risky as the outcome is unsure but entrepreneurs are specialists in risk taking and uncertainty-bearing (Knight, 1942). For an entrepreneur the key is to “*gather, evaluate and utilize information*” to decide what to invest in (Jacobson, 1992). All information about a situation cannot be collected. The opportunities entrepreneurs enter, are new, and the information does not exist (Alvarez & Barney, 2007). This lack of information creates a challenge that might stop many, but the entrepreneur is willing to take the opportunity and risk to exploit the situation and if possible, achieve economic success.

In the Austrian view the entrepreneurs have a key role in which the entrepreneurial innovation is central to business success. An entrepreneur does not think about the current demand of products but rather of the future demands (Garrison, 2005). The new business the entrepreneur enters creates new economic development for the firm, making them more dynamic and driving the economy forward through innovation and general improvement of society (Cuervo et al., 2007).

Entrepreneurs are said to work smarter and harder. They wish to achieve success which means that the alertness, smartness and work ethic comes into account when deciding who will succeed in the industry. Entrepreneurs can use many different types of strategies while trying to succeed (Alvarez & Barney, 2007).

What motivates the entrepreneur, according to Jacobson (1992), are the earnings out of the extraordinary. That is the reason why they take huge risks when developing their business. Entrepreneurs play an important role when it comes to delivering results. The earnings that

are possible when entering an emerging industry are motivating the entrepreneurs and they are willing to face the challenges present in the industry.

## 2.5 Firm resources in the developmental stage of the life cycle

The resource-based view (RBV) is how a firm can achieve a sustained competitive advantage through the resources available to them. A competitive advantage is sustained when it is creating a value not many other firms possess (Barney, 1991). The firm must investigate their internal structure to identify their available resources. Resources can be physical-, human-, or organizational capital. “*Positive reputations of firms amongst customers*” can also be a competitive advantage (Barney, 1991). Being able to identify relevant resources is a quality needed to achieve a competitive advantage.

Entrepreneurs with knowledge about the industry they are entering into can use that to their advantage as “*The entrepreneur's industrial experience, such as experience in the line of business and the degree of relatedness between the major and the product, affects growth positively more than other experiences*” (Jo & Lee, 1996). According to the same authors, by gaining full knowledge about the product, the firm will achieve a better result.

For a competitive advantage to be sustained, the advantage is not being subsidized or copied over a certain period. There is no definite answer on how valuable and rare a firm's resources must be to develop a competitive advantage. The resources vary from being a natural resource to the knowledge available to the firm.

To determine if a resource is a sustainable and competitive advantage one can use **VRIN** -, which stands for **Valuable, Rare and Inimitable**, supported by the **Non-substitutability**. A resource needs to have a certain value to be the source of competitive advantage. The more valuable the resource is, the more earnings it can generate for the firm. Rare resources and capabilities are only available, or owned, by few or limited firms (Johnson et.al, 2017). If the resource is not easily available, the competitive advantage will last longer. If the resource is rare, the question will rise if it is possible to imitate it for a lower price. If that is not the case, the resource will be more valuable and the competitive advantage last longer.

According to Dreyer and Grønhaug (2004), the product life cycle is becoming rapidly shorter and the competition increases due to globalization and technological development. Flexibility is a way to keep a competitive advantage as the uncertainty in the industries grow due to the global changes. Using the resources available to conquer the uncertainty, gives a firm a

competitive advantage. One type of resource can solve one type of uncertainty. The flexibility in resources gives a firm the possibility to handle uncertainties when they appear (Dreyer & Grønhaug, 2004).

### **3 Empirical context**

This chapter gives an overview of the global snow crab industry, followed by a more detailed background on the NSCI.

#### **3.1 The global snow crab industry**

The snow crab (*Chionecetes opilio*) is found on the continental shelf of the Bering Sea, Chuckhi Sea and the Western Atlantic Ocean. In the later years it has also established itself in the Barents Sea (AFSC, 2019).

One of the fisheries benefitting from snow crab is in Canada. The first catch of snow crab was a by-catch in the 1960's near Gaspé, Quebec. The following years the industry slowly developed. In the 1980's the snow crab industry had become one of the largest fisheries in Canada in terms of value (GOC, 2016). In 1988 the value of the snow crab caught in the Gulf of St. Lawrence was \$150 million. The year after, in 1989, the snow crab industry in Canada collapsed due to overfishing. The amount of snow crab caught was 30,000 tonnes instead of the allowed 5,000 tonnes (Hare, Dunn, Parsons, & Lear, 1993).

The catch of snow crab in Alaska started in the 1960's and developed into a major fishery within the next 10 years (Pinfold, 2006). Regulations started to come into place in the 1970's, including fishing gear and a minimum legal size of the crab. Total allowable catch (TAC) was also set (Pinfold, 2006). Until 1992 the number of vessels fishing for snow crab went from 103 to 250 (Greenberg, Herrmann, & McCracken, 1995). The high competition between vessels created an industry where fishermen fished for crab from the day the fishery opened until the TAC was reached for the season, and the fishery closed. Since the 2000's the harvesting was low but increasing. In 2000 the industry introduced a vessel licence (individual quota) to the vessels that were actively fishing for snow crab (AFSC, 2019). In 2004 the "crab capacity reduction program" was introduced the fishery was closed for new entrants. 24 vessels and 62 fishing quotas were bought out to create a more sustainable fishery (ABSC, 2019). Since 1999 the biomass has slowly been rebuilt, and the last overfishing was in 2008 (AFSC, 2019).

### 3.2 The Norwegian snow crab industry

The first sighting of snow crab in the Barents Sea was in 1996 when five crabs were found close to Novaja Zemlja. In 2004 the snow crab was found in the Norwegian zone of the loophole (Artsdatabanken, 2018). Different theories explain how the snow crab might have come to the Barents Sea, one being that the crab came from a part north of the Bering Strait (Artsdatabanken, 2018). Other theories include the crab coming to the Barents Sea as ballast from ship traffic (Alvsvåg, Agnalt, & Jørstad, 2009). In 2011, Jan Sundet at the Norwegian Institute of Marine Research, confirmed that the snow crab had started to establish itself in the Svalbard Fishery Protection Zone (Forskning.no, 2011). The year after, in 2012, the first tonnes of snow crab were landed. In 2015, the Ministry of Trade, Industry and Fisheries, provided 15 vessels with a temporary licence to fish snow crab (Erlandsen, 2015). The number of temporary licences today is 45 but the number changes regularly (personal communication with Norwegian Directorate of Fisheries).

It has not yet been established how big the snow crab population in the Svalbard Fishery Protection Zone is. The spreading might be larger than first expected as the results of the Norwegian Institute of Marine Research's studies show in August 2018 (Sætra, 2018). Russian researchers have estimated the snow crab population to be ten times higher than that of the red king crab (Sætra, 2013). Figure 3 shows the distribution of snow crab in 2017 with the orange part being the main catching area. It is expected that the snow crab will spread from the loophole up to Svalbard.

Until January 2017 the fishery of snow crab was conducted in the loophole in the Barents Sea. As the loophole is in international waters, all nationalities have access to the resources available in these waters. In the period 2014-2016, 19 foreign vessels in total have been registered by Råfisklaget to fish snow crab. In 2016, 18 foreign vessels and 16 vessels from Norway were actively fishing for crab. In January 2017 Russia closed the loophole and the Norwegian vessels had to move to the Svalbard Fishery Protection Zone (figure 3). This was due to the continental shelf belonging to Russia (Kvalvik & Hogrenning, 2018). Stated in the United Nations Convention on the Law of the Sea:

*“The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources” (Law of the Sea, 1994, §6)*



As the snow crab is a sedimentary species, Russia has the right to exclude other countries from harvesting the resource in their part of the loophole (Law of the Sea, 1994). Due to the spreading of snow crab (figure 3), the Norwegian vessels have set their pots along the border to the Russian part of the loophole (Lorentzen et al., 2018).

The Norwegian vessels are now fishing in the Svalbard Fishery Protection Zone. In this zone the fisheries are regulated by the Norwegian government, but all foreign vessels have equal access to the resources in the zone due to the Svalbard treaty (Regjeringen.no 2014). In 2017 a Latvian fishing vessel was arrested by the Norwegian coast guard for illegal snow crab fishing in the Svalbard Fishery Protection Zone. The case has since been through the court system in Norway. The shipowner claims the Svalbard treaty is valid whilst the Norwegian Government disagrees and claims sovereign rights on the continental shelf. The Svalbard treaty does not include the continental shelf and the resources found there. The Norwegian High Court decided February 14, 2019 that snow crab is a sedimentary species and the Minister of Fisheries, Harald Tom Nesvik, claims that the ruling states the snow crab to be a Norwegian resource, meaning it is not allowed to be harvested without a valid quota (Johansen & Hage, 2019). The Latvian shipowner has promised to go further with this case, to the international court system. The future for foreign snow crab vessels in the Svalbard Fishery Protection Zone is yet undecided.

The Ministry of Trade, Industry and Fisheries started to regulate the snow crab industry in 2017. There is a no-catch policy between June 15 until September 15 while the snow crab is molting. The first quota for snow crab in the Svalbard Fishery Protection Zone was set to 4,000 tonnes in June 2017 (Regjeringen.no, 2017). The 4,000 tonnes are the TAC and can be caught by all vessels holding a temporary licence. As the numbers show, the 17 vessels that caught snow crab did not catch the full amount, but were closer to 3,000 tonnes (Kvalvik & Hogrenning, 2018). The legal size for commercially caught snow crab is 100mm (Olsen, Herrmann, Sistiago, & Grimaldo, 2018). It has been registered 30% damaged crab onboard of Norwegian vessels (Ripman & Nøstvold, January 2019). In 2018 there were 8 vessels actively fishing for snow crab (personal communication with Råfisklaget).

The well-established fisheries industries in Norway are regulated by vessel quotas. These quotas are given out for free by the Norwegian government. Fishing the specie, the years before the quota is given out, gives the fishermen a historical right to a quota. The size of the catch decides the size of the quota they receive (Christensen, 2014). After receiving the vessel

quota, the fishermen are free to sell the quota to new entrants into the industry. The price of the quota is decided by the market and many fishermen pay large amounts for their quota (Dinh, 2018).

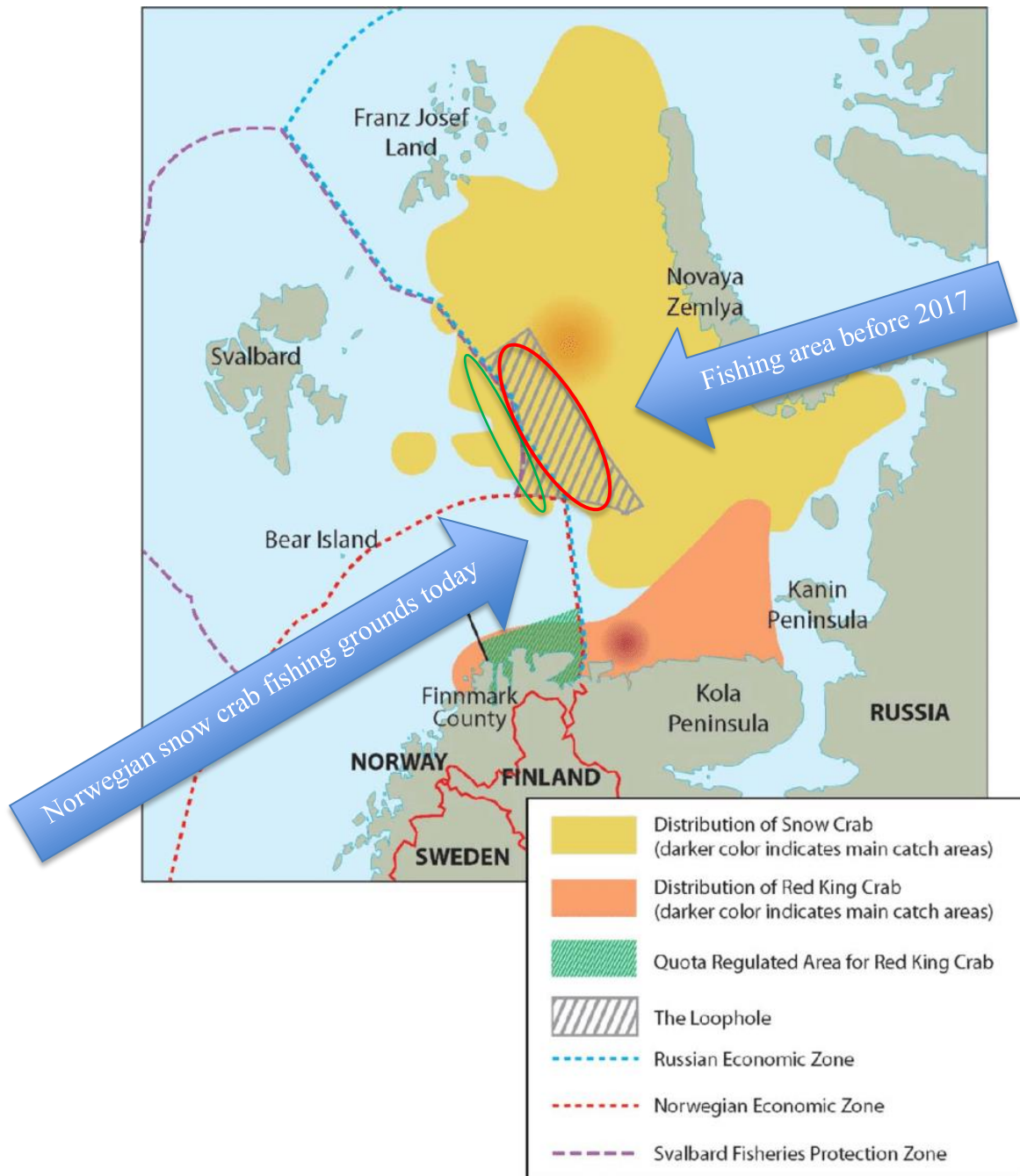


Figure 3: The fishing grounds of the NSCI before and after January 2017. Map from: *Current Status of the Red king Crab (*Paralithodes camtchaticus*) and Snow Crab (*Chionoecetes opilio*) Industries in Norway*, Lorentzen G., Voldsnes G., Whitaker R. D., Kvalvik I., 2017, *Reviews in Fisheries Science & Aquaculture* 26, p. 1-13. Used with permission. Used with permission.

## **4 Research design and qualitative approach**

In this chapter I will explain the reason behind the choice of a qualitative research design followed by introducing the case study including the selection of key informants, the interview, interview guide and analysing the information from the interviews. The chapter will be closed by explaining how to generalize from a case study and how this case study is reliable and valid.

### **4.1 Qualitative research design**

A research design is a “*Logical plan for getting from an initial set of questions to be answered, to a set of conclusions*” (Maxwell, 2013). For this thesis I have chosen a qualitative approach. The reason behind this choice was the lack on of secondary data. A qualitative study is an intensive study where data is collected as words (Jacobsen, 2016). The difference between the qualitative and the quantitative study is the phase of data collection, selection of research units, how to analyse the data, the results and the conclusion. The different phases in the qualitative study are happening almost simultaneous, meaning the collection of data, data analysis, theory development and developing and modifying the research question are influencing each other during the process. The qualitative research design is often seen as flexible as it must be adapted to each situation and the researcher must construct and reconstruct the research design (Maxwell, 2013).

### **4.2 The case**

I have chosen the case study as research design. The case study is often of exploring character where the researcher is trying to look for something new or tries to understand a phenomenon. A case study is an in-depth study of one or few research units (Jacobsen, 2016). Case studies often have a limited timeframe to study a phenomenon. They are considered best for new managerial theories as case studies study phenomenon’s in their context (Gibbert, Ruigrok, & Wicki, 2008). This type of research design is good for in-depth studies and it often results in detailed description of reality. According to Jacobsen (2016), the case study can establish a new understanding, which can lead to new hypothesis and theories. Case studies are good for theoretical or analytical generalization but shows difficulty generalizing statistics from one case to another (Thomas, 2010). This case study is a theory-first approach meaning the theory is the background and the case used to provide insight into an issue, in this case the NSCI. Thomas (2008) mentions that although the case study might be limited in its ability to

generalize. The research is still able to generate a preliminary theory related to the case. The theories developed from this study can be tested in further research.

In this case study the NSCI will be treated as one collective unit. The data will be collected through semi-structured interviews with the key informants with connection to the vessels involved in the NSCI and the Alaskan snow crab industry (ASCI).

#### **4.2.1 Planning and selection of key informants**

Being limited due to time and geographical placement, this study has a small selection of key informants. The Norwegian fleet, which is the focus in this thesis, is small, and therefore the availability of key informants, limited.

The opportunity to interview some players within the ASCI presented itself. As an observer I could join interviews being conducted with key informants active in the ASCI. Those informants were selected for their role in the industry and their availability.

The initial idea for the NSCI was to interview the whole fleet which soon showed to not be possible due to time, and geographical challenges as well as not everyone in the fleet responding to my request for an interview.

The first three interviews were conducted in Seattle, Washington. The interviews were over a timeframe of two days, which limited the number of possible interviews possible.

The interviews in Norway included a total of four entrepreneurs in the NSCI. These key informants represent five active snow crab vessels, about half of the active vessels today.

#### **4.2.2 The interviews and interview guide**

The individual, open interview is one of the most common forms for interviews (Jacobsen, 2016). The reason behind this choice was to get the best possible image of the NSCI and its players. The open individual interview is the best way to collect this information and give the informants the possibility to add, if something was left out.

Individual interviews with open questions allow each key informant to speak freely of their experience in the industry. The theory behind this study says an entrepreneur has certain traits which are determining their success. Separate interviews makes it possible to detect these traits. By interviewing each entrepreneur separately, I will get their individual views on the industry and its development (Jacobsen, 2016). The interviews are to determine how each

entrepreneur has perceived their entry into the NSCI, if their experience was different, or if the challenges and opportunities have been similar.

There was one interview guide for Seattle (Appendix 1) and one for Norway (Appendix 2). Both interview guides were set up in categories with questions in each category.

All key informants could talk freely about their experiences in the industry. The interviews started with the informants being asked if we could record, what the recordings would be used for and that they would be made unidentifiable in the thesis. The informants were also given a contract (Appendix 3) to sign before the interview which explained the procedures about data collection and handling.

Two of the interviews in Seattle were conducted in the head offices of the organizations. One informant in Seattle had two more people over conference call. The last interview was done in a conference center. The interviews were done in English.

Half of the Norwegian interviews have been conducted over phone and the other half have been in the offices of the entrepreneurs. Those interviews were conducted in Norwegian.

### **4.2.3 Analysing the information**

In this thesis I chose to transcribe all interviews word by word in the language the interviews had been conducted in. Laughter, breaks and similar sounds were excluded as well as information told “off record”, which was also not used in the thesis.

The information collected in Norwegian was translated before it was used in the thesis. As much as possible, it was translated directly but, in some places, adjustments had to be made to ensure the information would be understandable in English.

After transcribing and the information collected, I created a table with each theme of the interview, putting questions and answers next to each other to see if they collaborated or not. This way the non-relevant information was filtered out.

### **4.2.4 Generalizing, reliability and validity**

Each research method has its strong and weak sides. Case studies are a good method to start exploring new theories, but validity and reliability are often a challenge. One way to check a case-study for its validity and reliability is to conduct a test to establish the quality of the study. This test also includes internal validity but it is not relevant as it does not apply to

exploratory studies (Yin, 2003). Table 1 shows how the criteria for construct validity, external validity and reliability are applied to the case study of the NSCI.

*Table 1: Validity and reliability in the case study. The criteria for a solid case study, the tactics to ensure the criteria, and when and how they were applied in this study. Adapted from: Yin, R. K. (2003). Case Study Research: Design and Methods (3 ed.): Sage, p. 34.*

<b>Criteria</b>	<b>Case study tactics</b>	<b>Application in general</b>	<b>Application in this study</b>
<b>Construct validity</b>	Use multiple source of evidence	Data collection	Multiple interviews, documents, articles and websites
	Establish chain of evidence	Data collection	Structuring of data
	Have key informants review draft case study report	Composition	Results viewed by interviewees
<b>External validity</b>	Use theory in single case studies	Research design	Choice of single case study over multiple case study Comparison to theory
<b>Reliability</b>	Use case study protocol	Data collection	Followed case study protocol (Appendix 4)
	Develop case study database	Data collection	Organized data collection. Data base.

**The construct validity** is “Establishing correct operational measures for the concepts being studied”(Yin, 2003). The construct validity is about the quality of the operationalization for the relevant concept (Gibbert et al., 2008). The construct validity must be considered while collecting the data as it is about the reality the collective data represents (Gibbert et al., 2008). Having multiple sources of evidence means the conclusion is not based on one source. Instead the researcher uses multiple informants and sources to build a strong case. To ensure the case study has a clear chain of evidence, the steps taken in the data collection are documented and can be followed. This increases the construct validity. One way to ensure this, is to have an interview guide and ensure the multiple interviewees answer the same questions. The answers can then be compared to each other.

The **external validity** is “*Establishing the domain to which a study’s findings can be generalized*” (Yin, 2003). The idea behind this is that the study of the phenomenon must be able to be used, not only in the context it was studied in, but be the start of a theory and followed up with other studies to establish this theory (Gibbert et al., 2008).

**Reliability** is “*Demonstrating that the operations of a study- such as the data collection procedures- can be repeated, with the same results*” (Yin, 2003). Reliability refers to the “*Absence of random error*” (Gibbert et al., 2008). Here, transparency and replication are important. Transparency can be achieved by a case study protocol. The protocol shows the whole process of the case study (Appendix 4). The replication part can be achieved by making a study case database with all the information available so others can repeat the study and achieve the same results (Yin, 2003).

## 5 Results

The results are based on four interviews with key informants in the NSCI, and three interviews with key informants in the ASCI.

Part of the interview focused on how attractive the NSCI is now and why they chose to enter. These questions were asked to give an accurate picture of the situation today, and how it is different from when they entered the industry. This is to show how the attractiveness of the industry changed over the years. To indicate the future development in the NSCI, I will present information from the ASCI and compare these two industries in the next chapter.

### 5.1 The Norwegian snow crab industry

The **entrepreneurs** I interviewed all have an educational background based on vocational training within the fishing industry. All have been, or still are, active fishermen.

There are two types of **firm** structure represented in this case study. One being the typical family owned firm with the whole family active in the business. The other firm structure is different investors, the entrepreneur being one, and owning the biggest share of the firm.

The firms each own a different number of vessels. All vessels are under subsidiary firms, meaning that if one vessel goes bankrupt, it does not affect the others. How the firm employs their crew differs. Some employ their own family members and others employ mostly foreign crew.

Each firm has a **board**. Most of the board members have an educational background in fisheries. The board members who have a different educational background are either related to the owners or otherwise connected to the firm. There is weekly to daily contact between the vessels and the firm offices. The office is responsible for giving relevant information from the vessels to the board.

#### 5.1.1 The entrance

The entrepreneurs and their board entered the NSCI hoping for a profitable industry. They went into the industry, very open minded about the possible profit and were not expecting large earnings the first years. One entrepreneur said they decided they would enter for 3 years and exit if the industry was not profitable until then.



The decision to enter was an impulsive decision for most entrepreneurs. All of them had heard about a new species in the Barents Sea and decided to invest. The snow crab was “*Something new, something exciting.*”. One key informant said his family made the decision to enter, while another said the choice to enter was made during a board meeting:

*«We had a board meeting, discussed a bit and found, ok, we can invest a little bit in that»*

**The vessels** used in the NSCI are vessels which have been used for fisheries of other species. The firms that already owned a vessel chose to remodel, some firms bought a previously used vessel and another bought back a vessel which they had previously sold. One entrepreneur said they had invested a lot into the comfort of the crew members on the vessel, resulting lower turnover within their firm. All vessels are rebuilt and equipped with a factory for onboard production of brine-frozen clusters. Some of the entrepreneurs tried to deliver live crab but decided against it due to the high cost keeping the crab alive until they could be delivered to the processing plant. The vessel factories for onboard production require a high number of crew members and the labour costs on these vessels are high.

The **reasons** why the entrepreneurs invested in the NSCI were different. Some had been following the developing of snow crab for a long time while others had sold their quota share and vessels a time before and were looking for a new industry to enter. Another one had profits from other species and were looking to diversify the firm’s portfolio so they could continue to grow and develop. The **investments** needed to enter the industry came either from their own firm, foreign investors or their own personal wealth. Most entrepreneurs also invested personally in the NSCI.

The **reason to invest** into the NSCI was, according to the entrepreneurs, the expectation of lower investment costs than in other, similar industries because:

*«If you go seine fishing you have to invest 800 million (NOK) for a quota».*

Many other players have exploited the opportunity to obtain a temporary licence to fish snow crab. According to the interviews about 50 temporary licences have been given out but only 8-10 vessels have been actively fishing for snow crab. The actual number of temporary licences today is closer to 45 as the number is changing regularly (personal communication with Norwegian Directorate of Fisheries). According to the key informants, the serious firms invested heavily in rebuilding and equipping their vessels. There are rumours of another

vessel buying 200 pots and using them to go on one trip to catch snow crab. After being given their temporary licence they sell the pots to another vessel and they do the same.

The government has given out temporary licences but no vessel quota. According to my key informants the temporary licence *“Isn’t worth the paper it’s written on”*. The entrepreneurs informed me that the absence of a personal quota per vessel is hindering further investments into this venture because *“No bank will give you a loan without a quota”*.

The **reason why they chose to invest in the fishing industry instead of something else** was their educational background and experience in the industry. One stated *“Stick to what you know”* as why he chose to enter the NSCI instead of investing the money in a different venture. Another entrepreneur said he was confident his firm would succeed because *“We know vessels”*.

The entrepreneurs were optimistic when entering the NSCI, especially during the beginning of their ventures as one claim they had budgets *“So good we did not share them with anyone”*. These budgets were built on optimistic expectations. Now, after two challenging seasons, the entrepreneurs are still optimistic when it comes to the future in the snow crab industry *“If our stock estimates are correct, we will have a profitable industry in 5-6 years”*.

The fishermen active in the NSCI have gained first-hand knowledge on fishing for snow crab in Norway on how and where to set pots: *“Setting them (the pots) up with millimetre precision to maximize the fishing and we started to get an understanding for it.”*

### **5.1.2 Fishing in the loophole**

In the beginning the Norwegian vessels were fishing for snow crab in the loophole. As the first fishing grounds for snow crab were in international waters, foreign vessels joined the fishery in 2014, and the number of vessels steadily increased the following years. The foreign vessels entering the industry heightened the competition between the vessels. According to the key informants the profitability was good, until they got foreign competition.

*“We were 2-3 boats in the Barents Sea and were doing ok alone, but suddenly 30 boats came and that isn’t sustainable at all.”*

In January 2017 the loophole closed, and the profitability of the industry decreased even further. The available fishing grounds for Norwegian vessels changed and one entrepreneur

said: «*Suddenly the Norwegian vessels had many more restrictions on fishing grounds than before*».

The Russians closing the loophole was an unwanted decision by the NSCI but out of their control. After this happened, the foreign vessels disappeared but the Norwegian vessels had to leave as well. This was unexpected for the Norwegian vessels.

*“The foreign vessels disappeared but then Russia kicked out the Norwegian vessels as well, which we hoped would not happen”.*

*“We hoped for an agreement between Norway and Russia so we could continue fishing in the loophole”.*

The new fishing grounds do not supply enough snow crab. The amount of snow crab caught for the last two years has been too small to keep the industry afloat. The entrepreneurs said, when asked about the last two years: *“We and our investor have bled”, “The stock is good but they (the snow crab) are too small”* and *“Not yet so much full-grown crab that it can supply an industry”.*

### **5.1.3 Product**

The frozen snow crab produced onboard the vessels is sold to Japan or the US. According to the key informants *“There is a pull in the market”* for crab. The crab is a natural resource and according to the entrepreneurs, its availability is limited due to natural causes.

Each firm has their own buyer. The buyers have been the same every season, and most firms had a previous engagement with their buyer for another species. Finding a buyer for the product is not a problem as some said that they *“Got requests from other buyers, but we already had one”.*

All active firms have a quality control system in place. Some are given a list of requirements from their buyer, while other buyers send inspectors onboard the vessels to check and sort the snow crab after it is processed and frozen. According to the entrepreneurs the quality of their product is as good as it can get.

According to the key informants, there is a maximum price which the buyer is willing to pay for the product, determined by the market. The amount the market is willing to pay for the

product is decided by the quality of the crab. The biggest factor influencing quality is the crab's size.

According to one key informant, quality is *"The only competitive advantage we can have"*. Quality is important for all firms and it is very important to deliver the product to expectation. One informant said: *"I can say with pride that we have never had a complaint or a price reduction"*. Together with delivering a product with the expected standard, comes a good reputation *"We have a good reputation, I think."*

## **5.2 The Alaskan snow crab industry**

The ASCI is based on the same supply as the NSCI. How much crab the fishermen can catch per quota depends on the annual size of the crab stock. This varies every year and has been confirmed by the key informants.

*"I think that in the last few years that the quotas have been low in crab"*

The ASCI has a very intricate quota system where the fisherman holds one quota and the processing plants another. 90% of the quota from the fishermen needs to be delivered to a processing plant within a certain area. The last 10% can be sold on the open market. Each quota is limited to fishing grounds within a certain area. The processing plants also possess a quota meaning they have the right to 90% of the fishermen's quota. The fishermen are required to deliver their quota to one of the processing plants in their area of fishing. The snow crab is not the main species for the processing plants which compiles the fishermen and their vessels to wait until a plant is ready to take and process the crab. The fishermen in the ASCI deliver live crab to a processing plant which then handles the crab after the customers' orders. The fishermen will get an advance of 85-90% of the expected price on their payment. When the processor has sold the product, the fishermen will receive the rest of the payment of the final price. There are rules set to ensure the fishermen get their payment and *"After rationalization the power is with the fishermen"*.

Rationalization (the crab capacity reduction program) changed the ASCI and how the power is divided between fishermen and processors. According to the key informant, the ASCI is lucrative for the fishermen but not the processors. There are few recruits to the ASCI as one needs a quota to enter *"So the doors have been closed since rationalization"* and *"It's very hard for new entrants to get in."* It is possible to enter by buying or renting a quota and as the

fleet and its captains are aging. This is a challenge and there is a need for recruitment into the ASCI.

*“We are trying to help younger guys or new entrants in our fisheries to have an opportunity to, you know compete and be involved and have a future”*

There has been an effort in the ASCI to stop illegal fishing of snow crab in other countries as this also affects the market. The illegal crab is sold on the same markets they sell their product and illegal caught crab, can to a certain extent, substitute Alaskan snow crab.

*“There have been rigorous amounts of illegal fishing going on and tons and tons of unregulated, unreported catch going into the Asian market, and American market.”*

According to the key informants in the ASCI, there is competition between the vessels on fishing grounds but as everyone has their quota it is limited to that. Before the individual quota, there was a lot of competition.

*“4-5 days and then you might get a month and a half of Opilio fishing and then the quota was cut”.*

*“Previously it was a race for fish so the quota would be announced, the gun would go off, everyone would charge out.”*

*“Now you have your quota, and it becomes about efficiency. Becomes about not burning as much fuel, catching as much crab.”*

After the individual quota and rationalization, the fishermen have been able to focus more on efficiency and quality. The key informants in the ASCI were also very clear that they handle each snow crab with a lot of care: *“Each crab is treated like a celebrity”*. How to handle the crab changed when the crab stocks decreased, and the fishermen understood that *“They have to take care of the resources”* and they adapted their way to treat the crab. The weather can influence the quality of the crab as those *“Drop a leg”* when the temperatures are getting too low. The crabs which drop all their legs are called *“Hockey pucks”* by the fishermen and disregarded. Due to the careful treatment, the ASCI does not have more than 5% damaged crab on their deliveries.

The fishermen in the ASCI have discovered large stocks of snow crab below legal catching size. These crabs are all mature, and according to the key informant, they will not increase in

size. If the water temperatures increase, the industry has to move further north where there is not infrastructure for processing and the snow crab below legal catching size.

### 5.3 Attractiveness of the industry and the industry life cycle

Table 2 discloses that the attractiveness of the industry was supposed to be less investment heavy than a similar venture within fisheries. The firms have access to the snow crab for free but there is not enough crab. Their investments are the vessels, but they do not need to invest in a quota. The entrepreneurs hope for an individual vessel quota, given out by the Norwegian government to the vessels actively involved in the NSCI. There is no indication as of when this could happen. The development of the industry is challenging due to the small amount of crab and the lack of individual quota, which limits bank loans necessary to invest and develop further.

*Table 2: The five forces (power of supplier (access to resource), power of buyers, threats of new entrants, threats of substitutes and rivalry among existing competitors) applied to the NSCI and ASCI and which force influences the industries attractivity. Built on Porter (2008).*

<b>Force</b>	<b>Applied to the NSCI</b>	<b>Applied to the ASCI</b>
<b>Power of suppliers (access to resource)</b>	The supply is based on the biological production of wild snow crab. There is a total quota regulated by the Norwegian state.	The supply is based on the biological production of wild snow crab. There is an individual quota given out based on historic catch and a quota for production plants.
<b>Power of buyers</b>	The snow crab is sold to foreign companies exporting to the US and Japan. Some buyers are vertically integrated by investing in the firm. All firms have gotten several requests from buyers, other than the ones they sell to.	The production plants own a quota, which forces the fisherman to sell the crab to a plant in a certain area. The snow crab is sold to national and foreign companies selling the crab on the US market and exporting to the Asia. Some of the vessels and plants have the same owner and are vertically integrated.

<b>Threats of new entrants</b>	Institutional-, knowledge-, and investment barriers limits entrants. According to the “Participation Act”, to be allowed to own a fishing vessel, a fisherman must have been active at least 3 out of the last 5 years (Deltakerloven, 2000). The snow crab industry needs specially equipped vessels.	Institutional barriers limits entrants. There is an individual quota based on historic fishing rights putting limitations on who can enter the industry.
<b>Threats of substitutes</b>	The market demand is high and there is no threat of Norwegian snow crab being substituted by crab from other countries.	There is a pull in the market for snow crab, but they can be underbid with snow crab from other countries and illegal caught crab.
<b>Rivalry among existing competitors</b>	There is little to no rivalry amongst the active vessels. customers, suppliers and crew.	There is rivalry about the best fishing grounds.

In the ASCI the fishermen get the snow crab for free, but the industry is heavily regulated giving processing plants a quota to process and limiting new entrants into the industry. As each fisherman holds a quota there is only competition for the best fishing grounds.

Before January 2017 the NSCI was in the high- growth stage of the ILC due to the high number of vessels fishing in the loophole and “*Suddenly 30 boats came.*” Many players entered the industry because of the low barriers of entry. When the Norwegian vessels were fishing in the loophole there was a lot of competition at sea that affected their way of fishing and how much they would catch. Specifically, they would no longer be able to set the pots where they wanted to but had to turn as many pots per day as possible to catch enough crab.

*“Suddenly it was all about setting out as many pots as possible and be able to pull as many as possible in a day. Even if you were not really able to set them where you should have.”*

After January 2017 the Norwegian vessels started fishing in the Svalbard Fishery Protection Zone. The fishing rights in this area are still to be established in the international court system. Until now, the Norwegian government has claimed the right over the area.

There is no rivalry between the Norwegian vessels. The lack of results is not due to many rivals but the low stock of snow crab in the territory where Norway has claimed sovereignty. The only competition is on fishing grounds, meaning they do not share information directly with other vessels when they have found an area with a lot of snow crab. According to the entrepreneurs this competition is: *“How it’s supposed to be in fisheries”* and is not specific to the NSCI. This was also confirmed in the ASCI, there always is, and always will be, competition for the best fishing grounds. According to the key informants in the ASCI, the snow crab has no regular movement pattern and can be found different places every year. This makes it possible for one vessel to get a good catch while others do not catch the same amount of crab.

In the ASCI the barriers of entry have increased. The Government took charge and regulated how many vessels could be active in the industry. The vessels that are left can make a living from fishing snow crab. The key informants in the ASCI confirmed that the industry could, due to the regulations, focus on delivering better quality of the product and stabilize the number of vessels active in the ASCI.

*“Years prior to rationalization we would see the declining stocks, there were just so many boats fishing that there wasn’t really enough for us to make a lot of money for a lot of years. It was just overcapitalized”*



Table 3: The stages of the ILC (the development-, high-growth-, shake-out-, maturity- and decline stage) in the NSCI before and after 2017 and the ASCI, identified through the five forces (power of supplier (access to resource), power of buyers, threats of new entrants, threats of substitutes and rivalry among existing competitors) Built on McGahan (2000) and Porter (2008).

Stage	Five forces	NSCI before 2017	NSCI after 2017	ASCI
<b>Development</b>	Few players High initial investments Low barriers of entry		Few vessels High investments in vessels	
<b>High-growth</b>	Low buyer power Few players Low barriers of entry	No vessel quota for entry	No vessel quota for entry  Many buyers	
<b>Shake-out</b>	Higher barriers of entry Higher competition for new entry	Competition for resources Many players		
<b>Maturity</b>	High buyer power High barriers of entry			Individual vessel quota-high barriers of entry  High buyer power
<b>Decline</b>	Extreme rivalry Many exits			

Table 3 shows the different forces present in the NSCI before 2017, and after. It also shows the forces in the ASCI. The forces present determine which stage of the life cycle the industries are in.

## 5.4 The future

The entrepreneurs in the NSCI are still looking towards the future as the crab in the Svalbard Fishery Protection Zone is claimed to soon be above legal catching limit but *“We have to have the money to wait for that long”*. None of the entrepreneurs said they were thinking about exiting the industry as they invested in rebuilding and equipping vessels, *“If we exit now, we lose everything”*.

The entrepreneurs mentioned their strategy develops as time goes by, due to the governmental powers that influence the industry. The goals for 2019 are all similar: *“Better than last year”* *“Come out with zero”* *“As good as last year”*

The long-term goals and strategy are claimed to be “*Make more money*” or “*Have a profitable industry*”.

The ASCI has existed for a long time and there are many regulations in place. The industry is closed for new entries due to the individual quota. One of the biggest challenges is the “Greying of the fleet” meaning the active fishermen holding a quota getting older and not enough new recruits into the industry.

## 6 Discussion

This chapter discusses the opportunities and threats in the NSCI, combining theory and results to answer the problem statement of this thesis “*Which opportunities and threats have the entrepreneurs met since their entry into the Norwegian snow crab industry?*”.

### 6.1 Resources

**The entrepreneur** is the one starting the process of entering an emerging industry and taking the risk. According to Garrison (2005) the entrepreneurs think about future demands. This is what the entrepreneurs did, entering the NSCI. They took the opportunity the snow crab represented. So far, the risk to enter the industry has not paid off.

The entrepreneurs in the NSCI are **optimistic**, which is a typical trait of entrepreneurs. Optimism is necessary to dare taking the risk of entering an emerging industry, but it does not guarantee a profitable venture. The NSCI is not profitable yet, still, the entrepreneurs are optimistic that success will come, because of their knowledge of the fishing industry. Knowledge can be an advantage if applied correctly. **The board** of the firm can create competitive advantage by applying their knowledge to their strategy. The strategy must be adapted to the changes happening in the industry, such as changed government regulations. The boardmembers in the NSCI have a background from the fishing industry. They could use their knowledge and understanding of the industry to focus on the situation outside the firm to adapt the strategy accordingly. The board should have a strategy for the future and know how to handle competition because many temporary licences are given out. This is a threat, which can be limited by putting pressure on the government for individual quotas or securing crew members with knowledge on how to effectively fish crab. The board could also make a strategy to increase their product range. If the board uses their knowledge of the industry, and follow up with the markets demands, they can develop the flexibility necessary to deliver the product the market wants.

Onboard the vessels it is the low amount of snow crab that represents a challenge.

**Knowledge** about the best fishing techniques and the movements of the crab are valuable. They can result in better catches and according to theory, keeping crew with valuable knowledge can result in better profitability. It could increase effectiveness and decrease the amount of damaged crab.

It is not possible for the NSCI to control how much crab they will catch or the size. They control how they handle the crab and what **quality** they achieve. The key informants say that they have reached the maximum price for their product. The ASCI has substantially less damaged crab than the NSCI and it should be possible to reduce the percentage of damaged crab in the NSCI. The Alaskan fishermen started to treat each crab “*as a celebrity*” after gaining increased knowledge about their resource. It is possible that the NSCI and their fishermen are not at the same level of understanding. To treat the Norwegian crab “*as a celebrity*” represents a possibility to increase the quality.

As snow crab is a natural resource, the **threat of substitution** is unlikely. However, there is the possibility of NSCI being substituted by snow crab caught in other countries and even though there is no substitution for snow crab today, there might be in the future. The ASCI has faced challenges with illegal caught crab, and it can be a challenge for the NSCI in the future. As the snow crab is caught by other countries as well as Norway, the NSCI is competing in a global market. Changes in other parts of the world can affect the industry’s profitability. If the quotas in other countries increase, the market will be increasingly saturated and there is a possibility the Norwegian crab will be underbid.

**The vessels** actively fishing for snow crab are rebuilt and specially equipped. The firms have invested in rebuilding, but they did choose to use older vessels. This might be due to the risks present in the industry or because it is very difficult to get a bank loan when there is no individual quota. This limits the future development of the industry. Older vessels are not as effective as new ones, and if the firms are unable to get a bank loan, it will be difficult to try other catching methods or deliver live crab. As the vessels have invested in onboard production, the labour costs are high for each trip. If the production method is made more effective or adapted to needing less crew, the expenses will decrease, and the profitability rise.

There is a pull in the market for frozen snow crab and all firms in this study have gotten requests from other buyers. The active vessels in the NSCI deliver the same product and have similar quality controls in place. Because of that, it is at this point in the research not possible to establish if a more flexible production would give a competitive advantage.

For the future, a more differentiated product could give a competitive advantage and possibly make the resource inimitably and non-substitutional. As of today, if the market starts asking

for a different product the firms will not be able to deliver that. The frozen clusters are today the product their buyers want. If the firm wants to, or must, change buyers they might have to deliver other products. Having the possibility to change to another buyer would give the firm more flexibility as they do not rely on only one buyer. Theory shows that changes can happen rapidly, and it is important to be prepared and able to adapt to changes in products and buyers (Dreyer & Grønhaug, 2004).

By entering early, the entrepreneurs were able to enter the industry at a low cost. As the venture has been funded partly by their own capital the entrepreneurs stand at risk to lose their investments if they choose to exit before the industry creates a profit. The active vessels have all secured a **historical right to quota**. That is, if the government decides to give out a quota. This is still uncertain. There is a possibility all vessels which have caught snow crab will get a quota. If the quota is not linked to the amount of historical catch, the quotas might be too small for the vessels to create a profitable business and they will have to purchase additional quotas. If the government does not give out large enough quotas for the active vessels to make a profit, the industry will suffer. The risk giving out too many quotas is illustrated by ASCI's "vessel licence" followed by the "crab capacity reduction program". The quotas from 2000 were too small for each vessel and the government had to buy out vessels in 2004 and divide their quotas on the vessels left in the fishery. In the NSCI, catching snow crab cannot be combined with other fishery due to the vessels being specialized for snow crab. If there will be an individual quota, the government must ensure the vessels can make a profit on the quota they are given.

An individual quota would limit the new entrants, which looking at the ASCI, will be necessary when the industry increases its profitability. Right now, the NSCI has many threats linked to the lack of individual quota and the low crab stock in the Svalbard Fishery Protection Zone. The early entrance is an advantage if it counts towards a historical quota, it is a first-mover-advantage. If the entrepreneurs would exit now, they are giving up their historical right to a quota.

Table 4 discloses five resources available to the entrepreneurs and their firms in the NSCI. Crab as a natural resource, vessel and historical fishing right are resources the firms already possess. The snow crab is a natural resource which is valuable, rare, inimitable and non-substitutional on the world market. The value and rarity of snow crab can decrease if the

market is saturated by increased quotas in other countries. It is not determined in this study how big the threat of substitutions is to the NSCI.

*Table 4: The five competitive advantages (crab as natural resource, vessel, historical fishing right, knowledge about the industry and product quality) to the entrepreneurs and their firms in the NSCI applied to the VRIN-model. Built on Barney (1991).*

<b>Resource</b>	<b>Valuable</b>	<b>Rare</b>	<b>Inimitable</b>	<b>Non-substitutable</b>
<b>Crab as natural resource</b>	Yes	No	Yes	No
<b>Vessel</b>	Yes	Yes	No	Yes
<b>Historical fishing right</b>	Yes	Yes	Yes	Yes
<b>Knowledge about the industry</b>	Yes	Yes	Yes	Yes
<b>Product quality</b>	Yes	Yes	No	Yes

The vessels are valuable and rare to the firms as there are few vessels equipped to fish snow crab. It is possible to build new vessels or adapt existing ones and equip them. This resource is not inimitable. To be active in snow crab special vessels are needed and it is not possible to substitute the vessels.

The vessels that have been catching snow crab have secured a historical fishing right. This right is valuable if the government gives out vessel quotas based on the catch. The historical fishing right is rare and cannot be imitated. It cannot be substituted, but an individual quota could be bought if someone decides to sell their quota.

The last two (knowledge and product quality) are fully developed in the NSCI but are important in the ASCI. Knowledge about the snow crab industry is valuable, rare, inimitable and non-substitutable. If the players in the industry gain more knowledge, it can give them a competitive advantage to new entrants.

Increased product quality will increase the product value. It is rare and non-substitutable. How to achieve better product quality is not inimitable unless the methods are kept secret to other players.

## 6.2 Attractivity and industry life cycle

The players in the NSCI faced a big challenge when they had to move fishing grounds. Investors are interested in favourable industries, with low forces. This was the case with the NSCI when the first players entered. The decision to enter was primarily based on the stock prognosis in the Russian part of the loophole.

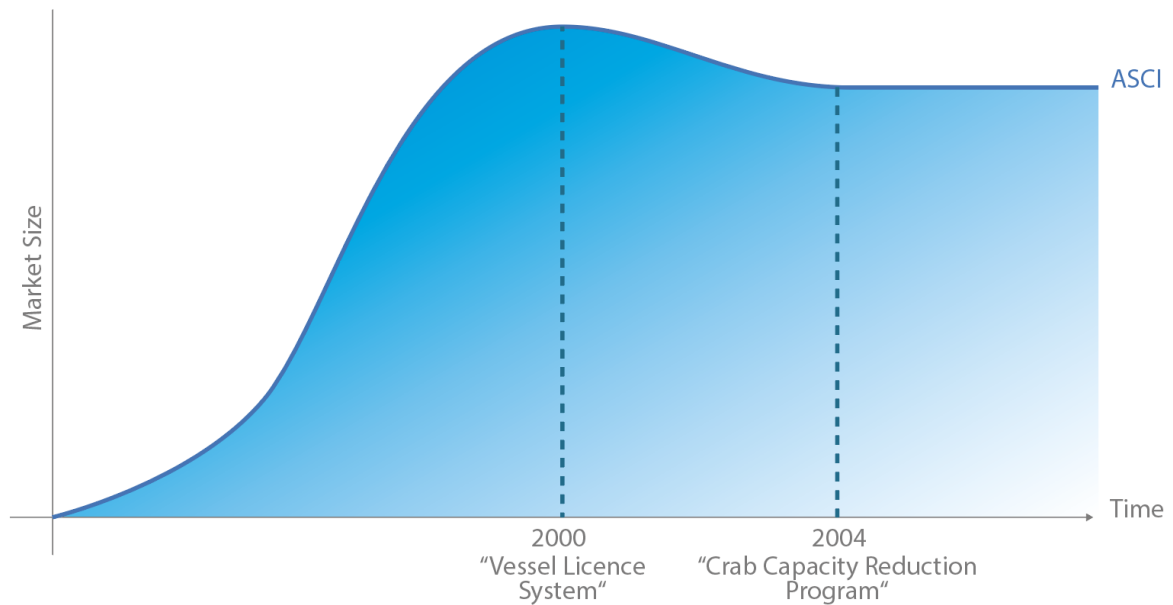
The Norwegian vessels and their firms were not prepared for the closing. Snow crab is a sedentary species and the Law of the Sea, which states the right over the continental shelf, is from 1992. It was clear from the beginning that Russia could claim sovereignty over the area. When the Institute of Marine Research and the Minister of Fisheries made their prognoses for how valuable this species could be, they did not mention that the loophole would be closed. If the information from the government and research institutes were not so optimistic, fewer might have taken the risk. The profitability was hyped up and not realistic. The fishermen were never really given the full truth about the situation.

For the last two years there has not been enough the wild snow crab above legal catch size for the industry to be profitable. The lack of profit has been hard on the entrepreneurs and their firms. No one has said they will exit, but it has become very clear that they need to start making profits soon or they might not have another choice and exit.

The future for Norway's sovereignty over the fishing grounds is not determined. The Latvian vessel convicted for illegally fishing snow crab will take their case to the international court system and the outcome is out of control from the NSCI. If the court decides to open the fishing grounds to international vessels the NSCI is facing an unknown level of competition.

The NSCI and its active players is facing an uncertain future when it comes to the level of competition due to lack of regulations. This is very similar to how the ASCI developed over time and players in the NSCI can use similar industries to see which resources have proven valuable, identify them in their own firm, and develop these further.

Figure 4 shows the ASCI and its ILC. The regulations from the government from 2000 and 2004 positively influenced the industry. In 2019, several years after the rationalization, the quota holders are getting older and this puts the future of the industry at risk. According to the key informants they support new-, and serious recruits to the industry. This is necessary to ensure there will be a future for the ASCI.



*Figure 4: The Industry life cycle of the ASCI. The combination of the “vessel licence system” in 2000 and “crab reduction program” in 2004 stabilized the ASCI in the maturity stage and avoided the decline stage. Built on McGahan (2000).*

According to Johnson (2017), there is no direct rivalry within the early life stages of an industry, which lowers the strength of the forces that make the NSCI attractive for entrants. That the NSCI is in the early life stages is shown clearly by the fact that there is very limited rivalry between the vessels. How fast this can change was shown by the international vessels entering the loophole and challenging the Norwegian vessels and their way to fish.



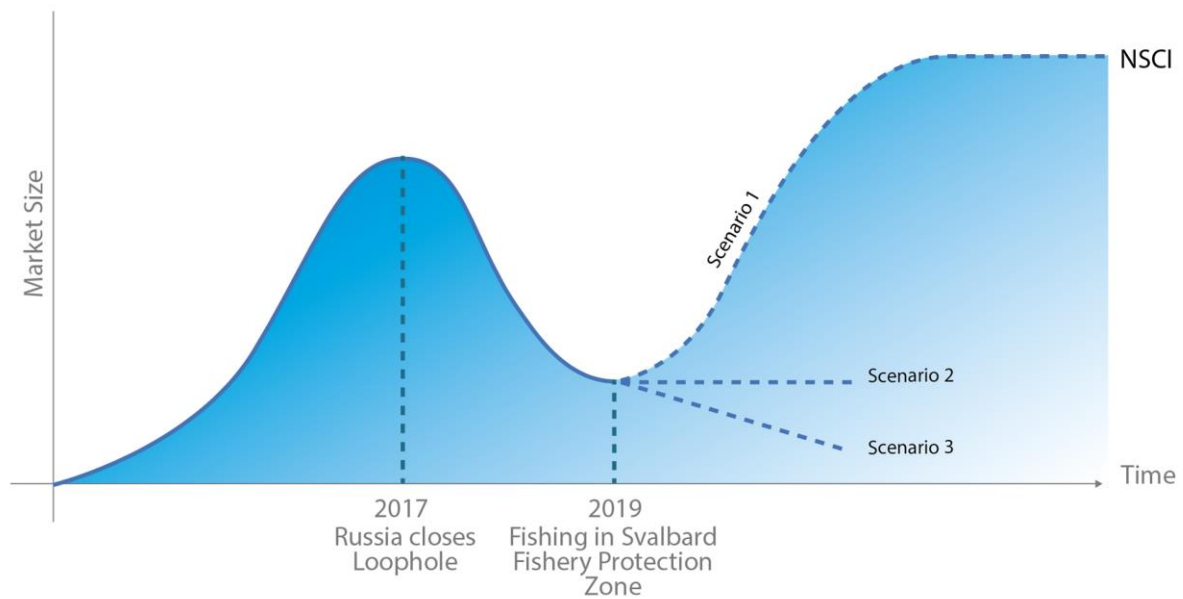


Figure 5 The life cycle of the NSCI. Russia closing the loophole in 2017 led to the situation today, in 2019 fishing in the Svalbard Fishery Protection Zone, from where there are three possible scenarios for the future: a collapse, a stagnation and an increase. Built on McGahan (2000).

Figure 5 shows the ILC of the NSCI. The industry was well in the developmental stage until 2017, when the loophole closed. Different fishing grounds and fewer vessels to compete against has brought the industry to a point where there are three possible scenarios for the future. Scenario 1 being the stock of snow crab increasing and the NSCI growing. If this happens, the industry needs more regulations. Scenario 2 is the snow crab stock not increasing and no new vessels entering the industry. It is possible that players will exit the industry if it is not profitable in the long run. Scenario 3 is the stock of snow crab decreasing and the industry disappearing due to lack of natural resources.

## **7 Conclusion**

The study has shown that the biggest opportunity gained by early entry into the NSCI is securing the historical fishing right. Knowledge about the industry and increased product quality are opportunities which can be further developed and become a competitive advantage in the future.

The biggest threat to the industry is the low crab stock. There is not enough crab above legal catching size to maintain a profitable industry. 45 vessels have a temporary licence and if the amount of crab increases, more vessels might join the venture. If the number of active vessels increases, it will heighten competition and influence the industry's profitability. The threat international vessels represent is not yet determined and the future decisions, out of control from the industry. The attractiveness of the industry has changed over time and it might change again. If the entrepreneurs are set on continuing in the industry, they need to be able to quickly adapt to changes.

History from a similar industry shows that too many players are a threat to the crab stock and the industry. This has also been confirmed by the entrepreneurs in the NSCI. An individual quota based on historical catch would increase the barriers of entry and decrease the threat of international vessels as these now, do not have the possibility to catch crab in the Svalbard Fishery Protection Zone.

The NSCI needs to be regulated. The fishermen in this venture have shown persistence, invested and risked a lot to enter and stay. Their future needs to be secured and so needs the sustainability of this industry.

## **8 Further research**

For further research I suggest comparing the quality of delivered snow crab against the price the vessels achieve. There might be possibilities to increase the quality of the snow crab caught by Norwegian vessels.

The Norwegian government has provided many vessels with a temporary licence to catch snow crab. Further research should be made on how large the snow crab stock in the Svalbard Fishery Protection Zone needs to grow to provide a profitable and sustainable industry for all vessels holding a snow crab licence.

There have been discovered stocks of mature, small crabs in Alaska which are of no commercial interest for the industry due to their size. Further research of the Norwegian snow crab should determine the average size of mature snow crab in the Svalbard Fishery Protection Zone.

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# Appendix

## Appendix 1- Interview guide Seattle

Could you tell us about you and the background/history of your organization?

- Why are you active on social media?
- How many vessels/companies?
- How many vessels of the SCI are represented by your organization?
- Do you get new members in your organization? – does the SCI grow?
- Is it considered an attractive industry? Why/why not?
- All over performance in the SCI?
- How do you get into the industry? (quota)
- Do you need special skills and/or knowledge/education to be or to start in this business?
- How important do you consider personal knowledge/education to succeed in the SCI?
- Is it considered a risky business? Why/why not? (investments)
- Ownerstructure of the fleet (several quotas/vessels/other species)

Access of skilled labour?

Could you describe the industry structure?

- Buyer/seller system – is the price/quality set? (negotiable)
- Is it a very competitive industry? (horizontal or vertical)
- Ownerstructure of the production/first hand buyer
- Foreign investors? Industry/fleet
- Is access of labour a challenge? Why/why not
- Foreign labour? (country of origin)

Harvesting pattern

- Could you describe the catching process?
- Live catch?
- Quality?
- Survival rate
- Damages

- How was it before, how is it now? (development/innovation)
- Do you change the catching process? (onboard production. Why/why not?)
- Where do you fish, what and when
- Does the fisheries close? (for molting)

#### The future

- What is your biggest challenge now?
- How much would a declining population of SC affect you?
- How will you meet these challenges (innovation)?
- Is the industry open for innovation?

## Appendix 2 – Interview guide Norway

Kan du fortelle litt om din bakgrunn og hva som fikk deg til å satse på snøkrabbe

### Entreprenør

- Hvilken utdanningsbakgrunn har du?
- Hvilken erfaring har du fra før?
- Hva var grunnen til at dere tok risikoen til å satse på snøkrabbe?
- Hvorfor valgte du å investere i snøkrabbeindustrien? (fremfor en annen industri?)
- Hvordan har dere klart å finansiere satsingen? (Kvote, EK)

### Industriens attraktivitet

- Hvor attraktivt var det å investere i snøkrabbeindustrien? (fremfor en annen industri?)
- Hva er fordelene med å investere i snøkrabbeindustrien? (ingen fartøyskvote)
- Hva var grunnen til at du investerte i snøkrabbeindustrien?
- Hvem selger dere snøkrabben til?
- Opplever dere konkurranse mellom båtene? (hvis ja, om hva? - kunder, mannskap, leverandører)
- Opplever dere internasjonal konkurranse?

### Firma

- Kan du forklare litt om hvordan firmaet er bygget opp?
- Hvordan ivaretar dere kvaliteten på produktet? (kan dette forbedres?)
- Får dere bedre betalt for god kvalitet?
- Har dere et konkurransefortrinn foran de andre båtene?
- Har dere en konkurranseulempe foran de andre båtene?

### Styret

- Hvilken strategi har dere kort-, og langsiktig?
- Hvorfor fortsetter dere i industrien når så mange andre har sluttet?
- Hva er målene for i år?
- Hvordan er kontakten mellom styret og båten?
- Hvilken bakgrunn har styremedlemmene?

### Prestasjon

- Hvordan er lønnsomheten? (også i forhold til konkurrentene)
- Er den som forventet? (hvorfor/hvorfor ikke)
- Hva var den forventede prestasjonen?
- Angrer dere for å ha gått inn?



## **Appendix 3- Contract Norway**

### **Vil du delta i forskningsprosjektet**

#### **” (SnowMap)”?**

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet i vår arbeidspakke er å videreutvikle teori rundt markedsorientering og strategi for små og mellomstore bedrifter. For å gjøre dette ønsker vi bruke Snøkrabbenæringa som eksempel, da denne næringa gir unike muligheter til å følge en ny næring under utvikling. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

#### **Formål**

Hele prosjektet SnowMap skal bidra til å løse identifiserte utfordringer og sluttbruker behov for å sikre bærekraft i den nye og voksende snøkrabbenæringa. Prosjektet er et verdikjede prosjekt som ser på alt fra teineutvikling, produksjonsoptimalisering, restråstoffutnyttelse i tillegg til forvaltnings- og markedsutfordringer. WP 5 ser spesifikt på markedsorientering og strategiske valg under etablering, utføring og håndtering av nye utfordrende situasjoner. Dette arbeidet vil også overføres til å rent teoretisk utvikle dagens teori rundt strategi og markedsorientering av små og mellomstore bedrifter. Data innsamlet i WP 5 vil være del av en master og en phd, i tillegg til å bidra til optimalisert fokus i de andre arbeidspakkene.

#### **Hvem er ansvarlig for forskningsprosjektet?**

Nofima As er ansvarlig for prosjektet, og forsker Bjørg Nøstvold for WP5. Innsamlet data i WP 5 vil deles med Prof. James Young ved University of Stirling i Skottland (samarbeidspartner på arbeidspakke 5) og Bernt Bertheussen ved universitetet i Tromsø (veileder for master og phd student). Anonymisert data vil, så snart alle personopplysninger og lydfiler er slettet, kunne deles med andre,

#### **Hvorfor får du spørsmål om å delta?**

Du får spørsmål om å delta på bakgrunn av din posisjon som aktør i snøkrabbenæringa. Vårt mål er å samle data fra så mange som mulig av aktørene som både har vært, er og ønsker å være en del av denne næringa. Aktører vil være både redere, eksportører og skippere.

Informasjon om deg er innsamlet via internett, personlig nettverk og proff.no. Informasjonen innhentet er kontaktinformasjon og informasjon om fartøyet og drift (størrelse, kvoter, antall ansatte i bedriften, økonomi i bedriften).

### **Hva innebærer det for deg å delta?**

Hvis du ønsker å delta vil vi møte deg til et personlig intervju hvor du også vil svare på et spørreskjema. Hvis du tillater vil intervjuet tas opp på diktafon. Lydopptaket vil senere transkriberes, men da vil all informasjon om hvem du er fjernes og teksten vil anonymiseres. Transkripsjonen vil lagres men lydfilen vil slettes etter prosjektslutt. I tillegg vil du svare på et kort standardisert spørreskjema om markedsorientering. Spørreskjemaet vil inneholde separat link mellom ditt intervju og skjemaet. Skjemaet vil ellers ikke inneholde noen personopplysninger eller kunne kobles tilbake til deg etter prosjektet er avsluttet. Det er frivillig å delta

### **Det er frivillig å delta i prosjektet.**

Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

### **Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger**

Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Navnet og kontaktopplysningene dine vil jeg erstatte med en kode som lagres på egen navneliste adskilt fra øvrige data. Du vil heller ikke kunne identifiseres i noen av publikasjonene. Eventuelle siteringer vil kun benevnes «skipper», «reder», «eier» uten navn på selskap, båt, deg eller annen identifiserbar opplysning.

### **Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?**

Prosjektet skal etter planen avsluttes 31.12.2019. Alle personopplysninger og lydfiler vil da slettes. Transkripsjonen vil lagres for å muliggjøre analyser i historisk perspektiv, men all identifiserbar data (som navn, sted, båtnavn etc) vil fjernes fra dokumentet. Spørreskjemaet vil fortsatt linkes til intervjudata, men disse vil som sagt være uten informasjon som kan kobles til deg.

## **Dine rettigheter**

Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

## **Hva gir oss rett til å behandle personopplysninger om deg?**

Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra Nofima AS har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

## **Hvor kan jeg finne ut mer?**

Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- Bjørg Helen Nøstvold ved Nofima AS. Kontaktopplysninger: e-post: [bjorg.nostvold@nofima.no](mailto:bjorg.nostvold@nofima.no), tlf: 77629041.
- NSD – Norsk senter for forskningsdata AS, på epost ([personvernombudet@nsd.no](mailto:personvernombudet@nsd.no)) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig

Eventuelt student

(Forsker/veileder)

## **Samtykkeerklæring**

Jeg har mottatt og forstått informasjon om prosjektet (sett inn tittel), og har fått anledning til å stille spørsmål. Jeg samtykker til:

- å delta i intervju
- å delta på spørreskjema

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet, ca. (oppgi tidspunkt)

-----  
(Signert av prosjektdeltaker, dato)

## Appendix 4- Case study protocol

<p><b>Background</b></p>	<p><b>Previous research on the topic:</b> Research on the biological aspects of the snow crab</p> <p><b>Main research question:</b> <i>“Which opportunities and threats have the entrepreneurs met since their entry into the Norwegian snow crab industry?”</i></p> <p><b>Additional research questions:</b> What were the entrepreneurs background and motives?  Why did they choose to enter the NSCI? (instead of another industry)  What is the board members educational background and relation to the firm?  Does the firm have a competitive advantage?  Are the results as expected?</p>
<p><b>Design</b></p>	<p><b>Single-case and qualitative study</b> As the key informants must be non-identifiable, the industries must be treated as one case.</p> <p>Personal expectations and experiences are of importance to answer the research questions.</p> <p><b>Object of study</b> The NSCI and its development</p>
<p><b>Data collection</b></p>	<p><b>Data to be collected</b> Personal interviews with key informants in the industry</p>

	<p><b>Data collection plan</b></p> <p>Interviews with key informants. Personal or over phone. The interviews will be recorded and transcribed after the interview. Each interview will follow the same interview guide.</p> <p><b>Data storage</b></p> <p>The data will be anonymized and stored on Nofimas server.</p>
<b>Analysis</b>	<p><b>Criteria for interpreting case study findings</b></p> <p>Analysis were done where done while the study task progresses</p> <p><b>Plan how to use which data element to address which research question</b></p> <p>All answers to the research question on a table for comparison</p>
<b>Validity</b>	<p><b>Construct validity</b></p> <p>Multiple interviews, documents, articles and websites for data collection</p> <p><b>External validity</b></p> <p>Choice of single case study over multiple case study</p> <p>Comparison to theory</p>
<b>Study limitations</b>	<p>Limitations documented before, during and after data collection and analysis.</p>
<b>Reporting</b>	<p><b>Target audience</b></p> <p>Master thesis available for all audiences</p>
<b>Schedule</b>	<p><b>Theory</b> – August 2018 to December 2018</p> <p><b>Interview guide based on theory</b>- November- December 2018 (Changed to February-March 2019)</p>

	<p><b>Data collection-</b> January to February 2019 (Changed to February to March 2019)</p> <p><b>Transcribing-</b> January- March 2019 (Changed to February- April 2019)</p> <p><b>Analysing-</b> February-April 2019 (Changed to April- May 2019)</p> <p><b>Results-</b> April 2019 (Changed to April-May 2019)</p>
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