



## Fishing for an institution-based first-mover advantage: The Norwegian snow crab case

Bernt Arne Bertheussen<sup>a,\*</sup>, Bjørg Helen Nøstvold<sup>b</sup>, Ida Ruiken<sup>c</sup>

<sup>a</sup> UiT The Arctic University of Norway, Pb 6050 Langnes, 9037, Tromsø, Norway

<sup>b</sup> Norwegian Institute of Food, Fisheries and Aquaculture Research (Nofima), Norway

<sup>c</sup> UiT The Arctic University of Norway, Norway

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### ABSTRACT

When the first Norwegian commercial catch of snow crabs was taken in the Barents Sea in 2012, an unexpected opportunity arose to create a new, profitable natural resource-based industry. However, hidden under the surface were massive biological, technological, and institutional uncertainties. This study first explores what motivated the entrepreneurs to invest in an industry exposed to extreme uncertainty and which firm and vessel resources were necessary to operate. The findings uncovered that most of the entrepreneurs had already exited another fishery with a profit. Thus, they were looking for new attractive business opportunities where they could apply resources and capabilities already accumulated. Furthermore, this study asks if there have been any survival-threatening challenges so far in the industry. The findings show that increased competition and the Russians closing the Loophole dramatically changed the opportunities for profitable fishing. Finally, the study discusses whether the players have the potential to gain a sustained institution-based first-mover advantage (FMA), i.e., a gratis fishing quota. It is argued that the snow crab vessels have positioned themselves into a historical stream of events, which can, at best, give rise to a gratis institutional protection of a valuable natural resource. Thus, if the vessels are allocated free individual transferable quotas, they will secure a sustained FMA, as a similar event is unlikely to occur in the future. Finally, in the paper, findings and implications are discussed.

### 1. Introduction

Emerging industries are newly created industries formed by recently discovered natural resources, technological innovations, changes in demand, and so on (Duchesneau and Gartner, 1990). Firms in emerging industries face a unique set of opportunities that can be explored and exploited and are a source of superior performance (Alvarez and Barney, 2007). The unique opportunities facing firms in emerging industries are termed first-mover advantages (FMAs) (Lieberman and Montgomery, 1988). However, emerging industries are characterized by immense uncertainty (Alvarez and Barney, 2007). Thus, the advantages of moving first must be balanced against the risks. Institutions reduce uncertainty for different actors by representing the “rules of the game” (DiMaggio and Powell, 1983). Thus, entrepreneurs and firms rationally pursue their interests and make strategic choices within the formal and informal constraints of a given institutional framework (Peng et al., 2009).

Snow crab is a new species in the Barents Sea, even though it is not a new species globally. Apparently, the crab has wandered into the

Barents in the mid-90s, settled down, and spread (Østhagen and Raspotnik, 2018). In 2012, a small commercial catch was landed in Norway, and landings in 2019 seemed to reach the total allowable catch (TAC) at 4000 tons. The Norwegian Institute of Marine Research is presenting prognoses for future TACs at 50 000 tons within another 10 years. However, in the emerging Norwegian snow crab industry (NSCI), there are large biological and political uncertainties. Biological uncertainty is about the development of the future stock in the Barents Sea as snow crab is a new species that has invaded Norwegian waters. The Norwegian snow crab fishery takes place in two geographical areas of the Barents Sea, which are highly disputed, i.e., the Loophole and the Svalbard Fisheries Protection Zone (FPZ). Thus, there resides great uncertainty about the future Norwegian total allowable catch (TAC) of snow crabs (see for example Hansen, 2016; Kaiser et al., 2018; Nyman and Tiller, 2020; Østhagen and Raspotnik, 2018). Furthermore, there is also great national institutional uncertainty about how the Norwegian TAC once set should be distributed among the vessels participating in the snow crab fishery (Regjeringen, 2019). On the other hand, the

\* Corresponding author.

E-mail address: [bernt.bertheussen@uit.no](mailto:bernt.bertheussen@uit.no) (B.A. Bertheussen).

first-movers into this industry may acquire critical assets, such as a fishing quota, thus gaining a FMA and access to a valuable limited natural resource.

This study takes place in a natural resource-based industry (NRBI), where the institutional framework is still not fully established. This provides a unique opportunity to study how entrepreneurs try to anticipate and exploit institutional opportunities that arise. The study attempts to explore how firms, through a first-mover strategy, can position themselves into a historical stream of events in order to gain advantageous access to a valuable natural resource, which eventually will be institutionally protected. By being first-movers, these firms are strategically positioned to reap the benefits of an expected, unique institutional future event (Barney, 1991). This is about deliberately being in the right place at the right time when the authorities expectedly will distribute (transferable or not) vessel quotas to the players cheaply or for free. Thus, the firms do not just trust blind luck (Barney, 1986). Firms, which have acquired a catch history and are actively fishing at the point of time quotas are distributed by the authorities, will gain a sustained FMA, as this unique historic event probably will never happen again (Barney, 1991). According to the resource based view (RBV) of strategy, firm specific resources differentiate successful firms from failing ones, as it is the existence of valuable, rare, and hard-to-imitate resources that can largely explain performance variations amongst firms (Barney, 1991). RBV has been criticized for its lack of an empirical base and lack of studies that consider how resources and capabilities evolve over time (e.g., Lieberman and Montgomery, 1998; Porter, 1991). Thus, a small piece of this puzzle is hopefully filled by this study.

Furthermore, institutional uncertainty, which may be the driving force of resource procurement in a NRBI, is more or less neglected within traditional strategic perspectives (Dorobantu et al., 2017). However, wealth creation in NRBI can significantly be influenced by institutions (Ingram and Silverman, 2000). Accordingly, this paper attempts to integrate the RBV of strategy, including FMA theory with the institution-based view (IBV) of strategy, as advocated by Peng (2002) and Peng et al. (2009). IBV argues that in addition to industry- and firm-level conditions, firms also should take into account the impacts of 'the rules of the game', i.e. institutions, when aspiring to understand firm and industry performance. The aim is to better understand how firms in an NRBI can exploit institutional opportunities. Accordingly, this paper brings the profit-seeking entrepreneur into institutional work, which is another theoretical contribution of the study. Finally, biological and environmental aspects of the snow crab innovation in the Barents Sea have been studied extensively (e.g., Kaiser et al., 2018), whereas studies of business opportunities for the firms and industry attractiveness are missing. Hence, this is also a contribution of the study.

In the following sections, relevant literature is presented, along with a tentative theoretical framework and empirical research questions (RQs). Next, the context of the study, the method used, and results obtained are presented. Finally, findings and implications are discussed.

## 2. Theory

The RBV of strategy takes a firm perspective in explaining competitive advantages that may lead to subsequent superior performance (e.g., Barney, 1991). Hence, performance variations are explained, as a result of firms (entrepreneurs) owning or controlling different strategic asset portfolios or of actors being capable of generating superior returns from their resources at varying degrees. However, RBV's inadequate attention to contexts has been criticized and called for new theoretical perspectives that can overcome these drawbacks. One result is the emergence of the IBV on strategy (Peng, 2002; Peng et al., 2009). IBV argues that in addition to the industry- and firm-level conditions, firms also should take into account the impacts of formal and informal rules of the game, i.e., institutions, when explaining firm performance differences. Consequently, it is not solely the firm's resources and capabilities (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984) nor industry characteristics

(Porter, 2008) that are relevant. Performance differences can also be due to vital and dynamic institutional forces, as they can impact both the value of firm capabilities and industry attractiveness (Ingram and Silverman, 2000; Jarzabkowski, 2008). Accordingly, this paper argues that treating institutions as background conditions only is insufficient to gain a deeper understanding of the strategic behavior and firms' FMAs in an emergent fishery.

More than 30 years ago, Lieberman and Montgomery (1988) developed the most prevalent framework to explain the relationship between entry timing and firm performance. Their FMA theory argues that a firm that enters a given market before its rivals gain a competitive advantage. They describe three main sources of FMA, one of which is being the first to gain control of critical resources. To take technological leadership in the industry and get a proper foothold among customers are the two others. In 1998, they connected the theory of FMA with RBV (Lieberman and Montgomery, 1998), and concluded that FMA studies on resource accumulation by early entrants can help to overcome the empirical deficit of the RBV.

In emerging industries, many of the rules of the games and standard operating procedures for operating, competing, and succeeding are still not established. Thus, first-moving firms can sometimes help establish the rules, acquire institutional benefits, and contribute to an industrial structure that is uniquely beneficial to them (Alvarez and Barney, 2007). In other words, this paper argues that one should include institutional factors, as first-movers can take action to help facilitate their own FMA that influences policymakers and also the final institutional framework.

In an emerging NRBI, a first-mover may acquire critical assets, such as a fishing quota, at a price that is lower than the price, which will later develop in the marketplace. In an individual quota system, there is room for only a limited number of firms to share the TAC. In Norway, when fisheries have been closed, firms that have already operated in the industry received their quotas for free from the authorities based on their catch history (e.g., Johnsen and Jentoft, 2018). After the quotas were initially distributed, latecomers had to buy quotas in the marketplace at a, perhaps, steep price to gain access to the fishery (Hannesson, 2013).

The early stage of the industry is characterized by significant uncertainty (Alvarez and Barney, 2007). First-movers are thus exposed to immense business risk. In an emerging NRBI, the size and geographical distribution of the stock of fish are uncertain, so is the optimal level of harvesting (TAC) (Kaiser et al., 2018). There is also uncertainty related to the most efficient catch- and processing technologies and practices applied. Moreover, it is unclear how the fish should be supplied to the market to create as much value as possible throughout the value chain (Voldnes, 2017). Last, but not least, there can be great uncertainty related to the establishment of the institutional framework developing around an emerging industry (Peng, 2002; Peng et al., 2009), e.g., how the TAC should be distributed among commercial fishers.

Strategy researchers have rarely explored the interactions among institutions, organizations, and strategic choices (Narayanan and Fahey, 2005). Instead, a market-based institutional framework has been taken for granted. Formal institutions, as laws and regulations, and informal institutions, as cultures and norms, have been regarded as "background" only (Peng et al., 2009). Uncertainty dims the judgment of actors, but institutions reduce uncertainty and also define what is legitimate (DiMaggio and Powell, 1983). Profit-seeking entrepreneurs, on the other hand, rationally pursue their self-interests and make choices within a given institutional framework (Lee et al., 2007).

Fig. 1 illustrates the theoretical argument of this paper. A firm is facing a major investment and extreme business uncertainty when entering an emerging NRBI. However, the investment provides access to natural resources. The value of the resource first and foremost depends on whether or not there is a market for it. Next, the resource must be institutionally protected. The firm can take action to influence the development of the institutional framework (Alvarez and Barney, 2007). If the firm enters the market after the resource has been protected (e.g., by means of individual transferable quotas [ITQs]), it must purchase



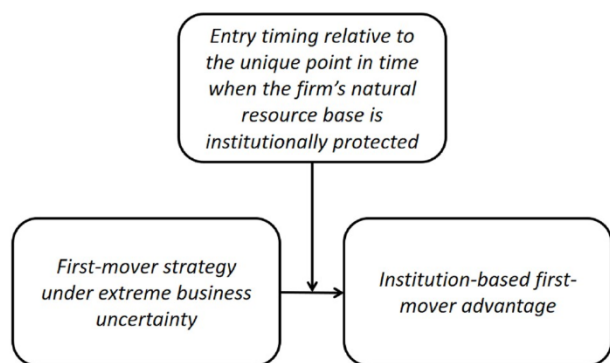


Fig. 1. Tentative theoretical framework.

protection at a market price (i.e., an ITQ). In that case, the firm will not achieve a competitive advantage relative to its competitors (Barney, 1986).

On the other hand, if the firm is engaged in fishing when the quota system is being introduced either by luck or deliberately, it can (at best) be allocated an ITQ for free. If so, the firm has gained a sustained FMA by being present in the industry at a unique historical point of time (Barney, 1986, 1991; Lieberman and Montgomery, 1998; 2013). A late-mover entering after the introduction of the quota regime will miss the historic opportunity to achieve a FMA over its rivals, and thus be subject to an institution-based late-mover disadvantage. Accordingly, it is theoretically relevant to discuss the relationship between a first-mover strategy and an institution-based FMA that is moderated by the timing of industry entry. Furthermore, it is important to empirically justify why this issue is relevant.

Against the backdrop of extreme biological, technological, and institutional uncertainty that characterizes the emerging NSCI, the following RQs are raised to enlighten the discussion raised in this study:

RQ 1: What motivated the first-moving entrepreneurs to enter the emerging and extremely uncertain NSCI?

RQ 2: Which firm and vessel resources did the first-moving entrepreneurs bring to NSCI in order to operate efficiently?

RQ 3: Has there been any survival-threatening challenges so far in the industry? If so, which, and how?

In the next section, the empirical context of the study is presented.

### 3. Empirical context

The snow crab has successfully established itself in the Barents Sea. The snow crab's main habitat is currently located in the northern parts of the Russian exclusive economic zone, as well as in international waters of the Barents Sea Loophole. The crab is presently expanding into the Svalbard FPZ. The overall area of distribution covers more than 34% of the Barents Sea (Bakanev, 2015).

In 2011, Jan Sundet at the Norwegian Institute of Marine Research confirmed that the snow crab had started to establish itself in the Svalbard FPZ (Fishery Protection Zone) (Forskning.no, 2011). The year after, in 2012, the first tons of snow crab were landed. In 2015, the Ministry of Trade, Industry, and Fisheries, provided 15 vessels with a temporary license to fish snow crab (Erlandsen, 2015). The number of temporary licenses today (2019) is 45. It has not yet been established how big the snow crab population is in the Svalbard FPZ. However, the spreading might be larger than first expected, as the results of the Norwegian Institute of Marine Research's studies showed in August 2018 (Sætra, 2018). Russian researchers have estimated the snow crab population to be 10 times higher than that of the red king crab (Sandø, 2013). It is expected that the snow crab will spread from the Loophole up to Svalbard.

The Norwegians started fishing for snow crabs in the Loophole, which is international water in the Barents Sea. The first commercial

catch by a sole vessel was delivered ashore late 2012. The following year, two more Norwegian vessels entered the fisheries. But then, in 2014, things changed; five more Norwegian vessels entered, and also several international vessels joined in, and the number of vessels steadily increased. As a result, the competition for snow crabs was drastically heightened.

That the snow crab is a sedentary species is based on a precedent from a court case in Canada (Tiller et al., 2019). The United Nations Convention on the Law of the Sea Article 77 gave Norway and Russia exclusive rights to exploit the crab in the Loophole. The largest area of the Loophole is Russian, and this is also where the major part of the snow crab biomass is located. In the fall of 2016, Russia decided to close its part of the Loophole from foreign vessels, making an exception for Norwegian vessels. However, in January 2017, the Loophole was closed also for Norwegian vessels. This event excluded them from the most lucrative fishing grounds.

The vessels in the fleet are mostly older and smaller in a Norwegian-Barents Sea fisheries context, with an average age of 42 years and an average length of 52 m. The vessels used in the NSCI are primarily vessels, which have been used for fisheries of other species, although a few are imported crab vessels from other countries. To adapt the vessels for catching snow crabs, all, except two, have been modified towards on-board production of cooked, brine-frozen clusters. Only two Norwegian vessels have tried live catch and delivery at shore, but this has never reached a significant amount. In 2018, no snow crab was delivered live onshore, and in 2019, only 16 tons were delivered live. No crab has been exported live the last three years. The on-board production needs a significant crew size. An average crew consists of 45 persons divided into two shifts that usually rotate one fishing trip each on a 20 to 30-day interval. Thus, labor costs on these vessels are significant. An average snow crab vessel had 278 operating days at sea in the period of analysis. Table 1 provides a timeline of critical events that have affected the development of the Norwegian SCI.

### 4. Data and method

Qualitative research encourages a focus on how organizations are operating rather than on performance and other output measures (Marshall and Rossman, 1989). The use of case studies was selected as (i) they coped with a situation in which there are manifold variables of

Table 1  
Timeline of critical events affecting the development of the NSCI.

Year	Event
1996	First snow crabs (SCs) observed in the Barents Sea (Hansen, 2016; Kuzmin et al., 1999).
2012	First commercial landing of SCs in Norway. Based on regular surveys, it was assumed that the volumes of SC would increase significantly.
2014	A general ban on harvesting SC in Norwegian waters was adopted. Norwegian vessels were required to obtain a license to be allowed to harvest.
2015	Norway and Russia granted access to harvest in each other's economic zones.
2016	5300 metric tons of SC landed in Norway, amounting to 338 m Norwegian kroner.
2017	The Russian government withdrew the mutual access agreement that was signed in 2016. This led to a considerable loss of opportunities for Norwegian vessels to harvest SC. They are now limited to fish in the protected zone around Svalbard and the small part of the Loophole that is Norwegian territory. Foreign vessels were also excluded from the fishery. For these reasons, the numbers of vessels participating in SC-fishing in the Barents Sea and the volume harvested was significantly reduced in 2017. The Norwegian Ministry of Trade, Industry, and Fisheries set the TAC for SC in the Norwegian regulated areas of the Barents Sea to 4000 tons. The total catch ends at 3100 tons.
2018	TAC stays at 4000 tons, but the total catch in 2018 was only 2812 tons.
2019	TAC is kept at 4000 tons. For the first time, it seems that the TAC will be caught. About 45 vessels hold a license to fish for SC, but as of late 2019, only ten vessels are actively fishing and of these, eight are taking the majority of the volume.
2019	Norwegian authorities have still not established a vessel quota regime for SC.

interest embedded in the context of investigation and (ii) a reliance on multiple sources of evidence, with data needing to converge in a triangulation fashion (Yin, 1994). Multiple-case study as a method is recognized for providing a strong base for theory building and explanations (De Massis and Kotlar, 2014). Another strength of the method is its ability to integrate both objective and perceptual data (De Massis and Kotlar, 2014). Thus, this multiple-case study attempts to dive into the NSCI by integrating several sources of data; in-depth interviews with managers, owners, and key personnel within the NSCI; visits on three snow crab vessels by observing and having informal conversations with the crew and captains; and, finally, collection and analysis of secondary data. Finally, the study followed industry media such as newspapers, web pages, and social media.

Semi-structured in-depth interviews were conducted with four Norwegian snow crab entrepreneurs. Investigations in the website proff.no and ownership data from the Norwegian Directorate of Fisheries show that even though each vessel is organized within a separate holding company, they are, more or less, owned by eight different persons who manage these vessels directly or indirectly. All eight were contacted, but only four were positive to share information in an interview. These four are responsible for delivering more than 70% of the total volume of snow crabs caught by Norwegian vessels. They have all been active since the very beginning of the fishery. Accordingly, they are considered representative for the industry and also fit well within the concept of first-movers. To protect the identity of the participants of the study, the cases are treated as one collective unit representing the NSCI. Even so, to ensure fulfillment of general data protection requirements (GDPR), all necessary permissions related to handle personal data were obtained from Norwegian Centre for Research Data (NSD).

An interview guide was developed, which included general topics to be discussed. The guide was based on the theoretical perspectives and previous analysis of secondary data to make sure the context of the questions were understandable and relevant for the entrepreneurs. The questions were formed very open, but aiming to steer the conversation into the research questions without suggesting any direction of answers. For example to enlighten RQ1 the question asked was: “can you tell me a little about your background and how you came to invest in the snow crab business”. For RQ2 the main question asked was “If I may ask, how did you finance the investment”, and for RQ3 “What have been challenging” and “What do you find the largest challenge for the future”. The four in-depth interviews were conducted during the winters of 2018 and 2019. Each interview lasted approximately 40 min. To build the case study and understanding of the context, we also conducted vessel visits and informal discussions with three skippers on snow crab vessels and three sales and marketing personnel. All formal interviews were taped and transcribed, and informal discussions were summarized in writing immediately after the meetings. The selection of interview objects was based on which Norwegian vessels had been most active since the beginning of the snow crab fisheries in the Barents Sea in 2013. Within this time period, 13 vessels had caught more than 100 000 tons of snow crabs.

Data were gathered and analyzed concurrently by data reduction, and key information in sections based on the topics of the interview guide was also gathered. First, each case where treated singularly, gathering relevant primary and secondary data. When all cases were concluded, it was searched for similarities and differences, and cross-case patterns that would shed light on the RQs were raised. As the data amount was not as voluminous, which is often the case of qualitative data gathering, no data analysis software was considered necessary. The data analysis involved several research team members, as recommended by Baxter and Jack (2008).

5. Findings

This section presents the empirical findings of the study.

RQ1: What motivated the first-moving entrepreneurs to enter the

emerging and extremely uncertain NSCI?

Excerpts from the interviews regarding the snow crab entrepreneurs’ investment motives are presented in Table 2. The motives for entering are classified as strategic (1–4), financial (5–8), and personal (9–10). The rightmost column in the table sums up arguments used to explain the specified source of motivation.

RQ 2: What firm and vessel resources and capabilities did the first-move entrepreneurs bring to NSCI in order to operate efficiently?

Table 3 reviews the available resources (1–4) and capabilities (5–7) of the entrepreneurs at time of entry of the NSCI.

Table 2  
Investment motives: excerpts from the interviews.

	Motive	Comments on the specified source of motivation
1	Strategic: seizing a “golden” opportunity	One entrepreneur had been following the development of snow crabs in the Barents Sea for a long time and was just waiting to seize the opportunity. But all the others also expressed an eagerness to exploit this new opportunity as soon as it arose.
2	Strategic: fishing for an individual vessel quota	The players expect that the authorities will distribute quotas in the near future and that the active vessels will benefit. This was expressed by the following statements: “Historically everyone that has entered and been engaged in a fishery, when the fishery is closed, they have gained an individual right to fish that eventually is sellable.” “We who are heavily invested in this ... we should have an advantage to the others entering after us”.
3	Strategic: fishing for a historical catch record	There are rumors of vessels “pretending” to fish just to gain a track record so that they can get into a position for a historic right to a quota. This is claimed to be the reason several vessels are registered with only smaller deliverances ranging from 5 to 1200 kg per year.
4	Strategic: investment horizon	The entrepreneurs were very optimistic at the beginning of their ventures. Still, after two challenging seasons, the snow crab entrepreneurs are optimistic when it comes to the future: “If our stock estimates are correct, we will have a profitable industry within 5–6 years.” However, they expressed some worries “... we need to have the money to wait for that long.”
5	Financial: profitability	The entrepreneurs entered the NSCI hoping for a profitable business. They went into the industry with an open mind about the possible profit and uncertainties. However, they were not expecting large earnings in the first year.
6	Financial: allocation of available funds	Most of the entrepreneurs had already exited another fishery by selling quota shares and vessels. Thus, they were looking for a new attractive industry to enter.
7	Financial: relative low investment	The investment expenditure is lower within the NSCI than in other similar industries. “If you want to invest in seine fishing you will have to pay 800 million (NOK) only for a quota.”
8	Financial: business diversification	One entrepreneur had profits from other fisheries and was looking to diversify the firm’s business portfolio to reduce the total risk so he/she could continue to grow and develop.
9	Personal: exploiting existing competence	They all mentioned their experiences as fishers as one reason for going into the NSCI and not going into a totally different business. As one expressed: “We have faith in what we are doing, and we know vessels.” Another claimed: “Stick to what you know.”
10	Personal: thrill-seeking	The snow crab is “... something new, something exciting .... ”



RQ 3: Has there been any survival-threatening challenges so far in the industry? If so, which, and how?

Survival-threatening challenges are divided into those that the industry has already encountered (1–5) and strategic measures taken in order to deal with the challenges (6–7).

## 6. Discussion

Industry entry in an NRBI takes place when a firm decides to engage in exploiting the commercial potential of a valuable natural resource. Entry timing focuses on how quickly a firm enters an industry compared with the entry of rivals (Dykes and Kolev, 2018). Further, industry entry typically refers to a one-time event (Dykes and Kolev, 2018). First-movers in a NRBI are exposed to great uncertainty about the development of the resource stock, right to fish, and international politics. In a new fishery, firms must also deal with the entire risk related to developing new catch and processing technologies and creating a market for the end-products. In an emerging industry, there will also be great institutional uncertainty, as the rules of the games are still not set. Accordingly, the overall purpose of the present study was to explore the relationship between a first-mover strategy and an institution-based FMA that is moderated by the timing of industry entry (see Fig. 1). The empirical context was the emerging NSCI.

**Table 3**

Resources and capabilities of the Norwegian snow crab firms in the sample at time of entry.

	Resource/-capability	Comment
1	Resource: firm ownership	There are two types of ownership represented. One is the typical family-owned firm with more or less the whole family engaged in the business. The other owner type consists of investors with the entrepreneur, which must be an active Norwegian fisherman, sitting on the majority of shares.
2	Resource: firm structure and risk management	The snow crab firms own a different number of vessels. All vessels are organized as separate limited liability firms. This is completed to reduce the business risk, meaning that if one vessel goes bankrupt, this will not affect the others.
3	Resource: funding	The funds needed to enter the industry came either from their own firm and foreign investors often in combination with their own personal wealth. Most entrepreneurs thus invested personally in the NSCI. For some, available budgets were substantial.
4	Resource: vessel used	Some already owned vessels that were not engaged in other fisheries. Others bought vessels that they modified to fit the NSCI.
5	Capability: board competence	Most of the board members have educational backgrounds in fisheries. Other board members are either relatives of the majority of owners or they possess complementary competencies to him/her.
6	Capability: professional background of vessel owner	All four entrepreneurs have vocational training within the fishing industry. They have been, or still are, active fishers. This is a requirement of the Participation Act of 1999, which regulates who can fish for a living in Norway. They were all men.
7	Capability: skills and stability of crew	The entrepreneurs emphasized the importance of predisposing a skilled and stable crew to fish snow crab efficiently. They expressed that this was a potential source of a competitive advantage. One entrepreneur told he had invested a lot on-board into the comfort of the crew members, which resulted in a lower turnover within their firm.

### 6.1. Motivation, resources, and survival-threatening challenges

The first and second RQs raised in this study focused on the entrepreneurs' motivation (RQ1) and the resources and capabilities they brought to the NSCI in order to operate (RQ2). The findings show that first-moving firms involved experienced entrepreneurs that chose to reinvest financial resources that they had already earned on other fisheries in the new, related, and promising NSCI (Tables 2 and 3). The overall goal of the investment was to make a profit (Table 2.5). However, Bertheussen and Nøstvold (2020) found that the first-movers in the NSCI performed very poorly financially in the first three years. This is somewhat surprising as they all were entrepreneurs who had previously succeeded in related industries. However, considering the immense uncertainty embracing the NSCI, poor economic performance was not unexpected. When making an investment decision, the entrepreneurs were aware that great uncertainty would characterize the early stage of the industry.

The third and final research question raised in this study (RQ3) was if there had been any survival-threatening challenges so far in the industry, and if so, which, and how? It turns out that the players had not fully realized how vulnerable the industry was for international political events. Accordingly, exclusion from the Loophole came as a surprise to the players (Table 4.2). The extreme uncertainty was, however, balanced against an expected significant earning potential and an expected modest investment outlay, as there was no need to buy a quota nor to build a new customized vessel (Table 3.4). In retrospect, some entrepreneurs realized that they did invest much more than originally planned, as investments grew over time because of the adaption of vessels based on increased experience and acquisition of more vessels, as the early prospects were very promising. The significant investments incurred have, for some actors, threatened their survival. But even after years of significant losses (Bertheussen and Nøstvold, 2020), not all of them regretted their decision to enter the industry and expand their snow crab business (Table 4.4).

### 6.2. Sustained institution-based FMA

The actors emphasize the importance of institutions in a FMA perspective. The NSCI expected institutional protection in the international zone. When this was not granted or made possible, this radically changed the prerequisite for the industry entrance and the attractiveness of the competitive arena. Despite an expensive setup period (Bertheussen and Nøstvold, 2020), some players still hope for an institutional protected future within the Norwegian boundaries. One player stated that "sooner or later, the fishery will get closed, and the market will set a price on the quota you've got." But do the first-moving entrepreneurs have the potential to gain a sustained institution-based FMA? This study argues that the answer depends on the combined future development of the TAC institution, and that the Norwegian authorities decide to introduce an ITQ institution in the NSCI.

#### 6.2.1. Development of the future TAC institution

As profit-seeking entrepreneurs, the first-movers all face an uncertain wealth creation potential. The upside firstly relates to the future development of the Norwegian snow crab TAC. The TAC will partly be determined by the development of the snow crab stock in the Norwegian part of the Barents Sea. However, the development of the TAC is also related to international regulations regarding the distribution of the stock between different nations. An increase of the Norwegian TAC will be beneficial for the first-movers, which immediately will be able to financially exploit better access to crabs. However, a positive stock development will trigger late-movers to go all-in in the fishery, and it may stop some firms from implementing a stop-loss exit strategy. Thus, the competition for the increased TAC will likely increase. Nevertheless, the biologic development and geographical movement of the stock is completely out of the firms' controls. This also applies to international

**Table 4**  
Survival-threatening challenges so far in the emerging NSCI.

Which challenge?	How?
1 Challenge encountered: increased competition	According to a key informant, the profitability was good, until the Norwegians were exposed to 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."
2 Challenge encountered: Russians closing the Loophole	This came as a surprise for the NSCI and was a situation completely out of firm control. Most vessels moved their pots into the Norwegian part of the Loophole and into the Svalbard zone. Still, this led to a significant decline in catches from 5300 tons in 2016 to 3100 tons in 2017 (landings by Norwegian vessels only). Individual catches were said to decrease with an estimate of 80%.
3 Challenge encountered: a need for improving fishing practices	The fishers participating in the NSCI had no previous experience with snow crab fishing. However, they gradually gained experience and got first-hand knowledge of how and where to set pots: "Setting them (the pots) up with millimeters precision to maximize the fishing, and we started to get an understanding for it."
4 Challenge encountered: financial difficulties	Most firms are struggling financially (Bertheussen and Nøstvold, 2020). Most of them have invested more heavily into the rebuilding and building of vessels than originally planned. Some increased their investments during the first year because of the very good catch in the beginning of the Barents Sea Snow crab fisheries, while most have regrets.
5 Challenge encountered: no quota; no further investments	The entrepreneurs underlined that the absence of individual vessel quotas is hindering further investments because: "No bank will give you a loan without a quota."
6 Strategic measure to deal with challenges: emerging strategic approach	According to the entrepreneurs, their firm's strategy emerged as time went by because of the national and international institutional powers that heavily influence the industry. Examples of pronounced goals for 2019 were: "Better than last year" and "Come out with zero." Catches in 2019 is estimated to be 3.5 times higher than the previous years.
7 Strategic measure to deal with challenges: institutional entrepreneurship	The NSCI are actively using their organization Fiskebåt (The Norwegian Deep-Sea fishing fleet organization) to influence the government toward closing the fisheries for newcomers.

negotiations regarding the national distribution of the stock. Thus, the players will have to wait and see and adapt flexibly to the environmental changes, which will take place (Porter, 2008).

### 6.2.2. Introduction of an ITQ institution

The first-movers are, however, well-positioned when it comes to exploiting the institutional changes that will expectedly take place to protect the snow crab resource for the firms (see Fig. 1). To protect the fishers against a race to fish (Homans and Wilen, 2005), the owner of the natural resource, i.e., the Norwegian State, has historically initially distributed quotas to fishers for free (Johnsen and Jentoft, 2018). However, this is conditioned upon the fact the players must have a track record of fishing and are still active fishers, as required by the Norwegian Participation Act of 1999. If the authorities intend to apply the same allocation rule within the snow crab industry, the firms that are

active at the unique historical point of time when quotas are distributed can expect to gain a sustained institution-based FMA. Accordingly, these firms will face an opportunity to superior wealth creation both through reduced rivalry (Porter, 2008) and through increased quota values over time, as experienced in other Norwegian fisheries (Hannesson, 2013). It is likely, and hardly unreasonable, that the players who have financially "bled" most in developing the Norwegian snow crab fishery and that have a proven catch history will be prioritized when (if) vessel quotas are once distributed. The losses the first-moving firms have inflicted so far can thus be interpreted as a real option premium of an ITQ. If this scenario becomes a reality, this will be a long-awaited financial reward for the so far patient first-movers.

Another key argument for introducing individual vessel quotas (IVQs) in fisheries is that banks require security in fishing rights to offer loans to the firms. External funding is necessary to enable the firms to streamline their fishing operations over time (see Table 4.5). However, as of today, these players have not yet gained an institution-based FMA.

Furthermore, the gross majority of the players (about 37/38 out of a total of 45 firms) do not participate actively in the fishing. They have, on the other hand, acquired a license, which gives them strategic flexibility, as they possess an option to start fishing when they find the risk/reward attractive. These players have thus saved a great deal of money in moving late (Bertheussen and Nøstvold, 2020). Nevertheless, since they lack or have a very modest catch history, they run the risk of being left without quotas once they are introduced. Accordingly, they will lose a golden opportunity to be awarded a sustained institution-based FMA.

## 7. Implications

### 7.1. Resolving international institutional uncertainty

The snow crab fishery in the Barents Sea began with open access harvesting in 2012. The fishery took place in the Loop hole, which is a large area surrounded by the Norwegian EEZ (exclusive economic zone), the FPZ of Svalbard, and Russia's EEZ. The Loop hole is regarded as international water or "open sea," and thus accessible for fishing by vessels from any country (Kaiser et al., 2018).

That the snow crab is a sedentary species is based on a precedent from a court case in Canada (Tiller et al., 2019). This decision transferred its status from a water column species to a continental shelf (CS) resource. As a consequence, the snow crab shifted from being a fishery resource in international waters to a shelf resource that is solely Russian and Norwegian property. These rights extend beyond the 200 nautical miles of both the Russian and the Norwegian EEZs. When the Loophole was closed, about 85% of it was placed on the Russian CS and the rest on the Norwegian CS (Tiller et al., 2019).

Furthermore, in January 2017, Russia claimed sovereignty over its part of the Loop hole area and closed it for all foreign vessels. The Norwegians were not prepared for the closing, and as a financial consequence, the operating income of the vessels fell sharply, and the operating losses increased (Bertheussen and Nøstvold, 2020). This incident clearly demonstrates how vulnerable the profitability of first-moving firms is when the natural resource is not protected by international institutional regulations.

The snow crab is now expanding in the Barents Sea and moving towards Svalbard (Hansen, 2016; Tiller and Nyman, 2017). However, it has been disputed for years who are permitted to exploit the natural resources both in the water column and the CS of the Svalbard FPZ. Norway asserts that the Svalbard CS and the Svalbard FPZ are theirs to manage and benefit from (Kaiser et al., 2018). However, Russia and others contest this view through the 1920 Svalbard Treaty. Nevertheless, for the purpose of this study, we will not discuss the challenges with regard to snow crab, the Svalbard Treaty and the continental shelf, as these issues are thoroughly debated elsewhere (see for example Hansen, 2016; Kaiser et al., 2018; Nyman and Tiller, 2020; Østhagen and Raspotnik, 2018).



International uncertainty, which leads to the rules of the game being changed, has the potential to create severe financial consequences for the firms involved in a fishery. The NSCI is facing an uncertain future due to the international turbulence regarding the regulations of the Loophole and the Svalbard PFZ. The property rights issues discussed will, in the future, influence the size of the Norwegian TAC of snow crabs, and thus the opportunities of the firms to create economic values thereof.

## 7.2. Resolving national institutional uncertainty

It is well established in the literature that economic values are created when closing a fishery (e.g., Birkenbach et al., 2017) is combined with private, decentralized, or common property rights regimes (Ostrom et al., 1999). IVQs, tradable (that is ITQs) or not, are permits that allow the holder to catch or transfer a share of a TAC. Typically, the permits do not expire, although if a fishery is closed or reduced, the permit is devalued (Pinkerton and Edwards, 2009).

Introduction of ITQs (e.g., based on the snow crab vessels' catch history) has the potential to increase the firms' future profitability, making it easier to obtain external financing to streamline operations and reduce the race to fish (Homans and Wilen, 2005). Furthermore, an ITQ regime will create barriers of entry, and thus protect incumbent firms (Porter, 2008).

Catching snow crab cannot easily be combined with other fisheries as the vessels are specialized for snow crab fishing and processing. Accordingly, the size of the quota is important for the profitability potential of the firms. If IVQs are introduced, the authorities must ensure that the vessels can make a profit on the quota provided.

Nevertheless, Norway does not formally manage its fisheries by ITQs. However, in reality, the fisheries management system in Norway has many similarities with such a system (Asche et al., 2014; Hannesson, 2013). In the prevailing system, a total quota (TAC) was allocated to individual vessels based on the vessel size (IVQ) (Zhang et al., 2018). Norway implemented a new quota transfer system in 2005. This system allows a vessel to buy another vessel and add a certain fraction of the acquired vessel's quota to its own vessel. The condition is that the purchased vessel is scrapped or sold out of the fishery (Standal and Asche, 2018).

When introducing a quota system in NSCI, it will expectedly be aligned with the already established Norwegian quota system. Thus, the vessels are likely to be allocated gratis individual transferable quotas by the authorities. If so, they will have gained a sustained FMA through receiving institutional protection of a valuable natural resource. This institution-based "fishing luck", they will achieve by having deliberately positioned themselves into a historical stream of events that is unlikely to occur again.

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