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Threats and Opportunities in the Norwegian Offshore Wind 'industrial adventure': Insights into Business Consortium Perceptions

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Abstract: Norway has committed to international agreements on reducing greenhouse gas emissions and has set ambitious goal for developing offshore wind as an important part of a future cleaner energy mix. However, recent political and structural challenges have created hurdles for a smooth transition to a livable offshore wind industry (OWI) in Norway, compromising the planned timelines and potentially influencing companies' willingness to be part of the next Norwegian 'industrial adventure'. The aim of this paper is to explore and describe how actors within the consortium organizations perceive threats and opportunities related to offshore wind in Norway during the years 2023 to 2024 concession phase. Data consists of ten semi-structured interviews with key informants in two different business consortiums representing four organizations and one informant from an industry network organization. Our findings provide insights into the Norwegian concession phase and occurring hurdles and challenges in the process of developing OWI Norway. Our informants paint a complex picture of threats and opportunities and identify several 'barriers to entry' but also point to factors that motivates them to be part of the OWI development in Norway.

Keywords: Norwegian offshore wind industry, maritime and offshore technology, renewable energy, decision making under uncertainty, risk perception, concession phase.

1. Introduction

In recent years, research on sustainability transitions has blossomed, and in the energy sector concession processes play a fundamental role in the creation of new green industries, such as offshore wind. Norway has had a unique opportunity to develop a strong industry to a national as well as the international offshore wind market given natural resources as well as transfer of technology and competence from the oil and gas (O&G) industry (Dahl et al., 2022). Still, the domestic market is yet to be developed. The aim of this paper is to explore and describe how actors within consortium organizations cope with uncertainty in the concession phase for offshore wind industry (OWI), focusing on their perception of opportunities and threats.

The development of offshore wind energy technology is important for European energy policy (Wieczorek et al., 2013; Díaz et al., 2020). As in many countries, the Norwegian government has committed to international agreements (EUs Green Deal, missions, sustainability goals, emission requirements on reducing greenhouse gas emissions etc.), and has set ambitious targets to achieve decarbonization goals. Developing offshore wind as an important part of the future cleaner energy mix has been driven by political actors as a solution to climate change problems and is assumed to give Norway industrial opportunities with potential for clean electricity exports (Normann, 2015) as well as to contribute to increased energy security. The political ambitions and support for a national offshore wind industry have been stated by the Norwegian Ministry of Energy in several reports to the parliament (Meld.St. 36 (2020-2021), Meld.St.11 (2021-22), Meld.St. 26 (2022-2023)).

While the offshore wind industry is growing rapidly globally (Rowell et al., 2024), the kick-off for offshore wind in Norway has been postponed numerous times. As Normann (2015) points out, political support for OWI has varied significantly since 2005. Also, substantial public and private funding have been invested into research and development (R&D) initiatives to develop concepts for offshore wind (Dahl et al., 2022; Normann, 2015, but the investments have not been fully capitalized to create a domestic market.

Previous research demonstrates how political conditions strongly influence the development of new energy technology (Normann, 2015:191) and renewable energy sectors. In general, there is a great amount of uncertainty associated with concession processes for the development of new green industries such as offshore wind. Yet, little is known about how consortia involved in concessions processes for offshore wind cope with this uncertainty and how they perceive the opportunities and threats of being involved in them. The purpose of this study is to address this gap in the literature.

2. Theory

Making strategic decisions is challenging because they are made under uncertainty. Conceptualizations of uncertainty date back to the pioneering work of Knight, March, and Simon, who argued that business environments are fundamentally unstable (March & Simon, 1993; Knight,

1921). This instability is multifaceted and includes different types of uncertainties. These can stem from exogenous or macro-environmental factors such as political, economic, regulatory, industrial, social, technological, and environmental conditions (Song, Sun, & Jin, 2017; Kansongue, Njugana, & Vertigans, 2023). It is hard for organizations (and consortia) to affect uncertainty in the macro-environment, but they must respond to it strategically. This response can manifest itself in both planned and adaptive strategies, both of which assume that key elements of the external environment cannot be affected by the organization's own efforts (Vecchiato, 2012).

This response is conditioned by an organization's perception. Perception can be defined as a set of mental activities or processes (Helfat & Peteraf, 2015), which is relevant in strategic decision-making process since it enables "construction of useful and meaningful information about a particular environment" (Gazzaniga, Heatherton, and Halpern, 2010:180). As Helfat and Peteraf (2015) point out, perception includes a number of abilities, such as pattern recognition and interpretation of data. This perception also includes how organizations interpret opportunities and threats in their business environment (Chattopadhyay et al., 2001; Connelly & Shi, 2022; Short et al., 2010). Opportunities can be defined as "an idea or dream that is discovered or created by an entrepreneurial entity and that is revealed through analysis over time to be potentially lucrative" (Short et al. 2010, p. 55), while threats occur when circumstances are perceived as having negative or harmful consequences for an organization (Connelly & Shi, 2022)

Returning to concession processes, the uncertainty associated with these is mostly beyond the control of the consortia involved in the bidding. So far, little is known about how consortia perceive the threats and opportunities associated with concession processes. In the following, we explain the methodology we adopted in this study to address this research gap.

3. Materials and Methods

Our data includes ten semi-structured interviews with key informants in two different business consortia representing four organizations and one independent informant representing an industry network. The two consortia in our sample were chosen as they differ from each other, and thus potentially can provide different views and experiences, and add to a broad understanding of risk and reward reflections. However, our intention here is not to compare the two consortia.

Most of the interviews were face-to-face and conducted by two researchers, while two of the interviews were performed digitally. The interviews typically lasted for about an hour. All of them were recorded and transcribed. The table below gives an overview of the data. The interview data was gathered in the period September 2023 until the end of April 2024.

Consortia typically include a developer (the main operator) and collaborating companies (suppliers, multi-utility companies etc.), here all named 'consortium partners' or 'OW companies'. The consortia we interviewed are involved in different concession processes in Norway. These are SørligeNordsjø II (SNII), a field south of Norway suitable for bottom fixed turbines, and UtsiraNord (UN), a field in the South-western part of Norway, which has the potential to become the world's largest commercial floating field if the government's timelines are met. While the contract for development of SNII has been awarded to a consortium, this formal concession process is yet to start for UN.

Analyzing the data we performed a content analysis using the following steps: a) Familiarizing ourselves with the material as a whole, b) selecting the most relevant passages, c) sorting and coding the different passages, d) categorizing the different groups of findings. In part 4 Results, we present these findings and refer to the different informants using the codes in Table 1. Quotes are used to illustrate the main analytical points.

Table 1. Overview over interview data.

Role	Affiliation	Cod
CEO	Industry network	IN-1
Business developer	Consortium 1	C1-1
Business Developer	Consortium 1	C1-2
HSE adviser offshore wind	Consortium 1	C1-3
Project manager offshore wind	Consortium 1	C1-4
Business developer/ authority contact	Consortium 1	C1-5
Project director	Consortium 2	C2-1
CEO	Consortium 2	C2-2
Business development, early phase	Consortium 2	C2-3
Commercial manager	Consortium 2	C2-4

4. Results

We organize our findings by first providing an account of what informants perceive as drivers for the interest in Norwegian OWI (4.1). We then present the informants' perceptions of opportunities (4.2) and threats (4.3). Finally, we give an account of more overall reflections which impact their strategic decision on whether to enter the Norwegian OWI or not (4.4).

4.1. *Motivation and interest for Norwegian OWI*

Green transition, commitments to decarbonization goals and new opportunities

Informants frame Norwegian OW in the setting of Norway's commitment to international agreements to achieve decarbonization goals. The companies in our sample want to play a role in the green transition and have objectives for decarbonization (C1-2, C1-3, C2-2, C2-4). OWI plays an important part in the green transition. As one informant states:

> "It [offshore wind] is a gigantic, almost incomprehensible big opportunity to provide clean energy to the world" (C2-5).

One of the companies has ambitions of net zero emissions by 2050, both when it comes to production and distribution and by contributing to end users reducing their emissions (C1-2). International agreements are important, but one informant also thinks the company has a moral obligation to contribute to the green transition after making huge profits on oil and gas (O&G) production for more than 50 years (C1-3).

Obviously, new business models for green transition must match the different companies' strategic goals and KPIs. Informants say they always look for new projects which fit and complement their business profile (C1-4, C2-3). However, the transition to renewable energy sources is often not economically sustainable and hence potentially in conflict with companies' aim for profit (C1-3, C1-4, C2-5). This is especially true for floating wind, which is an emerging industry still facing many risks (C1-2, C1-4, C2-3, C2-5).

However, the great interest for the Norwegian OW marked is grounded in a view that floating offshore wind is an area with great possibilities, and many company representatives state that it is likely that Norway will succeed in this industry (IN-1, C1-1, C2-3, C2-4). In 4.2 we describe this potential in more detail.

4.2 The Norwegian OWI marked as a business opportunity

The key factors related to opportunities include location and nature given advantages, oil and gas related experiences, potential for regional development, employment and for export.

Location and nature given advantages

The competition over the North Sea Basin is great, and many actors have shown great interest in the Norwegian market as it gives access to the North Sea Basin with reliable, strong wind, a prerequisite for OW production (C1-1, C1-4, C2-2, C2-4). Norway also has a long coastline with deep fjords suitable for manufacturing, assembling and transporting turbines, properties vital for offshore wind, especially floating wind (IN-1, C1-1, C1-2, C2-1, C2-4).

Extensive relevant industrial experience

In Norway, many companies are rooted in industrial traditions and have experiences of important to OW (C1-1, C1-2, C2-1, C2-4, C2-5). Informants highlight company experience from O&G, including floating installations and maritime operations, as the quote below illustrates:

> "Offshore technical installations and maritime operations are part of the Norwegian DNA" (C1-1).

Norway has a strong maritime industry, including shipping companies, shipyards and ports. (IN-1, C1-1, C1-2, C2-1).

Regional development, employment and export opportunities

For companies located in the regions which are geographically close to the two available OW fields (SNII and UN) the proximity implies a potential for business development of particular interest. Local stakeholders directly affected by development could either resist the changes, others may see the opportunities as well as the challenges. Typically, some actors (like municipalities and local business developers) could emphasize benefits like employment, green transition e.g., while others (like environmental organizations) could emphasize environmental interventions and the consequences for humans and wildlife.

Our informants from OW companies display balanced views on this topic but highlights how a successful new OWI would be very positive for Norway, especially for the west coast with opportunities for regional development and employment (C1-1, C1-4, C2-1, C2-2, C2-3). One informant illustrates the importance of integrating local content and regional development in rules and regulations:

> "We work with the local communities in the region to come up with good solutions that ensure a great deal of local value creation. This contributes to ensure social acceptance" (C2-1).

Two informants view floating offshore wind as the most relevant and promising business opportunity (IN-1, C1-1). They interpret the UN area as part of a governmental plan to build a domestic floating wind market, as they aim to offer the bid to three contestants to ensure technological development and competition between different actors. Informants see this as a good opportunity to build new competencies and capabilities, which they can use to expand. As the following quote illustrates:

> "A success in the Norwegian home market, could enable our company 'to go global'" (C1-1).

The opportunities to conquer new markets and projects are assumed to come rapidly. The potential in each new OW marked is analyzed by the companies (C1-2, C2-1), and finally the decision to enter a bid or not is based on expected profit as well as other criteria (C1-2, C1-3, C1-4). Such calculations conclude that offshore wind is currently not profitable, and that this specifically applies to floating offshore wind (C1-2, C1-3, C1-4). Hence, the

governmental support system in each country and market, as well as the long-term prospects are important factors to be considered (C1-2, C1-3, C2-1).

4.3 Perceptions on threats related to OWI

Perceived threats are related to several factors on international, national and industrial level.

International-level factors. Floating offshore wind is an emerging industry and still faces technological, financial and regulatory risks (IN-1, C1-2, C1-4, C2-2, C2-3, C2-4, C2-5). It is also affected by geopolitical, post-covid supply problems and increased cost of capital (C1-4, C2-1, C2-4, C2-5). The geo-political situation has contributed to the activity still being high in O&G in Norway, which means that the focus and the competence are not shifted towards OW (C2-1).

National-level factors: the Norwegian concession process
The concession processes in Norway have taken longer time than first anticipated (IN-1, C1-4, C2-2, C2-3, C2-4, C2-5). The government's ambition to produce 3 GW floating wind in 2030 is no longer credible due to the prolonged process and several delays (C1-2, C1-4). During this time there has been dialog between the industry and the government, which is described as a good thing (IN-1, C1-4, C2-5). Some issues raised by the industry have been resolved (C1-4). On the other hand, it is natural to feel disappointed over delays and having to go an extra round (C1-1, C1-4, C2-1, C2-2, C2-4). It comes with extra work, as the following quote illustrates:

> "It is in a way a privilege to be part of the starting phase, but at the same time, very demanding...The basis for what you are working on can suddenly disappear along the way, right, when it is so changeable" (C1-4).

Several informants describe the concession process, especially related to floating wind as unpredictable (C1-2, C1-3, C1-4, C2-1, C2-2). Several informants commented on the governments poor handling of the ESA negotiations, and raised concerns about how actors, especially foreign investors, may view the delays in the OW concession process, for instance related to the ESA negotiations over the prequalification criteria in the UN bid (C1-4, C2-1, C2-2).

On the other hand, two informants express understanding, patience and continuous trust C2-4, C2-5): One informant elaborates:

> "I think this will be a major strategic decision for Norway. They are trying to move away from oil and gas, and they need to do it right. As a developer, we are ready to go. It doesn't work like that. It doesn't change our confidence in Norway. The opportunity is there. It is a great opportunity, and we will be ready to pick it up when it starts" (C2-4).

Two other examples of unpredictability that is mentioned, are the Government's rather sudden introduction of a resource rent tax on onshore wind power from 2024 (C1-4) and the delay of the HSE regulation. Lacking the HSE regulation forces them [the consortium] to resort to 'educated guesses' of what the government expects and wants when preparing their bid (C1-3). All in all, the process is delayed and described as unpredictable. Some informants state that it would be very unfortunate if investors lose faith, find the Norwegian market immature and pull out (C1-4, C2-2).

Reflecting on what causes the delays, several informants refer to both a lack of competence and resources on the Government's side (IN-1, C1-2, C2-1), but also stress the importance of making it right from the start. They still understand that this is difficult. It will for instance be of great importance to avoid a major public resistance to offshore wind, as we have experienced with land wind in Norway (C1-1, C1-2, C1-3). However, one informant fears that the delays will give opponents of OW more leeway and promote more resistance (C2-1). The challenging concession process is described by several informants as going both 'too slow and too fast' at the same time (C1-3, C1-4).

Industrial-level factors
A risk for both bottom fixed and floating WI is related to which turbines are available when you need them (C1-2). This refers to the lack of standardization of models and still emerging new technological solutions. Now there is a lack of a project pipeline, a portfolio of upcoming projects in Norway, which makes it impossible to enter binding contacts with suppliers (C1-2). Standardization and the prospects of mass production of a few different types of floaters for example, is also vital to reduce costs (C2-1).

Norway has an advantage when it comes to ports (C2-4). However, port development to adapt to the needs for OWI is a critical factor (IN-1, C2-4). Ports must handle both manufacturing, assembling, storing and transporting of these huge installations. Being of use for OWI, the ports would need upgrading and the development of more areas. Regulation plans and financing need to come in place and the actual development will take years to accomplish.

Also, local production (in Norway) of foundations implies high labor costs (C1-2). Informants do however suggest capitalizing on established competence and technology to save costs. Norwegian companies are long-term successful suppliers in O&G, and over the last years also within OWI internationally (C2-1). Several reports have also pointed out a lack of manpower and the right set of skills as the OWI grows (IN-1, C1-1), but in our data material informants concludes that competence if needed can be transferred from other industries (C2-4).

4.4 Overall strategic reflections

To enter the Norwegian OWI, the threat-opportunity balance needs to be right (C2-5). The competition over the North Sea basin is great (C1-4), and "other countries are more successful than Norway [with OWI] at the moment" (C1-4, C2-1). The government must offer the first licenses and follow up with new ones for the consortia to consider entering (C1-2). The profitability in renewables has been low (C2-5) and the government's solution for financial support for the operators in the first projects is important (IN-1, C1-2, C1-4, C2-5). "Many were originally interested in SNII, then just 7 asked for prequalification, so many dropped out" (C1-4). The following quote elaborates on this topic:

> "It is difficult when the framework conditions do not hit the mark, and there is little understanding in society and in the government for the fact that the framework conditions are not good enough. That would be the most challenging thing for us. There is a gap in the understanding" (C1-4).

Informant C1-4 continues:

> "We have a choice whether or not to bid, we don't *have to* do it".

Different informants have diverging views on whether they should be involved in OWI from the start or not. Several informants hold being in from the start for important (IN-1, C1-2, C1-4, C2-5):

> "To succeed in floating wind, you must have been in on the journey" (C1-2).

> "If we think about offshore wind, right, it's clear that if one doesn't succeed in something here in the early phase, then one must evaluate whether it is viable for our or other companies to be in this field" (C1-4).

Other informants' opinions are that their consortium's strategy in the end will not be to take a pioneering position in floating wind, as it is not profitable at the moment.

> "A more obvious choice is to sit on the fence, to wait and see" (C1-3) and "we are skeptical" (C1-4).

> The profitability in renewables has been poor, for many reasons, and that makes you hold back a bit. After all, it's the shareholders money you're playing with, and you have to offer them something" (C2-5).

5. Discussion

In this part some of the main topics from the results will be discussed, focusing on how the consortia perceived the opportunities and the threats of participating in the concession processes for Norwegian offshore wind industry. These opportunities and threats were closely associated with various macro-environmental factors over which the consortia had limited control.

When it comes to opportunities, the strategic ambition to build a position in Norwegian offshore wind is strongly linked to the ongoing green shift in the energy sector, and the companies' plans to build a competitive position in the renewable energy industry. Our results illustrate that the initial broad interest in OWI in Norway has its origin both in natural given advantages (coastline, wind conditions, deep fjords etc.) and industry-based advantages (competence, technology, and experience from O&G, the maritime industry, access to ports etc.). This shows that natural resources and past physical infrastructures play an important role in framing the opportunities companies perceive, but this factor is seldom included when considering opportunities for new industry development (Njøs et al., 2024).

Moreover, the opportunity to transfer technology and competence from other sectors, and to be 'first-movers' into new acres, innovations within OW technology development (especially floating wind) and conquer new business areas, have according to informants been the main drivers in companies' considerations to enter the concession process. Numerous conceptual and empirical studies advance the notion that 'first movers' achieve long-term competitive advantages, i.e. benefit from early entry (Lieberman & Montgomery, 1988, 2013; Kerin et al., 1992). Thus, this concept may be of relevance for understanding companies' motivation for investing in OW technology development and be 'first-movers' into the Norwegian OW market (Suarez & Lanzolla, 2005).

Relatedly, while investments into Norwegian OWI may not lead to great financial rewards in the short run, it does represent an opportunity to gain valuable experience and develop new knowledge, which can yield returns in future projects. This also shows that the timeframe respondents operate with affect the opportunities they perceive. As Short et al. (2010) state: "to fully understand the opportunity process, one must understand the temporal dynamics of opportunities" (p. 54).

Overall, the findings from our interviews indicate that the consortia perceive opportunities in a similar way, whereas a more complex picture emerges when examining their perception of threats and their link to macro-level factors.

First, our results illustrate that the initial optimism was replaced with more realistic risk assessments during the 'pre-concession years' (2020-2024). During the concession phase the consortia identified numerous "red flags" related to technological, financial and regulatory threats. Many of these concerns were expressed by our informants: the activity level in O&G remained high (also politically stimulated), development costs for OW were too high, the needed technology development (floating wind) too costly, and governmental subsidies too low and/or unclear. These threats are hard for the consortia to remove and create a lot of uncertainty for them.

Second, the level and content of financial support from the Norwegian authorities were one of the main topics in the public debate on OW and, as our interview data illustrate, has been one of the major considerations for consortium partners. Companies also flagged uncertainties related to financial support from the government as one of the reasons for not entering the SNII and UN auctions. The result for the SNII auction was that all but two of the consortia withdrew from the auction (and one was offered the contract), while status (how many consortia will bid etc.) for UN is still unclear. The concession phase can be interpreted as a setback for OWI in Norway.

Third, the concession phase per se was experienced as unpredictable, very slow and time-consuming by several company partners. An illustrative case is the government's - to a certain degree – unprofessional handling of the ESA approval of the concession process which has significantly delayed the UN process. While the consortia prioritized to be well manned within OW business development, they experienced that the Norwegian ministry of Energy was not sufficiently staffed to handle the complexity of building up and supporting a new industry. Concurrently, the company reps appreciated the involvement and open dialogue with public authorities and the opportunities to influence OW policy and future rules and regulations, and some even stated that the time was needed and well spent. Interestingly, some of the companies in the consortia were content with delaying the process to enhance the quality of the concession process, whereas others wanted the government to push forward. This shows that a slow process is not necessarily perceived as a negative.

Fourth, an important learning for all parties was that building a new, complex industry such as OW takes time and energy, and demands stamina and long-term ambitions. The probably much needed time spent on dialogue and anchoring among stakeholders did however come at the expense of trust between the OWI and the Norwegian authorities. The complexity in technical and financial factors in OWI clearly calls for stakeholder engagement (Moverley Smith et al, 2021). In retrospect, the much-needed time spent on reaching the right organizational models, developing (or preparing) technical solutions, waiting for cost on capital to go down, has been the reality rather than "making it right" at the start. Although all this could be expected, our interview analysis indicates that stakeholder involvement could have been better prepared and performed, and that delays and changes through the concession phase have affected potential investors in the Norwegian OW market.

Fifth, while the initial governmental ambition was to build a domestic OW market to be followed by export opportunities for OW developers and suppliers, the opposite is currently the case. A diverse strategy has become the reality: Norwegian companies are doing well internationally, competing in global OW markets. Operators as well as suppliers deliver technology and competence on the international market and do not depend on the domestic OW market to open to succeed. Hence, valuable experience from the international market can and is being transferred from international to domestic operations. The companies will need to have critical competence and capacity available for when the domestic market opens, a potential threat which companies need to be aware of.

Finally, an additional threat is however if the Norwegian OW market is considered as trustworthy for international investors and OW companies. Being part of international consortia and collaborations, this is crucial to Norwegian companies. Our analysis indicates that the domestic concession with its delays, unclarities (timeline etc.) and still unclear business potential has raised this threat. Previous research supports the notion that the unpredictability which often comes with political shifts of governments, and the willingness to support and/or subsidize an emerging industry such as OW is also of concern (Normann, 2015).

Consequently, our findings reveal that the threats (Connelly & Shi, 2022) the consortia perceive are varied and are an important source of uncertainty for the strategic decisions they must make. In contrast, the opportunities (Short et al., 2010) associated with external conditions appear relatively more straightforward. Moreover, the path dependencies (Goumagiaset al., 2022) resulting from Norway's O&G heritage is a double-edged sword: On the one hand, Norway's competence, technology, and experience in O&G heritage can be leveraged in the development of Norwegian OWI. At the same time, the lucrative profits in the Norwegian O&G sector reduces the relative attractiveness of investments into Norwegian OWI. This shows that path dependencies stemming from O&G can both enable and constrain the transition to green through the establishment of a Norwegian OWI (Goumagias et. al, 2022).

6. Conclusions

In this paper we have aimed to gain a better understanding of how consortia perceive threats and opportunities in the concession process for offshore wind in Norway. To explore this topic, we asked ten key actors from two consortia to reflect on factors which had the potential to influence their strategic decision whether to enter two concession processes in Norway (SNII and UN). Findings show a complex risk picture and several 'barriers to entry' but also factors that motivated companies to be part of the OWI development in Norway, i.e. 'first-movers' (Kerin et al., 1992).

Based on our analysis we suggest that if the goal is to support the growth of a Norwegian offshore wind industry, the following issues require attention from the

government and industry (following Wieczorek et al, 2013): First, aligned national policies, instruments and regulatory frameworks, as well as a uniform European perspective on the industry. Second, a plan to handle potential shortage of skilled labor. Third, the costs need to be reduced, and the reliability of offshore wind farms must increase.

Although bringing new insights, this study has some limitations. As the offshore wind industry continues to grow and evolve, further research in this area is important. First, it would have strengthened the research design and the paper analysis if informants from the governmental level were included in the study. Hence, a study of the Norwegian concession process from this point of view is recommended as a topic for future research.

Also, as described previously in the paper, several consortia and industry partners in consortia have withdrawn from ongoing and upcoming bids since our data collection was finalized. A new data collection among these actors investigating the logic behind their decision could be a fruitful follow-up and continuation of this research. It would be especially interesting to investigate in detail the impact of different national systems when it comes to regulation and support packages as both prior research and our informants point to this as an important factor.

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