

Master's Thesis in Energy, Environment and Society

COLLINS MBEKA CHUEFOR



Universitetet
i Stavanger

University of Stavanger

Spring 2019

MASTER'S DEGREE IN
Energy, Environment and
Society

Candidate Number: **4039**

SEMESTER: Spring 2019

AUTHOR: COLLINS MBEKA CHUEFOR

SUPERVISOR: Reidar Staupe-Delgado

MASTER THESIS TITLE: Safety and Vulnerability in Arctic Oil and Gas Exploitation in Norway:
How do various stakeholders interpret risks and readiness?

SUBJECT WORDS/KEY WORDS: High North, Arctic, Oil and gas, environmentalists,
Emergency preparedness, oil spill, vulnerability, drilling, vulnerability, safety, Norway

PAGE

NUMBERS 92

STAVANGER

.....**30.07.2019**.....

DATE/YEAR

Foreword

This thesis is submitted in partial fulfilment of the requirement for the master in Energy, Environment and Society. The study process has been very challenging yet interesting as I had to push myself to meet up with the exigencies of assignments and examinations. However, I met a great team of classmates whose contributions during group work were invaluable.

I would like to start by expressing my sincere gratitude to Sigurd Jacobsen of the Norwegian Petroleum Safety Authority and Kjell Andreas Jødestøl of the Norwegian Environment Agency for their willingness to engage and for making themselves available throughout the research. I am grateful to all the informants who gave their time and insides to enable the studies to be accomplished.

This study would not have been possible without the guidance of Reidar Staube-Delgado whose direction, suggestions and motivations enabled me to complete the project. Finally, I wish to thank my wife Maxima-Lopez and my sons Stian, Mikkel and Jason-Niel for their encouragements and understanding throughout my studies.

ABSTRACT

Norway's petroleum history is comparatively short, notwithstanding it has suddenly stamped its authority as a petroleum nation using its energy geopolitical influence to make its voice heard in Europe and beyond. Few accidents in the early stage of its journey to become an oil dependent nation forced important legislative instruments to regulate the oil industry. The rising cost of operation in the North Sea due to aging oil fields and the discovery of large deposits in the High North accelerated the award of licenses to for operation in the Barents and the Lofoten areas (including the Norwegian Sea) a move considered by environmentalist as unconstitutional and a step away from the commitments made under the Paris Agreement to reduce CO2.

While Taleb's Black Swan Theory serves as a useful tool to policy makers and managers of the danger of hindsight bias in decision making, Perrow's Normal Accident Theory and Todd Laporte's High Reliability Theory constitute useful analytical frameworks to understand the possibility and impossibility of safety. However, findings through interviews from experts on the narratives of safety, vulnerability and preparedness in the High North after analyses reveals four conceptual frameworks namely:

- Too risky to drill in the Arctic
- Risk acknowledgement in Arctic drilling but necessary hence, good preparedness plans in place.
- Sceptic outlook on safe Arctic drilling
- Optimistic outlook on safe drilling in the Arctic

These conceptual frameworks lead to the understanding that the polarised atmosphere is Norway's Arctic oil and gas exploitation is a product of mistrust and normative interpretations based on vested interest amongst stake holders. The degree of Norway's readiness to drill in the Arctic is shaped by the conception of the stakeholders' 'truth' and the provenance of their

‘truths’ hinges on their overall objectives leaving one with a paradox of safety and Arctic oil money.

The quest for Arctic oil has stirred debates on the possibility and impossibility of drilling in the Arctic. The debate is characterised by differentials in the interpretation of risks and how prepared Norway is to expand its oil and gas exploitation further north. While the possibility argument has been pecked on the economic importance of oil and gas to sustain the economy and maintain the Norwegian generous welfare system, this research reveals among other things that the question of possibility and readiness are conflated with the importance of Arctic oil to Norway leading to juxtapositions in policy priorities. On the other hand, the impossibility debate has been dominated by vulnerability and safety concerns due to the specificity of the Arctic such as ice and icy conditions, remoteness, darkness, wind and high waves. This argument is spurred by environmentalism and reinforced by scientific evidence and literature on the Arctic. Furthermore, the Norway Auditor General’s recent report has added new impetus into the impossibility narrative as it concluded amongst other things that the equipment and technology in the High North are not adaptable for the Arctic. The objective of this study is not to come to any conclusion on the narrative but rather to understand how they are presented and their motivating factors in order to suggest avenues for further research as well as contribute to shape policy by clarifying and unpacking the arguments.

Table of Content

1.1. Foreword	3
1.2. ABSTRACT	4
2. INTRODUCTION	9
2.1. Delimitation and Scope	15
2.2. STRUCTURE	16
3. CONTEXT	17
3.1. Oil and gas in Norway	17
3.2. The Norwegian Arctic Environment and the Ecosystem	20
3.2.1.The Arctic	21
3.2.2.The Environment and the Ecosystem	23
3.3. The Actors in oil and gas in Norway	24
3.3.1.The state apparatus	24
3.3.2.The corporate bodies.....	26
3.3.3.The environmentalist organisations	27
4. THEORETICAL FRAMEWORK.....	28
4.1. The Impossibility of Safety.....	28
4.1.1.Normal Accidents (NAT)	29
4.1.2.The Possibility of Safety	37
4.1.3.Emergency Management.....	37
4.1.4.Risk and accidents reduction in socio-technical systems	39
5. METHOD	40
5.1.1.The Research Strategy and Research Design.....	41
5.1.2.Qualitative Research.....	42
5.1.3.Interviews	42
5.1.4.Discourse Analysis.....	44
5.1.5.Data types and data collection	46
5.1.6.Data reduction and analyse	47
5.1.7.Problems and limitations of the research.	47
6. FINDINGS	50
6.1.1.Interview Excerpts and Analyses	50
6.1.2.Too Risky to drill in the Arctic.....	50

6.1.3. Risk acknowledgement in Arctic drilling but necessary hence, good preparedness plans in place.....	53
6.1.4. Sceptic Outlook Arctic Drilling on Safe	59
6.1.5. Optimistic Outlook on Safe Drilling in the Arctic	60
7. DISCUSSION	62
7.1.1. The Arguments for Drilling in the Arctic	63
7.1.2. Unpacking the Narratives of Safe Arctic drilling possibility	63
7.1.3. The Private Claims for Safety	65
7.1.4. Public Claims for Safety	72
7.1.5. The Public Safe Drilling Narrative in Action	73
7.1.6. The Unsafe Narrative Amidst Polarised Views	77
7.1.7. The drivers for unsafe narratives	79
7.1.8. The Vulnerable and Unique Arctic Environment	79
7.1.9. The Implications of the Norway Auditor General’s Report	84
8. CONCLUSION	85
8.1.1. Limitations	87
8.1.2. Recommendations for further research	87

[Table of Figures](#)

Figure 1 Norwegian crude export	18
Figure 2: Macroeconomic indicators for the petroleum sector, 2018.....	19
Figure 3: The High Arctic and sub-Arctic regions	22
Figure 4: the Norwegian state apparatus in the petroleum activities.....	25
Figure 5 Perrow’s classification of industries in terms of their complexity and coupling	32
Figure 6 Goliat FPSO.....	66
Figure 7 BaSEC organigram	Error! Bookmark not defined.
Figure 8 Public and private preparedness resources along the coast of Nordland and Finnmark.	75
Figure 9 The Map of the Norwegian Continental shelf.....	76
Figure 10 Interaction of oil with sea ice.....	81

INTRODUCTION

Norway's petroleum history is comparatively short, notwithstanding the country has suddenly stamped its authority as a petroleum nation using its energy geopolitical influence to make its voice heard in Europe and beyond. The early phase of petroleum exploitation in Norway were marked by a test in Norway's patience and resoluteness towards a petroleum dependent pathway amidst financial, political and technological limitations leading to safety concerns in the industry. Although Norway's petroleum activities in the North Sea began at the close of the 80's, production in the Snøhvit¹ only started in 2007 due delays as accidents such as the blow out of the Bravo platform in the North Sea obliged policy reforms to reorganise the industry. It is against this backdrop that the 1981 Pollution Act was enacted and repealed in 1985. This piece of legislation stipulates that possible polluters to carry out an impact assessment of realistic accidents and estimate the likelihood of such accidents (Hauge et al., 2014a).

The 2015 award of the so called 23rd licencing round opened the High North for drilling in which the majority state owned Equinor scooped the lion's share of the licenses and when the 24th round was announced in June 2017 it signalled Norway's unabated intention to push further Northwards. These licensing rounds stunned the environmentalist communities and led to protestations by various environmentalist organisations and concerned citizens as well as a court case initiated by Greenpeace Nordic, Nature and Youth, and the Grandparents Climate Campaigns who argued based on article 110 b of the Norwegian constitution. Namely that:

Every person has a right to an environment that is conducive to health and to natural surroundings whose productivity and diversity are preserved. Natural resources should be made use of on the basis of comprehensive long-term considerations whereby this right will be safeguarded for future generations as well. In order to safeguard their right in accordance with the foregoing paragraph, citizens are entitled to be informed of the state of the natural environment and of the effects of any encroachments on nature that are planned or commenced. The State authorities shall issue further provisions for the implementation of these principles.

¹ The first offshore oil development in the Barents Sea

The fact in issue in the litigation brought up against the government epitomised safety and vulnerability concerns on the environmental consequences associated to drilling in the Norwegian Arctic. The plaintiffs argued that the latest licensing rounds are not in keeping with article 110 b of the constitution because drilling in the allocated areas will compromise the environment and it is against the government's mission of protecting the citizens and the environment as stipulated in the constitution. The plaintiffs also argued that Norway would not be able to meet up with its commitments² to the Paris agreement should it continue with its plans to open the High North for drilling. However, the litigation was seen by critics to be highly politicised and the victory of the government over the environmentalists signalled Norway's robust intention to exploit the large resource reserves underneath the Arctic (Milner, 2017). The move to open the High North for drilling was galvanised by surveys revealing vast amounts of oil and gas in the Arctic³ coupled with the maritime boundary settlement between Norway and Russia.

There has been an excellent work by a host of researchers for example Hauge et al. to make a risk assessment of what could be a worst-case scenario in the Lofoten area which plays host to a vast array of marine species while bearing in mind the importance of petroleum to sustain the Norwegian welfare system. Their findings highlight that there are often frosty relationships between the government and the oil and gas companies with regards to some aspects of preparedness for example on choosing test sites for potential blow. The Environment Agency has accused the industry for choosing blow out sites which are less representative of the reality while also revealing that the tendency of predictions are probabilistic on the effects oil spill coupled with the knowledge discrepancies making it an arduous task to archive long-run effects. Hauge et al. underscore the uncertainties related to determining the assessment of a worst-case scenario in the Lofoten, among others, they cite the rareness of major oil spills, the difference in ocean currents and other factors related to the environment as well as the political factors. They also looked at the consequences and effects of the uncertainties and they concluded that the uncertainties are partly due to the difficulties of finding data for the Lofoten area, therefore, the parameters for the North Sea are employed leading to gaps in terms of the

² This argument is based on Norway is committed to reduce its emissions, it made a strong commitment in its National Determined Contributions (NDCs) aiming to reduce CO₂ and subsequently global warming to 1.5 degrees centigrade above pre-industrial level

³ The United States Geological Survey's assessment of the north of the Arctic Circle reveals that closed to 30% of the world's undiscovered gas and 13% of oil are found at about 500 metres under water

data representativeness, consequences on innovation, surprise elements just to name a few. Though they affirm that major oil spills are rare, they conclude their studies by stating that a major spill will have a strong environmental effect on the marine ecosystem, especially to the fisheries exemplifying that about 50% of a year class of fish stock could be lost due to exceptionally high toxicity (Hauge et al., 2014b).

Yet, studies on the oil spill response on the pan-arctic level and specifically Norway arouses reasons for being sceptic concerning the emergency preparedness frameworks to tackle eventual oil spill from a tanker run aground or loss of control of an oil well. Besides, these concerns are exacerbated by the presence of multiple players in the emergency preparedness framework disposition with often overlapping roles leaving one with more questions than answers. Even the involvement of local fishermen and the creation of a 40-man task force on standby in Finnmark among technological improvements does not lift the lid off the sombre outlook of the emergency preparedness plan in the High North as presented by environmentalists and most scientific findings. However, the existence of deep polarisation in the way safety and vulnerability is interpreted amongst the protagonists in oil and gas drilling in the Arctic, though perceived in daily parlances, has not received enough scholastic attention. This paper intends to cover this gap in research by shedding some light on this phenomenon in order to stimulate interest for further research as well as providing a blueprint to facilitate policy reflections.

The overall objective of this research, therefore, is to investigate the narratives of safety and vulnerability in the face of oil and gas drilling in the Norwegian Arctic. Answering the following research questions will enable me to investigate these narratives:

- How do the various actors perceive the degree to which Norway is prepared to drill in the Arctic?
- Why is there such a deep polarisation in narratives between the major stake holders in the Arctic drilling discourse?

The decision to drill further north has raised the discourse of the paradox between societal safety (such as environmental and climate risks) and welfare⁴ in Norway (Brundtland, 1987;

⁴ In the context of The Brundtland Commission Report “Our Common Future”.

Chuefor, 2018b; Kuzemko, Lockwood, Mitchell, & Hoggett, 2016). Other researchers have questioned whether the quest for Arctic oil will put sustainability at risk (Mikkelsen & Langhelle, 2008). Considering that the Oil Fund is most financed by fossil fuel activities, therefore finding new exploitation is imperative for Norway to sustain and increase the fund's size in the face of dwindling oil fields in the North Sea owing to being at their tails amidst increasing cost of operation. It is therefore, a sound logic to infer that the choice to push further north is buttressed by aging oil fields in the North Sea as mentioned hitherto and on the other hand, the desire to exploit the large oil and gas deposits in the arctic as attested by the United States Geological Survey after assessing north of the Arctic Circle and concluded that closed to 30% of the world's undiscovered gas and 13% of the world's undiscovered oil may be found in the area, mostly offshore under less than 500 meters of water. However, despite protestations, the Norwegian government remains resolute and committed to provide a strong and stable welfare to the present and future generation financed by profitable oil and gas exploitation in the high North (Regjeringen, 2011). In terms of readiness and risk reduction the government feels confident it can oversee hitch free oil and gas exploitation in the High North as attested by a government white paper to the parliament.

The Norwegian Shelf is a world leader when it comes to safeguarding these considerations in offshore petroleum activity. The Government will further develop stringent requirements for safety and protection of the external environment, also for late-phase fields (Regjeringen, 2011, p. 15).

In the same vein, looking at the sustainability report and emergency preparedness framework presented by major corporate bodies with stakes in the High North such as Equinor and Vår Energi, there is a strong sense of confidence amongst these companies that socio-technical systems will work as planned (Sylves & Comfort, 2012).

There are important disaster preparedness dispositions put in place amongst the corporate bodies called The Norwegian Clean seas Association for Operating Companies (NOFO) as well at the national, regional and municipal levels. In addition, the Norwegian Coastal Administration has a reservoir of expertise and a stock of equipment for oil spills clean up along the Norwegian coastline comanaged with private bodies. Against these backdrops, unpacking the perceptions of the narratives of safety and vulnerability amongst the various stake holders as well as developing a better understanding for the varying ways in which perceptions and attitudes towards safety and vulnerability varies across sectors and

stakeholders seems academically interesting and to provide a pathway for sound reflection for policy makers as well as genuine step towards creating a rapprochement between the stakeholders.

Norway's decision to extend drilling northwards has triggered an avalanche of research aiming to investigate the oil spill response capacity put in place as the biggest question looming in the quest for arctic oil and gas includes but not limited to the consequence of an oil spill due to a tanker running aground or a major blow out. There is a growing number of research in the direction of the preparedness and the resilience engineering schemes of the stakeholders of Norway's arctic drilling to ascertain the Arctic's capacity to withstand a stressor such as an oil spill or other unforeseen contingencies on the one hand and on the other hand the capacity of the stakeholders to respond in the face of a mishap. The challenge to understand the preparedness scheme in Norway's Arctic is exacerbated by the presence of multiple actors charged with seemingly conflicting or overlapping roles (Knol & Arbo, 2014). Besides, the major stakeholders with vested interest in Arctic drilling such as the government ministries and agencies mandated to oversee drilling activities and the protection of the environment as well as the oil and gas industry on the one hand and the scientific and environmentalist communities on the other hand share very polarised views due to the fact that safety and vulnerability is seen through the eyes of vested interest. The perceptions of the narratives of safety and vulnerability have been institutionalised amongst the various stakeholders leading to claims and counter claims. This research therefore provides an opportunity to unravel the underlying motives of positions and cleavages.

It should be reiterated that the reason for focusing on the narratives of safety and vulnerability is that narratives are very important as they could influence the policy circle and the agenda setting (which is the way a political system manages its scales of preference in terms of which cases should be treated as priority and hence given urgent attention (Jones & Baumgartner, 2005). This is so because narratives carefully argued and popularised could suddenly be considered as a focusing event. Focusing events will get more attention, narratives influence the way the national, international media and the society perceive a topic as important as well as sway how it is relayed. Government operatives and people with influencing roles in the political landscape of a country are always interested in the political agenda (Kingdon & Thurber, 1984).

Mindful of the ramifications and the generic nature of problems dealing with societal safety or the environment it is logical these are phenomena which affect everyone in the society and will therefore be given more credence or attention than issues which affect only a cross section of the society (Downs, 1972, 1996). The importance of narratives is that they can conflate problems and cause the importance to be misconstrued or make problems of little importance to get national and international attention while salient issues may be relegated beneath in the pecking order of policy priorities. Therefore, narratives play very pivotal roles to bring an issue on the political agenda as the framings of problems often determine their importance and urgency. On the other hand, the articulation of narratives contributes to generate and foster interest in research. Therefore, the narratives of safety and vulnerability have wider implications on policy and theory. Against this backdrop, it is important to develop a better understanding for the varying ways in which perceptions and attitudes towards safety and vulnerability varies across sectors and stakeholders. The importance of focusing on the narratives of safety and vulnerability is that politicians are make the decisions to open or not to open areas for petroleum activities due to how the overall risk is perceived as well as their perception of the narratives of safety and vulnerability. Therefore, clarifying the interpretation the safety-vulnerability nexus in Arctic oil and gas exploitation will certainly have positive policy implications and will create a rapprochement amongst the stake holders.

Despite the fact that the oil and gas regime has made bold claims as to the fact that they can replicate their successful drilling practice in the North Sea in Barents Sea and the Lofoten area which includes part of the Norwegian Sea (Also referred to as the High North) the scientific and environmentalist communities have jettisoned these claims while painting a less optimistic picture by evoking the risk of an uncontainable oil spill and the peculiarity⁵

Furthermore, interviews conducted with environmentalist organisations such as Green Peace, WWF, Naturvernforbundet (Friends of the Earth) reveal that they are even more pessimistic pointing that the urgency of halting Arctic drilling does not only rest on the eventuality of a spill or a tanker running aground in the Barents Sea and the Lofoten area, but on the general schemes which accompany oil exploration and exploitation such as seismic surveys, transportation, building of platforms, piping etc in these vulnerable areas owing to the fact that

⁵ The Arctic (especially the Norwegian and the Barents Seas are infested with a vast array of biodiversity including varied fish species, sea mammals, sea birds just to mention a few.

these activities will drastically affect the marine ecosystem with dire consequences and reiterating that, an spill or a blowout will simply be a worst case scenario as there are already minor leaks in the operating areas which are often not unreported. Meanwhile, the industry has shown a willingness to improve its emergency preparedness and the search and rescue operation framework as well as making great strides in acquiring cutting edge technology and building advanced ICT architecture and infrastructure to respond to the exigencies of its northwards expansion. It is in the face of all these that understanding varying perceptions and attitudes of the stakeholders towards safety and vulnerability that this research will help to stimulate

Delimitation and Scope

Considering the vagueness\broadness of the topic, the paper will concern itself with the environmental impact of drilling in the Arctic. There is no doubt a strong debate about the sustainability of fossil fuel and Norway's commitment to reduce CO₂ within the framework of the Paris Agreement and there is also a willingness by the Norwegian government to diversify its economy. However, the risk of greenhouse gas associated to climate change which has far reaching effects globally (Webersik, 2010) will not be essentially the focus of this research. The paper will not lay emphasis on the risk associated to workers' safety on offshore platforms according to the practice of health safety and environment (HSE)⁶. This research principal objective is to investigate the narratives of safety and vulnerability in Arctic drilling in Norway. In doing so, the study does not seek to land on a conclusion but to examine the narratives presented by the stakeholders and analyse them to stimulate theoretical and political impacts leading to improved policy outcomes.

More so, mindful of the similarities of the pan arctic characteristics and considering the divergence of activities and different legislative and institutional frameworks available for different countries and mindful of some great pan arctic regulations and initiatives such as the Arctic Council or Norway's collaboration with other countries such as Russia on oil spill respond, maritime transport, protection of the marine environment, this thesis will mainly focus on the Norwegian arctic.

⁶This is under the auspices of the Ministry of Labour and Social Affairs and delegated to the Petroleum Safety Authority (PSA).

STRUCTURE

This section presents the outline of the research by providing a snapshot of the project. This research constitutes 7 chapters. The first chapter is the introduction, which lays the groundwork for what is to follow. It cast a quick look on some research which has been done concerning oil drilling in the High North and identifies knowledge gaps as researchers have not been interested in the narratives of safety and vulnerability in Arctic petroleum.

After the introduction chapter, the second chapter will present the context of the topic with the aim of shedding light on the importance or the relevance of the topic by looking at the economic and geopolitical implications of petroleum activities in Norway by situating oil and gas in the Norwegian context. A frantic attempt is made to clarify the appellation “Arctic” by looking at the geographical, astrological, climatic and political connotations as well as the broader Pan-Arctic interpretations of the Arctic environment. Henceforth, a comprehensive list of the stake holders in oil and gas drilling in Norway are presented with.

Meanwhile, the third chapter will introduce the theoretical frameworks on which the research is grounded. Theories such as Normal Accident Theory (NAT), High Reliability Theory (HRT), Black Swan Theory and Complexity, Tight and Loose Coupling are used to explain the possibility and impossibility perspectives of safety. This chapter provides the theoretical bases that will be used to problematise the findings of the research as the narratives of safety hinges around the argument of to drill or not to drill in the Arctic.

Chapter four presents the method used in the research and seeks to offer reasons for the chosen strategy as well as the data collection and the research method. This section also justifies and clarifies the importance of interviews as it forms the main bases of the findings of the research as well as presents a table of the interviewees. Then, chapter five will present the findings of the research which was obtained principally via interviews and analysed using analytical perspectives which revealed 4 conceptual frameworks namely:

- Too risky to drill in the Arctic
- Risk acknowledgement in Arctic drilling but necessary hence, good preparedness plans in place.
- Sceptic outlook on safe Arctic drilling
- Optimistic outlook on safe drilling in the Arctic

In the sixth chapter, the findings are discussed with some nuances in order to respond to research the research questions. The public and private claims for safety are presented as well as the motivations for such claims and these are tested with empirical evidence claims are problematised. Finally, the conclusion of the thesis is presented in the seventh chapter which addresses and provides closing reflections on the research questions by summarising the highlights and propose avenues for further research.

CONTEXT

This section has 3 objectives:

1. Situates oil and gas in Norway,
2. Looks at the Arctic environment and
3. The actors or stake holders in oil and gas drilling in Norway.

Oil and gas in Norway

Norway is a major producer of oil and gas in the world ranking 3rd in terms of world’s biggest producers. At the European level, Norway satisfies 25% of all of EU gas demands⁷ putting Norway in a strong energy geopolitical position. According to official statistics, the total sum of the exported value of natural gas, crude oil, natural gas liquid (NGL) amounts to about half of Norway’s goods exports with a value of approximately NOK 442 billion. Norway supplies about 2% of world’s oil demand according.

Figure 1 below amongst other things shows the importance of oil and gas to the Norwegian economy.

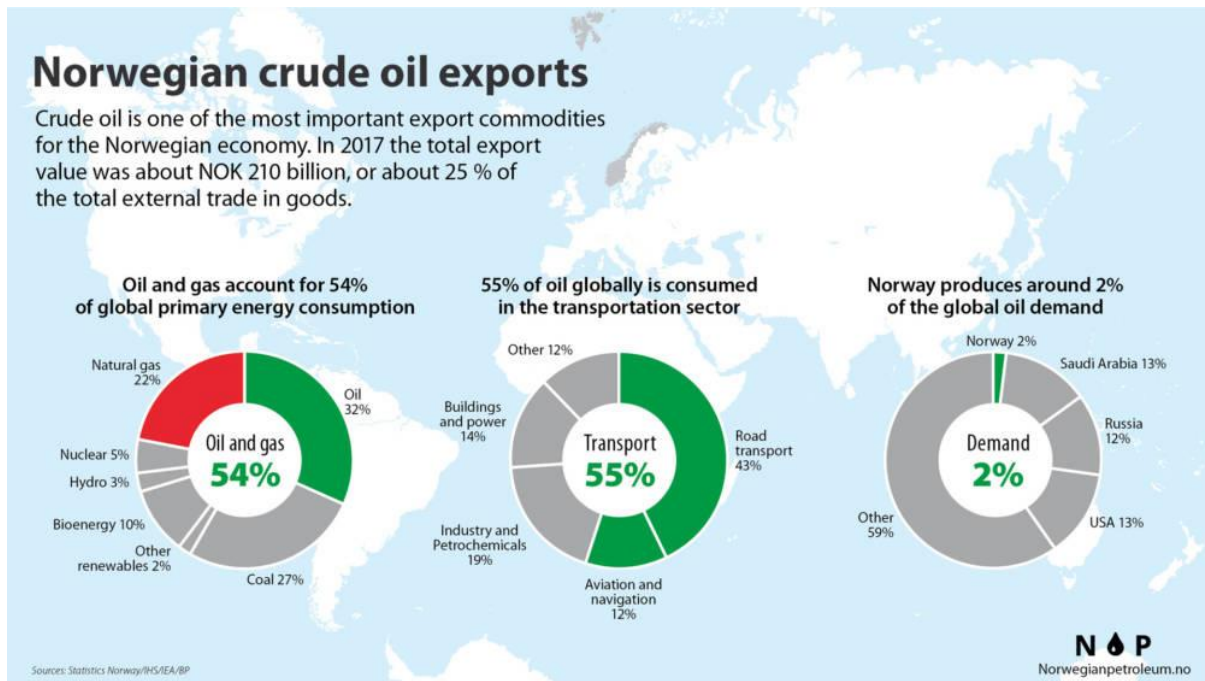


Figure 1 Norwegian crude export

Source: Norwegian Petroleum

⁷ According to statistics from Norwegian Petroleum: <https://www.norskpetroleum.no/en/production-and-exports/exports-of-oil-and-gas/>

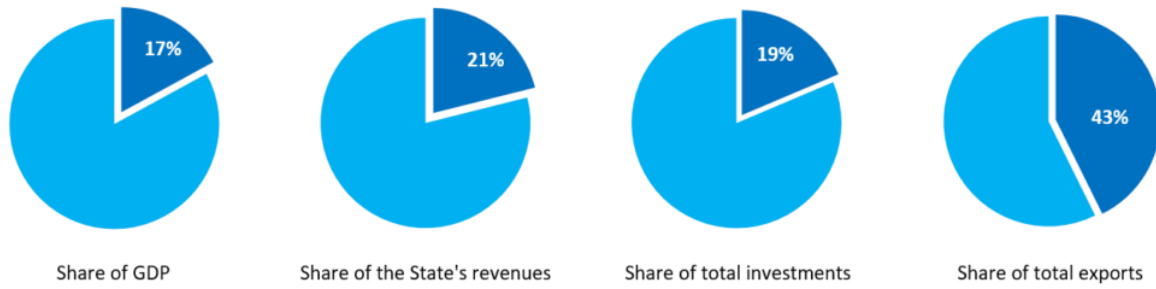


Figure 2: Macroeconomic indicators for the petroleum sector, 2018

(source: Norwegian Petroleum)

Petroleum serves as an important source of revenue with which Norway has built one of the best welfare systems in the world. Besides, the oil and gas industry has enabled Norway to amass a 1 trillion US Dollars sovereign wealth fund giving it stakes in over 9000 companies in the world corresponding to about 1.4% of all listed companies in the world (Bank, 2019) with an annual revenue of NOK 120 billion to the fiscal budget (Regjeringen, 2011, p. 6). The oil fund has a strong influence in global corporate governance using it to oblige corporate bodies to conform to certain requirements set by the Norwegian government such as sustainability standards or policies related to child labour etc failing which they are barred from the fund's portfolio. Considering that the oil fund has been invested in companies such as apple, Microsoft, Facebook, Amazon, Bank of America, Samsung Electronics, Nestle, Royal Dutch Shell, Exxon Mobil, JP Morgan Chase just to mention a few global giant companies, it will not be too much to say that it also constitute a source of soft diplomatic power to Norway.

The expected net government cash flow from petroleum activities (in billion NOK, 2019)

	2018	2019
Taxes	119.0	156.1
Environmental taxes and area fees	7.0	7.2

Net cash flow from State Direct Financial Interest (SDFI)	123.2	105.9
Equinor dividend	14.8	16.6
The net government cash flow	264.1	285.8

The expected net government cash flow from petroleum activities

Oil and gas constitute a major source of employment in Norway. The employment numbers given by Norway Statistics⁸ and other research authorities often vary slightly, these discrepancies are due consideration of direct and indirect employment in different studies. Mostly concerned with this discrepancy are the indirect employments as different research bodies have different parameters of considering which employment constitute indirect employment. The International Research Institute of Stavanger (IRIS) put the employment numbers to be 330.000 employed in the oil and gas industry in 2014. Of this, 186000 were directly employed while 144000 were indirectly employed in related industries. While Statistics Norway's reports reveal that in 2016 195000 and in 2017 170200 were directly and indirectly employed in the petroleum and related industries. As mentioned above there, there are no watertight criteria for determining what constitutes related industries. Be it as it may, the numbers show the importance of the oil and gas industry in terms of providing employment.

The Norwegian Arctic Environment and the Ecosystem

Since the discovery of petroleum in Norway, exploration in the North Sea did not raise much controversies or face strong oppositions. However, the decision to push towards the High North, has seen some opposition from a couple of environmentalist organisations and four political parties namely the Green Party, the Christian Democrats, the Liberal party and the Socialist party (B, 2018). Opposition to drilling in the Norwegian Arctic has ranged from protest marches to a court case. These opposition are buttressed on the one hand by the

⁸ Statistisk sentralbyrå the Norwegian official statistic authority

ambitions set in the 2015 Paris Agreement and the effects of climate change visible in the form of melting ice in the Arctic and on the other hand by the consequences of oil drilling in the Arctic especially on the biodiversity of the Norwegian and Barents seas and the Lofoten area.

The term Arctic is very generic, and its understanding is elusive. Almost all literature on drilling in the Norwegian Arctic use the words High North and Arctic interchangeably, while others prefer the appellations “the Lofoten area”, LoVeSe (referring to Lofoten, Vesterålen and Senja) (Kristoffersen, 2014; Kristoffersen & Dale, 2017).underpinning the importance of these three areas as far as drilling in the Norwegian Arctic is concerned. Though they refer to the same thing, the Arctic can be construed in many different contexts.

The Arctic

The appellation “Arctic” in Norway is very contextual as it carries geographical, astrological, climatic and political connotations as well as the broader Pan-Arctic interpretation. The Pan-Arctic is under the auspices of the Arctic council which comprise of Norway, Canada, Finland, Iceland, Denmark (Greenland and Faroe Islands), Russia, Sweden and the United States of America as well as over a dozen observer nations. The arctic council is limited to the eight countries whose territories extend above the arctic circle implying the geographical delimitation (Skagestad, 2010).

There are six working groups in the Arctic Council which are: Arctic Contaminants Action Program (ACAP), Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF),Emergency Prevention, Preparedness and Response (EPPR), Protection of the Arctic Marine Environment (PAME), Sustainable Development Working Group (SDWG) (Chuefor, 2018a). These working groups which were formerly vested with the simple role of analysis and advising have grown in importance and have become major players in the Arctic with huge scientific output and implementation of decisions (Mikkelsen & Langhelle, 2008). Though Council’s earlier output was mostly on maritime transportation, with decisions left at the volition of members to elect applicability, its sphere of influence has since evolved almost a body capable of enacting binding regulations amongst member states. An example of the Arctic council’s circumpolar reach are the 10 key regions were AMAP focuses its assessment activities. This includes both High Arctic and sub-Arctic regions as shown in figure ... below



Figure 3: The High Arctic and sub-Arctic regions

Source: AMAP

Geographically, it refers to the landmass which is split into three zones comprising the High Arctic, the Low arctic and the Sub Arctic. The geographical delimitation is connected to the climatic because it is the climate and the vegetation which determines the zones. The Arctic landmass is divided into three zones: the High Arctic, the Low Arctic (these two are demarcated by the tree line limit where trees ranging at minimum two to three metres can grow (BarentsWatch, 2016).

From an astral point of view, the arctic would refer to the portion of the earth which lies to the north of $66^{\circ} 33' N$ referred to often as the Arctic Circle. While climatically, it refers to the areas with permanent ice and to the ocean areas north of the southern limits of extreme occurrence of sea ice. A worthy definition of the Arctic is that which refers to the areas to the north of a line on the northern hemisphere map showing the July media temperature of $+10^{\circ}$ (Molenaar, Elferink, & Rothwell, 2013; Samstag & Nordic Council of, 1993; Skagestad, 2010)

The Environment and the Ecosystem

According to a survey by the US Geological Survey in 2008 about 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids may remain to be found in the Arctic circle which approximately 84 percent is expected to be found mostly in offshore areas just under less than 500 metres of water corresponding to about 30% of all the undiscovered gas and 13% of the undiscovered oil in the world. (B, 2018; Gautier et al., 2009). 43% of undiscovered oil and gas reserves on the Norwegian continental shelf are thought to be lying in the Barents sea (Norwegian Ministry of Foreign affairs, 2014). The Norwegian Arctic is currently experiencing very high density of marine transportation and tourism. 80 % of marine traffic in the Arctic passes through the Norwegian water. Tourism has become all year round with 206% increase in overnight stays in winter by visitors from abroad from 2005 to 2013. Paradoxically, this area has experienced 50% loss of ice cover since 1980.(Norwegian Ministry of Foreign affairs, 2014).

The Norwegian Arctic is very rich in terms of biodiversity. The Lofoten area is the Northeast Arctic cod, the world's most abundant cod stock which migrates from the Barents Sea to spawn. The eggs and larvae are drifted by currents in the direction of the Barents Sea via the continental shelf. In the same way, the Norwegian Spring herring spawning around Møre whose larvae must pass via the eye marked petroleum areas while going to their nursery in the Barents Sea(Hauge et al., 2014a). This area also endowed with a vast array of sea birds and sea mammals especially around the Barents Sea. Besides, it is also rich in plankton which the beginning of the food chain without which the entire ecosystem will be disrupted. This is so because, fish eat plankton and are thereafter eaten by bigger sea creatures such as birds, seals, sharks etc, which are also food for animals at the top of the food chain such as whales.

Conversely, this area is of massive importance to the Norwegian sea food industry. According to official government figures, 1000.000 tonne cod quota from the Barents Sea in 2013 with higher figures the following. The sea food industry is of significant importance to the local population around these areas as most of the people are employed in the fishing industry (Kristoffersen, 2014, 2015). However, some of the towns in these areas in the recent past are being influenced by oil and gas activities. A good example is Hammerfest which formerly a very small town experiencing rural exodus has been greatly transformed through developments

by the oil and gas activities through developments and employment and has seen a population increase of about 12%.

The Actors in oil and gas in Norway

This section will focus on the stakeholders in the oil and industry in Norway. The actors can principally be grouped into three categories, viz:

- The State apparatus
- The corporate bodies
- The environmentalist organisations

The state apparatus

The Norwegian parliament (Storting)⁹ is at the apex of the state apparatus as it sets the framework for petroleum activities in Norway including decisions for licensing rounds through parliamentary debate. It also supervises the activities of the government and the public administration.

Down the chain of command is the government which executes the decisions of the parliament and oversees or influences petroleum activities in Norway. Through the ministries¹⁰ of petroleum and energy, climate and environment, trade, industry and fisheries, labour and social affairs, transport and communications and finance. Some of the ministries such as the ministry of Climate and Environment through the Environment Agency have direct influence in shaping the petroleum landscape either by awarding licences and providing guidelines for drilling in addition to serving as advisory bodies to the parliament, while others (e.g. Petroleum safety Authority) act as watch dogs seeing into it that companies adhere to health safety and environmental (HSE) regulations. While the roles of others are consequential to the aftermath of drilling. (this is the case of the ministry of transport which is responsible for acute pollution in Norwegian waters and its subsidiary, the Coastal administration is charged with oil spill

⁹ Norwegian appellation of the parliament

¹⁰ The influence of the ministries is operationalised through directorates, agencies, designated administrative bodies and parastatals under the tutelage of respective ministries.

response while the Ministry of Finance is responsible for the financial fall outs from petroleum through the Pension Fund and the Petroleum tax office).

The organigram below illustrates the involvement of the Norwegian state apparatus in the petroleum activities.

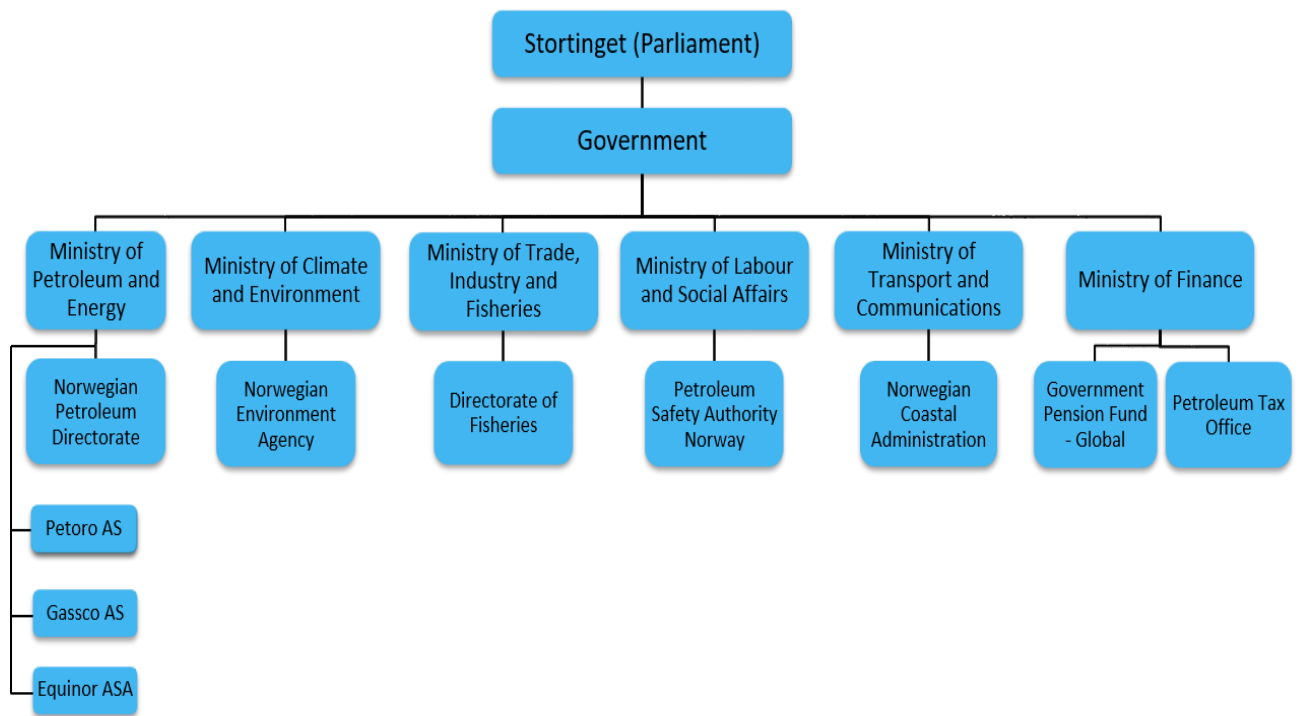


Figure 4: the Norwegian state apparatus in the petroleum activities.

Source: The Ministry of Petroleum.

The corporate bodies

According official statistics from the Norwegian Oil Directorate (OD), there are about 40 companies involved in active production in the Norwegian Continental Shelf (NCS). In the 23rd rounds Fifty-seven blocks/parts of blocks were concerned, 3 being in the Norwegian Sea and 54 in the Barents Sea with 13 companies involved. Meanwhile, the 24th round involved 102 blocks/parts of blocks, of which 9 were in the Norwegian Sea and 93 in the Barents Sea involving 12 new production licences to 11 companies. However, the followings are the active companies in the NCS:

- A/S Norske Shell
- Aker BP ASA
- CapeOmega AS
- Capricorn Norge AS

- Chrysaor Norge AS
- Concedo ASA
- ConocoPhillips Skandinavia AS
- DEA Norge AS
- DNO Norge AS
- Dyas Norge AS
- Edison Norge AS
- Equinor Energy AS
- ExxonMobil Exploration and Production Norway AS
- Faroe Petroleum Norge AS
- Idemitsu Petroleum Norge AS
- INEOS E&P Norge AS
- INPEX Norge AS
- KUFPEC Norge AS
- Lime Petroleum AS
- LUKOIL Overseas North Shelf AS
- Suncor Energy Norge AS
- Total E&P Norge AS

- Lundin Norway AS
- M Vest Energy AS
- MOL Norge As
- Neptune Energy Norge AS
- OKEA AS
- OMV (Norge) AS
- Pandion Energy AS
- Petoro AS
- Petrolia NOCO AS
- PGNiG Upstream Norway AS
- Repsol Norge AS
- Skagen44 AS
- Source Energy AS
- Spirit Energy Norway AS

- Vår Energi AS
- Wellesley Petroleum AS
- Wintershall Norge AS
- LOTOS Exploration and Production Norge

The environmentalist organisations

There are a host of environmental organisations active in Norway. They are very pessimistic to drilling in the Arctic. They produce periodic reports on the activities of the oil companies and the government. Their whistle blowing activism puts tremendous pressure on the oil and gas regime in Norway. Here are some of the prominent environmentalist organisations:

- Norwegian Society for Nature Conservation (FoE)
- Nature and Youth
- The Future in our Hands
- Green Peace
- WWF Norway
- The Green Warriors
- The Bellona Foundation
- The Friends of the Earth (Naturvernforbundet)
- The Norwegian Grand Parents Climate Campaign

THEORETICAL FRAMEWORK

The work of Perrow and La Porte suddenly pitched two theories against each other on the origin of accidents. While Perrow purported that no matter what organisations do, accidents are inevitable in complex and tightly coupled systems, La Porte opined that there were organisations which used reliability enhancement strategies to avoid accidents. These two landmark schools of thoughts have contributed enormously to the variation of safety possibility across literature. While the NAT and HRO serve as useful theoretical frame works to understand safety possibility and impossibility. Meanwhile, Taleb's Black Swan theory offers an excellent concept-metaphor to analyse and understand the effect of the hindsight bias or the outlier. It should be emphasised here that that I do not aim to use or test these theories in a bid to explain or analyse the possibility or impossibility of drilling in the Norwegian Arctic rather, I aim to draw on them to illustrate the heterogeneity of views as to whether or not safe operations are possible at an analytical level. The divergence on the views of safety possibility and impossibility and impossibility perspectives will constitute the subject matter of discussion.

The Impossibility of Safety

Pessimist theories argue that organisations or system cannot attain absolute safety. Under this heading some middle range theories on safety impossibility will be analysed. Perry example in his 1984 book titled Normal Accidents published after the 1979 nuclear disintegration at Mile Island highlighted the human influence of the nuclear breakdown. Another theory that can be used to explain the pessimists view of safety is the Black Swan theory developed by Nassim Nocholas Taleb in which he examined the role of unexpected events using the believe that was long held that only white swans existed. Perrow and Taleb offers the understanding that

achieving safety is very difficult if not impossible due to largely human factors. While Perrow indicts both humans and machines to be at the origins of safety impossibility, Taleb argues that the generalised nature of decision making hinders the discovery of surprised elements.

Normal Accidents (NAT)

By Normal Accident Theory (NAT), Perrow propagated that accidents were unavoidable in complex and tightly coupled systems with sophisticated technologies. NAT was inspired by Three Mile Island Nuclear plant meltdown in March 23rd, 1979 in Pennsylvania. In contribution to a book which looked at human aspects of the accident, Perrow came up with the seminar book *Normal Accidents (NA)* (Rijpma, 1997). Perrow's thoughts ushered a paradigm shift in the way of looking at organisational accidents. The premise of the NAT is that, no matter what organisations do, they cannot avoid accidents due to their complexity and the intertwined nature meaning that safety cannot be guaranteed in organisations with complex interface between human and technology.

Though Perrow explains that accidents are bound to occur in complex systems irrespective of what organisations do, it also provides explanations for systems' safety as was evident in Segan's studies during which he applied the NAT and High Reliability Theory (HRT) while analysing accidents in the US nuclear weapons system observed that there were closed calls as the system came close to disasters which were missed by a whisker (Rijpma, 1997). Though some scholars such as Leveson et al, have submitted that it is difficult to tell whether circumstances of near misses can be attributed to Normal Accidents (NA) or to High Reliability Organisation (HRO).

Perrow does not seek to depict organisations as being set up to become accidental ab initio but rather, actions or factors leading to accidents in organisations become wrong in the course of time rather than begin wrong (Weick, 2004). Implying that organisations become accident prone in the course of time owing to organisational complexities. This partly explains why Perrow later submitted in (Perrow, 1999) that NAT was more suited to explain error-inducing systems rather than error-avoiding systems. By inference, big and complex organisations or those that gain complexity and tight coupling during growth, always have accidents waiting to happen because small incidents go unnoticed and culminate over time to trigger meltdowns. The Three Mile Island accident is a normal accident par excellence in which a combination erroneous human actions couple with small systemic defects let to an accident which could have led to consequences far beyond the plant site and triggering the emission of disastrous

radioactive materials (Leveson, Dulac, Marais, & Carroll, 2009). While Perrow acknowledged that certain actions such as redundancy could reduce risk and enhance safety, additional layers of safety would make the system

Are Complex Systems Ipso Facto Risky Systems?

Perrow (1984) presents two fundamental factors which can herald or abet NA namely Complexity and Tight Coupling. Perrow (1994) refers to complexity as systems with accidentally unaccustomed sequences with unforeseen consequences without visibility and not comprehensive at the time (Shrivastava, Sonpar, Pazzaglia, Turner, & Gray, 2009). Perrow's thesis about complex system is that they are more accident prone because they involve the interaction of many components and layers of operation which do not guarantee a seamless interaction and hence makes safety elusive. Furthermore, systems involving complex technologies do not allow for meticulous planning as there are unforeseen contingencies which go beyond the ability of the operators' or engineers' intellectual capacity to anticipate, understand and manage them before they kick in (Perrow, 1999; Rijpma, 1997; Shrivastava et al., 2009). As a result, accidents in complex systems often begin as little cracks or fissures known as incidents in the system which often go unchecked and eventually culminating to accidents. This is facilitated by the multifunctionality and physical proximity of components as was the case in the Three Mile Island Nuclear plant where components failed in more than one direction. (Shrivastava et al., 2009). Talking about the inevitability of such accidents, Perrow opined that no matter what organisations do, owing to their complexity, it is only a matter of time for accidents to set in. From the Three Mile Island Nuclear accident, through the Chernobyl nuclear power plant disaster and the Bhopal disaster to the Fukushima disaster, Perrow's argument that disasters are a combination of human and machine failures.

On the other hand, Perrow argued that tight coupled systems are intricately linked together. with very little time lag from one process execution to another and possessing a regular sequence of processes with a single method of realising tasks, due to this, once a process is initiated, cannot be easily turned off implying that once a failure kicks in, there is a likelihood that it cascades into a disaster (Le Coze, 2015; Rijpma, 1997; Shrivastava et al., 2009)

It should be construed that Perrow though complex systems can operate better and timely as they have the dual effect of reliability and conceptual slack hence avoiding or reducing unforeseen hitches. This therefore requires a decentralised management competence by

delegating power to those who are specialised and closed to specific process, however, not decentralising the power to make decisions during unforeseen reactions will only increase the likelihood of accidents. The Chernobyl and the Bhopal disasters indicate that these were highly complex organisations with delegation of power to front line operators however, their recommendations were ignored by management. In the build up to the accidents many frontline operators suffered from major and minor accidents which management was complacent and took no steps to address the challenges.

Meanwhile, highly centralised systems are required for tightly coupled systems to operate properly. This is so because the systems operate as single and people not privy to the big picture cannot make sound decisions this allows for rapid and harmonized responses to some predicted circumstances while making it possible to recover quickly from some early failures before they heighten along tightly coupled lines. Nonetheless, the weakness is that they only work along pre-programmed premises and cannot operate in situations they are not designed for, therefore once an unanticipated hitch kicks it, it must run its full course as it cannot be deactivated. Perrow used the NAT to argue that complex and tightly coupled systems cannot operate as centralised and decentralised at the same time. As a result, such organisations experience NA.

Perrow came under scathing criticisms from researchers who do not agree with his postulations. Todd La Porte for example, jettisoned his arguments and postulated the HRT advocating certain reliability enhancing strategies which could help organisations avoid accidents such as slag and redundancy. Leveson et al criticised Perrow's classification of industries in terms of their complexity and coupling (as shown in the coupling and complexity chart below).

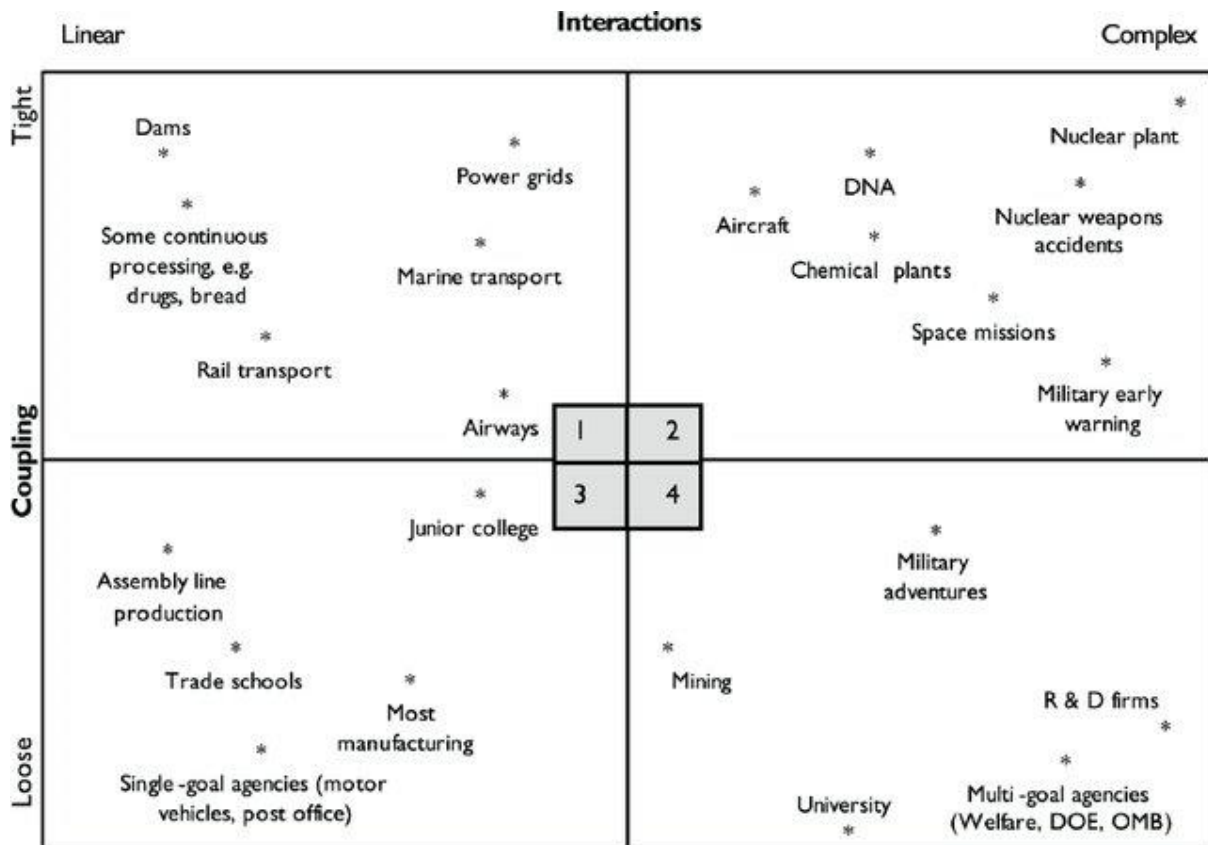


Figure 5 Perrow's classification of industries in terms of their complexity and coupling

His decision to put systems like Nuclear weapons, aircraft and military early warning in the tightly coupled and highly interactive quadrant in chart 2 implying that these industries experience high rate of accidents because they are complex and tightly coupled. This premise seems to be falsified because these industries experience low accidents (Leveson et al., 2009). Another criticism stems from his classification of some operations such as Air Traffic Control as complex and coupled which they are not. If Perrow's classification were to be correct, these industries will experience high accident rates than those in other quadrants but that is not the case (Chuefor, 2018a; Leveson et al., 2009) implying that the mere fact that a system is complex does not forcefully make it accident prone so to speak. Perrow (1999) seemed to retract from his earlier claim when he said "complex systems are not necessarily high-risk systems with catastrophic potential..." However, his affirmation cannot be taken as a complete shift from his premise but a recognition of the fact that his classification was very sweeping or generic as such, his retraction barely signifies that the kind of activity operated by an organisation is paramount to its safety. Reasons why, no matter how complex universities, research institutes or even government bureaucracies are, that never make them risky.

Furthermore, Perrow arguments were conceptualised in the wake of or against the backdrop of nuclear and other industrial mishaps as a result the analytical frameworks were shaped to capture complex production or manufacturing processes with complex interactions as opposed to linear and low risk transformation processes (Leveson et al., 2009).

That notwithstanding, Perrow's postulations cannot be jettison as its importance seems to be very glaring in contemporary operations. Nowadays, governments and industries depend on complex organisational and digital systems to function. Manufacturing processes are today more attached to complex technologies than in the era when the NAT was conceptualised. Risks such as hacking to steal trade secret, (such as cyber espionage) or the thread of cyber infiltration for sabotage in power stations or governmental digital infrastructures are very likely nowadays. While Perrow argument contemplated mostly risk that could emanate from complexity and tight coupling triggering human error, other elements such as engineering design difficulty and design errors, external elements such as terrorism targeting the digital space to compromise the safety and security of systems such as air traffic control, nuclear plants, government institutional digital architecture just to mention a few, indicates that Perrow's arguments today exceeds the realms of complexity and tight coupling to include external influence.

Even though complexity does not immediately make a system accident prone, complex systems are difficult to man and the chances of accidents are high. In many situations, accidents may not in themselves have ramifications as their aftermaths may. For example, the Exxon mobile grounding and the BP Deepwater Horizon explosion had far-reaching environmental and economic consequences. While the above-mentioned examples epitomise human negligence and overconfidence (Sylves & Comfort, 2012). A significant take away from NAT is that there are organisations whose activities are potentially risky, that is to say, the type of activity should be given full credence. The operation of a bakery and the materials involved in the production process are less hazardous coupled with the fact that its operating system is linear as Perrow rightly noted should not be treated in the same footing as Complex operations involved with hazardous materials. Complexity and tight coupling would simply increase the chances of accidents. Accidents arising from nuclear plants, an oil tanker running aground or a blow out from an oil platform for example will easily cascade to trigger ripple effects and often herald the review and amendment of existing rules or even triggering an abandonment of certain products or alter technological pathways in favour of those that hitherto saw reluctance in their implementation. A glaring example is the Fukushima disaster of 2011 which served as a

catalyst for energy revolutions in Europe mostly in Germany where it accelerated the introduction of renewable energy.

Safety is a function of what is known. The absence of the ability to make decisions based on foresight and in consideration of the broader picture explains why the attainment of safety in organisations and systems is elusive. Taleb's Black Swan Theory (BST) provides an important analytical framework to understand how safety is compromised by generalised decision making which ignores the other side of the coin. Therefore, the Black Swan (BS) is mostly considered as an event which shows up which was not contemplated or foreseen in the risk description.

The Influence of the Unknown to Safety

The BST is a great analytical framework which is used to explain the impact of the unknown to safety. It follows that early knowledge about swans in Europe was based on the belief that all swans were white until Dutch explorer Willem de Vlamingh saw swans with black plumage upon arriving in Australia. It became known that all swans are not white.

A black swan is something whose occurrence is surprising. It is an outlier so to speak. It is an event situated out of the ambit of ordinary expectations (Vehkalahti, 2013; Volery, 2008). Nassim Nicholas Taleb has used BST to portray how the "Hindsight bias" commonly referred to as the "know -it -all along phenomenon" influences safety. The September 11th, 2001 terrorist attack in the USA and the 2008 financial crisis are indicative of the influence of the unknown on safety. Safety is compromised because decision making lacks foreseeability as it is based on the state of knowledge and experience of the past. While the state of knowledge and past experience are important elements in decision making, relying only on them would ignore the black swan.

Taleb has criticised the Wall street bankers and experts for failing to see the "Black Swan" on the eve of the financial crisis. Taleb has used the BST to question the large discretionary power exercised by experts in decision making involving gross risk taking based on past experience. This is what Taleb calls "ludic fallacy" which refers to the application of game models to real-life situations with the assumption that the unknown can be predicted from statistical variations with the use of past observations with the understanding, they represent real sample distributions (Polasek, 2011; Taleb & Blyth, 2011; Volery, 2008). Implying that simulations must be treated with caution as they almost often fall short of the reality.

The failure to capture the unknown has led to catastrophic decision often leading to war as well as has led to the ushering of certain technologies without considering the hindsight. The US invasion of Iraq in 2003 exemplifies the hindsight bias. As the US prepared to invade Iraq, Defence secretary Donald Rumsfeld said in a press briefing on 12th February 2002 popularised the term “unknown unknowns” when he said:

“There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don’t know we don’t know”
(Steen & Aven, 2011, p. 12).

His statement was a confirmation that the US was not in possession of all the requisite information required to back the decision to invade Iraq. Nonetheless, Iraq was eventually invaded by the US on 19th March 2003. Soon afterwards it was revealed that Iraq did not possess nor was developing weapons of mass destruction as intelligence seemed to have confirmed.

On a second example of the hindsight bias, nuclei fusion was once hailed as the energy source of the future as scientists discovered the latent energy in radioactive elements. It was heralded because it was deemed to be inexpensive and clean and more so, because there were technological deadlocks in the exploitation of other energy sources notable shale oil and oil sand (Krupa & Jones, 2013). With the advancement in research in shale gas and oil sand technologies coupled with accidents associated with nuclear energy, it became apparent that the black swan of nuclear energy was not picked out. The 2011 Fukushima disaster laid bare the down sides of nuclear energy causing a wave of energy transition and transformation amongst many countries notably in Europe. Germany for example fast tracked the closure of its nuclear power plants and embarked on an energy revolution (Imbert, Ladu, Morone, & Quitzow; Rogge & Johnstone) causing many other countries such as France to follow suit (Malischek & Trüby, 2016; Marques, Fuinhas, & Nunes, 2016; Patel, 2014) Revealing that it usually after disasters have occurred the blind spot of decision making is unmasked thereby, prompting a cascade of decision makings which are often ill suited or poorly timed (Thomas A Birkland, 1998) as such, making learning from past mistakes difficult.

Safety and risk culture

Barry Tuner's "Man-Made Disaster" (Turner & Pidgeon, 1997) provides a theoretical analysis of how organisational culture breeds risk and subsequently compromise the organisation's safety. The bottom line of Turner's work was to systematically prove disasters in big technological systems were not random events often termed as 'Acts of God'. Rather it was as a result of organisational and human interaction in the course of managing complex and risky problems (Pidgeon, Amp, Apos, & Leary, 2000). The man-made disaster framework provides the understanding that safety in socio-technical systems is compromised by the usual processes of organisational operation. This relates to the safety cultures\climate, norms and beliefs which are either expressed or tacit. All organisations have a pattern of interpreting risk and how to deal with them. Some organisations develop a culture of over confidence or complacency with respect to risk and hazards. This kind of culture serves as an incubator for disasters. It follows that accidents do not suddenly occur in organisations or systems (Pidgeon et al., 2000; Turner & Pidgeon, 1997). They start with what are called incidents (minor disruptions in single components in the system which do not affect the overall functioning of the system). They worsen over time due to neglect or lack of vigilance by those whose roles are to spot accidents and eventually affect other components leading to accidents often with disastrous effects.

The institute of Risk Management (IRM) define risk as

“the sum of the organisation shared values, beliefs, knowledge, attitude and understanding about risk, shared by a group of people with a common intended purpose, in particular the leadership and employees of an organisation”

It follows therefore that the risk culture of an organisation should be well communicated and streamlined from top to bottom. However, risk is perceived differently by individuals in organisations and organisations fall short on effective leadership to trigger sound risk communication leading to a comprehensive risk culture. Organisational complexity and

coupling have led to fragmentation in risk interpretation across departmental lines based on normative precepts within organisations.

Despite the bleak picture portrayed by safety pessimists, the apologists of possibility theories present a somewhat optimistic outlook on the possibility of safety in organisations and they opine that organisations can actually take certain steps to attenuate risk as well as build robust systems that can be resilient in the face of accidents.

The Possibility of Safety

Notwithstanding the richness of the literature of safety impossibility, there is an avalanche of studies providing theoretical analyses to support the claim that organisations can implement models of safety cultures and safety indicators that can greatly improve their state of safety. Leading scholars have postulated theories advocating that emergency preparedness, risk governance, resilience, High Reliability Organisations (HRO) or High Reliability Theory (HRT) frameworks can mitigate risks of accidents in organisations. Apart from accident reduction in socio-technical systems, the risk governance literature indicates that inadequate preparedness for emergency response is the major reason why risk management seems a conundrum. However, a good emergency planning to deal with hazards will imbue resilience and render the system robust in the face of hazards leading to risk reduction. This section will engage with the work of authors such as La Porte, Perry, Lindell, Birkland, Tveiten and Alexander to reflect on risk attenuating mechanisms to increase reliability and make emergencies manageable.

The above-mentioned theoretical perspectives can either attenuate the possibility of accidental occurrences by increasing reliability and manage the consequences of risks/accidents in order to contain its effects.

Emergency Management

Emergency management refers to all the administrative routines and informal processes carried out with the aim control emergencies before, during and after an event through anticipation, planning ,learning, monitoring and handling of such emergencies (Tveiten, Albrechtsen, Wærø, & Wahl, 2012). Emergencies can be planned and managed as they generally have a

pattern of occurrence. By understanding emergencies, management plans can be drawn to respond to the exigencies of the typologies of the emergencies (Alexander, 2002). According to Alexander, the planning of a disaster will depend whether it is technological hazard (such as explosions, oil spills, emissions of radio-active materials), natural hazard (such as tornadoes, earth quakes, floods etc) and those of anthropogenic nature called social hazards (such as terrorism. Emergency management strategies if well-conceived and planned can mitigate the effects or hazards to avoid disastrous situations. This comprises all actions designed to reduce the impact of future disasters. Tveiten et al notes that one of the theoretical bases for understanding emergency management is rooted in resilience engineering.

Systems which apply resilience engineering look for ways to enhance their ability to thrive under different conditions (Hollnagel, Nemeth, & Dekker, 2009). Good planning implies having the right experts versed with actual knowledge of the threat and the response needed. This is the starting point to draft and execute the emergency planning capable to address risks. While a plan document is a great step in the right direction, Perry and Lindell warn that the emphasis should not be on a plan as a document instead emphasis should be laid on the planning process (Perry & Lindell, 2003). This implies that a plan should not be conceived as though an emergency is a linear process, therefore the vicissitudes of emergencies should be considered.

Furthermore, a plan document is a product of experience, from efforts made to understand the characteristics of the risks involved and a study of the actions required to reduce the susceptibility to harm related to the system. However, a document borne out of haste to respond to popular outcry or with the aspiration to satisfy political base might be void of the ability to address the exigencies of an emergency. For example, sweeping reforms passed after terrorist attacks or major accidents are usually borne out of haste with the ambition to react to quell down popular out cry. These kinds of documents could simply become ‘fantasy’ documents in the words of Thomas Birkland (Thomas A. Birkland, 2009) because they are created for rhetorical purposes and usually are never translated into action because often they are ill suited to address the challenges. Meanwhile, actions plan which redress risk and imbue safety learn from pass experience and are conceived with the aim of translating them into action. Even Events that are unforeseen or unlikely to repeat themselves such as technological hazards can be coped through effective preparedness and emergency planning as literature offers effective guides about them. Such events include dam bursts, oil spills, explosions or catastrophic pollution episodes, just to mention a few could be contained with effective preparedness. Past events such as the September 11 terrorist attack in the US led to a vast array of counter terrorism

actions geared towards avoiding as well as being prepared to cope in the face of such circumstances (Thomas A. Birkland, 2009; Perry & Lindell, 2003) on anthropogenic hazards and on technological hazards, the Exxon Valdez Oil Spill and the BP Deep Water Horizon are examples of hazards which have triggered a cascade of emergency reforms (R. T. Sylves & L. K. Comfort, 2012) as such law enforcement and emergency managers have learned to up the ante of preparedness and emergency management after these episodes.

Risk and accidents reduction in socio-technical systems

Charles Perrow's NAT was soon contrasted by Todd La Porte and colleagues of the Berkeley campus who postulated the HRT in which they held that they found organisations which were complex and tightly coupled with strong safety records because they used certain organisational strategies. (Rijpma, 1997). Their view departed from NAT where Perrow held firm that complex and tightly coupled organisations were susceptible to accidents. As Vaughan, (1996) pointed out, the premise of NAT was that accidents in complex and tightly coupled organisations were the product of organisational and technological failures, while Le Coze lifts the gaze off NAT when he opines that the NAT picked out technologically oriented organisations with high degree of risk embedded in their systems prompting him to ask whether Perrow was right for the wrong reason (Le Coze, 2015). Although Le Coze concludes like many others that Perrow was for a large part right, however, the HRO seeks to address the risk and safety gap of the NAT by using certain strategies in order to avoid accidents.

To start with, evidence from literature on HRO indicates that by using redundancy, organisations can reduce the risk of accidents. This implies adding extra layer of security which kicks in as a back for failing parts or/and backup for operating agents so that if an operating agent or an engineer fails in the execution of their duty, another would be signalled and can eventually rectify the neglect. It also implies building smart systems with rapid signalling abilities. As such incidents can be automatically signalled via warning systems hence, preventing systemic failures leading to accidents. However, the problem with redundancy is that it will add to the complexity of the organisation. An attempt by organisations to address bugs in systems create further needs for fixes making the organisation or system complex and often more prone to accidents, this thought is very fitting with the NAT. The purpose of

redundancy is often defeated by corporate cultures which aim at cutting cost and finding a way around regulations.

Similarly, centralization aids in coping with tight coupling – the thinking being that only an agency that is privy to the big picture can be expected to sensibly override local considerations to ensure the stability of the entire system. Organizations operating complexly interactive and tightly coupled systems cannot be simultaneously centralized and decentralized. By doing so, Perrow singled out a set of techno-organizations, the so-called ‘high-risk systems’, for their actual and potential damage. One conclusion that follows is that tightly coupled and complex systems with catastrophic potential should be abandoned or made less coupled and less interactive.

METHOD

The basis for this section is to explain the chosen method to operationalise this research as well as presenting the motivation for the choice of the method. Method refers to adhering to the conventional expectation of scientific procedures (Kumar, 2019). This section will consist of the method which I have used and a clarification for the choice. The research strategy chosen for this research is the abductive strategy as the aim of the research is not to come to a definite conclusion but to understand the narratives of safety and vulnerability of the Norwegian Arctic drilling among stake holders.

The method for this research is qualitative in which I will use interviews and discourse analyses to understand the narratives of risk in drilling in the Norwegian Arctic. To attain this goal, I engaged with some important players in oil drilling in the Arctic in interviews to understand how different narratives are shaped and to find out the reason for the difference. Besides interviews, I engaged in conversations with people of different backgrounds some with deep understanding on climate change, societal safety, energy policy and politics just to mention a

few and a host of lay men to try to analyse the discourses on the way safety and vulnerability is perceived in Arctic drilling in Norway.

The Research Strategy and Research Design

Research strategy offers guidance to the researcher (Johannesson & Perjons, 2014) enabling the researcher to collect data for the research. The strategy used in the research is the abductive strategy meanwhile, according to Blaikie, a research design is a laid out plan which points out how the researcher will answer the questions raised in the study (Blaikie, 2009). The design chosen for the research is the qualitative method.

The best research strategy which fits this research project is the abductive research strategy, this is so because as Blakie puts it, inductive research strategy can be used to answer ‘what’ questions and the Deductive and Retroductive strategies can be used to answer ‘why’ questions meanwhile, the Abductive can be used to answer both types of questions by coming out with understanding than an explanation by providing reasons rather than causes (Blaikie, 2009, p. 89). Since the research questions are ‘how’ and ‘why’, the Abductive strategy seems a natural choice to respond to the exigencies of the research.

The aim of this research is to examine the narratives of safety and vulnerability in arctic drilling in Norway and does not aim to come to a definite conclusion as to what is the truth of the matter. Therefore, an abductive approach will enable an interpretation and recontextualization of the narratives of safety and vulnerability in Norway’s arctic drilling and my analysis will provide a novel conceptual frameworks for interpreting safety and vulnerability in the Norwegian arctic drilling (Danermark, Ekstrom, & Jakobsen, 2005); (Kovács & Spens, 2005)

More so, the research aim to develop new knowledge as Kovacs and Spens affirm, works which carry with them some creativity are suitable for abduction because they break free from the constraints of induction and reduction as they are delimited to establish relations between already known constructs (Kovács & Spens, 2005). The primary objective of this research is to develop the understanding of a new phenomenon namely the interpretation of safety and vulnerability narratives in the Norwegian Arctic drilling. Literature on safety or oil spill have not interpreted the narratives of safety and vulnerability thereby, leaving a knowledge gap in the subject. Abduction method is suitable for the understanding of new phenomenon (Kovács & Spens, 2005). Implying that novelty of the subject matter makes abduction a suitable tool for understanding safety narratives in oil drilling in the Norwegian Arctic.

Qualitative Research

Qualitative method will be used in this research in the form of interviews. Qualitative studies mostly examine social processes and cases in their social context and seek to study the interpretations accorded to phenomena in social and cultural settings (Neuman, 2013). The overall objective of the study was to understand the narratives of risk in Norwegian Arctic drilling. This required an interpretation of stakeholders' perception of truth. I, therefore, acquainted myself with the actors during interviews and informal discussions as well as attended conferences (Klimapartnere conference in Stavanger on 7th May 2019 and the European Oil and Gas Conference from 28th to 29 of May 2019 in Stavanger.) which brought different stakeholders together. The interviews and conferences enabled me to gather qualitative data for thematic analysis as well as using existing literature on the subject to understand the state of knowledge in the field. Blaikie refers to a researcher's stance to mean the posture adopted by a researcher in the course of a research. I adopted the hybrid posture of detached observer and active reflexivity (Blaikie, 2010).

Interviews

In order to have a clear understanding of the provenance of the stakeholders' notion of truth and motivation of their interpretation of risk and safety, an interview was used. An interview could be used to gather data for research when the researcher seeks to understand the stakeholders point of view and interpretation (Blaikie, 2009). Literature reviews however important, would not meet all the expectations of this research, according to Tim Rapley, data as a source approach has been criticised in favour of interviews because they are interactional as both speakers speak, monitor each other's talk and their talk is produced locally and in collaboration. Also, the interview data is a reflection of a joint reality constructed by both the interviewer and the interviewee (Rapley, 2001). During the interviews, I enjoyed some form of working relationships with the subjects as we had extended communications both onsite and online thus gaining depth of knowledge and giving me the opportunity to take knowledge gained from one interview to another in keeping with Anne Ryen opinion on interviews. She says a key advantage which interviews have is the fact that it provides depth which is difficult to grab in other research strategies because it is established on extended relationships between

the two parties are involved with clearly understood and agreed roles and status with a defined framework on which the exchanges develop (Ryen, 2002).

Semi structured interviews were designed for the targeted interviewees which saw some modifications as the interview went on as some answers provoked follow up questions. Some of the interviews were carried out at the organisation premises and others were through video conferences due to the schedule and availability of the interviewees. Considering that some informants were too busy and difficult to meet, some of the interviews were opportunistic as I intercepted the subjects in conferences. Operatives from the following organisations took part in the interviews: The Norwegian Petroleum Directorate (NPD), Petroleum Safety Authority (PSA), The Norwegian Environment Agency (miljødirektoratet), The Norwegian Coastal Administration (kystverket), WWF, Friends of Nature (Naturvernforbundet), Green Peace, Equinor and Vår Energi. On the corporate side, Equinor’s strong stakes in the High North made it an interesting subject for the studies. It should be emphasised that Equinor, Vår Energi and the NPD did not offer the chance for interviews as such, information was harvested at the side-lines in conferences and informal discussions.

A table of interviewed informants and their organisations

INFORMANTS	ORGANISATIONS
1	WWF
2	Green Peace
3	Friends of Nature (Naturvernforbundet)
4	The Norwegian Coastal Administration
5	The Norwegian Environment Agency
6	The Norwegian Petroleum Directorate
**	Petroleum Safety Authority
**	Equinor
**	Vår Energi

**Informants not directly cited from the interviews

There were a couple of challenges faced in the course of gathering information for the research especially when trying to secure interviews with oil and gas companies. It took very long before emails were replied and often, they were ignored. Another challenge was the difficulty of contacting the experts of preparedness and contingency departments or related departments of oil and gas companies as most corporate websites do not have direct contact information to employees as such, all communications must go through the corporate communication department who are either too slow to reply and, in some cases, never reply. To overcome this, I settled for an opportunistic approach to reach corporate subjects. This is not the case with government institutions and environmental organisations who can be easily contacted due to the availability of contact information under each employee on their websites.

Also, subjects from governmental institutions and environmental organisations were forthcoming and willing to engage in discussions contrary to corporate subjects who were often somewhat reticent.

A technic used to get most informants was the “snowball” method as it was effective to bring me closer to the informants. Snowball sampling is when the researcher is aided by informants to get in contact with other informants. The process is often repetitive as informants refer the researcher to other informants, who are contacted by the researcher, and so on and so forth (Noy, 2008). The first informant I encountered put me through to the other informant who intend did the same for the next informant. This is facilitated by the fact that there is an inter-institutional cooperation when it comes to oil and gas drilling Norway. Though this cooperation has been criticised for producing overlapping functions amongst the stake holders in emergency preparedness and oil spill clean-up in Norway, the advantage is that, they have a network which produces an excellent snowball effect for researchers

Discourse Analysis

Arctic drilling is diversely interpreted in Norway, these divergent views has led to coalition building in the Norwegian political landscape. There is divergence of ideas on oil drilling in Norway and specifically in the Arctic. Interestingly, there is a growing opposition to drilling from the millennials spurred by the worries of the effects of climate change. However, among the older generation, the economic importance of oil and gas in Norway is the most important

factor as they content that without oil and gas, Norway will not be able to sustain such a generous welfare system. The discourses on drilling in Norway hinges on what different groups view as more important. In analysing the discourses, one thing seems evident namely that those who are against drilling in Norway especially in the High North worry about the environmental impact of fossil fuel while those who want Norway to continue drilling are motivated by the impact oil and gas has had in the economy in Norway and they specifically point to the oil fund, job creation, the welfare system and so on. After, analysing the ensemble of the discourses, it emerges that the discourses on oil drilling in Norway amongst the citizenry hovers on the conflicting objectives of societal safety and welfare. According to Hajer, a discourse refers to

“ a specific ensemble of ideas, concepts and categorizations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities” (Hajer, 1995, p. 44) .

Drilling in the Arctic is a topic which is very much alive in Norway. It is both historical and contemporary. Historically, it marks the beginning of a new economic chapter in Norway away from an economy essentially based on fishing. Cotemporally, oil and gas has put Norway on the global map Another curious observation worthy of interest leading to split in ideological bases is the local fishermen as they have now been incorporated in the preparedness plan. Therefore, the Ontological and the epistemological understanding of the various stakeholders on how they perceive their reality and what makes their claims true (Neuman, 2013) was aided by discuss analyse.

I engaged in both formal and informal discussions with lay people and those with understanding on climate change policies and politics. There are basically two sets of discourse which emerged. One on the fear of the breakdown of the social system and another on the consequences of climate change.

Lay men went with the narrative that “if we do not continue to drill oil, our social system will collapse”. While the younger generation and those versed with climate change said, “Norway must reduce emissions in order to save the planted”. A few made mention of Norway’s commitment to the Paris Agreement.

A remarkable omission in the discourses is that of the risk of drilling in the High North. The worries of the risk of an accidental spill and its consequences does not seem to feature in the discourses of drilling in the High North among ordinary Norwegians. To tie this to the data, it can be said that there is a sense of trust amongst the citizenry that the oil and gas companies and the government can manage the drilling business implying that the bold claims of the oil and gas industry to replicate its successes in the North Sea seems to resonate among the citizenry.

Data types and data collection

Data types included literature reviews and what Blaikie calls “social artefacts” referring to sources such as official statistics and public documents from institutions such as the Arctic Council, the Oil Directorate, the Ministry of Climate Environment and the ministry of Petroleum and Energy, the Coastal Administration, the Polar institute just to mention a few.

The data was primary and secondary types which will be collected from both natural and semi natural settings (Blaikie, 2009). On the natural setting, was to get information from individuals and concerned citizenry within the framework of discourse analysis. This was mostly informal discussions with the aim of contextualising the historical and contemporary perspectives of drilling in Norway and specifically in the High North. The secondary data relied on already existing research which has been carried out on Drilling in the Arctic. There is extensive research that has been carried out already however, most researches have only covered part of the problem. They have either looked at post petroleum in the Norwegian Arctic, oil spill response in the Arctic, resilience building into emergency just to mention a few. This research aimed to take a holistic approach by putting these pieces together with the aim of understanding how narratives on safety and vulnerability are formed and defended leading to coalitions policy positions.

At the meso and macro levels, the NGOs such as Green Peace, Bellona, WWF, Naturvernforbundet ((Friends of the Earth Norway) were very resourceful They have rich repertoires of data owing to their excellent histories of whistleblowing activities over the years. The meso and macro social phenomena refers to the actions of large organisations or social movements as opposed to business or private action (Blaikie, 2009). The data from will provide a good balance for this research project.

Furthermore, institutions such as the Arctic Council, the Oil Directorate, the Ministry of Climate Environment and the ministry of Petroleum and Energy are planned sources of data.

Equinor is a prime target for data collection, the reason being that they are one of the major stakeholders in the Norwegian Arctic. In collecting data, policy documents and reports from the industry were considered as positions of the various bodies.

Data reduction and analyse

The interviews and the literature were analysed to find patterns of narratives of risk in oil drilling in the Arctic of Norway. The abductive strategy, enables a researcher to recontextualise holistically (Danermark et al., 2005) to map out patterns of interpretations using thematic analysis considering that the objective is to investigate the narratives of risk in Arctic drilling in Norway. In this research, I processed the findings by mapping out the ideological patterns of the informants and I came up with 4 conceptual frameworks which were used to organise the findings thematically.

Problems and limitations of the research.

A traditional criticism of qualitative method has always been it's the fact that it does not use numbers as almost often numbers are equated to accuracy. However, certain criteria have been developed by qualitative methodologists to make their ideas accepted. Though the criteria set is astonishing to some reflecting the difficulties faced by those who prefer the qualitative method (Tracy, 2010). Therefore, the end goal of a research is more important than a mean practice.

One of the problems encountered was the difficulty of getting in contact with interviewees from the oil and gas industry. Emails for the request for interview were not replied. Probably because of the controversy in drilling in the Arctic or/and corporate bureaucracy. Despite repeated emails and follow up calls, corporate subjects were not forthcoming. I therefore decided to attend conferences where I was sure subjects from my target companies would attend. The European oil and gas conference organised in Stavanger on 28th and 29th of May 2019 gave me the opportunity to meet and talk to agents from Vår Energi and Equinor.

Also, not having so many participants for interview in the study could be viewed as a weakness of the study as so many participants could have brought in many different perspectives of narratives of safety and vulnerability regarding arctic drilling in Norway. However, the choice of a select group of participants was motivated by the desire to get very expert opinions from very qualified professionals who understand both technical and political ramifications of narratives. Such experts are not so many and finding them is very time consuming. Considering

that the time for a research like this is limited, I had to work with the time frame of the research reason why the number of participants were limited to a select few.

Another downside of the research could be the difficulty of passing the test of validity and reliability (Blaikie, 2009) refer to reliability to mean the consistency of results produced in a research, it also refers to the quality of a measurement steps that provides repeatability and accuracy. 'Unbiased and objective' means that you have taken each step in an unbiased manner and drawn each conclusion to the best of your ability and without introducing your own bestowed interest (Kumar, 2019). Implying that it will be possible for other researchers to come up with similar findings.

However, it could be hard for other researchers to get same results as they may not pick the same subjects for research. The sacrosanct role of scientific validity has often depended on certain criterial such as generalizability, objectivity and reliability but Tracy, (2010) opines that applying these criterial to qualitative research would be illegitimate (Tracy, 2010, p. 838). This research neither aims to prove the generalizability nor the objectivity of the narratives of safety and vulnerability in the face of oil and gas drilling in the Norwegian Arctic but rather aims to investigate the narratives.

The validity and reliability of the constructs evoked in the research could shift over time. For example, midway into the research, the Norwegian Labour party announced they would not support drilling in the Lofoten area, signally a shift in their pro-drilling stance and interpretation of the safety and vulnerability of the area. Another thing which could change over time and cause a change in narratives of risk is technological development. A strong part of the argument hinges on technological insufficiencies. A sudden breakthrough in oil spill recovery technology in the Arctic could swing the narratives of risk in the Arctic drilling. Conversely, a sudden accidental spill in Norway could relaunch the debate of safety in drilling and cascading into series of tougher drilling legislations.

On bias and objectivity, it will not be too much to state that my understanding of the environment has been shaped by my academic training and I struggled to detach myself from my academic standpoint going into the research. However, Blaikie states that the researcher can have six different stances namely: Detached observer, Empathetic observer, Faithful reporter, Mediator of languages, Reflective partners and Dialogic facilitator. He goes further to mention that the traditional scientific stance is that of a detached observer (Blaikie, 2010). By adopting the hybrid posture of detached observer and active reflexivity bias was minimised.

Mason, (2002) puts it that active reflexivity is based on the premise that a researcher cannot be neutral, or objective or detached the same knowledge and evidence they set out to gather (Blaikie, 2010, p. 53) On the other hand, the subjects were employees of corporate bodies, government institutions and environmentalist organisations who have been influenced by corporate and organisational policies and routines. They may respond differently if they change employers.

Notwithstanding, the research will produce an overview for understanding how safety is interpreted among the stakeholders. While construct validity is if the findings could be taken as general constructs (Blaikie, 2009). With qualitative method, especially with the abductive method, the objective is not to establish generalised conclusions but to understand constructs. Irrespective of the problems and limitations akin to qualitative research, Sarah Tracy in her work titled: *Qualitative Quality: Eight “Big-Tent” Criteria for Excellent Qualitative Research* has laid out some 8 criterial which marks excellent qualitative researches which are

- Worthy topic
- Rich rigor
- Sincerity
- Credibility
- Significant contribution
- Ethics
- Meaningful coherence

The topic of this research is very worthy as the future of Arctic oil depends on which narrative will prevail. Besides, the topic sits at the upper tier of the political discourse in Norway, this is partly because Norway is considered an environmentally friendly country involved in fossil fuel exploitation and with the intention to explore in areas considered as pristine areas. The research is very rigor in the sense that there is enough data to support the claims raised. On credibility, the research uses trustworthy steps to present the claims through different voices- the use of interviews (multivocality) to coherently attain the objectives of the research (Tracy, 2010). By harvesting and analysing narratives from different actors, the research legitimises itself.

FINDINGS

The finding section was principally consecrated on interviews and interview analyses of some major stake holders in the oil and gas industry in Norway. The interview excerpts were analysed through analytical perspectives which revealed 4 conceptual frame works as shown below.

Interview Excerpts and Analyses

This section seeks to explore the data harvested from the interviews through analytical perspectives using 4 conceptual frame works namely:

- ❖ Too risky to drill in the Arctic
- ❖ Risk acknowledgement in Arctic drilling but necessary hence, good preparedness plans in place.
- ❖ Sceptic outlook on safe Arctic drilling
- ❖ Optimistic outlook on safe drilling in the Arctic

Too Risky to drill in the Arctic

The government's policy for drilling in Norway in general is marked by a policy of zero tolerance and specifically in the High North more stringent requirements have been set. An example is the marginalised zone which is set at the minimum distance of 50 km from the ice edge. The proponents of are confident that the margin is safe enough to avoid accidental spilled oil to move into ice. However, this narrative is quashed by risky narratives arguing that the marginalised zone does not guarantee any safety and will not prevent spilled oil from moving into ice and making cleaning complicated thereby cascading into an environmental debacle. Another tangent of this narrative seeks water down the bold claims of the oil and gas regime's ability to replicate their successes of safe drilling in the North Sea. This strand of reasoning is epitomised by the excerpts below.

It's not true at all. An oil spill will be a catastrophe in the northern areas. But do you know what the Norwegian Auditor General is? It's a public auditor, that audits every sectors of the public sphere to make sure that things are as they should be. And they recently produced an auditor's report of the oil spill, Preparedness and Response

Technology in high North areas. And they have concluded that it is not prepared for Arctic conditions at all if there's to be an accident. And it had quite a lot of criticism against the cooperation between what would you call it the Coast administration and marine researchers and other areas. And this is very interesting, because the way that this has been painted, especially with regards to cooperation with Russia, it's been painted as it's been perfect. But looking at this with third party external expertise, it has received nothing but criticism. (Informant 1)

The informant's reference to the Auditor General's recent report breathes new life into the pessimists' viewpoint on drilling in the High North. The report will have a strong bearing on the preparedness framework up North going forward as it confirms what literature and environmentalists have had to say. The report referred to by the informant certainly offers very strong questions for the government watch dogs and corporate bodies to answer. The informant's mention of the criticism of the cooperation between the Coastal administration and the marine researchers seems to be an area of concern to the environments as the same point was echoed by other informants. Drilling pessimists see the lack of cohesion amongst the organs charged with drilling safety and risk management as strong reasons to stake their claims of safety impossibility.

This point is neatly illuminated by the following excerpt:

... All this time, they have been likely aware that their response technology is bad... And response cooperation between Norway and Russia has been previously said to be good, but apparently, it's not when you look at this report. So, it's fascinating stuff. I would say that to answer that. Now, the marginalized zone is highly threatened and at risk from an oil spill and biologically speaking, it would be a catastrophe because the sea plankton that is the foundation of the food chain, in the Arctic, blues right outside, the marginalized zone is facilitated by the marginalized, it's highly sensitive to toxins found in oil, and that will damage the food chain, and it will also directly damage all the animals that congregate in the marginalized zone in the spring and summer to eat. So, I don't agree with their safety claim of the marginalized zone. (informant 1)

The environmentalists are not only concerned about lack of adaptable technology as they also hold that the areas in the High North are too sensitive and an oil spill will be very challenging to manage irrespective of the technology. Besides, the informants statement cast doubt on the

safety potential of the marginalised zone which is thought to be a reasonable distance that oil will be contained before it gets into ice to be good enough provide safety for the sea plankton.

Looking at the leasing blocks around the Spitsbergen Svalbard area, they are quite closed to the marginalised zone. Though they are not yet active, if they certainly go operational the fear of informant 1 would be existential. Also, considering that after the marine boundary settlement between Norway and Russia in 2010, the 23rd and 24th licensing rounds were made in 2015 and 2018 respectively. Though Norway and Russia have enjoyed some maritime agreements mainly related to fishing, there have been some observed knowledge gaps in the previous agreements. Analysts say that the time frame between the border settlement and the issuing of the licenses did not allow enough time to work out proper joined contingency plans and joined cleaning operations, as well as specifics about payments. Thinking that this would be discoursed during an accidental spill situation will compromise any effective joined efforts between Norway and Russia as it will increase reaction time. The informant's excerpts points to a questioning inter institutional cooperation amongst the organs charged with the coordination of drillings activities in Norway at the national level and on the other hand reveals the cross-border oil spill clean-up agreements with Russia leaves one with more to desire.

Another point of divergence between pro drilling and the pessimists is that successes recorded in the North Sea could be replicated in the High North. While the pessimists acknowledge a degree of dexterity and diligence when it comes to drilling in Norway relative to other countries, the bone of contention on the part of the pessimists' hovers more on the geographical specificity of the High North as seen in the excerpt which follows:

We need to look at the Barents and the North Seas and the Norwegian Sea kind of two separate places. And they obviously are, I think, if you take a ruler on the map and kind of compute the distance from the North Sea to the Barents Sea and then from the North Sea to the Mediterranean Sea, you will see that the distances is comparable. We can never have a response to oil and gas spill in the Barents Sea, which will be comparable to the North Sea in terms of response time. (Informant 2)

The informant does not think the claim of good safety records in the North Sea could be extended to the High North because of fundamental differences between the two areas requiring quite different sets of exigencies. Meaning an oil spill in the North Sea would easily be managed than in the High North. The informants categoric stance of impossibility implies that

even a breakthrough in oil spill recovery technology will not address the exigencies of the Barents Sea.

While playing down the impact which improved technology will have to the environmental exigence of the High North, the informant plays down the claims of a rosy story in the North Sea by citing instances of new misses. As seen in the following excerpt:

You see that, for instance, Equinor may have had at the time some large, almost accidents in the North Sea. I think they were 60 seconds from a great kind of gas explosion only some years ago in one of their platforms in the North Sea. They were also very closed to an oil spill in 2007, and 2008. So, I mean, it's not like the Norwegian continental shelf is a total kind of story of flowers and roses. There has been issues there as well. So I think, while Norway has a kind of comparatively good record regarding management of the oil industry, I think it is not safe to say that drilling in the in the Norwegian Arctic in the Norwegian golf in the Barents Sea and the Far North and also in Sonja, is the same as in the North Sea because of the closeness to the coast and are two totally different prospects of projects. (Informant 2)

By invoking cases of near misses in 2007 and 2008 waters down any claims of smooth safety that is general thought to have existed in North Sea. This is a general narrative observed in Norwegian discourses mostly amongst the citizenry. It would seem this narrative has been popularised by the mainstream media or through what informant 1 called cultural chauvinism. Going by examples of observed Implying that though the Oil and gas industry have enjoyed a great deal of safety in the North Sea, it will be erroneous to conclude that it is as a result of special safety dispositions without scientific evidence to back such claims.

Risk acknowledgement in Arctic drilling but necessary hence, good preparedness plans in place.

This narrative is conveyed by the idea that the government's political will to exploit the oil and gas reserves in the High North comes before scientific recommendations. This narrative recognises the importance of institutions such as the Norwegian Coastal administration (NCA), the Environment Agency (EA), Norwegian Clean Seas Association for Operating Companies

(NOFO), Polar institute just to name a few but nonetheless waters down their importance for lack of autonomy. This line of reasoning is mirrored by the following excerpts:

Obviously, organizations such as NOFO and the coastal administration do an important job. They're obviously administrative bodies, NOFO is one of the institutions responsible for oil spill response. So, we obviously we have some shared beliefs with them. And I'm not that well worse well versed in the different corporate Coalition's that's not my strong side, such as BASEC. But to talk more in general terms, obviously, we do share beliefs and values with the environment directorate and such, our main problem maybe is that they don't have enough power as we see. So, if the Directorate for environment, or the Polar Institute, for instance, if they say that a license in the sea is not advisable to open for drilling, and the government still does that, they still hand out those licenses, which is problematic. (Informant 2)

The informant invokes the problem of the dominance of politics over science in decision making in the issuing of licensing blocks. The decision to issue new rounds is made by the parliament through majority votes, it is this process which creates a feeling that the process is heavily weighted in favour of politics rather than scientific evidence. However, here it is alleged that there has been a complete disregard of the recommendations of the institutions which have the competence to advice police makers on environmental and Arctic topics.

The Environment Directorate and the Pola Institute are bodies under the governmental apparatus made up of state employees. This certainly invokes the feelings of ethical dilemma as governmental agencies and institutions must work in line with the government's agenda. The engineers and researchers in these institutions have personal opinions which are certainly different from what they must do within the framework of their profession as they have routines norms to follow.

While the informant paints a picture of the influence of politics over science in the excerpt above, the excerpt below reiterates the informants claims that scientific or expert environmental opinion as far as drilling is concerned has been given less credence by the successive governments.

And points to the fact that oil is not just the environmental perspective, oil and gas in the Arctic invokes the risks associated with them that are not sufficiently taken into account in our opinion. So, that is maybe why we believe some of the rhetoric for the environment should have more power to have a larger say on what license are given

out. The current government has disregarded all of the advice from the Environment Directorate and their kind of hearing responses to the licensing rounds. (informant 3)

By saying that oil and gas is not just the “environmental perspective”, the informant alludes to other factors which influence oil and gas in Norway, notably the economic advantage. As demonstrated earlier above under the context section, the economic importance of oil and gas to Norway is undeniable and almost irresistible, enabling Norway to build a very generous welfare system as well giving Norway an edge in the global and (especially) European geopolitics of energy. In the mind of the informant the importance of the industry to Norway accounts for the reasons why expert advice on the environmental consequences of drilling in the High North have been almost always ignored.

The informant sticks to the claim of the government disregarding advice from research institutions and environmental by backing it up with statistics in the excerpt below.

You have governmental agencies, these research institutions like Polar institute, environment Directorate, and they are supposed to give their advice to the politicians. The problem is, in our opinion they are not listening to these advices. They have only been listening to the oil industry, not listening to the advice from agencies and research institutes. This government has ignored about 100% of the advices and the previous government was not better, a finding showed that they only took 20% of advice. (Informant 3)

The informant reiterates the powerlessness of the environmental advisory organs who are overlooked by the politicians in favour of the aspiration of the oil and gas industry. This in part speaks of the influence of the oil and gas industry in Norway as well as reveals that the government has systematically disregarded of expert opinions.

Another area fuelling pessimism is the possibility of an environmental risk and the challenge of emergency preparedness and clean up in the High North. A successful preparedness and contingency planning in the High North hinges on the availability of adequate infrastructural development. The Arctic is vast and remote for the most part with poor telecommunication network. This explains why even proponents of drilling in the High North are wary and believe that infrastructural development should precede drilling operations in the area as attested by the excerpt below: “It is important that exploitation be done around civilization because exploitation should be done only when the infrastructure is available” (Informant 6)

Despite the recognition of the indispensability of adequate infrastructure, there is the view that setting up the required infrastructure could take time. Besides the complications associated to Arctic drilling are multifaceted and a magic wand cannot be used to automatically address the situation as it will require time and effort as attested by the following excerpt:

It will be more challenging to respond and contain oil spill. No one hopes to have a blowout or a transport vessel running aground. There is no quick fix to that. I think that the challenge here is that I'm a little bit uncertain about what the expectations are. Because of course nobody wants a blowout situation like Deepwater Horizon or a large vessel running aground on the farther away from the coastline and the farther away from civilization. (Informant 4)

The informants make express acceptance of the fact responding to an oil spill in the High North will be an uphill task especially further away from built up areas. Accidents are normally not wanted happenings, however, engaging in acts that are potentially accidental requires a great deal of preparedness to manage the consequences of such accidents. From the informants' excerpts, it is apparent that the preparedness and contingency framework in the High North is probabilistic and the operation will be rendered arduous further away where remoteness will make response operations complicated. The informants' points touch on one of the fundamental arguments put forward against drilling in the Arctic namely that the deployment of containment equipment and search and rescue operations will be very challenging in the remote Arctic coupled with limited network coverage.

Besides the challenged posed by remoteness to the contingency and preparedness framework in the High North, the efficaciousness on the instruments would be highly affected by the weather as expressed by informant 4 below:

So, to say that you get of course somewhat challenging it will be to respond to that and as you mentioned also in the Barents Sea and given areas as well as along the Norwegian coastline you will have a very large seabird colonies and we will have spawning grounds for fisheries and other kinds of marine mammals in the area. And all this could be threatened by a large oil spill. And I think if somebody says that a big oil spill will be contained by the use offshore oil spill response resources at sea, that is really not the case for the whole year. As I mentioned around the weather limitations.

About 70 percent of the year you will be able to use the equipment efficiently the rest of the year it will be more or less inefficient.” (Informant 4)

The informant’s assertion and confirmation of the presence of varied marine creatures including seabirds in the Barents Sea and the Norwegian Sea gives credence the literature on oil spill scenarios in the High North. It also implies that there is an acceptance on the part of state agents concerning the challenge that may be involved in an eventual oil spill in the Norwegian Arctic. The effectiveness of the instrument axes somewhat upon a good weather. Considering that a good weather is an act of God, an oil spill in a terrible weather condition albeit the technology in place will simple not achieve any significant result meaning that there would be a great danger for the marine ecosystem. Search and rescue missions will also be in peril. On the other hand, if a spill will occur during a good weather, containment and clean-up will be more successful.

The harshness of the weather condition means that some areas may be covered by ice. As drilling draws closer to the permafrost areas, preparedness teams face the daunting task of readiness to face the challenges of cleaning up oil spill before it gets into icy water. Part of the plan involves the use of dispersants, burning just to mention a few. However, the exact method to clean up spilled oil will depend on the oil type as painted by the informant in the excerpt below:

... I also mentioned that they will be somewhat dependent on the oil type and as crude oil that you produce from offshore installations are generally categorized into different types. Some of them are more persistent on the water's surface than others and if you have a heavy fuel oil from vessels that will be very persistent on the sea surface and can stay afloat for a very long time and will use a very long time to degrade naturally. There is softer crude oil that will more or less evaporate and degrade quite rapidly. So, there is really no quick fix answer to that either but in general terms the challenge and what worries us is to have an oil spill situation very close to either the large bird colonies or to the large spawning areas. (Informant 4)

Considering that a ship may run aground anywhere as well as an accidental spill may occur just anywhere, the fishing industry may be in danger in the event of an oil spill. It could therefore be said that, a decision to drilling further northwards is a decision to sacrifice the

fishing industry as well as the environment. Considering that Economically speaking, that may seem a reasonable choice but environmentally speaking, it will cast doubts on Norway's as an environmentally friendly country as well as challenging the motive other environmental initiatives geared towards reducing emissions and protection of pristine areas such as Norway's effort in protecting the Amazon rainforest.

Despite the fact that some methods of cleaning spilled oil such as the use of dispersants and burning to be considered controversial, in an event of an accidental spill, the clean method to be decided upon would be based on what will produce the best results for the environment given the situation. The informant's excerpt below sheds illustrative.

I think you maybe need to sort of evaluate which kind of research report you rely upon because in Norway in general the use of chemical dispersants is approved under certain conditions. Before you either use it or not, you have to make an environmental benefit analysis of some kind to see what is more beneficial for the environment in a given situation and in very general terms the use of dispersants will basically remove the oil faster from the water's surface then perhaps mechanical recovery will be able to do and. So, it will be dispersed in the water column typically down to 10-15 meters and you will have a very large area for natural biodegrading by bacteria to sort of finally take care of the oil spill so to say.

(Informant 4)

Furthermore, the challenge of containing an oil spill in the High North could lead to desperate measures such as the use of dispersants and concrete. Dispersants are considered to contain chemicals that are toxic. Even though, they could be effective in degrading the oil, its aftermath can be very detrimental to plankton, spawning grounds, bird colonies and marine mammals including bacterial. The informant's assertion alleging that dispersants will degrade oil and leave the remnants for bacterial for natural biodegrading seems contradictory as dispersants are inimical to bacterial. This confirms the words of the informant "there is no quick fix".

Despite the challenges for setting up a robust contingency and preparedness framework in the High North, it remains incumbent on the oil and gas industry to come up with adequate contingency and preparedness plans for the areas. The informant's excerpt below captures the idea. "The preparedness and contingency in the Barents Sea is something which the industry must work on" (Informant 6)

This assertion confirms that the long-standing principle in Norwegian oil and gas exploitation and exploitation in which the preparedness and contingency is the prerogative of the industry. The informant's statement could confirm the insufficiency of the preparedness and contingency framework in the High North as noted in the Auditor General's report and echoes a state of urgency as to the fact that the industry must get the contingency and preparedness up to speed going forward. However, it could be noted that concerning the Barents, the industry is faced with the conflicting objective of profitability and security.

Sceptic Outlook Arctic Drilling on Safe

The pressure exerted by whistle blowers and environmental justice campaigners reflects an essential element of the sceptic narratives of the Norwegian Arctic drilling. The environmentalists in Norway are putting enormous pressure on the government and the oil and gas industry. Environmental activism in Norway are in the rise as activists are asking for more accountability on the part of the government and the industry. There is also a growing interest on the environment amongst youths demonstrated through school strikes and public manifestations to force public actors to do more to protect the environment. Concerned citizens and environmental organisations are piling more pressure on the oil and gas regime. This pressure is an embodiment of pessimism towards drilling in the Norwegian Arctic. The recognition of the influence and impact of the pressure is captured in the following excerpt:

The environmental organisations (NGOs) Bellona, Greenpeace, WWF and so on post tremendous pressure of course on both us as an agency and the political parties. But I think I can say that we don't let ourselves be affected in our duties in handling applications and issuing permits for activities that is decisions which are made in the government. So, if the area is open for petroleum activities, they will develop these management plans, this white paper, which I gave you a link to earlier. So, they put forward the main requirements and kind of framework that we have to apply against. And then of course, then you have the HSE regulations for the petroleum activities, they have to comply with the HSE regulations, that is much of our duty to ensure that they follow the laws and regulations and the guidelines which have been issued. So, the environmental organizations have to work towards the general opinion and the political parties, so that they can decide on restrictions, such as not to open areas or to put specific restrictions on the activities in the areas that are open. (Informant 5)

Despite the pressure mounted on the government, there seem to be a strong governmental resistance and policies set for by the politicians must be respected by the agencies in charge of coordinating oil drilling activities in Norway even it goes against what they consider scenically tenable. This sentiment is demonstrated by the following excerpt:

I really don't know. Actually, from one perspective that might be the case that they don't really listen to the advice that the environment agency and other another research institution. As you mentioned. But on the other hand, is this the politician's duty to sort of make policies related to these questions and that they will then from one perspective, rely more on advice from other institutions than the environmental agencies. If that means that they are taking their decisions on clear understanding of what the threats and the possibilities and the limitations are, I don't really know. It's all politics.
(Informant 4)

There is the recognition of the pressure exerted by whistle blowers on the government and on the parliament. However, for such pressures to be meaningful, they must have bearing on the political parties as they decide on to open areas for exploitation. The agencies and institutions responsible for the day-to day follow up for the petroleum activities simply follow the guidelines laid out in the white paper. This confirms the importance of politics in the oil and gas landscape in Norway. Meaning that, the narrative of risk of the parties with the majority in parliament is the most important narrative. It is apparent therefore that it comes down to the question of risk versus profitability. And for there to be to a paradigm shift, the politicians a higher risk than profitability.

Optimistic Outlook on Safe Drilling in the Arctic

The opposition of drilling in Norway seems to experience changes over time both at the national political level and at the regional and municipal levels. Comparatively speaking, there is less opposition to drilling in the High North in comparison to the opposition shown in other countries.

I would mention that Equinor is the biggest oil company in Norway. And now they have projects in Australia. In the Australia Bight. Have you ever seen the community protests from the local communities are expensive in Australia, but in Northern Norway, the majority of people are very positive to the oil industry, I mean, you have

a lot of fishermen who are not very happy about the industry and you have a lot of other people as well. But all in all, people are very happy for the oil industry. I mean, if you take a city, like Hammerfest, it has grown substantially. I mean, people were moving from Hammerfest leaving, going further south. The population number was decreasing in lots of places in the northern Norway. But after you have had this oil activities and field developed, in Finnmark, the situation has changed. People are moving back; the population numbers are increasing. So, all in all, people are very happy for the industry in the North. (Informant 5)

Equinor has faced strong opposition for its operations in the Great Australian Bight which experts said showed that a major oil spill in the Bight could cause environmental damage along several thousand miles of the southern Australia coast (Williams, 2019). This prompted a statement from the company which read in part:

"Equinor has implemented strict barriers to prevent a spill, [prepared] intervention and mitigation measures as backup and is confident that the risk has been reduced" Equinor, (2019)

The informant's comparative analyses between the resistance faced in Australia mostly led by local communities and beach users and the situation in the High North where resistance has been mostly led by environmental organisations such Green Peace and WWF to signify an acceptance of oil drilling operations. The passiveness of the local population in the face of oil drilling in the High North could signify a welcoming attitude towards the exploration of oil and gas as indicated by the informant. However, it could also indicate a general tendency of the Norwegian culture which is not marked by strong community protest so to speak. A case in point, is the new toll stations which have been implemented to reduce congestion in cities and encourage the utilisation of public transport and cycling. At the initial stage, it was expected that there were going to be very strong protests but not much has been seen in terms of protests apart from small pockets of protests which were observed in few cities after the tolls became operational. In contrast, in France, an announced increase in fuel tax led to nationwide riots by the so called "yellow vests" which have spiralled into broader demands even after the proposal was abandoned by the government as a sign of appeasement. From the above example, considering passiveness as acceptance could be a misleading analysis.

Nonetheless, the evidence of economic growth and strong job numbers in Hammerfest is undeniable. It has created pro oil and gas sentiments in the area. On the broad political spectrum, there is a swing in political opinion consisting drilling in the High North. The

declaration of the Labour Party stating that they were withdrawing its support for drilling in the Lofoten area creating a parliamentary majority against drilling in the area. This signifies that there is a growing political understanding of the environmental risk associated to drilling in the Lofoten area considered by many researchers as a pristine area.

DISCUSSION

This section seeks to clarify the stakes in the literature review and the findings as well as debate on problematised rhetoric found during the research in order to contribute to the understanding of how safety and vulnerability is framed in socio-technical systems and specifically how the narratives of safety and vulnerability in oil drilling in the High north are derived and supported. It will be worthy to mention here retrospectively that the theoretical framework covered the impossibility and possibility of safety using theories such as Normal accidents theory, High reliability theory, Black swan theory and Complexity, tight and loose coupling to analyse the perspectives. Moreover, it should be recalled that the overall objectives set for the research was to investigate the narratives of safety and vulnerability in the Norwegian arctic.

The Arguments for Drilling in the Arctic

The debate on arctic drilling in Norway hinges on two paradoxical themes of safety to the environment and the economic benefits which it entails (B, 2018; Bourmistrov et al., 2015; Mikkelsen & Langhelle, 2008). The argument on the environment concerns the effects of CO2 emission from fossil fuel as this argument has been accentuated by the 2015 Paris Agreement (PA) as mentioned above. The proponents of this rhetoric opine that for Norway to meet its commitments under the PA the remaining fossil fuel in the arctic must remain in the ground. The second segment of the environment argument against arctic drilling is underpinned by the worries surrounding the safety and vulnerability.

Meanwhile, the economic advantage of arctic oil drilling has been used as a counterweight for the Northward push for oil. As demonstrated under the context chapter above, the economic ramifications oil and gas are so strong and provide almost irresistible motivations to drill the vast deposits of oil in the arctic. (As stated earlier, this research did not focus on the climate change argument) As demonstrated earlier in the research in the context chapter under oil and gas in Norway that oil and gas inject astronomic amounts of money into the Norwegian economy. enabling the adoption of the most generous. In addition, it's job creation potential has been the focal point of successive governments while pressing for the northwards push for drilling. The importance of oil and gas as shown in the context chapter has been used as a motivation to drill in the High North and often times juxtaposed in the safety vulnerability discourse all with the aim of making a case for Arctic drilling. It therefore follows that the argument as to whether to drill in the High North or not reposes on the narratives of safety\vulnerability and economic advantage nexus. Haven presented the economic implications in the context chapter, soffits to look into the safety narratives in the High North.

Unpacking the Narratives of Safe Arctic drilling possibility

It is important to underscore the fact that the research findings reveal two major ideological cleavages on arctic drilling. Namely an optimistic outlook for safe drilling championed by the government and the oil and gas industry here after referred to as the oil and gas regime. Such safety narratives are typified by bold claims of safe exploitation in the ecologically vulnerable arctic using drilling records of the North Sea to buttress their claims. Meanwhile, the environmentalist organisations and most literature on arctic drilling have downplayed such claims while projecting a tremendously sombre outlook on arctic drilling, projecting it as a risky and unnecessary adventure. Between these two opposing narratives, there exists the

narrative of risk acknowledgement opining a cautious and dexterous approach to arctic drilling which is projected mostly by the environmental and preparedness experts most of whom are employees of state institutions responsible for overseeing the smooth running of oil and gas operations in Norway.

As argued above, safety possibility is enabled by resilience engineering (RE) and High Reliability Organisations (HROs). While RE seeks to augment a systems ability to strive under different conditions that is, responding to the effects of stressors and return to its status quo ante, HRO is concerned with organisations generating the capacity to manage unanticipated events and spot risk (Tveiten et al., 2012). As LaPorte and Consolini put it, the HRO reflect organisations which shown outstanding capacities to handle complex systems without major accidents. The adventure into Arctic drilling is somewhat novel and has been approached with caution. Considering that major accidents in drilling operations are rare (Most worst-case scenarios put occurrences at once every 10.000 years) but their occurrences come with untold consequences. Norway has constantly developed risk assessments aiming to minimise or eliminate accidents by addressing potential risks as well as learning from the past incidents. The 1977 blowout in Bravo platform in the North Sea heralded the need for worst case scenarios with special attention to blow outs. While after the Alexander Kielland accident in 1980, it became a requirement to include risk with a probability higher than once in every 10.000 years. Furthermore, following the enactment of the 1981 Pollution Act, impact assessments and the probability of accidents became mandatory (Hauge et al., 2014a). This highlights Norway's intention to set very high standards in the Norwegian continental shelf through learning from pass events as well as adapting to the exigencies of the Norwegian continental shelf. The efficaciousness of the oil spill emergency preparedness in Norway is seen in the disposition of the 1981 Petroleum Act which acts at three levels vis Corporate level where the corporate bodies have the responsibility to handle acute spills closest to the source, at the municipal level, where coastal local governments must possess the required instruments to tackle minor spills and finally at the national or state level. The state takes over when a spill is above the corporate and municipal entities to handle.

The preparedness and resilience landscape in Norway are marked by a seemingly smooth-running cooperation between the government (local government inclusive) and the corporate bodies. An important aspect of oil exploitation in Norway is the use strict regulatory frameworks such as management and Activities regulations amongst other mechanisms which are the best practices for the planning of emergency management and preparedness such as

NORSOK standard Z-13 which presents requirements to planning, execution and use of risk and Emergency preparedness analysis (EPA). The stringent legislative measures and the deployment of cutting-edge technology and information technology deployed in oil drilling in Norway has imbued a sense of confidence in safe drilling amongst the government and the oil and gas industry even in the face of the push towards the vulnerable High North. While the regulatory frameworks EPA standards have yielded fruits in oil exploitation in the North Sea to the extent that Norway's oil drilling is regarded as one of the safest in the world, nonetheless, specificities of the High North such as ice and icing, cold climate, darkness, long distances, low population density just to mention a few makes the norward push for oil exploitation even more challenging as such putting extra responsibility on the oil regime. Albeit these challenges, the oil and gas regime have made bold claims that they can replicate their successful North Sea experiences in the High North. In order to understand the provenance and the claims of safe drilling in the vulnerable High North, public and private schemes for safety, preparedness and resilience need to examine separately. Private initiatives refer to measures by the corporate bodies to reinforce safety and prevent accidental occurrences as well as being prepared to manage unforeseen contingencies while public actions refer to those of the central and local governments.

The Private Claims for Safety

The narrative of safe drilling in the High North from the industry is motivated by believe of understanding the stakes of the High North and the mastery of the vulnerability. The confidence is buttressed by investments in research and development and the acquisition of machinery and ICT architecture as well as having the best talents required. These conditions being embedded in the procedure to award licenses for exploitation in the High North also saw very qualified companies winning the awards.

Perrow's claim on Normal accident came at a time when accidental occurrences in organisations where mostly mechanical. This implies that the level of technological advancement as we have today where production processes are imbedded in cutting edge ICT systems with artificial intelligence such as remote censoring which does not necessary suffer

from Perrow's implied mechanical errors. The oil and gas industry have shown that they can take certain steps to reduce the occurrence of accidents. An example is the integration of artificial intelligence and the use of double layer security even though complex enhances reliability and hence promote redundancy, the oil and gas companies are proud to say that the oil platforms in the High North are imbedded with state of the art technology which meet the expectations of the Barents Sea and the Lofoten area. This claim is corroborated by the stringent requirement authorisation for operations in the High North. The Goliat oilfield can be used to exemplify the provenance of confidence in safe arctic drilling from the side of the industry. The Goliat is owned by Vår Eni (65%) and Equinor (35%) and built in South Korea by Hyundai Heavy Industries. Being the first oil field to start production in the Barents Sea, it went through rigorous controls occasioning delays due to recommendations from the Petroleum Safety Authority (PSA) who at the time had limited experience on oil fields of this kind, had to hire external expertise. The Goliat oilfield symbolises the test of patience and resoluteness from the oil and gas to drill in the arctic



Figure 6 Goliat FPSO

Source: Equinor

Goliat is an FPSO (Floating, Production, Storage and Offloading) oilfield and has a capacity of 1 million barrels of oil, it built with the most advanced technologies in order to tackle the technical and environmental challenges demanded by Arctic operations. Located in the Barents Sea roughly 85 km north-west of Hammerfest. The daily output will reach 100,000 barrels of

oil per day. Production takes place through a subsea system consisting of 22 wells, and of which 12 are oil producers, 7 water injectors and 3 gas injectors. It was built with the most advanced technological solutions in order to minimize the impact on the environment, due to the supply of electrical energy from land and it is in line with the “zero discharge” operating policy. While picture of the Goliat might appear somewhat bright, it may not capture the challenge which installations far from civilisation might face. However, it typifies the resoluteness of the industry to brave the odds in the challenging Arctic conditions for the quest for oil and gas.

Considering Vaughan’s (1996) summary of NAT where he highlights that, the premise of NAT was that accidents in complex and tightly coupled organisations were the product of organisational and technological failures. And if her summary were to be true, then the claims of the oil and gas industry would be given credence as the industry has not experience such organisational and technological failures in the past. Conversely, one can assume that Perrow picked out organisations which were accident prone and it was this which prompted Le Coze to as “what if Perrow was right for the wrong reasons”. To situate the oil and gas industry (those operating in the High North) within this context the, it will beg the question as to whether operating in the areas such as the Barents Sea and Lofoten area are potentially dangerous? However, it is evident that oil exploitation in the High North is not in itself a dangerous operation, but the challenge will be the consequence of an accidental spill to the vulnerable environment. The fact in issue reposes on how prepared they are to handle such an incident. Therefore Perry and Lindell say “preparedness is a state of readiness to respond to environmental threats” (Perry & Lindell, 2003, p. 338) . The Norwegian authorities reposes the burden of preparedness and contingency in the hands of the industry. The industry and the government operate in a system of mutual trust. The expectations of the industry when it comes to preparedness can be summarised by this quote from the director general of the Norwegian Petroleum Directorate (NPD) Bente Nyland.

“The preparedness and contingency in the Barents Sea is something which the industry must work on” Nyland, (2019)

The narrative of safety is also reinforced by actions taken by the industry to pool their resources together in win-win consortiums. The desire to push further north, has seen an increase in cooperation between the industry and researchers in order to move towards a proactive emergency management via early risk anticipation through iworkshops and mimicking of scenarios of loss of wells controls. This has led to enhanced interaction and communication

between the different levels of operation. These actions are aimed to mitigate accidental occurrences and enhance safety of the organisations. The norward push for oil drilling in Norway has seen very concrete preparedness actions for oil spill response in the form of material acquisition combat oil spills and cooperation between the operator companies on the Norwegian Continental Shelf have joined their forces to create the Norwegian Clean Seas Association for Operating Companies (NOFO) whose task is to manage a collective emergency response system as well as design contingency plans and spear head efforts geared towards R&D of modern oil spill response environment as well as engaged in measures to tackle acute accidental spills most closed to the source. (Knol & Arbo, 2014). The effectiveness of NOFO confirms the fact that unity commands strength and by delegating the management of oil spills to NOFO the corporate bodies can focused on reducing accidents and reinforcing safety in their operations. The NOFO has established its bases along the Norwegian coastline and is also in charge of an emergency centre. These emergency dispositions have helped to embolden the corporate claims of safety. While the NOFO consist of a generic disposition which cuts across the entire Norwegian Continental Shelf, there are specific collective initiatives tailored for the High North such as the creation of BaSEC in 2015. BaSEC was created by the following companies.

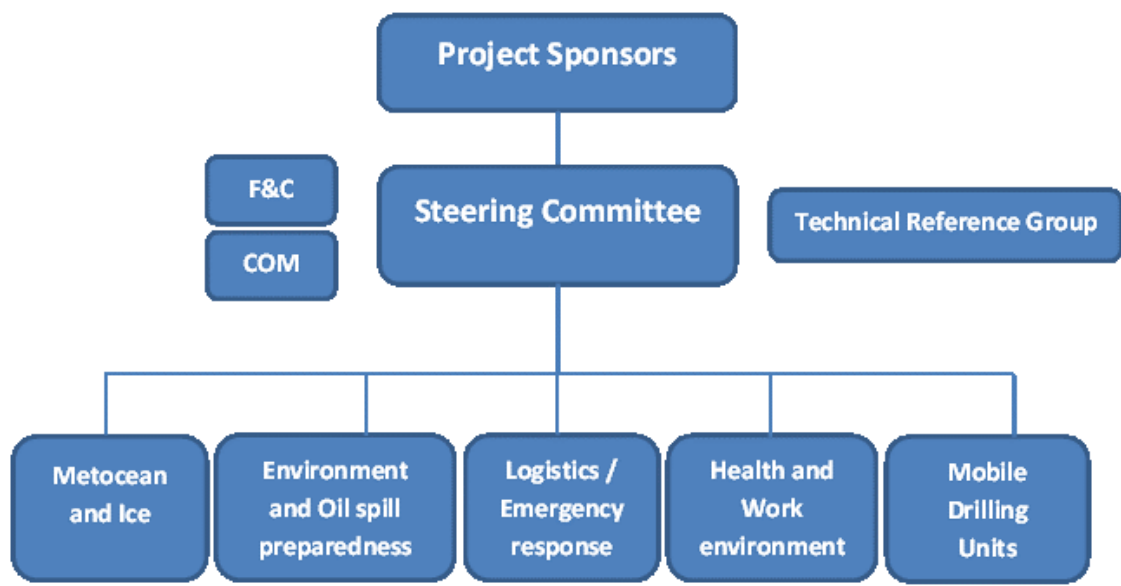


Figure 7 BaSEC organigram

- Statoil ASA
- Eni Norge AS
- Lundin Norway AS
- OMV Norge AS
- Engie (GDF Suez E&P Norway AS)
- Chevron Norge AS
- Repsol Exploration Norge AS
- Total E&P Norge AS
- ConocoPhillips Skandinavia AS
- Aker BP
- Wintershall Norge AS
- Edison Norge AS
- Norske Shell AS
- DEA E&P Norge AS
- Centrica E&P Norway
- Cairn Energy PLC
- PGNiG Upstream International
- Lukoil Overseas North Shelf AS

The creation of BaSEC was due to the recognition of the challenges in the Barents Sea as such after the award of the 23rd round of licencing these companies came together to join forces to find ways to overcome those challenges. The major aim of BaSEC according to the organisation's documents is to develop common solutions that can ease the followings

- A joint operator approach to HSE in the Norwegian Barents Sea
- Appropriate level of safety and emergency preparedness
- Data sharing
- Standardisation

BaSEC cooperates on 5 key areas which are very important for operations in the Barents Sea area. As seen in the figure above, their cooperation reposes on the followings:

- Meteorology, oceanography, ice conditions (Metocean and Ice) with focus knowledge sharing on safe and efficient marine operations.

- The Environment and Oil spill preparedness is mandated with agreeing on an operator approach on how to perform environmental risk analysis and setting up oil spill response for Barents Sea operations.
- While the Emergency Response and Logistics focuses on a joined operator approach for putting an acceptable and cost-efficient emergency response for remote operations in the Barents Sea.
- Then the Health and Working Environment working group is charged with researching on risks connected to operations in cold and harsh climate conditions and proposing solutions to improve workers conditions in the harsh Barents Sea climate.
- And finally, the Mobile Drilling Units focus is to map the needs of rigs in different areas in the Barents Sea in order to ensure year-round drilling operations and well as Identifying challenges and opportunities with connected to cooperation on rig consortium.

These actions demonstrate a recognition of the challenges which the High North poses to the oil and gas industry and their determination to take proactive steps to bridge their knowledge gaps pooling their resources together which helps to reduce R&D cost and the same time providing a platform for the sharing of both tacit and explicit knowledge. Considering that most of these companies are international corporations, the coming together has facilitated international agreement on oil spill management as well as international competence in arctic drilling.

It should be mentioned that even the environmental organisations who are extremely critical of the norward push for oil drilling are very positive about the work being carried out by NOFO and BaSEC. Even environmentalist have expressed their satisfaction and welcom the contribution of NOFO and BaSEC. Amongst the environmentalist community, there is a sense of confidence that these private initiatives have the effect to mitigate accidental occurrences and foster safety. The actions of the oil and gas industry are fitting with Pidgeon and O’Leary’s 4 rules about safety which are:

1. senior management commitment to safety;
2. shared care and concern for hazards and a solicitude over their impacts upon people;
3. realistic and flexible norms and rules about hazards; and

4. continual reflection upon practice through monitoring, analysis and feedback systems (organizational learning). (Pidgeon et al., 2000).

Pidgeon et al's reflection of practices which can instil organisational safety ties up with the focal points of BaSEC as there is a top down commitment to foster organisation learning through research in different areas which constitute the challenges the Barents Sea. During the outbreak of E-coli. food poisoning in Scotland, (Pidgeon et al., 2000) had there been an interorganisational cooperation like is evident today in most industries such an unknown distribution of contaminated food could have been avoided. Inter organisational cooperation and joint research seems to be a strong response to man-made disaster theory as it prevents a risk culture due to constant procedural review. Negligence or danger that a single organisation could not have spotted is picked out by others since organisation in a research consortium.

The industry has made some strides in taking initiatives aiming at attenuating the risk of environmental pollution in the face of oil and gas exploitation in the High North. An example of such initiatives is the concept created by Vår Eni and Equinor in collaboration with NOFO for the setting up of a 40-man task force who could be deployed within 48 hours of an incident to the Norwegian shoreline. Such initiatives have further paved the way for cooperation with local companies for development of adaptable technologies for the Barents Seas and the Lofoten area. Besides this, fishermen have been trained to become part of the rescue team because of their local knowledge of the sea and as an appeasement for the consequences which the Norward extension of drilling is perceived to have on the fishing industry. To attain these objectives, their fishing boats have been upgraded to drag small booms and they are being given financial incentives. These dispositions denote a robust preparedness aimed to be ready to deal with accidental oil spills.

Perrow's Normal Accident reflected mostly an era of individualistic organisational management whereby organisation tried everything they could do within their competences to avoid accidents. The importance of knowledge sharing is epitomised by successes recorded in accident reduction and safety enhancement in the aviation industry. During an air crash, the entire aviation industry together with flight safety authorities worldwide come together to trouble shoot the cause of the accident in order to avoid future occurrences. This collaboration which cuts across the industry, governments and the scientific community has led to the drastic reduction in aviation accidents.

Public Claims for Safety

The public claims for safe drilling in the High North are a revelation of the confidence public authorities in Norway have in the actions which they have taken leading to the build up to exploration in the Barents Sea and the Lofoten area. As mentioned earlier in this study the argument against safe drilling in the High North hinges on the adaptable technology to cope with the demands of the Arctic in order to avoid accidents in the vulnerable North. It seems befitting to mention here that the vulnerability of the Arctic has not been put up for debate as there seems to be a broad base consensus on that. However, the fact in issue is as to whether or not drilling can be carried out safely as accidents such as loss of control of an oil well or a tanker running aground would pose an enormous challenge for oil spill

rescue operators and search and rescue teams due to harsh weather characterised by strong winds, ice and icing. Couple with other factors such as remoteness which makes telecommunication and the moving of equipment challenging. Nonetheless, public authorities have not back down from their claim that safe drilling is possible. Aware of the vulnerability of the High North, the authorities have taken measures in the form of legislative instruments and to enhance the robustness of the High North. These measures double down on the already strict rules for operating companies in the Norwegian continental shelf. These measures give the impression that the authorities are mindful of the risk associated to the vulnerability of the High North as vulnerability is an aspect of risk. Implicitly, vulnerability analysis is part of the risk analysis. (Steen & Aven, 2011) The actions which inspire the confidence of safe drilling possibility in the High North are enshrined in documents such as the integrated Management Plan (IMP), the Contingency Plan (CP), the Pollution Act (PA) and other legislative instruments such as the Petroleum Regulations (PR), the Management Regulations (MR), the Facilities Regulations (FR), the Activities Regulations (AR), the Technical and Operational Regulations (TR), Framework Regulations (FR) the Working Environment Regulations (WER) etc. Competent authorities are charged with the follow up these instruments which incarnates the governments safe drilling policy. These actions can be defined as resilience engineering management which refers to actions carried out to increase or boost resilience (Steen & Aven, 2011). While the above-mentioned highlights the government's intention to superintend safe drilling in the vulnerable Arctic, attention should be paid to the fact that written documents are not synonymous to actions. Many turn to confuse between written documents and concrete actions (Thomas A. Birkland, 2009).

Also, another confusion that should be avoided is not to take planning for written plans as planning is a continuous jurisdictional process meanwhile the plan is simply the snapshot of the process at a given point in time. This implies that having a written plan, in no way guarantees readiness since readiness or preparedness is not a static process and pivots upon prevailing processes (Perry & Lindell, 2003). It follows therefore that emergency planning should be a dynamic process capable to adapt to changing circumstances. Against this backdrop, it will be interesting to present the concretisation of the government's preparedness in the face of Arctic drilling.

The Public Safe Drilling Narrative in Action

The Norwegian claim of safe arctic drilling is buttressed by the government's posture for drilling in the High North which aims to manage industrial interest and sustainable development. Conscious of the challenges, the government's actions seek to one hand mitigate the risk of accidents this has been achieved by reinforcing safety through additional layers of security by very stringent measures for operating companies in the High North (backed up by several legal instruments and institutional frameworks) and on the other hand be ready to respond in case of foreseen contingencies. This has been made possible by institutional dispositions and distributed competences to various ministries and their agencies as well as to coastal municipalities (Knol & Arbo, 2014). The fundamental basis of protecting the Norwegian environment when it comes to activities which could pollute the environment as per the 1981 Pollution Act is to hold the polluter responsible (Stortinget, 1981)

The public confidence for safe operations in the High North amongst other things, has a strong connection to the perception of its preparedness for emergency response. The preparedness landscape in Norway is overcrowded with shared competences between national, local and private actors as well as some involvement of NGOs such as WWF. (Knol & Arbo, 2014). Though the Ministry of Petroleum and Energy through the PSA has the overall responsibilities for petroleum activities in Norway, Preparedness Plans lie in the hands of the Ministry of Transport and Communications through the Norwegian Coastal Administration (Kysteverket) which leads which chairs the National Emergency Council.

The Arctic Council's contribution in safeguarding the environment has been very outstanding via its working groups. An interesting advancement of the Arctic Council is that it has evolved from just being a research and counselling organisation whose principal focus had been on

maritime transport to passing binding agreements such as its binding agreement on Search and Rescue operations in the Arctic agreement on Search and Rescue operations in the Arctic (Mikkelsen & Langhelle, 2008). The claims for readiness are strongly related to the investment in equipment and equipment depots along the Norwegian Continental Shelf with standby vessels with booms and skimmers tackle oil spills which are jointly managed by the state and private actors like NOFO as seen in the figure below. Most especially the deployment of emergency resources and depots along the coast of Nordland and Finnmark for emergency readiness in the Barents Sea shows the government's robust effort to deal with contingencies in the High North. Besides, there exist international partnerships and cooperation to get assistance and to adhere international frameworks to deal with cross-border oil spills such as the cooperation with Russia, Finland, Sweden, Finland, Iceland, Canada, US on the one hand and the broader Arctic Council and EU cooperation in addition to being a signatory of the UN Conventions on the Law of the Sea adopted in 1982 which it lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources.

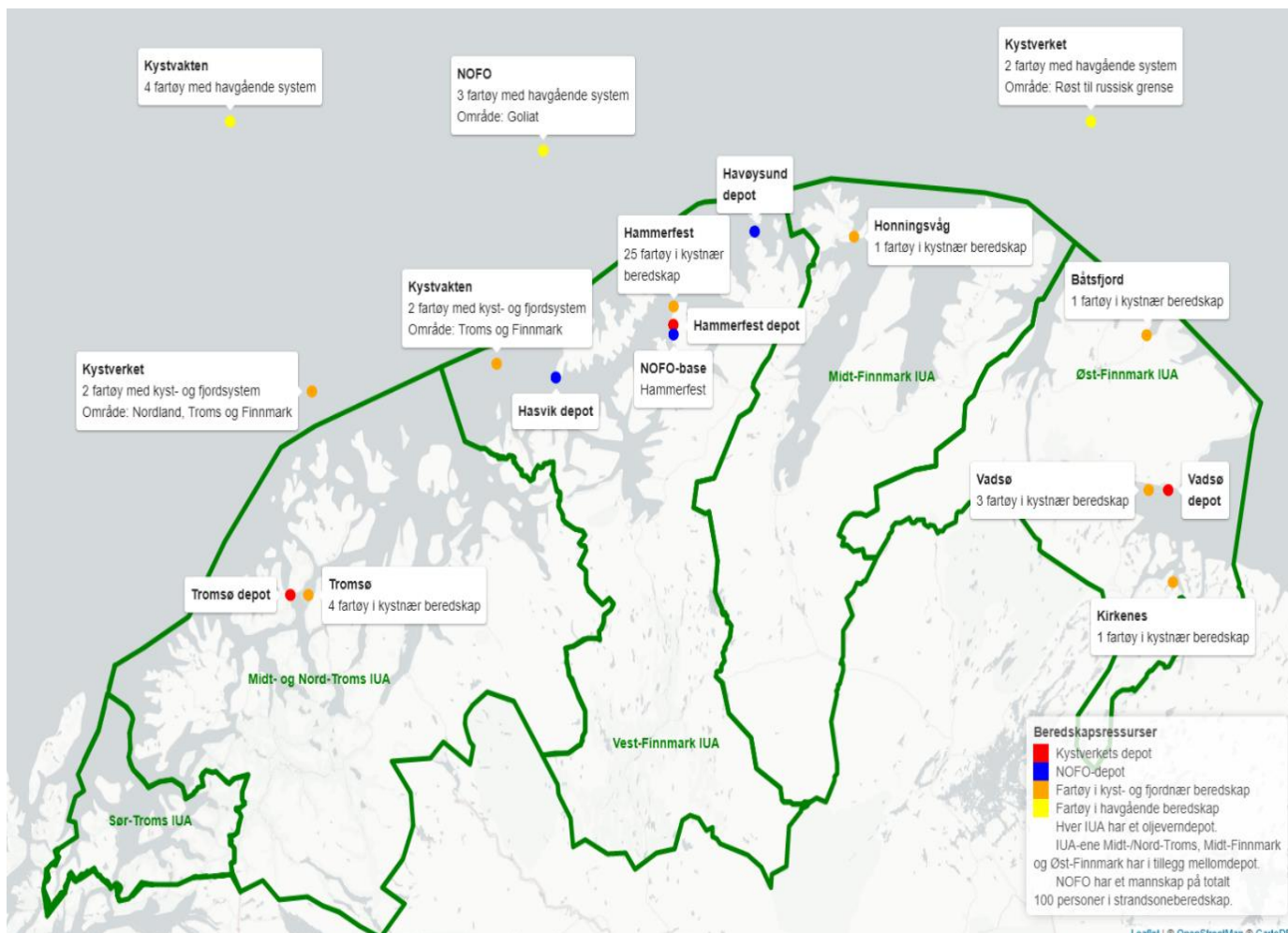


Figure 8 Public and private preparedness resources along the coast of Nordland and Finnmark.

Even though the plethora actors have attracted criticism from some quarters who perceive it as disorderly and counterproductive with no clearly defined roles, the government maintains that multiple players add extra layers of security. This reasoning is in tandem with La Porte's arguments whereby backup for failing parts are used so that if one actor fails, their action will be remedied another. The Norwegian model of operation in the Arctic has earned some praise in comparison to other countries such as Russia have operationalised their Arctic drilling policy. It should be mentioned that the authorities have avoided hasty actions in the granting of permissions for drilling in the High North with the aim of avoiding blind spots which could lead to accidents. This has seen the PSA doubling down on its inspections and the PSA thinks they lack the technical understanding for inspection in certain areas, they have had to hire external expertise. An example is the Goliath whose time frame for operations were delayed because the PSA did not find that the oil field was ready for operation at the time frame set by Vår Eni. (Riksrevisjonen, 2019).

Another reason of public optimism is the fact that the authorities have not refuted the challenges underlying such as remoteness, harsh weather such as winds, ice, storms etc, the presence of marine mammals and other sea creatures as well as bird colonies just to mention a few. While acknowledging these challenges which represent the black swan of drilling, they have opted for cautious steps- learning on the job by choosing to start drilling operations closer to civilisation. Bente Nyland's statement quoted above reflects the government's Arctic drilling policy which prescribes the marginal zone to be at least 50 km from ice. In this respect, one can be tempted to think that the Goliath oil field being 85 km from land was a laboratory rat whose success will define Norway's arctic oil policy. The successes archived in the Snøhvit, Johan Castberg and Goliath will shape the debate for Arctic drilling and will reinforce the determination to open the areas which have been licensed but yet to start operations. Considering that statistics from the OD shows that production will peak in 2023, it leaves one to imagine that the government is confident they can deliver safe drilling in the Arctic and will certainly support the industry to open the licenced areas under the 23rd and 24 rounds which have not begun operations.

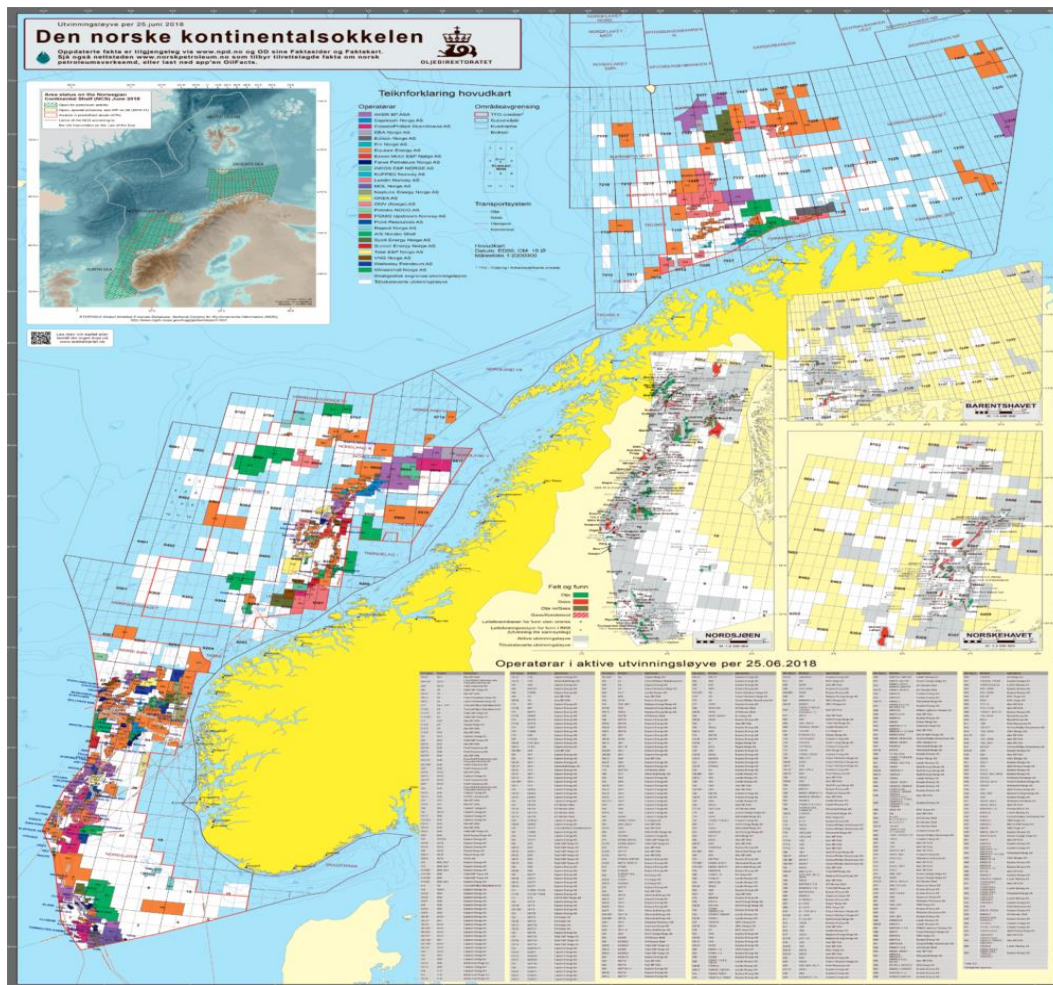


Figure 9 The Map of the Norwegian Continental shelf

The smaller map on the upper left side in figure 9 above shows the areas around the Barents and the Norwegian Seas that are opened for petroleum activities. These are areas which are closed to land within the prescribed distance of the marginalised zone. The other map of the whole Norwegian continental shelf shows oil blocks and their owners as well as the different petroleum products extracted or that will be extracted when the fields become operational. Considering that most of the oilfields in the North Sea are at their tail, and most companies are selling out them out, due to the increase in the cost of operation, it would be a sound reasoning to opine that the companies holding the licenses in the areas not yet in operation will only accelerate their quest to begin operations in the High North. It will be interesting to see how the government reacts to the pressure from the corporate bodies as well as being able to tame its appetite for Arctic oil money.

The findings of this research reveal two major opposing views with regards to Arctic drilling in Norway namely that Arctic drilling is too risky as such must be abandoned and that of confidence which seeks to explain that with the right skills and technology while following prescribed requirements safe drilling could be carried out. The section above has elucidated on the motivations of confidence of safe drilling fuelling the narratives of safe drilling in the vulnerable High North. The summary of the narratives shows that those the oil and gas regime in Norway seem to have adopted management regulations like what Terje Aven's risk regulation and management prescribes namely:

- (i) cautionary and precautionary principles, and
- (ii) (ii) robustness and resilience.(Terje Aven1, 2012)

The government and the corporate bodies' notions of caution, precaution, robustness and resilience have failed the expectations of the environmentalists community hence prompting sharp criticisms from those who view Arctic drilling as an enthusiastic and poorly calculated venture driven by the greed of capitalism with a total disregard to what the consequences would be.(Røstvik, 2015).

The Unsafe Narrative Amidst Polarised Views

Le Coze in criticising Perrow opined that Perrow picked out highly risky techno organisations susceptible to accidents. (Le Coze, 2015). A question that could be ask if Perrow arguement has any bearing on drilling in the High North or whether the oil and gas industry would be considered as a risky industry? If anything, the answer to this question would reflect the narratives in the findings. One which the arguments quickly shifts to the advantages and disadvantages of oil drilling to Norway. Many researchers have done a great job to in assessing the risk of oil and gas drilling in the High North by looking into what will be the worst case scenario (Hauge et al., 2014a), investigating the adequacy of Norway's oil spill response capacity (Knol & Arbo, 2014) or the challenges to arctic societies in the face the norward push (B, 2018). These studies have pointed towards the same conclusion that the challenges in the High North are enormous and cast doubts on the claims of the oil and gas regime. The scientific conclusions have often concord the arguments of the environmentalist community. However, the debate on safe drilling in the High North has not been without controversies in which the ministries sometimes are in sharp disagreement with the petroleum sector in certain aspects for example, when it comes to simulations of worst-case scenarios for blow outs, the industry has

been criticised for choosing less representative sites. Furthermore, the resoluteness of the industry in their push northwards has led them to accuse scientists who have advised against opening the Lofoten area of being political. In other instances, the argument has centred around in risk evaluations all year-round petroleum activities in the Barents Sea. In this regard, as well, reports from the government, PSA and the industry revealed to be in sharp contrast with that of environmentalist organisations.

One curious observation is that, there is not a very fixed cleavage in terms of all the perspectives of safety among politicians, government agencies and the industry as they often come in conflict with one another in certain issues. Political parties have moved forth and backwards in their support for drilling in the North signalling a lack of conviction in their narratives. Meanwhile, there is an observation of consistency in the narratives of environmentalist and the scientific community. Considering the differences in narratives, it could be interpreted that while the narratives of the scientific and environmentalist communities are motivated by hard facts and scientific evidence, those of the government/politicians and the industry are motivated political correctness, pressure from the industry and the desire to ensure the flow of the oil money to maintain a generous welfare system in Norway on the part of the government/politicians and the quest for corporate profits on the part of the industry. The influence of politics in decision making has caused many to affirm that the government's disregard of expert counselling from its own in house experts and research institutions with respect to Arctic petroleum simply that decisions with respect to the opening of new oil fields in the High North are based political agendas which go along party lines.

While, the experts of the Environmental Agency, (EA) Polar Institute and can only wallow in silence as the EA is a subordinate agency under the ministry of Climate and Environment while the Polar institute is a state funded research institution. In refuting the claims of safety, the pessimists have relied upon scientific findings with harsh conclusions on the challenges of drilling in the High North and on the consequences of the loss of control of an oil well or a tanker ruining aground.

The overriding factor amongst the stake holders is the fact that their narratives are tone towards their objectives. The environmentalists are concerned as their overall mission of protecting the environment against what they consider indiscriminate exploitation while the industry is made up of organisations with profit making as their sold aim of existence. The successive governments have continuously played the role of a partial arbiter their policies have been pro

drilling hence making them to leaning in favour of the industry. Considering that there are parastatals involved in petroleum exploitation in which the government is majority shareholder, gives the government vested interest in oil and gas exploitation. It would be safe to say that the variance in narrative is conditioned the objectives of the stake holders. Considering that their objectives stand at extremes, this explains why they are deeply polarised.

The drivers for unsafe narratives

Todd La Port et al conducted research which showed that organisations could undertake certain measures to overcome NA accidents which Perrow said where unavoidable. From the presentation of safety narratives seen earlier, one could be lured into thinking that the legislative, institutional, international and local cooperation, as well as the preparedness disposition in terms of the massive investment in emergency response equipment especially around the Barents Sea and the Lofoten (area which includes part of the Norwegian) would certainly guarantee a state of the art readiness as such quashing the fears of inadequacies which the pessimists decry concerning Arctic drilling. One of the great dangers of risk management and decision making is the assumption that very complex technologies will work as expected (Sylves & Comfort, 2012). It is this assumption and confidence which hinders learning and complicates risk management in sociotechnical systems. The drivers of unsafe narratives for arctic drilling are fuelled the challenges of the vulnerable and uniqueness of the Arctic. In the meantime, the recent report of the Norway's Auditor General has added fresh impetus into the unsafe narrative.

The Vulnerable and Unique Arctic Environment

The 1989 Exxon Valdez grounding and ensuing spill and the BP Deepwater Horizon of 2010 are two landmark accidents which could be used to understand how much risk managers have learned over time. It emerges that risk culture which marked these two organisations namely poor safety culture in the face of complex technology and a culture of over confidence. However current researches such that that carried out by Tveiten et al, while investigating on emergency management found that there exists a risk culture and over confidence in emergency preparedness modelling in the industry amongst other things, their research uncovered that the all the actors of emergency management did not have access to the log system. Their findings

also reveal that it was not clear who should have access to various information and the systems. (Tveiten et al., 2012). Also, referring to the work of French and Niculae (2005), Tveited et al, pointed what constitute an essential argument against drilling in the High North as they revealed that since major incidents are infrequent, models are not well attuned as there are not sufficient past data to test the models leading to the industry not having fixed emergency personnel as they are drawn other departments of the organisation. The quarrel here is that it will take more time to assemble folks from other departments during emergency situations and these people could be ill suited for the task. If anything, the findings uncover a state of complacency in the industry when it comes to emergency preparedness. Tveiten et al findings are in conjunction with Turner when he argues that accidents are not random events which just occur referred to as ‘Acts of God’ they are as a result of organisations handling of complex technologies. Turner opined that disasters arise from an interaction between the human and organizational arrangements of the socio-technical systems set up to manage complex and ill-structured risk problems.(Turner & Pidgeon, 1997)

Furthermore, it has already been mentioned that over confidence impairs the chance of learning and will only lead to hasty and maladjusted decisions after accidents (Thomas A. Birkland, 2009). The confidence of the industry of being ready to drill in the High North and tackle any challenges is often backed by the ability to replicate their successes in the North Sea. However, while the experiences gained over the years in the North Sea is invaluable in their northwards push for Arctic drilling, it will be erroneous to compare the Barents Sea and the Lofoten area to the North Sea as the former is characterised by darkness, remoteness leading to challenges in telecommunication and moving equipment, ice and icing, wave, wind and so on. It is important to note here that darkness for example represents the challenge for tracing and handling spilled oil while concerning ice, spilled oil will quickly slip under, among or in ice making recovery process very difficult if not impossible.

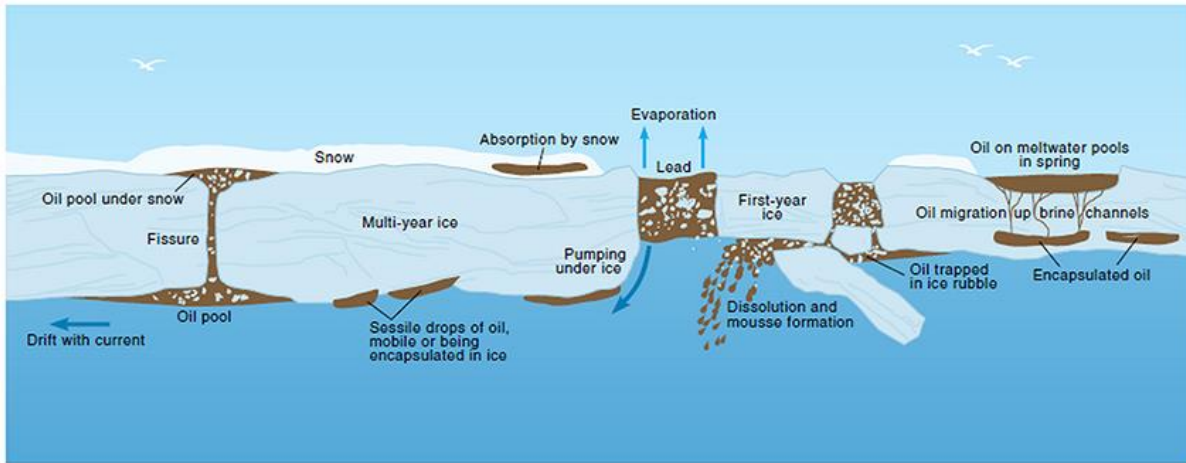


Figure 10 Interaction of oil with sea ice

Source: AMAP, 2007

The solution proposed to tackle ice in the High North are in situ burning and dispersants which are themselves very controversial due to their environmental unfriendliness as dispersants contain toxic chemical substances which could be very detrimental to the fragile arctic ecosystem while burning pose public health risk to man and to sea birds and mammals. Open burning will still leave residues which if not cleaned will be harmful to the environment. Oil in pack ice have a slow evaporation rate than from cold open water to thick film formation.(Bourmistrov et al., 2015). Trapped oil in ice will quickly diffuse to the bottom making recovery almost impossible. Besides, several scientists including have concluded that there is no effective means of containing and clean up oil spills in broken sea ice. (B, 2018; Bourmistrov et al., 2015; Hauge et al., 2014a; Knol & Arbo, 2014). The industry and the government have both conceded to this conclusion therefore, the environmentalists recommend a halt to the northward push until at the very minimum there should be available effective technology to tackle oil spills in ice. Research shows that the expansion of drilling in the High North presents research and governance challenges and in icy conditions only 1-5% of oil can be removed.

Against this backdrop, the challenges in the High North are dissimilar to those in the North Sea. More so, the industry has been criticised for not recognising that there were several instances where they came closed to accidents. The fact that Equinor escaped accidental oil spills in 2007 and 2008 gives credence to the pessimist arguments that the claims of successes in the North Sea are somewhat chequered just as Sagan (1993) noted after using both the theories of Perrow and La Porte to analyse accidents and near misses in the US nuclear weapons system, he came to the conclusion that, despite the US nuclear weapon not

experiencing any major accidents, it could not be proven that they had exploit reliability enhancement strategies rather they were characterised by normal accident tendencies. He underscored that they had some good fortunes than reliability enhancement (Rijpma, 1997).

The absence of major accidents in the North Sea cannot therefore be used as grounds for readiness. Risk management theorists posit that just one major accident can lead to the change of pathways cascading into reforms. After a total of 346 people died in the Ethiopian Airlines and Lion Air disasters which involved the Boeing 737 Max aviation experts began questioning if the malfunctions which brought down the tow aircraft were not the same and if Boeing was not aware of the software defects. While the company has offered to create an upgrade to address the problem aviation authorities in many countries have begun acting against the company. In the US the Federal Aviation Agency (FAA) announced the grounding of Boeing 737 Max further investigation and confirmation that the bulk has been properly addressed. The FAA action reflects a general pattern of trust which exist amongst watch dog institutions and corporate body. Also, the attempt by Boeing to address these bulks will certainly add to more complexity to the aircraft which could become more problematic and complicated for the pilots in the future confirming Perrow's arguments that complex organisations are accident prone no matter what is done.

The example of the Petroleum Safety Authority in Norway and Vår Eni as highlighted below goes to reiterate the fact that a period of accident free operations cannot be considered as the presence of reliability enhancement factors.

Had there been any major accidents in the North Sea, the award of licensing in the High North would have received more scrutiny in the Norwegian political landscape. However, the absence of accidents in the North Sea does not imply that there are no examples else to learn from. As mentioned above, the Exxon Mobil and the BP Deepwater disasters offer glaring learning opportunities to Norway.

According to Rijpma (1997), Even systems or organisations using redundancy sometimes depend on common conditions such as weather, explaining why the two O-rings Challenger space shuttle's Solid Rocket Booter's sealing could not back up each other because both depended on the weather as such were both corroded at the same time.(Rijpma, 1997). Even the Norwegian Coastal administration have recognised that the functionality of the equipment to be used in the High North will depend on the weather.

The argument of Arctic drilling impossibility hinges on the vulnerability of the arctic in the face of an accidental occurrence. As Adger (2006) puts it vulnerability is the state of susceptibility to damage from exposure to stresses linked with environmental and social change and from the absence of capacity to adapt (O'Brien et al., 2008). In simple terms, a vulnerable person to a sickness is a person who is like to die from that sickness because their system cannot absorb and adapt to the stressor under which they have been subjected. It should be underscored that there is a consensus amongst all the stake holders in arctic drilling on the vulnerability of the Barents Sea and the Lofoten area. The factors which have occasioned vulnerability are the configuration of the ecosystem- the ecosystem of the Barents Sea for example is considered to be a moderately productive ecosystem able to produce a great amount of fish stock relative to its size and the base of the ecosystem is algae which uses sunlight in order to assimilate inorganic carbon into cell material in the same way trees photosynthesise. Algae are the base of the food chain in the Barents Sea and in other parts of the Arctic Sea. (Bourmistrov et al., 2015). Algae are very sensitive to oil and in an event of an oil spill they will be eradicated hence putting the whole ecosystem in peril since it serves as food to fish species and the fish are then eaten by species up the food chain such as sea mammals and sea birds. The figure below gives a snapshot of the Barents Sea food chain.

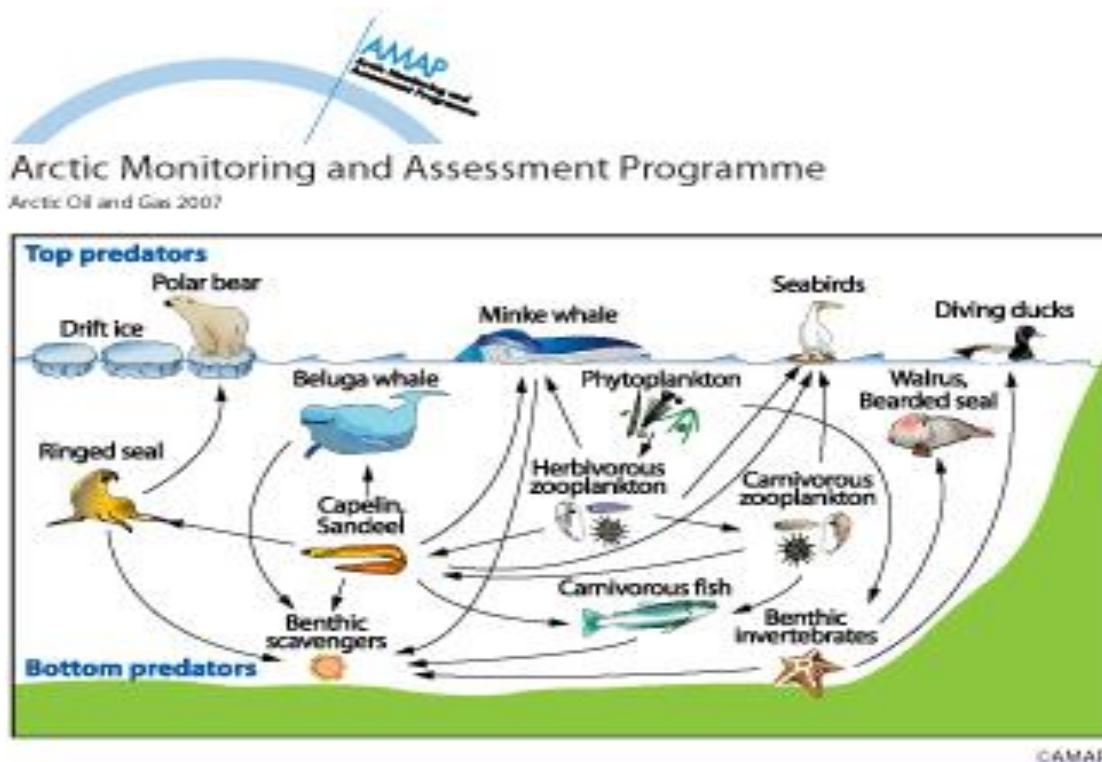


Figure 11. A simplified Barents Sea food chain

Source: AMAP

The Implications of the Norway Auditor General's Report

The recent report from Norway Auditor General,(NAG) the public service watch dog in Norway on its investigation of the operation of petroleum activities in the High North came out despite with some praise to the PSA on the job they are doing in terms of the overall supervision of the petroleum activities in Norway. However, the report had two over riding factors:

- It revealed that the PSA has exited complacency in following up of companies for conformity to regulations related to health safety and environment due the principle of good faith shared between the PSA and the companies thereby not using supervisory methods that takes into account risk factors and the significance of follow up.
- The report also concluded that the equipment for oil spill response in the High North are not adaptable to Arctic conditions (Riksrevijonen, 2019)

The auditor general report has relaunched the debate on Arctic petroleum and oil spill readiness. A significant take away from the report is that it has come to confirm what researchers and environmentalists have be saying. The excerpt from informant 1 of environmentalist organisation reflects how the NAG's report has been received with satisfaction and will galvanise the environmentalist community in their argument against safe drilling in the High North as it has now become the main reference point to buttress their claims.

Another striking point about the report is the fact that the NAG noted that “The PSA granted consent for the commissioning of Goliat despite the fact that the safety of the platform had not yet been properly guaranteed “. Such practices indicate that the authorities underestimate what could be the repercussion of an accidental occurrence in the Barents Sea considering that Goliat's daily output is 100.000 barrels of oil. A loss of control of an oil well will be very costly environmentally and financially. Such practices give credence to Perrow when he claims that overconfidence in safety or warning technologies usually cause people including decision makers to take unwise risks. He continued by saying that often blame is levied to ‘operator error’ in big accidents meanwhile poor regulatory and safety omission, mechanical lapses and multiple systems failures are the actual causes of disaster.(Sylves & Comfort, 2012). This is reminiscent of the Boeing 737 Max accidents and most other technological hazards. Such errors could prove very costly if an accidental scenario of the size of the BP Deepwater Horizon could be imagined in the Barents Sea considering that 9000 barrels of oil was spilled into the sea

requiring 26000 vessels to be involved for the cleaning and 20000 people with some around to clock.

Despite the fact that Goliat oilfield is situated some 85 km from land, an accidental scenario of the size of the BP Deepwater will be an uphill task. This explains why there has been as strong disagreement between the petroleum authorities and the environmental and fisheries authorities on the relevance of simulating the effect of a Deepwater Horizon sized oil spill in the Lofoten 3 times the size of the worst case scenario as was exposed by the article “Refuses catastrophe scenario”. Also, the ministry of environment has criticised the industry for choosing sites which are less representative for simulations. These wrangling between governmental institutions on the one hand and between governmental institutions and the industry on the one hand shows a manifest desire to conceal the reality but most importantly, it reveals a risky knowledge gap which needs to be addressed urgently.

CONCLUSION

By and large, I have argued that the so called 23rd and 24th rounds of licenses signalled Norway’s unabated intention to exploit its vast natural oil reserves in the Arctic. While this move was seemed by the maritime border agreement between Russia, the conclusion of the agreement as well as dwindling oil fields in the North Sea amidst rising cost of operation played significant roles to herald the push for Arctic petroleum in Norway signalling that Norway is not yet ready to either relinquish its petroleum dominance nor alter its energy path way in at least in a radical fashion. Notwithstanding, still willing to conserve its status as an environmentally friendly nation still committed to the Paris Agreement. One of the ways the oil and gas companies have succeeded in this argument is to present themselves as part of the solution of the energy crisis and climate change. (Mikkelsen & Langhelle, 2008). The northward push for Arctic petroleum has caused many to wonder whether Norway was more committed to grow the size of its oil fund or to protect nature. This has been labelled as an Arctic paradox (B, 2018).

It should be construed that the looming question in the face of the northward push for Arctic petroleum has been Norway’s readiness to drill safely in the vulnerable Arctic. Considering the Arctic holds several unknowns (Bourmistrov et al., 2015) and the challenges it presents are very dissimilar to those of the North Sea and considering that the ecosystem of the Barents sea and the Lofoten area is considered of the most pristine and the consequences of an oil spill will have far reaching

consequences. The question of Norway's readiness to drill in the High North has divided the stakeholders. While the oil and gas industry bask with assurance pointing to its record in the North Sea. The governments has bought into this narrative and are confident drilling could be safely carried out in the High North pointing to legislative and preparedness and emergency dispositions that they have put in place and they are confident Norway has one of the most stringent regulations in the world. On the other hand, the environmentalist organisations have jettisoned these claims while warning that the consequences of an accident will be dire pointing to factors such as ice, darkness, wind, which could be a huge challenge for emergency preparedness. The Auditor General's report offered fresh impetus for arguments and seemed to have reinforce their stance. However, findings reveal the the narratives are along 4 conceptual frame works namely:

- Too risky to drill in the Arctic
- Risk acknowledgement in Arctic drilling but necessary hence, good preparedness ---- plans in place.
- Sceptic outlook on safe Arctic drilling
- Optimistic outlook on safe drilling in the Arctic

It is undeniable that Norway holds the Arctic sacred and is committed to preserving. There are noticeable concerted efforts towards this direction examples being Norway's committed in the Arctic Council and other bilateral agreements with other Arctic nations as well investment in research through institutions such as the Polar Institute. That notwithstanding, the question of whether or not Norway is prepared for drilling in the Arctic has often been politicised and misconstrued to be synonymous to the importance of continuous drilling. Furthermore, the preparedness questioned has often been answered by pointing historical records in the North Sea as well as claims of exploiting petroleum in the best way with respect to other nations. While these claims are undisputed credit to Norway, they do not respond to the question of preparedness. The latest report of Norway's Auditor General is in tandem with scientific evidence as well as adds voice to the environmentalist claims while indicating the challenges embedded in Arctic drilling

Conversely, the polarised nature of narratives underscores contrasting views of the stakeholders buttressed by their agendas. The corporate bodies are after all business organisations with their primordial aims being profit making, the environmentalist organisations seek to stay through to their mission of protecting the environment meanwhile the government in Norway's interest is heavily

weighted in favour of drilling albeit putting legislative frame work to prohibit indiscriminate exploitation.

By and large, the fact that the government won the case which the environmentalist brought before the court of law, implies that legitimacy of Arctic drilling has been secured from a juridically point of view. However, the growth of environmental activism and the resentment of Arctic drilling amongst young students signals that environmental justice might be acquired out of the courts on the one hand and on the other hand, a major accident in the High North could make the government unpopular and could force major reforms. Conversely, a sudden breakthrough in another energy technology could render Arctic drilling obsolete and alter the current pathway.

Limitations

It should be emphasised that the research was limited by time and resources. A major weakness of the studies is the study is that the time frame was certainly short as such it took a toll on the quality. This research required within the margins of 1 to 2 years to capture some details such as getting more informants and most especially getting the views of the municipalities such as Nordland and Hammerfest municipalities. Another limitation was the absence of funding. The absence of funding restricted my ability to travel as most of the earmarked informants are spread across Norway. Therefore, the inability to get a broad range of subjects obliged me to focus on the experts in order to zoom in on qualitative.

Recommendations for further research

The growing importance of the Arctic in the face of human encroachment certainly attracts interest for further studies. This research has focused on how the narratives of safety and vulnerability are interpreted amongst stake holders in Arctic petroleum. It offers the understanding that the narratives in Arctic oil and gas reflect the vested interest of the stake holders, it would be interesting to see what increased roles the Arctic Council will play in regulating international Arctic cooperation in the face of increased Arctic encroachment. Furthermore, it will be interesting to understand the consequences of increased transportation in the in the Arctic amidst the threads of global warming with melting ice. Considering that the Arctic Sea route is said to become a reality with ice breaking cargo ships to ply the Arctic from China to Europe, it becomes scholastically interesting understand what the ramifications would be to the Arctic ecosystem.

REFERENCES

- Bank, N. (2019). How the fund is invested. BarentsWatch. (2016). What is the Arctic? Retrieved from <https://www.barentswatch.no/en/articles/Hva-er-Arktis/>
- Brundtland, G. H. (1987). *Our common future*. Oxford: Oxford University Press.
- Chuefor, C. M. (2018a). *The interface between societal safety and drilling in the Norwegian arctic*. (unpublished) University of Stavanger,
- Chuefor, C. M. (2018b). *The Paradox of Societal Safety and Drilling in the Norwegian Arctic*. (unpublished) University of Stavanger,
- Dale, B., Veland, S., & Hansen, A. M. (2018). Petroleum as a challenge to arctic societies: Ontological security and the oil-driven 'push to the north'. *The Extractive Industries and Society*. doi:10.1016/j.exis.2018.10.002
- Gautier, D. L., Bird, K. J., Charpentier, R. R., Grantz, A., Houseknecht, D. W., Klett, T. R., . . . Wandrey, C. J. (2009). Assessment of undiscovered oil and gas in the arctic. *Science*, 324(5931), 1175-1179. doi:10.1126/science.1169467
- Hauge, K. H., Blanchard, A., Andersen, G., Boland, R., Grøsvik, B. E., Howell, D., . . . Vikebø, F. (2014b). Inadequate risk assessments – A study on worst-case scenarios related to petroleum exploitation in the Lofoten area. *Marine Policy*, 44(C), 82-89. doi:10.1016/j.marpol.2013.07.008
- Kristoffersen, B. (2014). Drilling oil into Arctic minds? State security, industry consensus and local contestation.
- Kristoffersen, B. (2015). Opportunistic Adaptation: New discourses on oil, equity and environmental security. *The Adaptive Challenge of Climate Change*, 140-159.
- Kristoffersen, B., & Dale, B. (2017). Post petroleum security in Lofoten: how identity matters. *Arctic Review*, 52.
- Kuzemko, C., Lockwood, M., Mitchell, C., & Hoggett, R. (2016). Governing for sustainable energy system change: Politics, contexts and contingency. *Energy Research & Social Science*, 12(Supplement C), 96-105. doi:<https://doi.org/10.1016/j.erss.2015.12.022>

- Mikkelsen, A., & Langhelle, O. (2008). *Arctic oil and gas : sustainability at risk?* London: Routledge.
- Milner, R. (2017). Lawsuit tests Norway's enthusiasm for Arctic drilling. *Financial Times*. Retrieved from <https://www.ft.com/content/0a0b0df2-c3d9-11e7-a1d2-6786f39ef675>
- Molenaar, E. J., Elferink, A. G. O., & Rothwell, D. R. (2013). *The Law of the Sea and the Polar Regions*: Brill | Nijhoff.
- Norwegian Ministry of Foreign affairs, R. (2014). *norway's arctic policy*
- Creating value, managing resources, confronting climate change and fostering knowledge. Developments in the Arctic concern us all.
- Regjeringen, N. M. o. P. a. E.-. (2011). *An industry for the future- Norways petroleum*. Oslo.
- Samstag, T., & Nordic Council of, M. (1993). *Arctic challenges : report from the Nordic Council's Parliamentary Conference in Reykjavik 16-17 August 1993*. [Stockholm]: Nordic Council.
- Skagestad, O. G. (2010). *The 'High North'*
- An Elastic Concept in Norwegian Arctic Policy*. Retrieved from
- Sylves, R. T., & Comfort, L. K. (2012). The Exxon Valdez and BP Deepwater Horizon oil spills: reducing risk in socio-technical systems. *American Behavioral Scientist*, 56(1), 76-103.
- Webersik, C. (2010). *Climate change and security : a gathering storm of global challenges*. Santa Barbara, Calif: Praeger.
- Alexander, D. E. (2002). *Principles of emergency planning and management: Oxford University Press on Demand*.
- B, D. (2018). Petroleum as a challenge to arctic societies: Ontological security and the oil-driven 'push to the north'. doi:10.1016/j.exis.2018.10.002
- Bank, N. (2019). How the fund is invested.
- BarentsWatch. (2016). What is the Arctic? Retrieved from <https://www.barentswatch.no/en/articles/Hva-er-Arktis/>
- Birkland, T. A. (1998). Focusing events, mobilization, and agenda setting. *Journal of public policy*, 18(1), 53-74.
- Birkland, T. A. (2009). Disasters, Lessons Learned, and Fantasy Documents. *Journal of contingencies and crisis management*, 17(3), 146-156. doi:10.1111/j.1468-5973.2009.00575.x
- Blaikie, N. (2009). *Designing social research*: Polity.
- Blaikie, N. (2010). *Designing Social Research (Second Edi)*. In: Cambridge: Polity Press.
- Bourmistrov, A., Mellempvik, F., Bambulyak, A., Gudmestad, O., Overland, I., & Zolotukhin, A. (2015). *International arctic petroleum cooperation: Barents sea scenarios*: Routledge.
- Brundtland, G. H. (1987). *Our common future*. Oxford: Oxford University Press.
- Chuefor, C. M. (2018a). *The interface between societal safety and drilling in the Norwegian arctic*. Masters. University of Stavanger.
- Chuefor, C. M. (2018b). *The Paradox of Societal Safety and Drilling in the Norwegian Arctic*. Department of Media and Social Sciences. Master. University of Stavanger.
- Danermark, B., Ekstrom, M., & Jakobsen, L. (2005). *Explaining society: An introduction to critical realism in the social sciences*: Routledge.
- Downs, A. (1972). Up and down with ecology: The issue-attention cycle. *The public*.
- Downs, A. (1996). 2.1. Up and Down with Ecology: The" Issue-Attention Cycle. *The politics of american economic policy making*, 48.

- Gautier, D. L., Bird, K. J., Charpentier, R. R., Grantz, A., Houseknecht, D. W., Klett, T. R., . . . Wandrey, C. J. (2009). Assessment of undiscovered oil and gas in the arctic. *Science*, 324(5931), 1175-1179. doi:10.1126/science.1169467
- Hajer, M. A. (1995). *The politics of environmental discourse: ecological modernization and the policy process*: Clarendon Press Oxford.
- Hauge, K. H., Blanchard, A., Andersen, G., Boland, R., Grøsvik, B. E., Howell, D., . . . Vikebø, F. (2014a). Inadequate risk assessments—A study on worst-case scenarios related to petroleum exploitation in the Lofoten area. *Marine Policy*, 44, 82-89.
- Hauge, K. H., Blanchard, A., Andersen, G., Boland, R., Grøsvik, B. E., Howell, D., . . . Vikebø, F. (2014b). Inadequate risk assessments – A study on worst-case scenarios related to petroleum exploitation in the Lofoten area. *Marine Policy*, 44(C), 82-89. doi:10.1016/j.marpol.2013.07.008
- Hollnagel, E., Nemeth, C. P., & Dekker, S. (2009). *Resilience Engineering Perspectives: Preparation and Restoration* (Vol. 2): Ashgate Publishing, Ltd.
- Imbert, E., Ladu, L., Morone, P., & Quitzow, R. Comparing policy strategies for a transition to a bioeconomy in Europe: The case of Italy and Germany. *Energy Research & Social Science*. doi:<https://doi.org/10.1016/j.erss.2017.08.006>
- Johannesson, P., & Perjons, E. (2014). *An introduction to design science*: Springer.
- Jones, B. D., & Baumgartner, F. R. (2005). *The politics of attention: How government prioritizes problems*: University of Chicago Press.
- Kingdon, J. W., & Thurber, J. A. (1984). *Agendas, alternatives, and public policies* (Vol. 45): Little, Brown Boston.
- Knol, M., & Arbo, P. (2014). Oil spill response in the Arctic: Norwegian experiences and future perspectives. *Marine Policy*, 50, 171-177.
- Kovács, G., & Spens, K. M. (2005). Abductive reasoning in logistics research. *International Journal of Physical Distribution & Logistics Management*, 35(2), 132-144.
- Kristoffersen, B. (2014). Drilling oil into Arctic minds? State security, industry consensus and local contestation.
- Kristoffersen, B. (2015). Opportunistic Adaptation: New discourses on oil, equity and environmental security. *The Adaptive Challenge of Climate Change*, 140-159.
- Kristoffersen, B., & Dale, B. (2017). Post petroleum security in Lofoten: how identity matters. *Arctic Review*, 5(2).
- Krupa, J., & Jones, C. (2013). Black Swan Theory: Applications to energy market histories and technologies. In (pp. 286-290).
- Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*: Sage Publications Limited.
- Kuzemko, C., Lockwood, M., Mitchell, C., & Hoggett, R. (2016). Governing for sustainable energy system change: Politics, contexts and contingency. *Energy Research & Social Science*, 12(Supplement C), 96-105. doi:<https://doi.org/10.1016/j.erss.2015.12.022>
- Le Coze, J. C. (2015). 1984–2014. Normal Accidents. Was Charles Perrow Right for the Wrong Reasons? *Journal of contingencies and crisis management*, 23(4), 275-286. doi:10.1111/1468-5973.12090
- Leveson, N., Dulac, N., Marais, K., & Carroll, J. (2009). Moving Beyond Normal Accidents and High Reliability Organizations: A Systems Approach to Safety in Complex Systems. *Organization Studies*, 30(2-3), 227-249. doi:10.1177/0170840608101478
- Malischek, R., & Trüby, J. (2016). The future of nuclear power in France: an analysis of the costs of phasing-out. *Energy*, 116, 908-921. doi:10.1016/j.energy.2016.10.008
- Marques, A. C., Fuinhas, J. A., & Nunes, A. R. (2016). Electricity generation mix and economic growth: What role is being played by nuclear sources and carbon dioxide emissions in France? *Energy Policy*, 92(Supplement C), 7-19. doi:<https://doi.org/10.1016/j.enpol.2016.01.027>
- Mikkelsen, A., & Langhelle, O. (2008). *Arctic oil and gas : sustainability at risk?* London: Routledge.

- Milner, R. (2017). Lawsuit tests Norway's enthusiasm for Arctic drilling. *Financial Times*. Retrieved from <https://www.ft.com/content/0a0b0df2-c3d9-11e7-a1d2-6786f39ef675>
- Molenaar, E. J., Elferink, A. G. O., & Rothwell, D. R. (2013). *The Law of the Sea and the Polar Regions*: Brill | Nijhoff.
- Neuman, W. L. (2013). *Social research methods: Qualitative and quantitative approaches*: Pearson education.
- Norwegian Ministry of Foreign affairs, R. (2014). norway's arctic policy
Creating value, managing resources, confronting climate change
and fostering knowledge. Developments in the Arctic concern us all.
- Noy, C. (2008). Sampling Knowledge: The Hermeneutics of Snowball Sampling in Qualitative Research. *International Journal of social research methodology*, 11(4), 327-344. doi:10.1080/13645570701401305
- O'Brien, K., Sygna, L., Leichenko, R., Adger, W. N., Barnett, J., Mitchell, T., . . . Mortreux, C. (2008). Disaster risk reduction, climate change adaptation and human security. *Report prepared for the Royal Norwegian Ministry of Foreign Affairs by the Global Environmental Change and Human Security Project, GECHS Report, 3*.
- Patel, S. (2014). France moves to bid adieu to nuclear dependency.(France energy policy shift)(Global Monitor). In (Vol. 158, pp. 8).
- Perrow, C. (1999). *Normal accidents : living with high-risk technologies*. Princeton, New Jersey: Princeton University Press.
- Perry, R. W., & Lindell, M. K. (2003). Preparedness for emergency response: guidelines for the emergency planning process. *Disasters*, 27(4), 336-350.
- Pidgeon, N., Amp, Apos, & Leary, M. (2000). Man-made disasters: why technology and organizations (sometimes) fail. *Safety Science*, 34(1), 15-30. doi:10.1016/S0925-7535(00)00004-7
- Polasek, W. (2011). Nassim Nicholas Taleb: The black swan: the impact of the highly improbable. *Statistical Papers*, 52(1), 247-249. doi:10.1007/s00362-009-0226-8
- Rapley, T. J. (2001). The art (fulness) of open-ended interviewing: some considerations on analysing interviews. *Qualitative research*, 1(3), 303-323.
- Regjeringen, N. M. o. P. a. E.-. (2011). *An industry for the future- Norways petroleum*. Oslo.
- Rijpma, J. A. (1997). Complexity, Tight–Coupling and Reliability: Connecting Normal Accidents Theory and High Reliability Theory. *Journal of contingencies and crisis management*, 5(1), 15-23. doi:10.1111/1468-5973.00033
- Riksrevijonen. (2019). *The Office of the Auditor General's investigation of the PSA's follow-up of health, safety and environment in the petroleum industry*. Retrieved from www.riksrevisjonen.no
- Rogge, K. S., & Johnstone, P. Exploring the role of phase-out policies for low-carbon energy transitions: The case of the German Energiewende. *Energy Research & Social Science*. doi:<https://doi.org/10.1016/j.erss.2017.10.004>
- Røstvik, H. N. (2015). *Corruption the Nobel way : dirty fuels and the sunshine revolution : a witness report*. Oslo: Kolofon.
- Ryen, A. (2002). *Det kvalitative intervjuet: fra vitenskapsteori til feltarbeid*: Fagbokforlaget.
- Samstag, T., & Nordic Council of, M. (1993). *Arctic challenges : report from the Nordic Council's Parliamentary Conference in Reykjavik 16-17 August 1993*. [Stockholm]: Nordic Council.
- Shrivastava, S., Sonpar, K., Pazzaglia, F., Turner, N., & Gray, G. C. (2009). Normal Accident Theory versus High Reliability Theory: A resolution and call for an open systems view of accidents. *Human Relations*, 62(9), 1357-1390. doi:10.1177/0018726709339117
- Skagestad, O. G. (2010). *The 'High North'*

- An Elastic Concept in Norwegian Arctic Policy*. Retrieved from
- Steen, R., & Aven, T. (2011). A risk perspective suitable for resilience engineering. *Safety Science*, 49(2), 292-297. doi:10.1016/j.ssci.2010.09.003
- Pollution Control Act, (1981).
- Sylves, & Comfort. (2012). The Exxon Valdez and BP Deepwater Horizon oil spills: reducing risk in socio-technical systems. *American Behavioral Scientist*, 56(1), 76-103.
- Sylves, R. T., & Comfort, L. K. (2012). The Exxon Valdez and BP Deepwater Horizon Oil Spills. *American Behavioral Scientist*, 56(1), 76-103. doi:10.1177/0002764211413116
- Taleb, N. N., & Blyth, M. (2011). The Black Swan of Cairo: How Suppressing Volatility Makes the World Less Predictable and More Dangerous. *Foreign Affairs*, 90(3), 33-39.
- Terje Aven¹, O. R. (2012). On the Risk Management and Risk Governance of Petroleum Operations in the Barents Sea Area. 1561-1575.
- Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative inquiry*, 16(10), 837-851.
- Turner, B. A., & Pidgeon, N. F. (1997). *Man-made disasters*: Butterworth-Heinemann.
- Tveiten, C. K., Albrechtsen, E., Wærø, I., & Wahl, A. M. (2012). Building resilience into emergency management. *Safety Science*, 50(10), 1960-1966. doi:10.1016/j.ssci.2012.03.001
- Vehkalahti, K. (2013). The Black Swan: The Impact of the Highly Improbable, Second Edition by Nassim Nicholas Taleb. *International Statistical Review*, 81(2), 309-311. doi:10.1111/insr.12020_4
- Volery, T. (2008). The Black Swan: The Impact of the Highly Improbable.(Off the Shelf)(Book review). In (Vol. 22, pp. 69).
- Webersik, C. (2010). *Climate change and security : a gathering storm of global challenges*. Santa Barbara, Calif: Praeger.
- Weick, K. E. (2004). Normal Accident Theory As Frame, Link, and Provocation. *Organization & Environment*, 17(1), 27-31. doi:10.1177/1086026603262031
- Williams, J. (2019). Surfers Fight to Block Oil Drilling in the Great Australian Bight. *The New York Times*. Retrieved from <https://www.nytimes.com/2019/04/29/world/australia/surfers-drilling-bight.html>
-