

Norway's Intra-Arctic Shipping activity

How will an increase in Norway's Intra-Arctic Shipping activity affect economic-, environmental-, and social activities?

EMIL MATHIAS HOEL
ERIK CHRISTOFFER CARLSEN

SUPERVISOR

Naima Saeed

University of Agder, 2020
School of Business and Law

Master

Preface

This thesis marks the end of two years of the Master of Science in Economics and Business Administration at University of Agder.

Before we begin, we would like to extend our gratitude to our supervisor, Naima Saeed, for her invaluable guidance and support. We would like to thank those who participated in our interviews, who have been a tremendous help with our research. Lastly, we would like to thank our friends and family for their support during the course of this thesis.

Abstract

In this foresight study, empirical studies and qualitative research have been used to identify specific activities that are affected due to an increase in Norway's Intra-Arctic shipping activity. Furthermore, this thesis analyzes how affected activities will have to adapt to accommodate the changes that follow climate change and the opening of the Arctic Ocean. Overall, the literature and the findings are conclusive in the sense that over the foreseeable future, the Arctic will become an important region for the shipping industry, and possibly change as it is known today.

The main focus of this thesis is on the effects on economical-, social- and environmental factors, addressed as both challenges and opportunities. The goal of the thesis is adding relevant theory by real-life knowledge and experiences by relevant persons to the topic arctic shipping.

Table of contents

Preface	1
Abstract	2
1 Introduction to the topic	6
1.1 Theme & Background	6
1.2 Purpose	7
1.3 Research question	8
2. Theoretical Framework and Literature Review	9
2.1. Arctic Sea Routes	9
2.2. Intra- and Inter-Arctic Shipping	10
2.3 Benefits and Risks of Opening the Arctic.	11
3 Literary review	12
3.1. Climate Change and Arctic Routes	12
3.2 Intra- vs. Inter-Arctic Shipping	13
3.3 Ports	14
3.4 Challenges and opportunities	15
4 Methodology	19
4.1 Introduction	19
4.2 Data Collection and Methodology	19
4.2 Choice of Methodology	19
4.3 Validity and Reliability	20
4.4 Selection	21
4.5 Recruitment	21
4.6 Development of the Interview Questions	22
4.7 Execution of the Interviews	22
4.8 Transcription	24
5 Findings	25
5.1 Presentation of the Participants	25
5.2 In-depth Interview Questions	27
5.2.1 Question 1. What is your relation to Arctic Shipping?	27
5.2.2 Question 2. Climate changes result in ice melting in the Arctic region, which opens up new alternative shipping routes through the Arctic. How do you think this affects Norway?	28
5.2.3 Question 3. Do you see any benefits in using the new shipping routes, and what do you think this has to say for Norway's shipping activity?	30
5.2.4 Question 4. Statoil does not consider Inter-Arctic shipping to be very attractive yet, and Norway's use of the northern sea routes is currently limited in volume. Do you	

think that Norway should reserve most of its resources for Intra-Arctic activity rather than Inter-Arctic activity? Why, why not?	31
5.3.5 Question 5. How will an increase in shipping activities (fishing, oil extraction, tourism, etc.) affect Norway in relation to economic-, environmental- and social factors?	33
5.3.6 Question 6. How will increased shipping activity and climate changes affect Norwegian port operations in relation to restructuring, management and measures to deal with climate challenges?	34
5.3.7 Question 7. How do you experience the increased number of tourists coming to Norwegian ports with cruise ships? Do you see this as a problem, or a positive direction that can give beneficial effects?	36
5.3.8 Question 8. How will a future increase in shipping activities affect yourself as a person? Are you already experiencing any changes?	37
5.3.8 Question 9. Do you have any more information to add which we have not already asked for? Is there anything more you think we should have asked you which you find relevant?	38
6 Discussion and Analysis	40
6.1 Coding - Nvivo Analysis	40
6.2 Comparison Diagrams	40
6.3 Word Tree	47
7 Conclusion, Limitations and Future Research	50
7.1 Conclusion	50
7.2 Limitations	51
7.3 Future Research	52
8 Sources	53
Appendix	58

Tables and Figures

Figure 1: Arctic sea routes	10
Figure 2: Comparison diagram between interview 1 and interview 2	41
Figure 3: Comparison diagram between interview 1 and interview 3	42
Figure 4: Comparison diagram between interview 2 and interview 3	43
Figure 5: Comparison diagram between interview 1 and interview 4	44
Figure 6: Comparison diagram between interview 5 and interview 9	45
Figure 7: Comparison diagram between interview 2 and interview 5	45
Figure 8: Comparison diagram between interview 1 and interview 5	45
Figure 9: Word tree - “Shipping”	48
Table 1: <i>Potential opportunities linked to increase in shipping activity</i>	15
Table 2: <i>Potential challenges linked to increase in shipping activity</i>	17
Table 3: Participants - relation to Arctic Shipping	27

1 Introduction to the topic

1.1 Theme & Background

In recent years, Arctic Shipping has become more prevalent and a recurring theme discussed in media, politics and financial settings, both internationally and nationally. In regard to climate change sympathizers, parliaments and business opportunists, Arctic Shipping could potentially provide solutions for benefactors and challenges for opponents. This may be increased frequency of shipping vessels producing economic growth, tourism and leniency, or harming the environment, workers, economy and wildlife. In light of rapid climate change and increased demand for transportational variance, Arctic Shipping proves to be an exciting and challenging subject.

The Arctic Ocean consists of the following coastal states: Canada, Denmark (Greenland), Norway (Svalbard), Russia and the United States (Potts and Schofield, 2008). As a result of climate change, this arctic environment has experienced a substantial increase in temperature over the last 50 years in contrast to the rest of the world. Due to this, the ice surrounding the area is melting, potentially harming the Arctic wildlife and causing new challenges to the shipping industry (AMAP, 2017). At the same time, reduced ice-coverage results in shipping routes, such as the NEP (North east passage), becoming navigable for a longer period of time. Studies suggest that, in 2050, the trade route will be permanently open during late summer in the northern hemisphere (AMAP, 2017). Consequently, navigating the Arctic is estimated to become commercially viable during September 2030. This is when the shipping activity is at its peak because of the reduced volume of ice covering the sea. (Eguilez et al, 2016).

According to these estimates and previous studies, it is expected that traditional shipping through the Suez- and the Panama Canal will eventually subside, and the global shipping traffic will divert increasingly towards the Arctic. Moreover, an increase in Arctic Shipping would challenge ports along the Arctic coastline to handle more traffic while transit sea ports, such as Singapore, will see a decrease in traffic (Zhang et al, 2019).

During the last decade, the main Arctic Sea routes have seen a substantial increase in

shipping traffic (Lasserre & Alexeeva, 2015). The sea routes that have seen such marginal change are NEP (North East Passage), NSR (Northern Sea Route), and TSR (Transpolar Sea Route) (Stephenson, Davies, Huntington & Sheard, 2019, p. 83-89). Along with the gradual “opening of the Arctic”, and an increase in shipping activities, economic-, environmental- and social opportunities are examples of factors that will emerge (AMAP, 2017). However, with opportunities come certain responsibilities and challenges that must be carefully analyzed and acted upon accordingly, in order to successfully adapt to the new Arctic Shipping era.

This thesis analyzes how the previously mentioned factors will be influenced by a potential increase in Norway’s intra arctic shipping activities, policies and global climate change.

1.2 Purpose

The purpose of this thesis is to see which factors are more prominently affected due to an increase in intra Arctic shipping in Norway. There will be benefits and challenges tied with the arctic ice melting, and gradual opening of the Arctic Ocean as a market. Arctic shipping is a “hot topic” that is highly debated among scholars, researchers, government officials and business opportunists. It can be seen as an untapped market with limitless possibilities for future economic-, environmental-, and social growth between the Arctic States, and parties with shared interest. Furthermore, these recent developments and effects of climate change will be thoroughly discussed and analyzed, in order to answer the research question developed for this thesis.

1.3 Research Question

How will an increase in Norway's Intra-Arctic Shipping affect economic-, environmental-, and social activities in Norway?

Sub-question 1: *Why is there more focus on Intra-Arctic shipping compared to Inter-Arctic Shipping in Norway?*

Sub-question 2: *What are the opportunities and challenges of opening up Norway's Intra-Arctic shipping activities?*

2. Theoretical Framework and Literature Review

This chapter provides some general information on the topic of Arctic Shipping. It emphasizes on a Norwegian point of view to explain the research question adequately.

2.1. Arctic Sea Routes

The Arctic Ocean consists of the following coastal states: Canada, Denmark (Greenland), Norway (Svalbard), Russia and the United States (Potts and Schofield, 2008). From a historic point of view, several sea routes have emerged ultimately connecting the continents since the invention of sea travel (Sharda, 2019). Among these sea routes, the arctic routes will be the focal point of this thesis. In addition, comparisons with other sea routes e.g. Suez- and Panama-Canal will be included. There are generally five arctic sea routes to consider when discussing the Arctic Sea; The Northern Sea Route (NSR), The Northwest Passage (NWP), The Northeast Passage (NEP), the Arctic Bridge, and the Transpolar Sea Route (TSR). These routes are illustrated in Figure 1 below. The Arctic Bridge is a Trans-Arctic sea route, connecting Russia and Canada, more specifically; the port of Murmansk to the Hudson Bay port of Churchill, Manitoba. Next is the Northeast Passage (NEP), which connects Europe and Asia, spanning from Norway along the Northwest portion of Russia, and to the Bering Strait. In addition, the Northern Sea Route (NSR) shares most of its transit with the NEP. Moving on, the Northwest Passage (NWP) stretches along the North American coastline and the Canadian Archipelago, meeting up in the Bering Strait with the Northeast Passage. Finally, there is the Transpolar Sea Route (TSR). There are some prerequisites for the NSR to be considered a viable transit from Europe to Asia, being the shrinkage of ice coverage and increased temperature in the Arctic (Bennet, 2019). The TSR cuts directly through the northern tip of the northern hemisphere and out towards the Pacific Ocean. The benefits of utilizing the TSR instead of both arctic sea routes, and the two canals, can be tremendous in terms of reduced voyage time, reduction in pollution, and other economic factors (AMSA, 2009). The distance between Europe and China would be reduced by approximately 40 percent and 60 percent rather than voyaging through the Suez-Canal and Cape of Good Hope respectively. In addition to reduced transportation time, fuel consumption, pollution and

environmental emission, it also eliminates the risk of piracy and allows for larger and a variety of shipping vessels. (ArcticBulk, 2020). To summarize, the NSR is the most efficient arctic transit route between Europe and Asia, given that certain prerequisites are met.

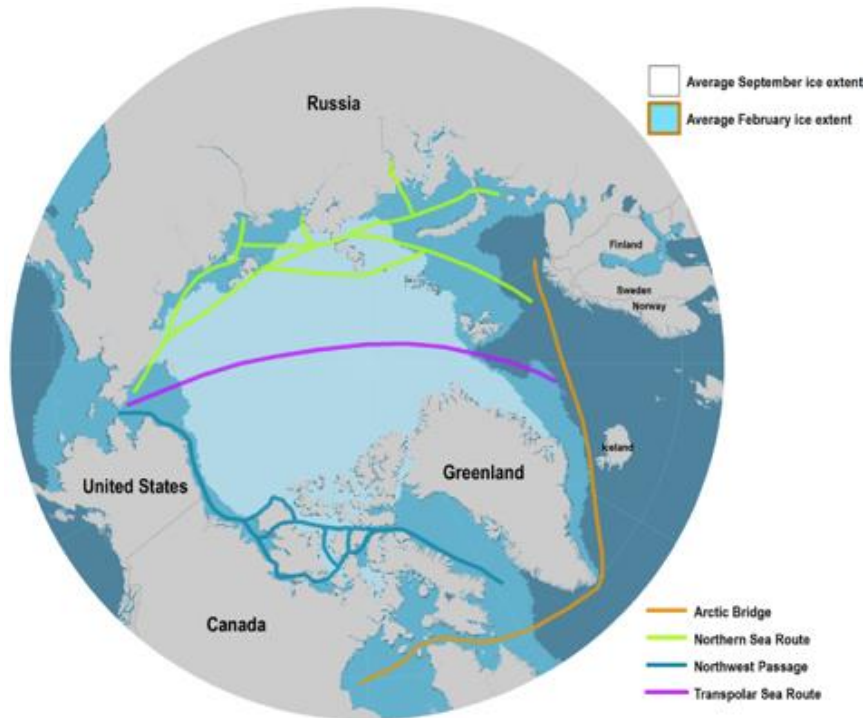


Figure 1: Arctic sea routes: https://transportgeography.org/?page_id=412

2.2. Intra- and Inter-Arctic Shipping

Arctic shipping is often categorized into two main categories: Intra-Arctic transport (Intra-Arctic shipping) and Inter-Arctic transport (also known as Trans-Arctic transport). The first category includes two or more Arctic states including marine activity that remains in the general Arctic region (Saeed & Ng, 2019). An example of Intra-Arctic shipping is the marine route between Hudson Bay, Canada to Murmansk Russia, fittingly named “Arctic Bridge”, between the two continents. Another example may be a Dutch fishing trawler operating in Norwegian waters.

The second category is Inter-Arctic Shipping, which entails voyages connecting, or involves, North Atlantic and North Pacific Oceans through the Arctic region (Saeed & Ng, 2019).

Norway is currently operating with a more Intra-Arctic approach rather than opening up for a potential increase in Arctic shipping. A spokesperson at Equinor (previously known as Statoil) said in an interview in 2014 that they do not consider voyaging through any of the Arctic Sea routes as a viable or better option than existing alternatives. Pre-existing factors, such as ice growlers, navigation and environmental risks, does not make the northern routes attractive when considering safety of the voyage (Pettersen, 2016). Furthermore, in a telephone interview in 2019, Equinor reported that they are still not considering voyages through the Arctic mainly due to shallow waters in the North East Passage and Russian regulations which shipping lines are required to comply with. (Saeed and Ng., 2019).

2.3 Benefits and Risks of Opening the Arctic.

With an increase in shipping activities and the potential opening of the Arctic Ocean comes certain benefits and risk. In this segment, the focus will be on the activities presented in the research question and will be further explained in the literary review. The benefits were in line with the initial predictions at the start of the research, mainly the economic aspect, reduction in shipping distances, and reduction in Co2 emission by a large margin.

Theoretically, 49-78 percent reduction in Co2 emission and, on average, 40 percent reduction in time spent on a voyage is overall seen as a good benefit for the shipping industry and the environmentally concerned (AMAP 2017). Over the last few years, Norway has seen ample increase in its tourism activity. From the year 2013 to 2016, tourism activity increased by 7,7 percent both domestic and foreign consumption (Innovasjon Norge, 2017).

There are also risks tied with the opening e.g. political disputes, environmental damage, poor port infrastructure etc., (Saeed & Ng., 2019). Increased Intra-Arctic shipping activity in Norway could have negative side-effects on the environment in terms of pollution, harm wildlife, and increase the reduced ice-coverage (AMAP, 2017). Ports that see a marginal increase in traffic may generate unwanted noise and smells. Mining and extractions of natural resources have a direct effect on the environment, both wildlife and indigenous people, and only amplifies the need for government control and regulations (Lindholdt, 2006; Norwegian polar institute, 2015).

3 Literary review

The literary review serves as a scholarly source of information on a specific topic. Arctic Shipping has a multitude of new discoveries, developed topics, and is by no means finished. In this chapter, studies and articles related to the opening of the Arctic Ocean will be discussed as secondary data and later included with our own findings and primary data for comparisons.

3.1. Climate Change and Arctic Routes

For the past decade, the effects of existing and future climate change have been taken into consideration regarding endeavors in business exploitation. The increased reduction in Arctic sea ice around the Northern hemisphere, most prominently the Northwest passage and Northeast passage, have sparked debates among scholars, researchers, media and government officials. Furthermore, the continuous decrease in sea ice has allowed shipping routes between the Arctic States and Asia to remain open for extended periods of time – outside of the “normal” navigable season (Stephenson et al, 2014; Lasserre, 2016).

Since the mid 2010s, projections of “access” to Asia from the Arctic states have seen new development. The drastic change in temperature over the past 50 years have estimated that in 2050, these shipping routes will be largely free of ice during the summer (AMAP, 2017). Thus, the need for special ice class vessels, experienced guides, fees for access through famed passages, such as NEP and Suez-canal, will in theory become obsolete in this navigable period in year 2050. Moreover, if these predictions turn out to be correct estimates, Europe and Asia will be more connected allowing for increased frequency in voyages i.e. more traffic, a reduction in travel distance by about 40 percent, and a more interconnected world (Lassere, Beveridge, Fournier, Têtu & Huang, 2016, p. 105-114).

A report by AMSA (2009) and a paper published by Lasserre (2009) investigated if the reduced ice coverage was the key driver for the shipping industry to conduct business in the Arctic. Furthermore, the reports indicate that economic related shipping activity and

source of natural resources was the motivation behind the unexploited opportunity of an arctic shipping market. (Lasserre, 2016).

In 2013, the Arctic Council granted the People's Republic of China permanent observers status over the Arctic Ocean (AMSA, 2020). With the "opening" of the Arctic Ocean, China and other major Asian economies stand to gain a substantial amount if the opening occurs. The Guardian wrote in an article that China would save billions of U.S dollars in shipping expenses alone, mainly due to the reduced distance voyaged from e.g. Shanghai to Hamburg being 2800 nautical miles shorter than via the Suez-Canal. (Strutzik, 2013) The Arctic possesses oil reservoirs, gas, minerals and Arctic wildlife - including fishing. Based on the article, China seeks to use the Arctic as a means to gain economic growth. The continent of Asia has long had its eyes on the Arctic for its natural resources, future attractive trading routes by sea, and business opportunities (Xinhua, 2018).

In the survey conducted by Lasserre in 2016, they emailed questions and held phone interviews that provided insight on both sides of the survey questions. Most of the shipping companies that were interviewed produced similar answers as to whether the Arctic can be seen as a viable market. They concluded with the following; *"Shipping companies consider that there may be a commercial future for shipping in the Arctic, however few consider going into this market which they describe as small, or even niche"*. This proved that the lack of motivation and preference for destination- rather than transit-shipping, despite repeating the inevitable shrinking of sea ice, that there is no sign of aggressively entering the gradually-opening Arctic routes (Lassere et al., 2016).

From the survey, the results indicated that going through the Arctic, either the NWP or NEP, was not cost-effective since it is not open year-round, in addition to several fees and rental of icebreakers made the route seemingly unattractive at the time.

3.2 Intra- vs. Inter-Arctic Shipping

During the introductory part of the thesis, Intra-Arctic and Inter-Arctic Shipping was defined as two separate categories for shipping activities. As mentioned, Norway is currently more focused on Intra-Arctic shipping, because opening up today does not seem attractive yet,

compared to existing alternatives (Saeed & Ng, 2019). Nevertheless, bigger countries with bigger ambitions are turning their eyes towards the Arctic in hopes of exploiting its strategic position in a possible new market. As stated in the previous segment in this chapter, China has shown great interest in the Arctic over the last decades. This is made clear in their fairly recently published white paper from 2018. China, and other Asian countries, ultimately want to be a part of the Arctic States, and be able to conduct business in the Arctic region. This has been amplified by the continuous exponential decrease in ice coverage (Xinhua, 2018).

Moreover, why does not Norway share the same ambitions as the Asian continent? Several articles published, and already mentioned, have one specific factor in common; it is not viable yet. The article about Kirkenes, and their inevitable connection to Chinese businesses, reveals that it is not an “if” anymore, but a “when” it will happen (Borshoff, 2019). The same goes for Articles published by researchers, such as Lasserre, that it all boils down to a cost effective, safe and attractive route. However, this is a product of the future (Lasserre 2016). This will be further discussed in detail from our findings in Chapter 5.

3.3 Ports

Ports are a significant part of any shipping activity and invaluable for countries' infrastructure e.g. the Arctic states. Numbers from 2015 show that approximately 74 percent of all goods leaving and entering Europe are exported and imported by sea (Europa, 2020). This shows that exports and imports are primarily conducted by sea-transport, thus ports can be classified as an important part of any business operating outside of their own region.

The EU regulation 2017/352 aims to protect ports and port management to secure both workers and the environment by continuously updating port standards with sustainability in mind (EU, 2017). In recent years, Norway has seen an increase in traffic in its ports. From 2014 to 2015, cargo to or from Norwegian ports have seen an increase of about 5 percent, international ferries bringing tourists saw an increase with 172 000 from 2015 to 2016 (SSB, 2016).

With the emerging accessibility of the Northern Sea Route (NSR) ports along the Arctic states will see a drastic development. In addition to an increase in accessibility, traffic in the Arctic region will most likely increase. Bigger ports, such as Murmansk and Kirkenes, will become a focal point when voyaging through the Arctic Ocean whereas smaller ports

would act as transit ports that can service vessels that pass. With modernized and highly operative ports in key locations, the cost of voyaging through an accessible Northeast Passage (NEP) and Northern Sea Route (NSR) would be reduced by 20 percent per ship (Arctic portal, 2020; MOE and Jensen, 2010).

3.4 Challenges and Opportunities

In regard to the research question of this thesis, “How will an increase in Norway's Intra-Arctic shipping activities affect economical-, social- and environmental activities”, there must be a conduit that provides this growth in shipping activities. According to studies regarding the subject Arctic Shipping, researchers have established that when the Arctic becomes a viable, attractive and a fully operational market, it will improve any maritime business activity conducted with an open Arctic state by a large margin (Zhang et al., 2019). Consequently, there are several challenges and opportunities linked with climate change and opening of new Arctic routes. Saeed and Ng (2019) developed risks and benefits for opening up Norway’s Arctic Ocean, and categorized each benefit or risk that can potentially affect factors in Norway. Table 1 below consists of opportunities, in addition to a short description of each category that will affect the aforementioned factors contributing to an increase in Norway’s Intra-Arctic shipping activities.

CATEGORY	DESCRIPTION
Economical opportunities	<ul style="list-style-type: none"> ● Increased tourism and maritime opportunities ● Potential increase in oil, mineral, gas and other resource extractions ● Larger variety of fish species and increase in fishing activities due to climate change ● Allow for mega vessels to navigate through the arctic as a result of reduced ice-coverage ● No passage fees (Zhang et al, 2019; Lindholdt, 2006; AMAP, 2017; Norwegian polar institute, 2015)
Social	<ul style="list-style-type: none"> ● Better relationship with Nato, Russia and other Asian countries ● Political disputes may erode (Borshoff, 2019)
Environmental	<ul style="list-style-type: none"> ● Reduction in time spent on voyage (estimated to be on average

	<p>about 40%)</p> <ul style="list-style-type: none"> ● Reduced carbon dioxide emission (estimated to be about 49-78%) <p>(Schøyen and Bråthen, 2011; AMSA, 2009)</p>
--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Table 1: *Potential opportunities linked to increase in shipping activity*

Based on the literary review, Table 1 describes the positive outcomes from an increase in shipping activities in Norway as a result of opening up the Arctic Ocean and Norway’s intra-Arctic shipping activities. The economic opportunities are all products of the aforementioned possibility. Increased tourism and maritime opportunities are contributed by every factor listed, as ports will have to adapt accordingly to the increased demand for docking. This is a recurring subject in our interviews that will be presented in chapter 5 of this thesis.

Furthermore, oil, mineral, gas and other resource extractions could foreshadow a massive business project in the near future when a satisfactory amount of research has been conducted in the potential areas. It is estimated that the Arctic holds 25.5% of the undiscovered oil reservoirs in the world (Lindholdt, 2006). Minerals and precious metal ores have been discovered along the Norwegian North Eastern Coast and mainland, making the geographical area bordering Northern Scandinavia and Russia highly attractive for resource extraction. (Lindholdt, 2006).

Fishing is a highly regulated and important industry for Norway, both from a political- and economical point of view. As a result of higher temperatures in the Arctic, mainly due to climate change, species of fish have emigrated north and consequently alter the ecosystem in those waters (Norwegian Polar institute, 2015). A lot of Norway's Intra-Arctic shipping activities involve granting other nations the ability to fish, within a quota, in these waters.

As opposed to voyaging through the Suez-Canal, going around Cape of Good Hope is not considered safe or economically viable, even though one would not have to pay canal-fees for mega vessels i.e. ships that are too large for the Canal routes. This is due to the politically unstable regions and piracy risks, which is absent in the Arctic Region (Zhang et al. 2019).

From Table 1, the social category describes how an increase in Norway’s Intra-Arctic shipping activities will affect the social structure, and political sides of Norway. As seen in the table, the possible business exploitation of Northern Norway and the Arctic Ocean is heavily influenced by politics.

With opportunities comes challenges. Table 2 shows several challenges related to Norway's intra-arctic shipping activity and will be listed the same as Table 1 was described.

Category	Description
Environmental	<ul style="list-style-type: none"> ● Emission from oil and gas extraction, and mining ● Increased shipping activity can cause pollution in ports ● Over-tourism ● Increased traffic can increase the risk of oil spills ● Damaged wildlife and overfishing (AMAP, 2017; Potts and Schofield, 2008;
Inhabitants/communities	<ul style="list-style-type: none"> ● Arctic communities that live off the land are in danger as an effect of climate change and increased shipping traffic ● Busy ports may disrupt local communities (AMAP, 2017; Norwegian polar institute, 2015)
Maritime Safety	<ul style="list-style-type: none"> ● Sustainability in ports, shipping activity, environment ● Ports safety, operational safety (Gard, 2020)
Social	<ul style="list-style-type: none"> ● Political disputes may erupt (Borshoff, 2019)

Table 2: *Potential challenges linked to increase in shipping activity*

A direct effect of business exploitation in the Arctic is emission from economical industries such as oil and gas extraction, including mining and tourism (Norwegian Polar Institute, 2015; Potts and Schofield, 2008). Pollution can potentially be harmful to wildlife existing in the Arctic, as well as aqua- and agriculture in surrounding regions. Fishing is regulated in Norwegian waters, however overfishing can have severe effects on certain species. (AMAP, 2017).

Indigenous people of the Arctic e.g. Sami, will be negatively affected by climate change and potential business exploits (The Norwegian polar institute, 2015). Ports can cause foul smells and loud sounds to disrupt local communities that live close to ports. In addition, ports are generally not seen as pristine construction and can harm the experience of tourists and locals.

With an increase in shipping activity and increased maritime traffic, the need for safety and risk management will be enormous. Ports in the EU are, as mentioned in the

section regarding ports above, adapting and taking safety measures to ensure that operational ports are in line with updated rules and regulation. Working with heavy machinery and large shipping vessels can be a work hazard, and with an increased frequency in docked ships, the workspace needs to be secure for both ship and workers. Moreover, if there are more ships operating in the Arctic, the potential risk of wreckage and crises is higher. Thus, rescue teams and damage controlling operators need to be prominent in the event of a crisis (Gard, 2020).

Political disputes between the USA and Canada, as well as Norway and Russia may erupt over sovereignty over land (Potts and Schofield, 2008).

4 Methodology

4.1 Introduction

In this chapter, we will describe our choices and the assumptions we have made in order to answer our research question. In addition, the data collection and the analysis will be introduced, and will be discussed in detail in the next chapters.

4.2 Data Collection and Methodology

The data has been collected through in-depth interviews with a variety of participants. One of the advantages of using primary data is that it is collected first hand and with a single purpose. Thus, disturbance originating from other sources will dissipate entirely. However, using primary data for research comes with its disadvantages, one being the dependency on the willingness and truthfulness of the respondents. Besides, making in-depth interviews is fairly time-consuming. (Zikmund, Babin, Carr & Griffin, 2013).

In total, data has been collected from nine (9) respondents (one face-to-face, three by email, and five telephone interviews). We were assisted by our supervisor for coding the interviews, wherein NVivo was used.

4.2 Choice of Methodology

The choice of research methodology depends on the research question of the study, and the choice of research methodology highly depends on what research design is being used.

Research designs often differ between three types of designs; descriptive design, exploratory design and explanatory design (also called causal design). The three designs are used differently, depending on the purpose of a study. Initially, our knowledge about the topic Arctic Shipping was low, which indicates the use of exploratory design as the most obvious research design to start with. With exploratory design, we seek to understand and interpret the topic better, and learn more about the theoretical terms. In the first phase of this

study we used literature studies and secondary data to gain more knowledge of the topic (Gripsrud, Olsson & Silkoset 2010, p. 38-39). Later on, we collected data ourselves, and used this primary data in order to answer our research question the best way possible.

The study then slides into descriptive design, where we seek to obtain data and describe how increased Intra Arctic Shipping will affect the economic, environmental and social activities in Norway. Descriptive designs are often used to collect data and describe characteristics of objects, situations, or events. (Sekaran & Bougie, 2016, p. 43). In the end, we will process and analyze the data.

Research methodology is often divided into two classifications; quantitative- and qualitative research. A qualitative research approach will be used in this study. It is the research question that dictates which methodology that should be applied in a given case, but most social phenomena will have both quantitative and qualitative sides. Moreover, it is the data collected itself which characterizes as either quantitative or qualitative. Quantitative data is data that is expressed in numbers or units while other data are qualitative data. (Gripsrud et al., 2010, p. 79).

Primary data in a qualitative study can be collected in different ways. In this thesis, the primary data is collected by communication with people through interviews. The qualitative data is used in analytical descriptions and understanding of correlations between Arctic shipping- and economic-, social and environmental activities.

4.3 Validity and Reliability

There are certain requirements for scientific methodology and approach in order for the research to achieve a desired level of reliability and validity. Reliability and validity are both terms used as an indication of how good the research is. The terms are often used in relation to how well one would measure one or several phenomena (Gripsrud et al., 2010, p. 51).

Validity is subjected to how well one measures what is intended to measure. Even though a measure has a high level of reliability, does not mean that the level of validity shares the same level of quality. When something is measured with a high degree of accuracy and reliability, however we measure something different than what was originally intended is called a systematic error. (Gripsrud et al., 2010, p. 51).

Reliability describes to what degree of certainty the results in a study are reliable. In other words, if the research is repeated with the same, or a different methodology, will the

result be the same? This means that the random errors that always occur must be as few as possible for the research to be reliable. In order for a study to be reliable, it is important to include a precise description of the execution of the study. In addition, it is also critical for the study to describe how the selection process was done, and how the analysis itself was conducted (Gripsrud et al., 2010, p. 52).

To answer the research question of the paper, we have a selection of nine interview objects related to the topic Arctic Shipping. This will not give a complete picture of the topic; however, it will enlighten some of the main characteristics on how Norway is affected by the shipping industry. In order to fulfill the requirements of validity and reliability, we talked to stakeholders with different relations to the topic, and from different geographical parts of Norway.

4.4 Selection

The selection of the interview objects was strategically chosen, based on their relation to the topic, and with the intention that it would give as much relevant information as possible regarding the research question. A principle in qualitative studies is that the selection must be suitable for the research question, and therefore not randomly selected (Gripsrud et al., 2010, p. 79). The focal point of the study will be carefully evaluated, in order to exclude collection of unnecessary data, and set a selection together in a way to secure depth and diversified viewpoints of the topic. The main criteria for the participants to be included in the study was that they had some kind of relation to the topic Arctic Shipping. We ended up asking inhabitants in Northern Norway, port employees, shipping corporations and professors.

4.5 Recruitment

Since our knowledge of the topic was purely based on secondary data, interview objects were recruited by utilizing our own network in hopes of coming into contact with relevant stakeholders. As a result, several stakeholders showed interest in the subject, however many more did not have the time or capacity to assist. This can be partially blamed on Covid-19 pandemic giving the thesis not as many interview objects as desired.

In the first phase of the recruiting process, we made an information text, as well as a short presentation of the study. We then sent this out by e-mail to 25 different stakeholders, shipping lines, businesses, ports and politicians. From this, we received a positive response, and five potential informants wanted to participate in the study. We sent the information text to all participants who wanted to collaborate, and further agreed on time and place for the interviews. The gender distribution of the study was random depending who wanted to participate in the study. Later, we saw the need for more interviews to further increase the validity and reliability of the research and managed to hold four more interviews.

4.6 Development of the Interview Questions

As mentioned earlier, we chose to use semi-structured in-depth interviews for this study. Individual in-depth interviews are often used when the personal experiences, opinions or similar are of interest (Gripsrud et al., 2010, p. 90). We developed eight questions regarding our topic that were made to give as much information as possible regarding our research question. The questions were made based on our research question, and to get the relevant information we needed to answer this in a pleasant way. The goal with the questions was to lead the participant in the right direction, but at the same time not influence any answers.

The interview questions were meant to be open, so the participants could answer in a relatively free and subjective manner. Since the questions were structured this way, we did not consider it necessary to ask more than eight questions. However, we continuously asked follow-up questions where we saw it relevant as a natural direction of the conversation, even though it was not on the question form to amass relevant knowledge.

The questions asked during the interviews were later changed based on the answers that were given. Between the interviews, we realized that for the questions to be friendlier towards the participants. We started altering the questions to a more precise extent i.e. the questions would relate more to the individual participant, while still retaining the same degree of relevance for every participant.

4.7 Execution of the Interviews

Individual in-depth interviews are usually used when the individual's personal experiences, opinions or similar is of interest (Gripsrud et al., 2010, p. 40). The interviews were conducted

in a 2-1 situation (since we are two students writing this thesis together), consisting of open questions where the participants could answer freely of the topic.

One of the interviews was held face-to-face in one of the participants' workplace, and the rest took place over telephone. A main advantage with face-to-face interviews is that the researcher can adapt the questions as necessary, ensure that the responses are properly understood, and clarify doubts. The researcher can also pick up nonverbal clues from the participant. However, face-to-face interviews are often difficult to execute because of geographical limitations (Sekaran & Bougie, 2016, p. 120).

Six of the interviews were conducted over the phone. A main advantage with this type of interviews is the number of different people that can be reached. The disadvantages can be seen in the advantages for face-to-face interviews, but also the fact that the participant can terminate the interview without warning or explanation (Sekaran & Bougie, 2016, p. 120). Due to geographical limitations, most of the interviews in this thesis were conducted by telephone. Lastly, we had 3 interviews conducted by email. These were conducted by participants that did not have the time or possibility to schedule a meeting.

The interviews were held in the months from February to May 2020. In the interviews, the respondents had time for in-depth answers and comments and was able to collect a high rate of individual information without influence by us or others. Before all the interviews were conducted, we began with some small talk and an introduction about the thesis and ourselves. This was mainly to get to know each other a little bit, and for the respondent to know who they were interviewed by. Our first question in every interview was "What is your relation to the topic Arctic Shipping?". By asking this, we got more information about who they were and what they have been working with to further enhance reliability of the participants' answers. Furthermore, we informed that the participants were voluntary, and they could at any time withdraw from the interview or abstain from answering any of the questions asked.

In addition to the questions asked, the participants had the opportunity to answer beyond the scope of questions and as well as follow-up questions where this felt natural. If the respondents got into topics that we had later on our interview guide, we let them continue to keep a natural flow in the conversation. When we at a later point came to these questions, we simply asked if they had anything more to add beyond what they had already said. At the end of each interview, we asked if they had any questions for us, if they had something more to add, or if they meant that there is something we did not ask about that should have been included. They often had something more to add, which was valuable to our research.

Nine interviews were completed in total. The shortest and longest interviews lasted approximately 30 and 50 minutes respectively. Furthermore, the interviews lasted 40 minutes on average. The respondents were either based in North of Norway, had a relation to Arctic Shipping, or both.

4.8 Transcription

The literature on transcription provides several different definitions. However, a central similarity in the literature is that transcription is theoretical in nature (Ochs, 1979, 1999). Main differences in the literature relate to methodological and theoretical factors on how researchers approach the transcription process, and how transcription should represent the language. According to SNL, transcription is transferring speech to audio writing, or text from one writing system to another (Gundersen, Johansen & Bjerkestrand, 2018).

We executed our transcriptions in two ways. Two of the three email interviews were conducted in Norwegian, and simply had to be translated to English. The last email interview was conducted in English, and did therefore not need to be translated.

The five interviews that were done by phone, were recorded by a recording program. This was later transcribed by us into text. Since the phone interviews were conducted in Norwegian, we also translated this into English language. The face-to-face interview was in similarity recorded by a recording program, and later translated into English text. All of the participants allowed for the use of information provided, and granted either oral- or written consent for the recording and transcription part to be applied in our study.

5 Findings

In this chapter, we will present the findings of our research with the goal to answer the research question, and the two sub questions of the thesis;

How will an increase in Norway's Intra Arctic Shipping affect economic-, environmental-, and social activities in Norway?

Sub-question 1: *Why is there more focus on Intra-Arctic shipping compared to Inter-Arctic Shipping in Norway?*

Sub-question 2: *What are the opportunities and challenges of opening up Norway's intra Arctic shipping activities?*

First, we will introduce the participants of the in-depth interview, and their relation to the topic Arctic Shipping. Furthermore, we will present the findings and review them in light of the reviewed literature.

5.1 Presentation of the Participants

The previous chapter described the process of collecting primary data. There were in total nine interviews conducted, one face-to-face, three by email, and five over telephone. Experience and relation to the topic Arctic Shipping varied between each interview object, resulting in increased validity of the study. In addition, some of the participants were what one would call experts in this field of study, thus making the results more reliable in accordance with the findings and secondary data.

The experts

Among the interview objects, there were two participants that applied a more academical approach to the questions asked during the interview.

Expert 1 is currently CEO of a shipping company based in Northern Norway, and has experience from the Royal Norwegian Naval Academy, as well as an experienced lecturer in Arctic Shipping at the University of Tromsø.

Expert 2 works in an environmental movement company founded in 1986, and has worked there ever since. The company has involvement in Arctic business, Arctic Ocean and Arctic wildlife.

The inhabitants

People are directly affected by climate change and increased shipping activity in the Northern Hemisphere. To better strengthen the research, and the credibility of the study, inhabitants of Svalbard and Northern Norway were included as interview objects.

Inhabitant 1 has experience as a CEO of a shipping company based in Tromsø, and has voyaged several years in the Arctic Ocean. The inhabitant currently lives in Tromsø, and is now retired.

Inhabitant 2 has lived in Tromsø for the most part of its life, and works at Tromsø airport (Langnes).

Inhabitant 3 and 4 have both lived and worked in Svalbard for several years.

Port representatives

Ports are an important factor when it comes to the topic Arctic Shipping. Everything shipped by sea is delivered through ports. Thus, it is natural to include port representatives in this thesis, as they have valuable information regarding increase in intra-arctic shipping activities.

Port 1 is very much like a port conglomerate of neighboring areas where the main focus is on infrastructure and port management between each area.

Port 2 is the largest southern based port in Norway, and deals with mega vessels and cruise ships.

Companies

Both the experts could also be included here. However, they chose to not be represented as such and would rather be considered as interview objects. They possessed great knowledge about everything Arctic Shipping, thus fittingly described as experts in this manner.

In this research, there were several objects with connections to companies operating in the Arctic. Business exploitation is a large part of this thesis as it focuses on the premise that the Arctic Ocean is seen as a market with unexploited possibilities. One such company is

based in Bergen, however the representative was director of the company branch in Murmansk, Russia and has had several years of experience regarding Arctic shipping.

5.2 In-depth Interview Questions

In this section, we will present the economic, environmental and social effects of increased shipping identified through the in-depth interviews, and unveil if they correlate with the literature review of this study.

5.2.1 Question 1. What is your relation to Arctic Shipping?

The purpose of this question is to establish that the object is relevant to the study. This includes sub questions such as; How long have you been relevant in that subject i.e. work, research, other demographic factors, etc. Since the participants already have been described, we have made a table to simplify their connection and relevancy to the subject.

Participant	Relation to shipping	Years relevant to Arctic Shipping	Description
Expert 1	From Bergen, works in Tromsø	Unknown	The expert graduated from Royal Norwegian Naval Academy, and has worked as a ship commander as well as other relevant positions.
Port 1	Lives and works in Trondheim	3 years	The port representative works at the harbour in Trondheim.
Port 2	Lives and works in Kristiansand	Unknown	The port representative has worked with operating a tugboat and maritime services the last few years before working at Kristiansand port.
Expert 2	Lives and works in Oslo	34 years	The expert is educated in fishing vessels, and has worked on different fishing boats in the Barents Sea, Svalbard and Jan

			Mayen. The expert currently works with risk and safety in relation to both the shipping-, oil- and gas industry.
Inhabitant 1	Lives in Tromsø, retired	54 years	The inhabitant has lived in Tromsø 54 years, and has administered several research vessels.
Inhabitant 2	Lives in and works in Tromsø	26 years	The inhabitant has lived in Tromsø for 26 years, and has worked at the local airport for 6-7 years.
Company 1	Lives and works in Murmansk, Russia	32 years	The company representative graduated from Archangelsk Marine College in 1988. The representatives have worked in several shipping companies and as a navigation officer. The representative has also more relevant experience with shipping, and is also the author of a book about Arctic Shipping.
Inhabitant 3	Lives in Svalbard	21 years	The inhabitant has lived in Svalbard since 1999, and seen the development of shipping to Svalbard over time, as well as the changes in climate with less ice in winter.
Inhabitant 4	Lived in Svalbard	17 years	The inhabitant lived in Longyearbyen from 1999-2015, and also worked with cruise boats from 2016-2018.

Table 3: *Participants - relation to Arctic Shipping*

5.2.2 Question 2. Climate changes result in ice melting in the Arctic region, which opens up new alternative shipping routes through the Arctic. How do you think this affects Norway?

Question 2 is a broad question where the goal was to receive as much information possible before the upcoming questions became more specific. We wanted to receive some valuable insight on whether the participants find the new shipping routes as an interest for Norway, and if Norway would be affected by this in any way.

There were different opinions on what alternative shipping routes would mean for Arctic Shipping in general, but also how this will affect Norway. Two of the respondents, Expert 1 and Expert 2, answered that Norwegian shipping might not be much affected at all, and goods might be loaded on larger European ports, and ships will voyage right past Norway.

“...it is still some years before the sea opens, and if it is still uncertain around 2035, we cannot build these huge infrastructures on land for a transpolar route. Then maybe the goods will just be loaded on bigger European ports and sail right by Norway, and then it will mean very little to us” (Expert 1).

“I have no great belief that there will be any boom in Arctic shipping in the form of the Northeast Passage or the North Sea Route becoming very attractive or competitive with the Suez Canal or whatever” (Expert 2).

Most of the respondents also mention that reduced ice coverage will cause several other challenges that prevent new potential shipping routes to become faster and cheaper to navigate through. They mention expensive and slow icebreaker ships, as well as more waves and a more unpredictable ice map. At the same time, some of the participants have experience with the icebreaker ships being used later in the year than normal due to less ice coverage. Thus, saving enormous costs from renting these ships, and the regulations and travel guide costs that follow, would eventually add up to a lot of money that can be spent elsewhere, and be a positive economical factor for the shipping industry.

“Standard transport routes from Asia today or via the Indian Ocean, Suez, the Mediterranean up to Europe and can be tremendously shortened” (Port 2).

“...renting Icebreakers to go further north through the Northwest Passage is really expensive, and with all the regulations to travel with guides it adds up to a lot of money in the end. Money that could be invested elsewhere” (Inhabitant 1).

All of the respondents agree that Norway will in one way or another be affected by ice melting and new potential shipping routes. 6 out of the 9 participants mention how ports may

become more important in the years to come. Northern Norwegian ports can be used as base stations, as a hub of service, or a transit port.

“Longyearbyen is conveniently located in relation to a western sailing route through the Northwest Passage, and can be a hub of service, crew change, etc.” (Inhabitant 4).

7 of the participants also mention more challenges in relation to accidents that come with increased traffic and more foreign ships entering Norwegian waters.

“It may be that we get a contingency challenge, because we are exposed to those ships. They get problems in Norwegian waters, so we have to save people or assist them” (Expert 1).

“I also think this will create a lot of challenges and consequences, such as rescue far north by helicopter, but also the hospital. The hospital in Longyearbyen is limited and does not do major operations...” (Inhabitant 4).

5.2.3 Question 3. Do you see any benefits in using the new shipping routes, and what do you think this has to say for Norway's shipping activity?

This question is similar to question 2, but narrowed down to be more specific towards the shipping industry. The purpose of the question is to see if the participants find the new shipping routes beneficial, and how it will affect the shipping industry in Norway, as well as foreign shipping companies.

3 of the 9 participants were not asked this question because during the development of the questions, some alterations were made and new questions were included, as mentioned in chapter 4. Company 1 did not answer anything relevant to the question. Inhabitant 1 believes that opening of the Arctic will mean a lot for Norway as a hub or transit port. The respondent still suspects a marginal increase in traffic over the next few years.

“I strongly believe that an opening of the Arctic will mean a lot for Norway as a Hub or Transit port in general” (Inhabitant 1).

Inhabitant 3 claims the voyage routes are shorter, but further from inhabited areas, and thus greater challenges in the event of accidents. Furthermore, inhabitant 4 explains there will be more fishing opportunities, and longer seasons for all boats, which again will increase e.g. tourism. The inhabitant believes increased shipping will generate more companies to sustain the increased shipping activity, and ships in need of equipment, fuel, etc.

Inhabitant 2 is more focused on the cost perspective. The inhabitant mentions that icebreaker ships are costly, and companies that do not already have them must get it in order to carry goods, which is an expensive investment, both to rent and buy.

Expert 2 works with the use of heavy fuel oil on Arctic transport, and explains that this is not an advantage, but rather a disadvantage. The expert mentions the risk of oil spills and potential harm to nature created soot from heavy oil, which in turn accelerates the ice melting. The expert does not see any benefits from such increased activity. However, expert 2 explains some transportation economic benefits.

“...it is clear that an ice-free northeast passage would have been beneficial in terms of energy consumption to move goods from northern Europe to Japan, China and Russia. But today, with the ice conditions, you use more fuel despite being shorter, because you have to hurry forward. It is not a straightforward voyage” (Expert 2).

5.2.4 Question 4. Statoil does not consider Inter-Arctic shipping to be very attractive yet, and Norway's use of the northern sea routes is currently limited in volume. Do you think that Norway should reserve most of its resources for Intra-Arctic activity rather than Inter-Arctic activity? Why, why not?

This question begins with a statement issued by Statoil (now Equinor) in 2014 and is further explained by the interviewer to get the object more information to go on. The response from the participants was conclusive in the sense that the Arctic has much to offer in terms of business opportunities, arctic community development, environmental reinforcement- and preparedness:

“Yes, we have Svalbard which after all is our stronghold in the North, and all political signals indicate that we will continue to have some kind of business activity in the Svalbard Islands” (Expert 2).

“...many countries want Svalbard, just to take advantage of the many different opportunities. Both the position and the economy that comes with the opportunities (that) are very sought after, so I think it is important for Norway and to take advantage of what they have in the Arctic” (Inhabitant 3).

“Interest in the Arctic will increase and it will be very soon” (Company 1).

The participants answer this question with what they personally believe will eventually be the new reality. They firmly indicate belief in the arctic as a whole new market for Norway, and as Company 1 mentions; the world. When prompted to answer this question, all the participants showed that perhaps Equinor acted the way they should, however it should not be disregarded as a viable option. The question is answered indirectly, whether Norway should reserve their resources on Inter-Arctic- rather Intra-Arctic shipping activity, as all participants predict a more Inter-Arctic approach in the future. Furthermore, Expert 2 explains that there are economic factors that are unwanted in the region.

“Now I do not think and hope that it will be mineral or oil recovery. Coal which has been the activity up until today is on the way down, fortunately. So, it is in a way tourism and fishing that are the industries I see have a future there. And research of course” (Expert 2).

Research and technology for emission and pollution free business activity in the Arctic would be a miracle at the time being. However, since progress in that area has not made these qualifications yet, it can be harmful for the environment and potentially be a great risk (See Table 2). Expert 1 is the only participant to include pollution and emission risk in this question.

5.3.5 Question 5. How will an increase in shipping activities (fishing, oil extraction, tourism, etc.) affect Norway in relation to economic-, environmental- and social factors?

This question is identical to the research question. The purpose behind the question is to see if the participants have any direct opinions about the research question.

All of the participants agree that increased shipping activity will have a huge impact on Norway, one way or another. Two of the participants mention automation, and less need of manpower and the traditional jobs that are linked to shipping and port management today. Furthermore, the type of required competence and education will most likely see a change from the current situation.

“A part of being a more efficient port includes handling more goods of different kinds limited to what resources that port possesses. So, an increase would, over time, yield demand for new competence, and fewer people working at ports. It will be more automated and modernized” (Port 1).

Three of the participants talk about tourism as the most important factor that will affect Norway. Inhabitant 2 mentions the tremendous increase in cruise tourism in Tromsø, and links it with the Covid-19 pandemic to put into perspective.

“...in terms of tourism and shipping with cruise tourism. After all, here in Tromsø it has been important for the past few years considering that there has been such a huge increase. So, you just look and read about the damage that corona causes, and the halt in tourism it causes, there are huge figures across the industry, the private sector in Tromsø is bleeding now because of corona restrictions, and that probably it will not come to any cruise tourists this summer. It is clear that it has a huge meaning” (Inhabitant 2).

Both the Svalbard inhabitants also mention increased tourism, but as inhabitant 2 explained how much it had to say for the economy, they were more concerned about how it would affect the environment.

“In Svalbard, shipping activity is now primarily linked to tourism. This increases strongly, including cruises and expedition cruises. This creates great pressure on the environment and on the inhabited areas of Svalbard. There are likely to be greater restrictions in this area, including environmental requirements such as the ban on heavy oil” (Inhabitant 3).

Inhabitant 4 mentions some examples on how increased shipping affects climate change in Svalbard, which again affects social factors. Proclaiming that the ice is becoming thinner, and explains that more accidents happen due to the reduced ice coverage. People are used to walking and driving snowmobiles over the ice, which nowadays causes more accidents related to the ice cracking up. She also mentions another example;

“For example, you have a landslide accident that took about 10 houses in the middle of our city a few years back. Two lives were lost and several were injured. Due to climate change, the wind comes from other directions which led to the snow settling layer by layer like a mountain in some areas” (Inhabitant 4).

5.3.6 Question 6. How will increased shipping activity and climate changes affect Norwegian port operations in relation to restructuring, management and measures to deal with climate challenges?

Since ports are such a vital part of the shipping industry, the goal behind this question is to get some insight on how ports adapt through changes in the shipping industry and how they adapt to climate change.

Most of the participants mention the importance of a ports role when it comes to environmental responsibilities. Both of the port representatives interviewed explained that measures already have been made to reduce emission and pollution in the vicinity of the mainland. According to port 2, they have no cranes that run on diesel, and are the first Norwegian port to offer mainland electricity to cruise ships. Port 1 claims they have emission free boats that are powered on water or hydrogen. In total, six of the participants mention the importance of environmental measures.

“Greater demands on climate measures for the ships that dock, including emissions. Ports will probably have to offer mainland electricity” (Inhabitant 3).

“I hope we eventually reach a point where all vessels are emission free, and electric cranes, trailers and so forth” (Port 1).

“And we are working on changing the infrastructure for access to renewable energy sources, or as an alternative energy for oil and gas” (Expert 2).

“I would like to say that we are well underway and are working hard to achieve the climate goals we have set, and believe that we can achieve these before the deadline” (Port 2).

“They would also have to develop more possibilities for mainland electricity, try to limit emission, but that will prove difficult as more traffic yields more emission” (Inhabitant 1).

Two of the three inhabitants living in Tromsø also mention the negative impact of the ports, causing pollution, dust, noise and smell for the population living in the city, especially the area close to the harbor. Expert 1 explained that the ports have been engulfed by the cities over time and cannot be used in the same way because people nowadays live so close to it. According to the expert, some ports are therefore already planning to relocate, and not necessarily because of measures to deal with climate change.

Four of the participants mention the need for ports to adapt to increased shipping activity, rising sea level and increased frequency of extreme weather. Expert 1 mentions the need to develop new ports and develop infrastructure for existing ports, but also the need to link this to other infrastructure such as railroad, road, etc. Expert 2 claims that port infrastructure might be one of the most vulnerable industries to a rise in sea level and more extreme weather, and mentions the need for major investments in the future. They both mention this will come with huge costs and that it is a process that will take time.

“But it does so little with a harbor that stands for itself. A port must be linked to other infrastructure, whether it is railroad, road or whatever it may be. And there are huge costs” (Expert 1).

Port 2 identifies the need for port adaption for larger and deeper ships, and new requirements for efficiency as shipping activity increases. Port 1 says these challenges are already taken into consideration when building new ports, and more requirements will come for future ports. Port 1 also recognizes the need for developing emergency docks to nearby ports, in order to deal with an eruption of storms and more challenging voyage conditions.

5.3.7 Question 7. How do you experience the increased number of tourists coming to Norwegian ports with cruise ships? Do you see this as a problem, or a positive direction that can give beneficial effects?

The purpose behind this question is to find opportunities and challenges with increased tourism, and how the participants could be (or is) affected by this. The most insightful answers were provided by ports and inhabitants as they are directly affected by any change in this category.

“Only positive. An increase in tourism yields more demand for control and administration. The oil will eventually end, and we (Norway) have to adapt accordingly” (Inhabitant 1).

“We are Norwegians who love to travel to Spain, Greece and other nations. So, I see no reason why we should not open up the country and end up with more tourists as well. And since it is profitable, I do not see it as a problem either. Before I was in the military, I worked at a clothing store, and we depended on tourists coming, because it gives good sales figures. It has been like this for a number of years, and in recent years it has only increased (Inhabitant 2).

The inhabitants of Northern Norway are divided, they can muster both positive and negative sides of the question. From the first quote in this question, the statement that *“the oil will eventually end”* originates from the notion that the extraction of oil and gas is not sustainable in the long run for Norway's economy. Thus, Norway must look for other possible ways to generate revenue when the fossil fuel eventually ends. From the quotes above, there is a positive economic effect generated from tourism in Northern Norway, businesses are established and catered towards tourists. Ports have, over the years, seen an exponential

increase in tourism by cruise ships. Port 1 explains that they already have to turn down requests for ships that want to dock in 2021. Thus, on one hand this is good for the communities, on the other hand it may cause challenges in other areas.

It creates apartment shortages to those who actually live in the city itself. The landlords see that they earn more on short-term rentals on Airbnb for tourists rather than renting out to for example students. So, students who come every school-year struggle to find housing. It is probably the only problem with tourists, but otherwise it is a good situation for the economy of the city (Inhabitant 2).

The arrival of large cruise ships with up to 6,000 passengers can be experienced as an invasion. Many people who live in the small places - and do not work in the field of tourism could easily have been negatively affected, even with regard to local pollution from cruise ships (Inhabitant 3).

With high port activity, increased population, and other negative side-effects of tourism the participants explain the need for regulation and control regarding tourism.

5.3.8 Question 8. How will a future increase in shipping activities affect yourself as a person? Are you already experiencing any changes?

The purpose of question 8 is to get subjective opinions of how the participants feel about increased shipping, and information regarding changes they have already experienced.

Four of the participants did not answer anything relevant to the question. Two of the inhabitants (Inhabitant 1 and 3) said that they are only affected in positive ways.

*“...But still, I see this as a positive effect. It is undoubtedly good for the city’s economy”
(Inhabitant 1)*

“...Longyearbyen now has a year-round boat connection (shipping), which is very positive. Previously, this was limited to the period May - October” (Inhabitant 3)

At the same time, Tromsø inhabitants explain that there are increased tourist shops that have emerged in the city, and the fact that the city has changed from once used to be. They mention that new shopping malls located closer to the airport, and increased tourist shops around the city are the main factors contributing to the fact that the daily life in Tromsø has changed over the past few years.

Three of the participants also mention the change in climate. Both Svalbard inhabitants mention they notice increased climate change, without describing this more in detail. Expert 2 recognizes that new knowledge gaps are opening regarding the moving climate zones, which makes something that is vulnerable today, not necessarily vulnerable in 10 or 30 years. Furthermore, expert 2 explains that researchers today do more research and have increased general knowledge about both the Arctic and climate changes.

There was only one participant that was negative to the changes she noticed. Inhabitant 4 told us that there is increased pressure on the locals as the year gradually becomes a busier season. The inhabitant claims Longyearbyen became more impersonal and more of a work-related city where you came to work and then went home, in addition to less privacy because of the increased number of tourists.

“...tourists look at you through the window when you watch TV, and you are constantly stopped for photos because you have a weapon on your back. Or a husky” (Inhabitant 4).

However, inhabitant 4 is positive to the economical aspect, as increased shipping gives a lot more work in general for the inhabitants.

5.3.8 Question 9. Do you have any more information to add which we have not already asked for? Is there anything more you think we should have asked you which you find relevant?

The purpose with the last question is to seek more information than what the questions asked for. If the participant had valuable knowledge or information the interviewers did not ask for, then this is a great way for the participant to share information they are enthusiastic about, or find important in regard to the topic.

Six of the nine participants did not have additional information to add, but several told us to reach out again if we needed more information. However, the three participants that had something more they wanted to share, shared a lot of information.

Expert 1 was talking about how the mineral deposits can generate a lot of activity, including maritime activity. The expert expects the volume to be of such a great amount that the only way to extract it is with ships. At the same time, expert 1 is not certain when the plans to accumulate these minerals will be executed, or if it will happen at all. This is because mining activity is so disputed, and because it interferes with the environment and ecosystems in the Arctic.

Inhabitant 2 was talking mostly about the need of a train to Tromsø, and to reduce the heavy transport. The inhabitant reasons this with the winter conditions and foreign drivers without the right qualifications and equipment to drive on icy roads as dangerous situations and may cause deaths. The inhabitant acknowledges that this will come with sizable costs, but answers with the fact that lives that are lost are a huge cost as well.

Expert 2 expects the government to develop a management plan for the Arctic Ocean.

“...after all, the edge of the ice is a question of definition, which is at the same time a limit to how far we want to drop the oil business north. And we are of the clear opinion that there are very risky investments being made there, which we have no guarantee of being profitable from a societal perspective” (Expert 2).

Expert 2 further explains that Norway must improve the preparedness policy both in relation to oil protection and vessels and lifesaving and such, making preparedness a key factor for successful business exploitation in the Arctic.

6 Discussion and Analysis

In this chapter, we will discuss our findings and compare them to the literary review as a part of this foresight study. With the results of the findings fresh in mind, and as mentioned in the methodology, we had some assistance from our supervisor conducting an NVivo analysis. This analysis yielded comparison diagrams and word trees to better understand the transcriptions. First, we will begin with the comparison diagrams, followed by the tree diagram, and finally discuss the findings upwards to the literature review.

6.1 Coding - NVivo Analysis

The analysis provided this thesis with comparison diagrams and word trees. We decided to include all of the comparison diagrams in this chapter, as well as one word tree to thoroughly assess and dissect the transcriptions. The rest of the word trees can be seen in the appendix.

6.2 Comparison Diagrams

Comparison diagrams are useful to see which participants of the in-depth interview have discussed the same topic. One could also read what interviews have in common and what is unique to each interview. This has been extremely helpful to structure the findings in a more presentable manner. In this chapter, the comparison diagrams are illustrated and explained below.

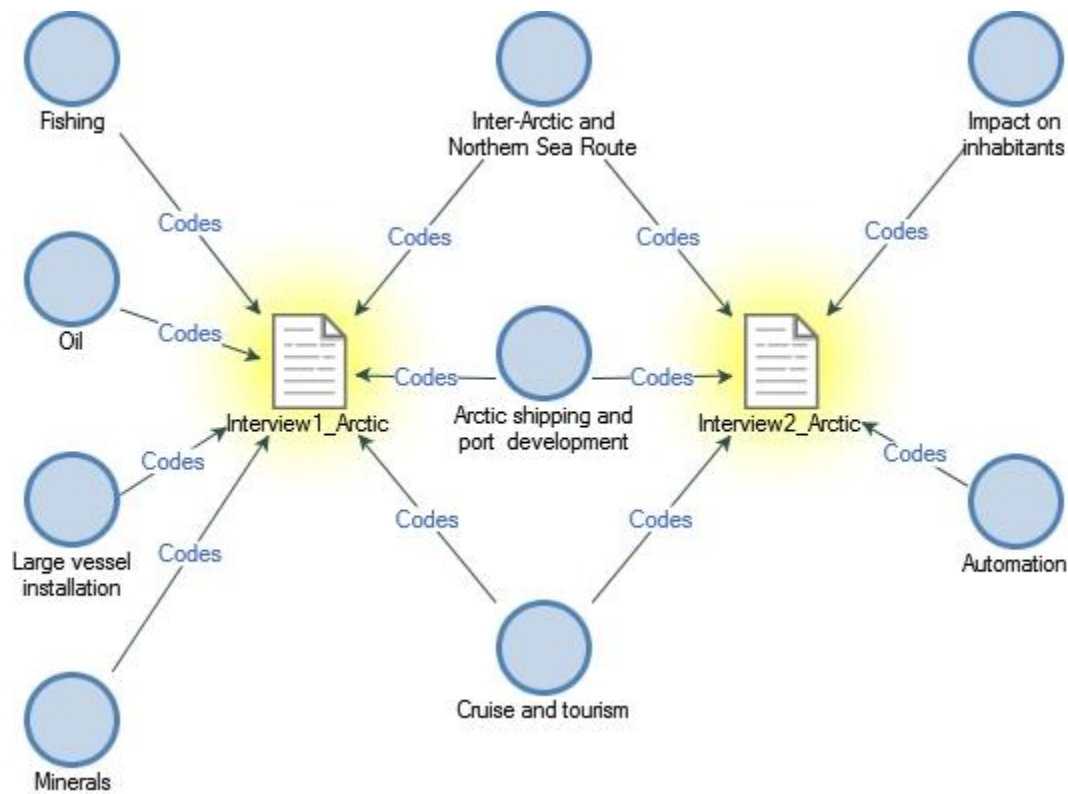


Figure 2: Comparison diagram between *interview 1* and *interview 2*

The first comparison diagram illustrated is between Expert 1 (Interview 1) and Port 1 (Interview 2). As seen in Figure 2, both interviews are connected by Arctic Shipping and port development. Since Expert 1 is CEO of a shipping company and shipping activity includes ports in their infrastructure it is only natural to draw a comparison between them. Cruise and tourism are topics that also can draw comparisons between the two participants since Expert 1 is currently situated in Tromsø. In the findings gathered from the in-depth interviews both interviews discuss an increase in tourism activity and what that would mean for the local communities, Norway's intra-arctic shipping activity, and port management. Given the increase in tourism over the past decade, Port 1 predicts less jobs and more automation for ports in general, and that ports can offer utilities and docking possibilities for bigger ships. Expert 1 sees a similar increase on the other side of the country, however the ships stay the same size. This calls for large vessel installations to carry more passengers to proportionally follow up with the increase in number of tourists. This could potentially lower pollution and emission in port areas and reduce frequency and number of ships to soothe communities near ports complaining about possible smell and noise. Both concur that ports are in need for adaptability and are currently doing so.

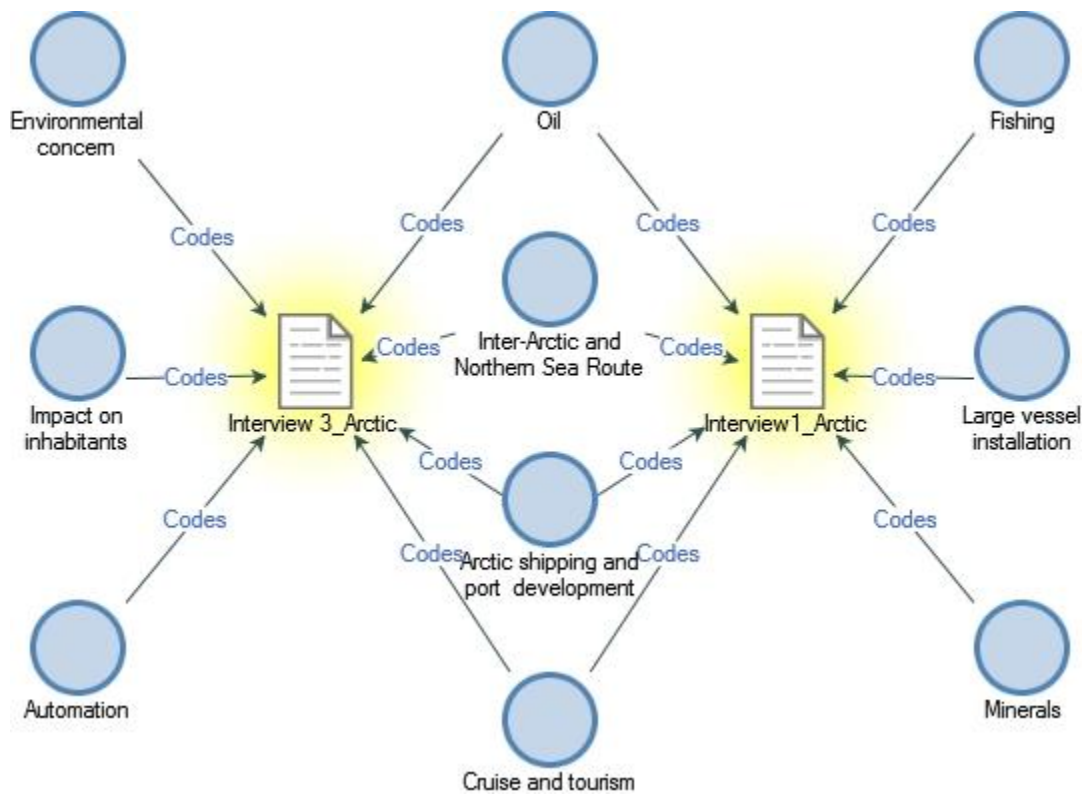


Figure 3: Comparison diagram between *interview 1* and *interview 3*

This comparison diagram is between interview 1 (Expert 1) and interview 3 (Port 2). They are fairly similar to the previous figure, Figure 3. In addition, they both openly discuss the potential of a transpolar sea route (TSR) emerging as a result from reduced ice coverage in the future. Port 2 explains that the port would act more as a transit port rather than a destination port. Expert 1 does not mention every port in Norway when explaining that Norway's intra-arctic shipping activity will be diverted and become internationalized and focus on inter-arctic shipping. However, both argue that oil recovery and tourism activity are among several activities that will see new opportunities in the future.

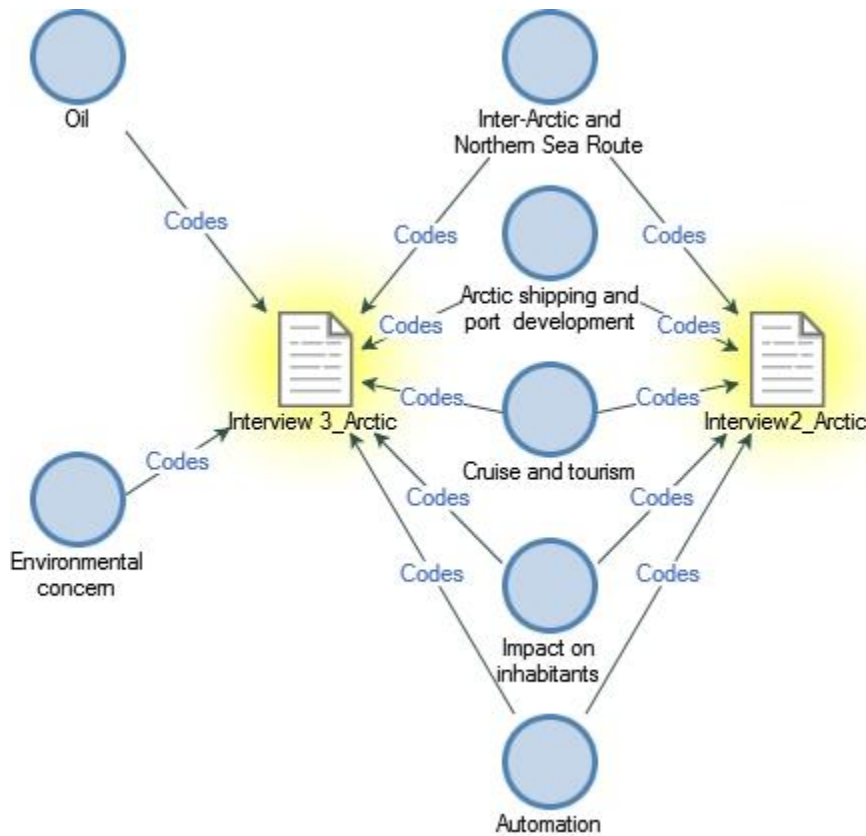


Figure 4: Comparison diagram between *interview 2* and *interview 3*

Figure 4 shows the comparisons between the two ports from the in-depth interviews where they answered fairly similarly in terms of cruise, tourism, port development and the impact ports have on inhabitants. However, Port 1 adds environmental concern in regard to ships and how they will eventually reduce that pollution by use of technology advancements, while port 1 discusses hydrogen as a fuel source used to operate ships to reduce the impact it has on inhabitants. Both the ports operate with mainland electricity, heavy fuel oil, port handling and management, and have sustainability and safety incorporated with everything they do. In addition, they share similar values and business aspects regarding increase in shipping activities, yet they operate differently towards one another.

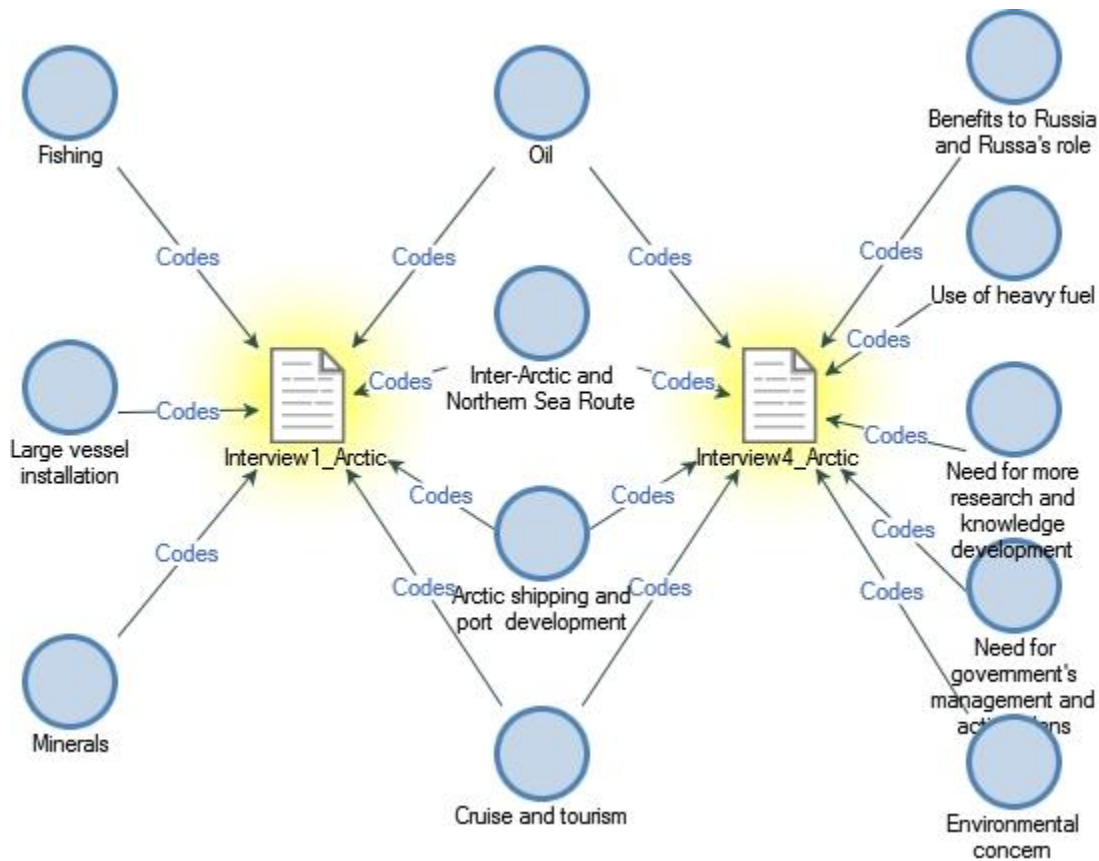


Figure 5: Comparison diagram between *interview 1* and *interview 4*

Figure 5 illustrates the two experts and is very interesting to compare. Expert 1 (interview 1) is more positive in his response to the questions from the in-depth interviews regarding the opening of the Arctic ocean, talking about oil, rare minerals and materials, fishing and other resources the arctic possess which could potentially be of great economical gain for Norway's intra-arctic shipping activities. In contrast, Expert 2 shares some of the values and positive side-effects explained by Expert 1, yet is more focused on precautions and security measures taken in order to actually expand throughout the Arctic ocean. Expert 2 adds the need for research and knowledge to fully utilize the arctic in an ethical manner, need for government management to act according to codes and ethical boundaries, and lastly is very focused on the environment surrounding the Arctic. When Expert 1 ushers its environmental concern it is in regard to wildlife, including fish species, pollution, security and sustainability, and the inhabitants (indigenous people).

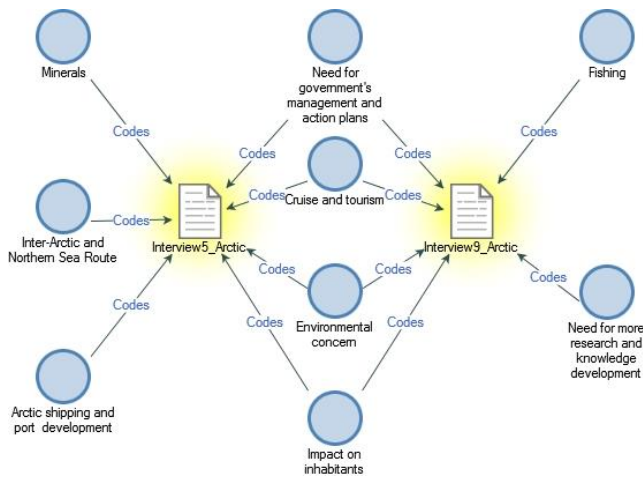


Figure 6: Comparison diagram between *interview 5* and *interview 9*

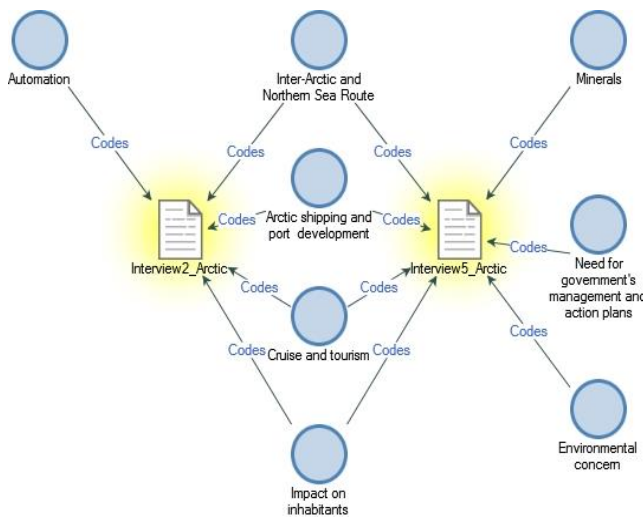


Figure 7: Comparison diagram between *interview 2* and *interview 5*

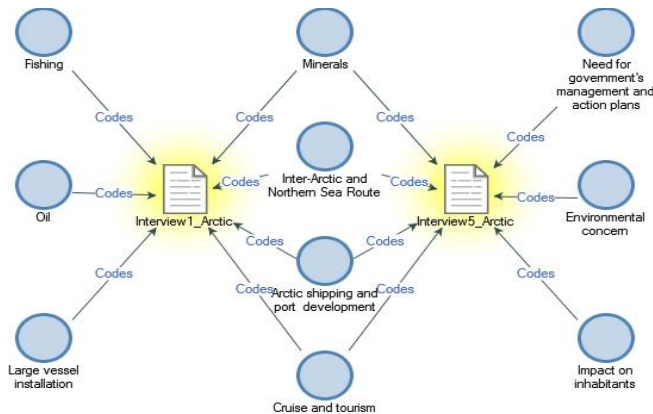


Figure 8: Comparison diagram between *interview 1* and *interview 5*

Listed above are three comparison diagrams between interview 5 (Inhabitant 1) and three other participants; interview 9 (Inhabitant 4), interview 2 (Port 1), and interview 1 (Expert 1).

It felt natural to include all three in one paragraph because the comparisons are very similar to one another.

In Figure 6, comparing the interview between Inhabitant 1 and Inhabitant 4, they both explain their experience with increase in tourism as an intra-arctic shipping activity and how it affects them and the cities they live in. Inhabitant 1 experiences the increase in tourism as a positive effect, due to it being good for the city's economy. However, Inhabitant 4 expresses more concern towards than positive side-effects of the increased tourism. Not every inhabitant is positive to the communities catering to the tourists. Especially when it comes to pollution of cruise ships as both inhabitants feel the need for pollution control. In addition, both inhabitants agree on the fact that sufficient research must be conducted in order for an Arctic market to potentially open.

Figure 7 is between Inhabitant 1 and Port 1. From the comparison diagram, there is not much to extract that has not been mentioned. However, Inhabitant 1 explains that ports are in need of technological improvements, and believes this is due to an increase in the amount of traffic a port is susceptible to e.g. increased tourism. The inhabitant also mentions in the interview that some jobs would be eradicated due to technological advancements in the port industry, in return for more efficiency. Port 1 said the same in their interview that port related jobs in the future would be less manned by people, and that maybe just one person would control the entire operation from a tower.

Lastly there is figure 8, a comparison between Inhabitant 1 and Expert 1. They provided a lot of similar information during the interviews. Given that they share much of the same background, this was more or less expected and taken into consideration. Both participants believe the Arctic possesses a great deal of resources that can be utilized by the Norwegian government. Inhabitant 1 adds the concern for the environmental impact shipping activities have on the arctic region. Furthermore, the inhabitant discusses the need for regulations from the government regarding pollution, tourism, and ports. They both find the Northeast Passage (NEP) to not be an attractive route yet and await eagerly for the opportunity to see a transpolar sea route emerging.

6.3 Word Tree

A word tree diagram is a product of NVivo. To be able to see associations with a specific subject a word query search is done through the program to identify any of these aspects the participants of the interviews indulged in. Below is Figure 9, where the word query search was “shipping”. The figure categorizes the participants' answers regarding the word shipping and then expanding them into sub-categories. The word tree will include anything related to the word “shipping” when used in relevant sentences from the transcribed interviews. We asked the participants a great deal of questions regarding “shipping”, most importantly we asked them how Norway’s intra arctic shipping would be affected by an increase in shipping activity and yielded these results.

It becomes evident that Arctic and Activities are words associated with the term “shipping”. This is due to the questions being tailored to answer shipping-related questions coherently with the words Arctic and Activities. Furthermore, shipping is discussed in terms of emission and pollution, reduction in voyage time, tourism, ports and so forth. It is the most well-rounded word tree that provides a more detailed illustration to capture the essence of the research question. In addition, the word “shipping” is used to describe side-effects and other factors that have an impact on different scenarios that were a result from the findings chapter. From the literary review, shipping dominates most of the discussions and findings from previous studies. This may be because it is a broad topic and was chosen as the word query search because of its relevance and yielded the best results out of the other word trees.

Finally, “shipping” ties together all the in-depth interviews not just because of the questions, but since the participants are all affected by shipping in different ways. Thus, making shipping most likely the best word tree to illustrate.

Text Search Query - Results Preview

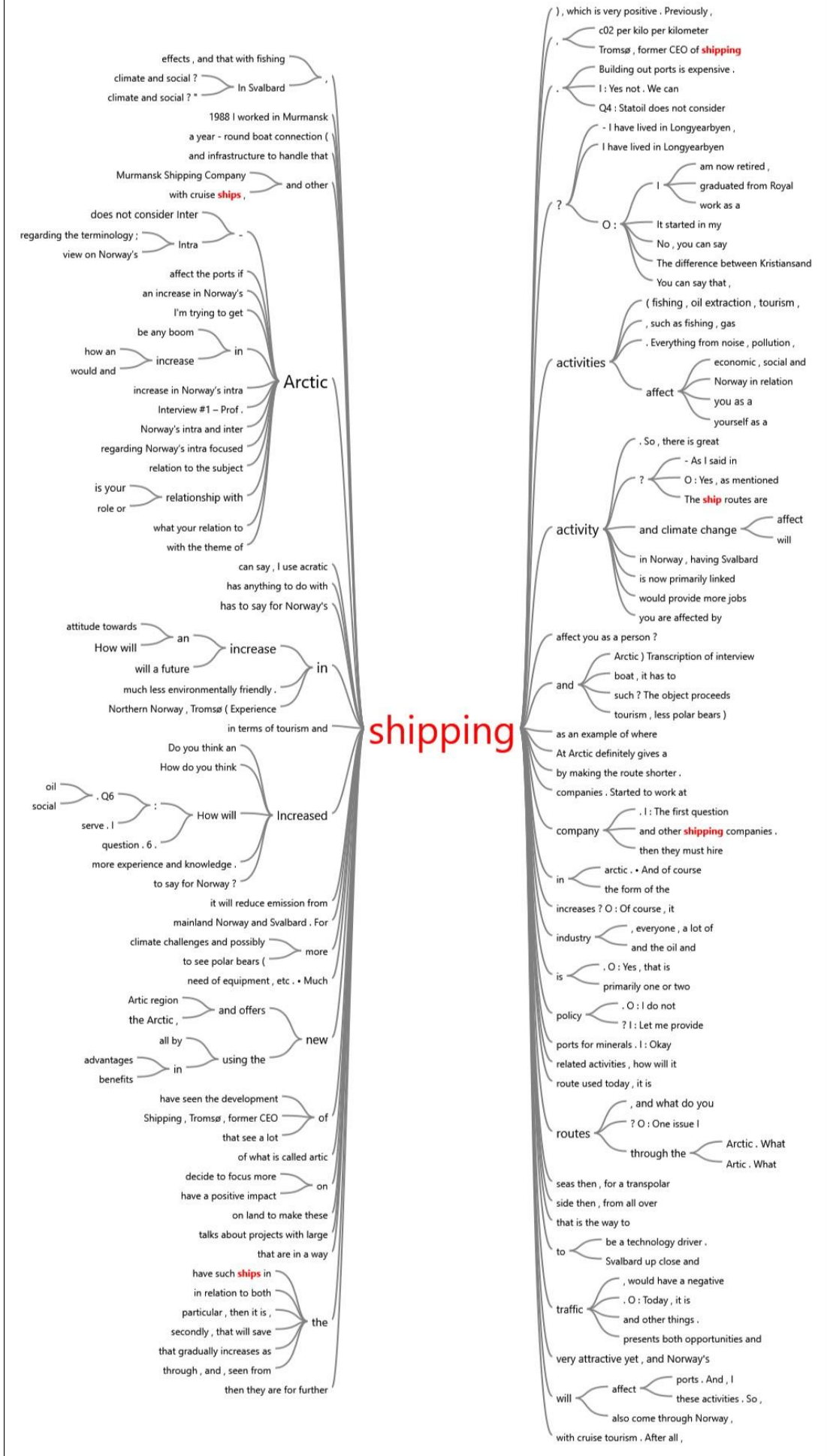


Figure 9: Word tree: “Shipping”

7 Conclusion, Limitations and Future Research

This chapter represents the conclusion of the foresight study in addition to limitations tied to conducting said study and future research where this thesis can supply additional information.

7.1 Conclusion

The conclusion of the foresight study is that an increase in Norway's intra-arctic shipping activity would indeed affect economical-, environmental- and social activities. In this thesis, persons relevant to arctic shipping have been a part of in-depth interviews to see if there are any correlations between increased shipping activity and the aforementioned activities. The in-depth interviews strengthen the literature of Arctic Shipping by including real-life knowledge and experiences to illustrate the research question and relevant theory. This study compiles the analyzed information gathered in order to explain commonalities that characterize an increase in shipping activity.

If an increase in Norway's Intra-Arctic shipping activity and opening of the Arctic Ocean were to happen, it has proven to come with both new opportunities and challenges. Foreign and domestic interest in the Arctic Ocean, for its resources e.g. oil, gas, minerals and materials, and the possibility of new accessible shipping routes have been discussed in the findings and in the literature. Relevant studies conducted regarding the topic Arctic shipping have concluded that the shipping industry does not consider the Arctic shipping routes through, NSR, NEP, and TSR, to be viable as of now. From the findings, one can conclude that the opening of Norway's Intra-Arctic shipping policy would benefit Norway, Arctic states and shipping companies by reducing the distance voyaged, emission and costs as a product of shipping activities. However, increased shipping traffic in Norwegian waters can put pressure on existing challenges already experienced today. According to the literature, increased shipping leaves a larger footprint on the environment, and can possibly alter the ecosystem in the Arctic region and harm wildlife with increased shipping activity.

The findings in this thesis shows that tourism has become a vital industry for the economic growth of Norwegian cities all over the country. Even though it alters the social culture by e.g. catering towards tourists instead of inhabitants of a city, especially in Tromsø,

most of the participants from the interviews agree that the communities benefit from tourism. Increased tourism supports economic growth and sustainability for local businesses, in addition to providing new job opportunities for local inhabitants.

Ports in the Arctic will be modernized to manage the increased traffic and will serve as either transit ports to service shipping vessels with mainland electricity and other commodities, or they will be large destination ports such as Kirkenes or Murmansk. Ports and rescue services will have to adapt for more preparedness towards risk maximization scenarios according to the findings. More traffic yields greater risk for possible accidents and the resources for this are currently limited, especially in the areas where shipping activities are expected to increase the most i.e. areas affected by climate change. Furthermore, the noise, smells and other contributing factors resulting from high port activity is a commonality that is mentioned throughout the interviews, which shows that the positive effects with increased port activity have some negative effects on the Arctic communities and environment.

An increase in Norway's Intra-Arctic shipping activity will undoubtedly have effects on economical-, environmental-, and social activities. Based on the literature and the findings of this thesis, the effects on the activities caused by an increase in Norway's Intra-Arctic shipping activity will yield both positive and negative effects. Over time, the Arctic will most likely become more important and a central market for the shipping activities, business exploitations, tourism, and government management.

7.2 Limitations

Most of the limitations of this study are related to the interviews that had to be conducted to receive the information needed for the analysis. The first one being the time restriction on writing the thesis. Due to this, we were not able to conduct as many interviews as we would have liked to do. Ideally, ten to twelve interviews should be conducted to get the most information possible to get a detailed view on the research question. Politicians and businesses are often busy and do not have the time to respond to an interview. This was also the case for our thesis since we sent out 25 invitations to conduct interviews, and we had nine respondents out of this. Another limitation regarding the interview being conducted is the Covid-19 pandemic. This made it more difficult to get a hold on the politicians since they

were busy discussing pandemic-related issues, in addition to meeting face-to-face with other participants.

7.3 Future Research

This is merely a foresight study of how Norway's intra-arctic shipping activity could be affected by aforementioned activities. It would be interesting to see whether the opening of the Arctic Ocean will be conclusive with pre-existing theoretical frameworks. Another suggestion for future research could be how to ethically and sustainably operate the Arctic Ocean as a new emerging market with a valuation of said market. If a similar study such as this thesis is to be conducted, more participants for in-depth interviews should be considered as well as to include political persons.

8 Sources

AMAP: Snow, Water, Ice and Permafrost in the Arctic (SWIPA) 2017. Arctic Monitoring and

Assessment Programme, (AMAP), Oslo, Norway. xiv + 269 pp, available to download at <https://www.amap.no/documents/download/2987>

AMSA, 2020. Non-arctic states. Retrieved from:

<https://arcticcouncil.org/en/about/observers/non-arctic-states/>

AMSA. (2009). Arctic Marine Shipping Assessment 2009 Report:

https://www.pmel.noaa.gov/arcticzone/detect/documents/AMSA_2009_Report_2nd_print.pdf

Arctic Bulk, 2020. *Northern Sea route*. Retrieved from:

http://www.arcticbulk.com/article/186/NORTHERN_SEA_ROUTE

Arctic Gateway summit, university of Manitoba, WINNIPEG, CA, 2012. Available to download at: <http://library.arcticportal.org/1563/>

Arctic portal, 2020. Retrieved from: <https://portlets.arcticportal.org/hub-ports/92-hub-ports>

Assessment Programme, (AMAP), Oslo, Norway. xiv + 269 pp, available to download at <https://www.amap.no/documents/download/2987>

Barnard, B. 2016. Amidst overcapacity, losses and rate doldrums – Merger outburst set to reshape container carrier alliances. *Maritime Magazine* 80:17-21.

Bennet, 2019. *The arctic shipping route no-one's talking about*. Retrieved from:

<https://www.cryopolitics.com/2019/04/23/transpolar-passage/>

Borshoff, I. 2019. *Norway's "northernmost Chinatown" eyes arctic opportunity*. Retrieved from: <https://www.politico.eu/article/norway-kirkenes-china-influence-arctic-shipping-opportunity/>

Eguíluz, V.M., Fernandez-Gracia, J., Irigoien, X., Duarte, C.M., 2016. A quantitative assessment of Arctic shipping in 2010–2014. *Scientific Reports*, 6: 30682, pp. 1–6.

EU, 2017. Regulation 2017/352. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0352>

Europa, 2015. *Report of the exchange of views between port ceos and transport commissioner bulc, 19. Jan. 2015*. Retrieved from: <https://ec.europa.eu/transport/sites/transport/files/modes/maritime/ports/doc/2015-01-19-report-exchange-of-views-comm-bulc-ports-ceos.pdf>

Gard, 2020. *Crisis response*. Retrieved from: <http://www.gard.no/web/services/crisis-response>

Gripsrud, G., Olsson, U. H., & Silkoset, R. (2010). *Metode og dataanalyse*. Norway: Høyskoleforlaget

Gundersen, D., Johansen, P., & Bjerkestrand, N. E. (2018). *Transkripsjon, Store norske leksikon*. Retrieved from <https://snl.no/transkripsjon>

Innovation Norway, 2017. *Key Figures for Norwegian Tourism*. Retrieved from: https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/Key_Figures_2017_pages_9b3f82d5-43f4-4fe9-968c-7a85a36704b2.pdf

Kedzierski, 2012. *Troubled waters: How to protect the Arctic from the growing impact of shipping*. Retrieved from: https://www.transportenvironment.org/sites/te/files/publications/2012%2009_troubled_waters.pdf

Lasserre, F. 2009. High North Shipping : Myths and Realities. NATO Defense College Forum Paper, 7, 179-199.

Lasserre, F., Alexeeva, O. (2015). Analysis of maritime transit trends in the Arctic passages. in Honour of Donat Pharand. Brill Academic Publishing, Leiden. pp. 180–193.

In: Lalonde, S., McDorman, T. (Eds.), *International Law and Politics of the Arctic Ocean: Essays*

Lasserre, F., Beveridge, L., Fournier, M., Têtu, P-L., and Huang, L. (2016). Polar seaways? Maritime transport in the Arctic: an analysis of shipowners' intentions II, *Journal of Transport Geography*, 57, 105–114.

Lindholt, L. (2006). *The economy of the north: 3. Arctic natural resources in a global perspective*. Oslo: Statistics Norway.

Melia, N. (2016). *On predicting the opening of Arctic sea routes* (Doktoravhandling). Department of meteorology. http://centaur.reading.ac.uk/66414/1/14011930_Melia_thesis.pdf

MI News Network, 2019. *Maritime silk routes - The story of the older trade routes*. Marine insights. Retrieved from: <https://www.marineinsight.com/maritime-history/maritime-silk-routes-the-story-of-the-oldest-trade-routes/>

MOE, A and Jensen, Ø, 2010. *Opening of new Arctic shipping routes*. Available for download at: <http://library.arcticportal.org/1564/>

Ochs, E. (1979). Transcription as theory. In E. Ochs and B. B Schiefflin (Eds.), *Developmental pragmatics* (pp. 43–72). New York: Academic.

Ochs, E. (1999). In A. Jaworski & N. Coupland (Eds.), *The discourse reader* (pp. 158–166). London : Routledge.

Pettersen, T. 2016. Declining interest in use of Northern Sea Route. *The Independent Barents Observer*, March 18. Retrieved from: <https://thebarentsobserver.com/en/industry/2016/03/declining-interest-use-northern-sea-route>

Potts, T., and Schofield, C. (2008). An Arctic Scramble? Opportunities and Threats in the (Formerly) Frozen North, *The International Journal of Marine and Coastal Law*, 23, 151–176.

Rodrigue, J.P, Figure 1. *Polar Sea routes*. Retrieved from:

https://transportgeography.org/?page_id=412

Saeed, N and Ng., A, 2019. *Opportunities and challenges of the opening up the Arctic Ocean for Norway*. Retrieved from: Naima Saeed

Schøyen, H., Bråthen, S. (2011). The Northern Sea route versus the Suez Canal: cases from

Sekaran, U., & Bougie, R. (2016). *Research Methods for Business*. New York: Wiley

Sharda, (2019). *What is Arctic Bridge sea route?* Marine Insight. Retrieved from:

<https://www.marineinsight.com/marine-navigation/what-is-arctic-bridge-sea-route/>

SSB, 2016. *Maritime Transport*. Retrieved from: <https://www.ssb.no/en/transport-og-reiseliv/statistikker/havn/kvartal/2016-06-29>

Stephenson, S. R., Smith, L. C., Brigham, L. W., & Agnew, J. A. 2013. Projected 21st century changes to Arctic marine access. *Climatic Change*, 118(3-4), 885-899.

Stevenson, T.C., Davies, J., Huntington, H.P., and Sheard, W. (2019). An examination of trans-Arctic vessel routing in the Central Arctic Ocean, *Marine Policy*, 100, pp. 83–89.

Strutzik, 2013. China signals hunger for Arctic mineral riches. *The guardian*. Retrieved from:

<https://www.theguardian.com/environment/2013/jun/04/china-arctics-mineral-riches>

The Norwegian Polar Institute. (2015). The Arctic Region, available to download at

<https://www.environment.no/topics/the-polar-regions/the-arctic-region/>

Xinhua, 2018. *China's Arctic policy*. Retrieved from:

http://english.www.gov.cn/archive/white_paper/2018/01/26/content_281476026660336.htm

Zhang, Z., Huisingh, D., and Song, M. (2019). Exploitation of trans-Arctic maritime transportation, *Journal of Cleaner Production*, 212, pp. 960–973.

Appendix

Reflection note - Emil Mathias Hoel

This reflective note will shed some light on the knowledge and experiences attained during my master program at the School of Business and law at the University of Agder. I was tasked to include three themes to put my knowledge into perspective, those themes are internationalization, innovation and responsibility.

The thesis my partner and I have been working on for the past six months is a foresight study of Norway's Intra-Arctic shipping activity, and how an increase in that activity will affect Norway's economic-, environmental- and social activities. In the beginning, I did not have much knowledge surrounding the topic Arctic or Shipping in general and it was interesting to research something new, and to expand my knowledge in this field of study. After discussing with my supervisor and reading up on the topic before embarking on this six-month long journey, I found that this untapped market would be a central part of Norwegian business in the future; perhaps even the world.

Intra-Arctic shipping activities have a major impact on the Arctic States across a wide spectrum. In addition, the currently discussed dilemma of whether Norway should open up to the Arctic Ocean other Arctic States and observers, such as China, has taken an interest in order conduct business, both on the mainland and offshore. Ports will most likely see a drastic change in the future, where they need to adapt in order to handle new shipping vessels as well as new regulations and standards. The northern hemisphere will also see development in a mostly desolate landscape. However, there are precautions and risks that need to be properly addressed. Environmental damage, social risks and destruction of wildlife are some of the potential threats that come with Norway's inevitable expansion of the Arctic Ocean and land.

As part of this thesis, in-depth interviews were conducted in order to add to the already existing literature and theories. The findings in the research provided some great perspectives of the same questions as the participants had different backgrounds. However, the participants answered fairly similarly to one another.

The conclusion of the foresight study was that an increase in Norway's intra-arctic shipping activities would affect the aforementioned activities differently. If the opening of the Arctic Ocean would come to pass and climate change would reduce ice coverage, there could

be an entire new market for fishing, oil, gas, minerals and materials. In addition to new shipping routes to the Asian continent, West America and Canada. However, environmental effects were a concern for most of the participants and the demand for regulations from the government is clear. Even though a new shipping route, the transpolar sea route would cut emission by a substantial amount. Social activities such as political disputes, jobs and inhabitants in the arctic communities would be directly affected by this increase in shipping activity.

Innovation

Over the course of my study, during the interviews and surmising my findings, I discovered that the need for innovation to fully exploit potential business opportunities in the Arctic Ocean is a requirement, not just a preference. The Arctic is notorious for its many risks involved with any shipping activity conducted in the region and needs to be taken seriously to avoid certain risks. From my thesis there are examples of sought-after innovative ideas e.g. environmentally friendly fuel, clean port management in terms as in any form of pollution and operating in the Arctic region, either on land or at sea. At this age of technology, adaptability and innovation are capabilities that will be of utmost importance when the world is changing rapidly as it now is. During my courses at UiA, I have been thought a great deal about innovation. At first, innovation was a way to make something better or new, such as a business opportunity, and was not a necessity. However, during my last year and when writing this thesis, I realized what innovation truly represents when put into perspective.

Internationalization

With the opening of the Arctic Ocean and reduced ice-coverage in and around the preexisting sea routes, the world is becoming a much smaller place every year. In addition, technological advancements assist in the shrinkage and connect the world, in a broader sense. A highly discussed point in my thesis is whether to welcome “big players”, such as China, into the Arctic region to further enhance relations and conduct business together. There are split opinions on the possible outcomes of this. However, all the interviewees said that Norway, as a country, cannot remain on the sidelines. The interviewees refer to this when discussing the emergence of a new market, potential new sea routes and port management. Tourism has become a prevalent factor for Norwegian economy over the last decade. Ports are full until

the end of 2021 as of today. One of the interviewees (Port 2) mentions that we need to adapt as other countries handle this exponential growth.

Responsibility

At the start of the thesis, a great deal of research was conducted to see the possible effects of increased intra-arctic shipping activity, both positive and negative effects. Later, they were labeled as challenges and opportunities. During the interviews, Expert 2 exuded a concern for opening up the Arctic ocean for business in regard to the preparedness of the activities. If proper measures of risk are not taken into consideration, it could become costly to do business in the arctic. Furthermore, this thesis argues that the reduced ice coverage is seen as a universally good thing. It is not. Wildlife is in an increasing amount of danger, some species could be more than endangered as a result of climate change, pollution and emission. As business opportunists, governments and people it should be implied that they have certain responsibilities. A sustainable environment should not be seen as a minimal requirement.

After five years at the university of Agder, I have gained a considerable amount of experience and knowledge that I will use in the next phase of my life. These five years have been challenging, especially the last six months. Despite the hardships that comes with writing a master thesis, it has been, overall, a thrilling experience. The limitations of conducting in-depth interviews, regarding the pandemic, was first seen as a major set-back. However, it proved to just be another hurdle, and was overcome by simply thinking outside the box. I am certain that the findings and relevant literature can be of some use for future research on this topic.

These six months have been tough, but fair. As the last piece of the puzzle, that is my education, is finally put in place I am ready for what comes next.

Reflection note – Erik Carlsen

The reflection note is a mandatory part of this master thesis, with the intention to look back at the process and work that have been done. I will discuss this with focus on internationalization, innovation and responsibility.

For the past months, me and my writing partner have been writing a qualitative study about Arctic Shipping. In the start phase, we worked out our research question “How will an increase in Norway’s Intra Arctic Shipping affect economical-, environmental,- and social activities in Norway”? We realized early that we would write about this topic from Norway’s point on view. This decision was made after a meeting with our supervisor. This would let us collect more detailed information, and we also saw this as an interesting problem to work with. Before we started writing, we did not know much about the shipping industry. This also made us eager to learn and find out more.

We quickly learned that Arctic Shipping, and the climate changes we experience today, may turn out to give a lot of new opportunities for the shipping industry. New and shorter routes to travel have the potential to save a lot of costs in the future. Increased shipping activity and climate changes also forces the ports around the country to adapt. New technology and automation is necessary to stay relevant in the industry. Increased tourism also changes the social structure in Norwegian cities, and affects the daily lives of the local inhabitants.

With the potential opportunities, we see in the future, there are also challenges tied with increased shipping and climate changes. Problems we did not consider relevant several years ago, is now something we need to take into account every day. Climate changes provides changes that companies and communities are now used to, and we need to adapt. With the economic opportunities we see, environmental challenges need to be taken into account.

We collected our data through in-depth interviews. This was an interesting process where we first needed to find relevant interview objects, then contact them and lastly arrange the interview. Initially, our plan was to do most of the interviews face to face, but due to the pandemic, we held most of the interviews by phone. We learned a lot through this process, as we got to talk to people that are experts on the field, or deal with Arctic Shipping on a daily basis.

Some of the findings from our research was expected, however, most of them were a bit surprising. Environmental changes due to climate changes are already happening, and the inhabitants already notice this. The most surprising thing was the fact that the tourists in both Longyearbyen and Tromsø have affected so much of the daily lives in these cities. It has changed the social behavior in the cities, however, the tourists are both important for the local economy and for job opportunities. It was also interesting to see different opinions on how the new shipping routes would affect different activities in Norway. Several of the participants saw this as a totally new market that would have a great impact on the industry. Others were more skeptical to how much this will affect the traditional routes, especially in the near future. We also had a lot of other findings that are discussed in the thesis.

Internationalization

Arctic Shipping is highly linked to internationalization. Ships travel in and out of Norwegian waters, and most goods travel by boats. As mentioned in one of the interviews, clothes, phones and technology we use every time has most likely been shipped here by boat. Also increased tourism connects countries and makes the world a smaller place. People come from all over the world to see the Northern Lights in Tromsø, or polar bears on Svalbard. Reduced ice-coverage in the Arctic also opens up opportunities for faster travel between ports and countries. Also mentioned in one of the interviews is that Norway needs to look at what other countries are doing, and learn from them. Shipping nations have a lot to learn from each other, and are depending on ports and companies in other nations. Internationalization is also what I experienced during my studies, also apart from the master thesis. Going on exchange for five months to Indonesia has given me a lot more language skills, but also an insight on a totally different culture than what I am used to. These five months taught me a lot about networking, communication and globalization. I left Indonesia with a bigger network and better language skills. This is something I took advantage of when working with this thesis, and helped me with my work.

Innovation

Our findings indicated the need for innovation, especially at the ports handling the cruise boats and other shipping activity. The need to become more sustainable and automated is more important than ever before. The government, ports and companies set climate goals that should be reached, and we learned from both ports that innovations are an important part of this process. Fuel innovations is an example that can benefit the shipping industry on a huge

basis, and be a turning point on how we travel today. Our findings also show that innovations are a process that takes time and patience. This is the main problem I see with the changes and climate goals. Innovation and changes are always a process that requires time and research, but also investments. Innovation can be very expensive, but in the long-run it has turned out to be profitable for now.

Innovation also allows us to find more information than before, and also find it easier and quicker. Using the program NVivo also helped us a lot when writing this thesis, as this gave us figures and connections we might not have found on our own. This is a great example of how innovations and new technology can make the writing process more interesting, and for us to provide better research.

Responsibility

When writing a thesis, and doing in-depth interviews, there are responsibilities that need to be taken into account. First of all, I am responsible for doing my part of the work, and to provide quality work. When finding information and data from previous work, it is important to cite correctly and in the right places. With the new General Data Protection Regulation (GDPR), responsibility is more important now than for only a few years ago. Keeping personal information and data safe and protected can be a more challenging task than I first assumed. This is especially important when doing in-depth interviews where the personal information of the participants should be excluded from the thesis, and information that may expose their identity must be removed. We worked a lot with this during the writing process, and also checked this several times after. When doing an interview, we also needed the consent from the participants in advance, and informed them about their rights during the interview, for example the right to quit at any given time.

There are also ethical challenges linked to responsibility when writing a master's thesis. I think citation and referring to where we got the information we write about is the most important aspect of this.

Lastly, I would like to express my gratitude for studying at the University of Agder. This has been five years I will always remember. I have gained experiences and knowledge that will be beneficial in the future. It has been five years of hard work, a lot of social activities and a semester abroad with new and exciting experiences. Writing the master thesis was a good way to end my studies, as I got to use and show the knowledge I gained over the years.

Figures from NVivo - Word trees

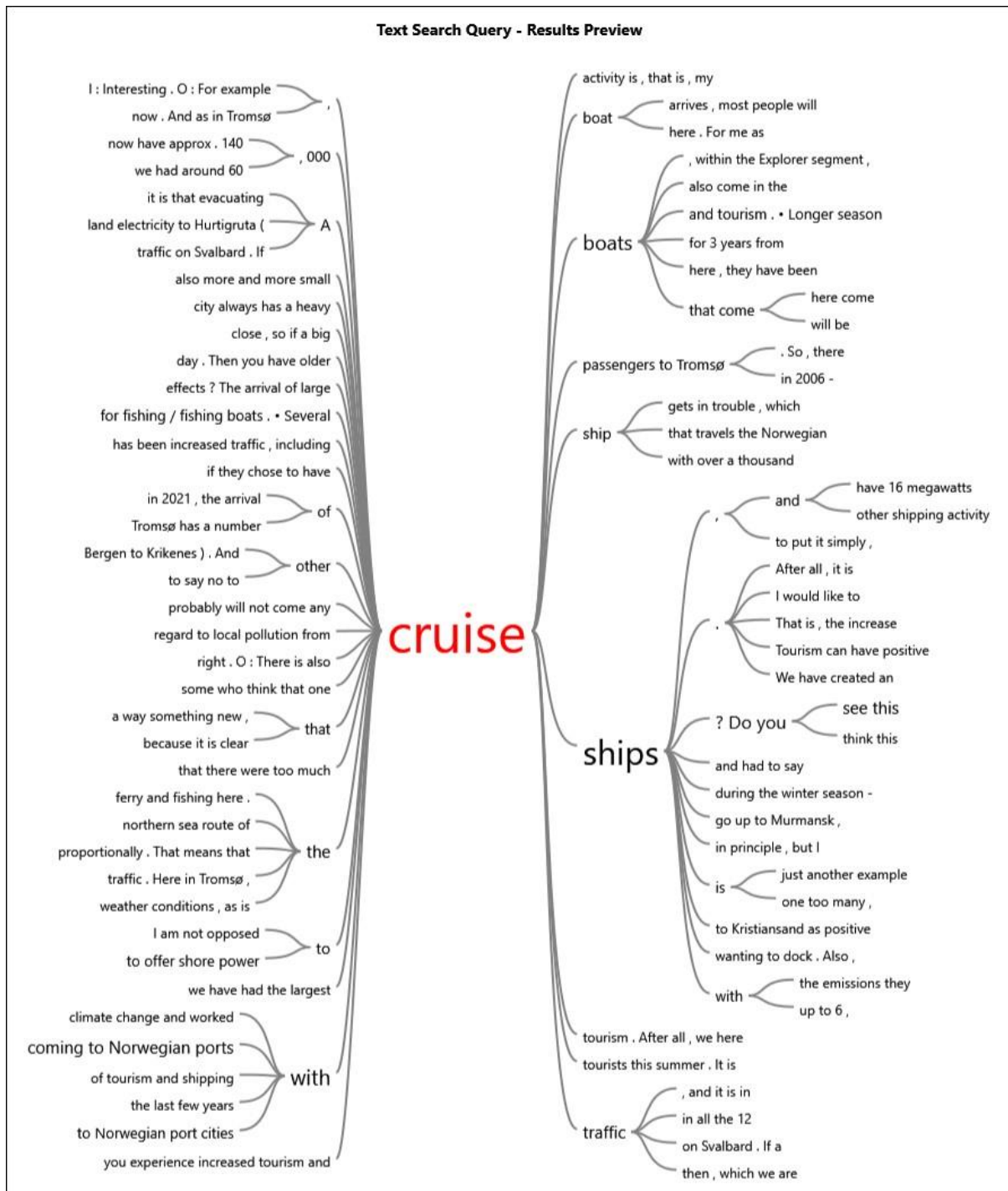


Figure 10: Word tree - "Cruise"

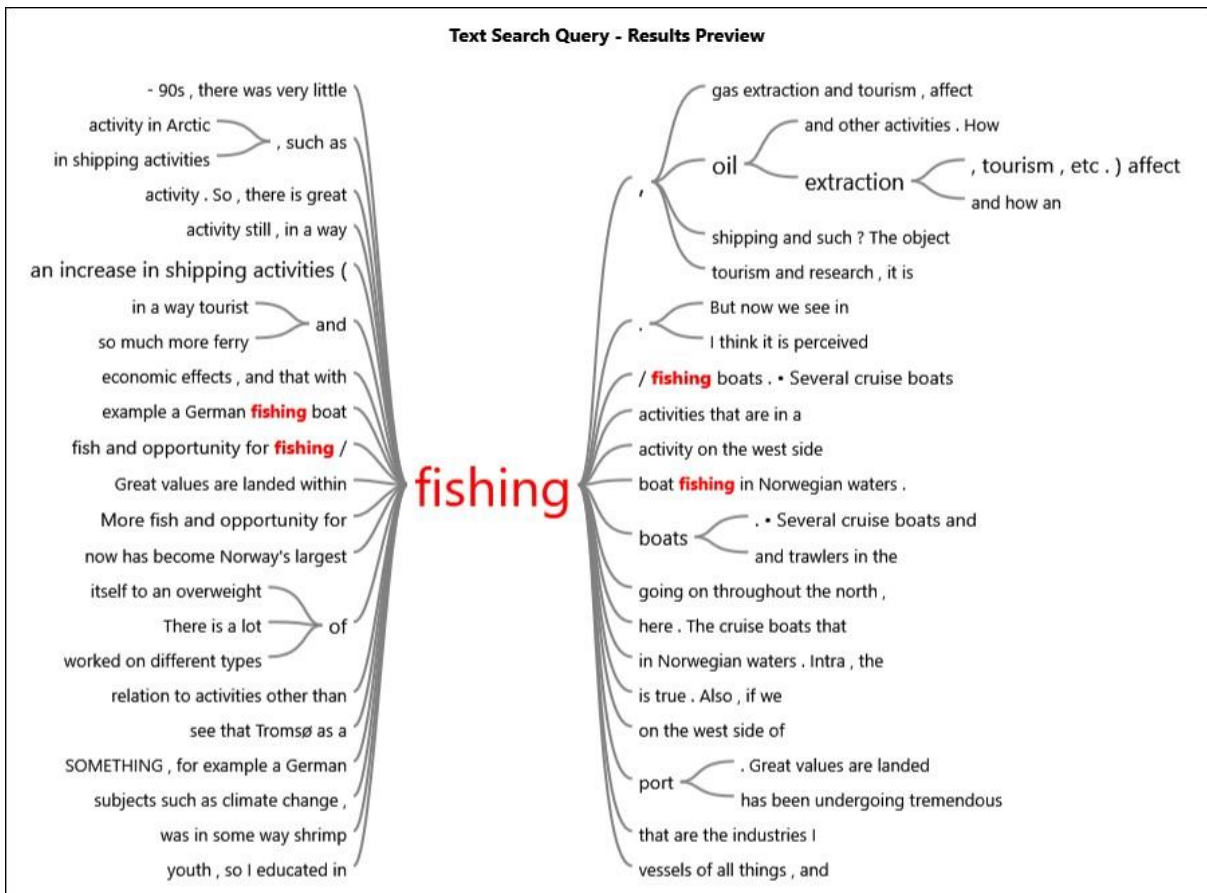


Figure 11: Word tree - “fishing”

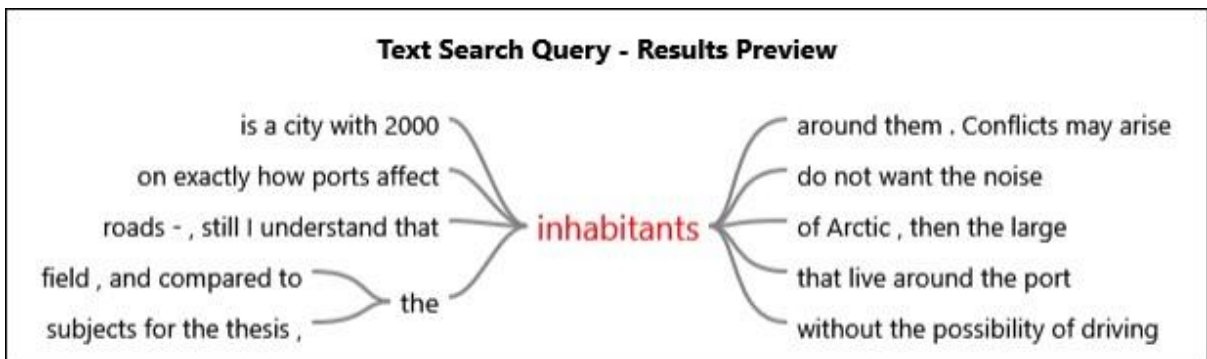


Figure 12: Word tree - “Inhabitants”

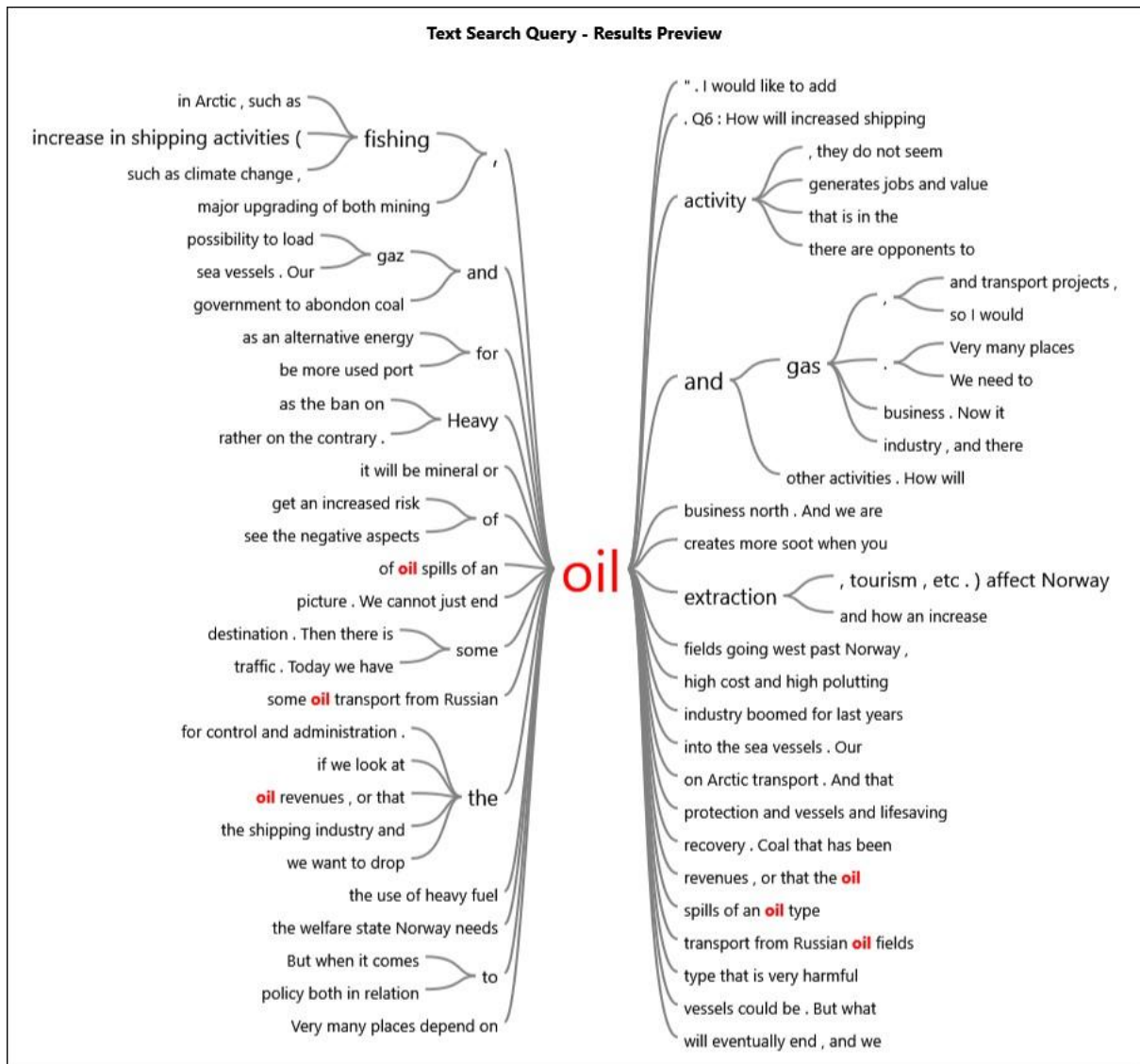


Figure 13: Word tree - "Oil"

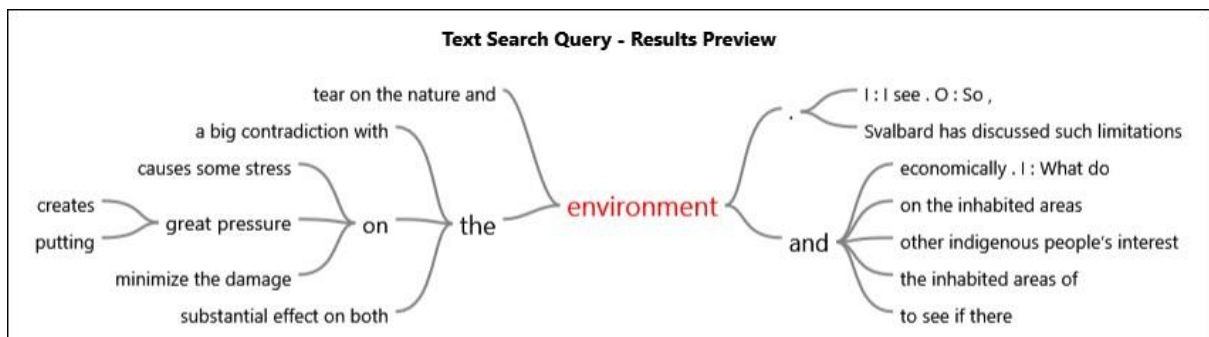


Figure 14: Word tree - "Environment"

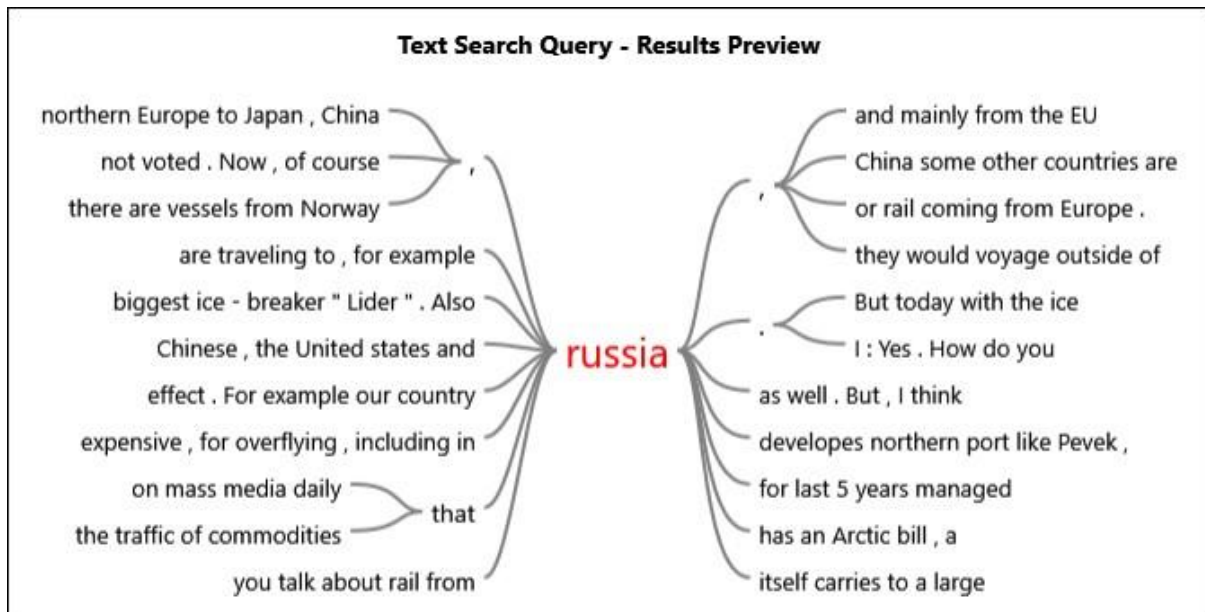


Figure 15: Word tree - "Russia"

Text Search Query - Results Preview

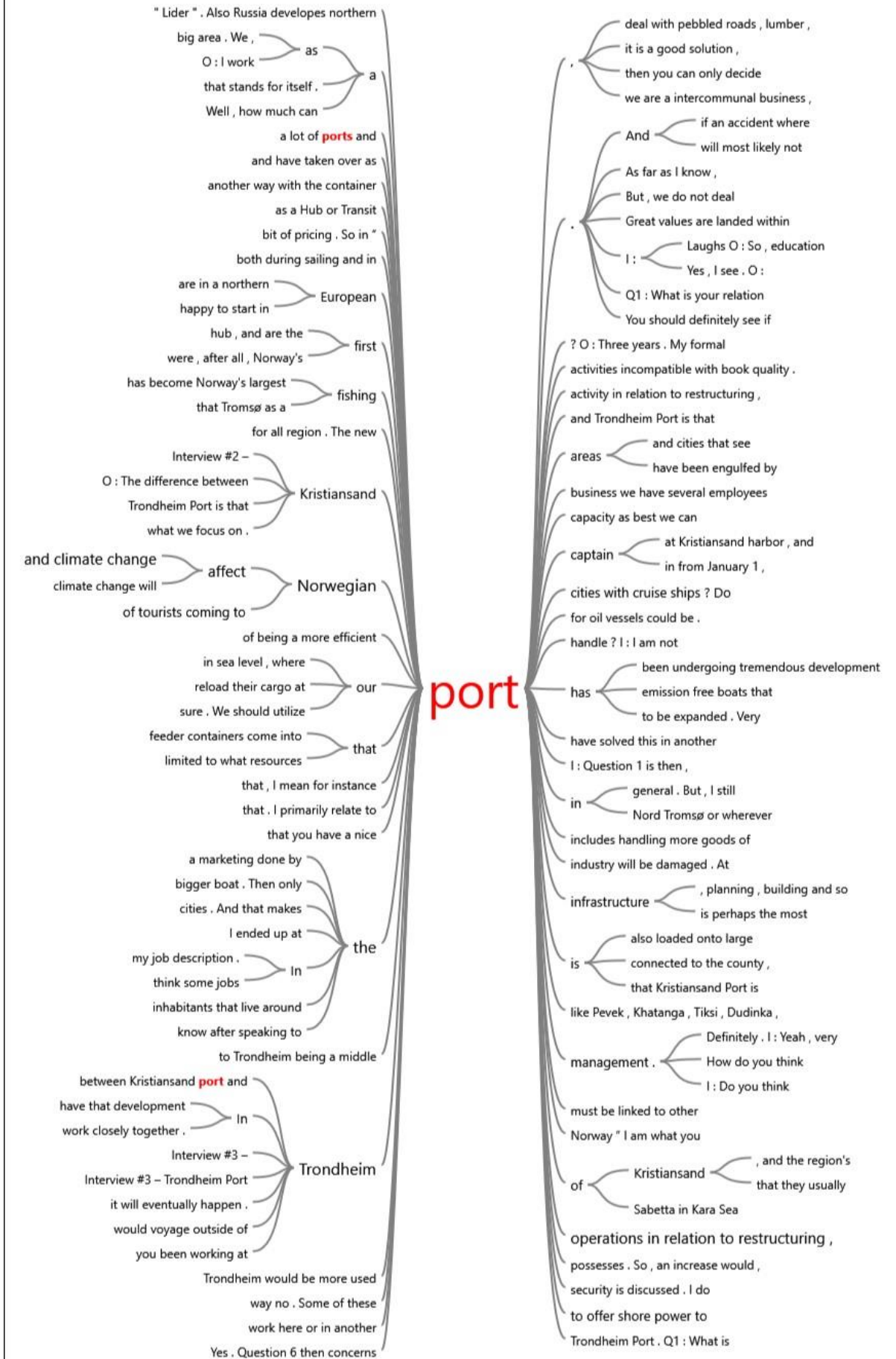


Figure 16: Word tree - "Port"