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**Abstract**

The Arctic is heated, both in the natural science and social science senses. Undeniably, ice melting in the Arctic is a matter of fact. More areas are emerging with shipping routes developing through high seas, which are remodelling maritime situation and impacting current maritime management mindsets. Arctic seems to become more accessible, regardless its harsh environmental limitations. There are increasing interests toward the Arctic around the world. China, with its 2018 white paper of Arctic policy, is one of those countries that are seeking to expand participation in Arctic activities. The changing Arctic region is embedded with uncertainties and affecting both geographically and societally the future. By studying the futures of the Arctic, we would be able to address this task from a macro perspective via scenario thinking and analysis in compact.

The research design unwinds alternative futures of the Arctic on matter of Arctic shipping and maritime governance with Dator's four generic futures. Through a futures table exercise, variables are extracted from policy documents and public release, a set of scenarios are constructed. They are: continued growth scenario, collapse scenario, disciplined society scenario and transformational scenario. Personas and storylines are applied to present research results with the parity to stress on the differences of each scenario for comparison purpose.

Alternative futures of the Arctic are challenging to conceptualise nor be predicted, due to the vigorous attribute of change-occurring nature encapsulated with evolving uncertainties.

Key words	Arctic Futures, Arctic Shipping, Maritime Governance, China's Arctic Policy, Scenario Thinking, Persona, Storyline, Scenario, Four Generic Futures, Futures Table.
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Otsikko	Neljä arktisen tulevaisuuden skenaariota vuonna 2050: Arktisen merenkulun kehitys ja arktinen merenkulun hallinta Kiinan arktisen politiikan valossa		
Ohjaaja(t)	Prof. Petri Tapio		

### Tiivistelmä

Arktinen alue on kuuma aihe sekä luonnontieteellisessä että yhteiskuntatieteellisessä mielessä. Jään sulaminen arktisella alueella on kiistämätön fakta. Lisää alueita avautuu, kun merireitit kehittyvät avomereksi, mikä uudistaa merenkulun tilannetta ja vaikuttaa olemassa olevaan merenkulun hallintaan. Arktinen alue näyttää olevan helpommin saavutettavissa ankarista ympäristöolosuhteistaan huolimatta. Kiinnostus arktista aluetta kohtaan kasvaa ympäri maailmaa. Kiina on vuoden 2018 arktisen politiikan strategiallaan yksi niistä maista, jotka pyrkivät lisäämään osallistumistaan arktiseen toimintaan. Arktisen alueen muutos sisältää epävarmuuksia, jotka vaikuttavat sekä maantieteelliseen että yhteiskunnalliseen tulevaisuuteen. Tutkimalla arktisen alueen tulevaisuutta voimme käsitellä tätä kysymystä makronäköymästä skenaarioajattelun ja morfologisen analyysin avulla.

Tutkimus jäsentää arktisen alueen vaihtoehtoisia tulevaisuuksia arktisessa merenkulussa ja merenkulun hallinnassa käyttäen Datorin neljää geneeristä tulevaisuutta valittuina tulevaisuuden arkkityyppeinä. Muuttujat poimitaan poliittisista asiakirjoista ja muista julkaisuista ja tulevaisuustaulukon avulla rakennetaan vuodelle 2050 joukko skenaarioita, jotka ovat: jatkuvan kasvun skenaario, romahtamisskenaario, kurinalaisen yhteiskunnan skenaario ja muutosskenaario. Henkilöitä ja tapahtumia käytetään skenaarionarratiiveina tutkimustulosten esittämiseen korostamalla kunkin skenaarion eroja.

Arktisen alueen vaihtoehtoiset tulevaisuudet ovat haastavia käsitteellistä tai ennustaa johdettujen voimakkaista ympäristössä tapahtuvista muutoksista, joita ympäröivät lukuisat dynaamiset epävarmuustekijät.

Avainsanat	Arktiset skenaariot, Arktinen merenkulku, Merenkulun hallinta, Kiinan arktinen politiikka, Skenaarioajattelu, Tulevaisuusnarratiivi, Skenaarioarkkityypit, Tulevaisuustaulukko
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**UNIVERSITY  
OF TURKU**

Turku School of  
Economics

## **FOUR SCENARIOS OF ARCTIC FUTURE IN 2050:**

**Arctic Shipping Development and Arctic Maritime Governance in the  
Light of China's Arctic Policy**

Master's Thesis  
in FUTURES STUDIES

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The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION</b> .....	<b>5</b>
1.1	History and Background of the Arctic in Study .....	5
1.2	Changes in the Arctic and the Arctic Shipping Development .....	6
1.2.1	The development of China’s Arctic Policy with Changing Arctic.....	6
1.2.2	From “Blue Economic Passages” to Arctic Shipping Routes .....	7
1.2.3	China’s Arctic Policy and “Polar Silk Road” .....	9
1.3	The Scope of the Study .....	10
<b>2</b>	<b>THEORETICAL FRAMEWORK</b> .....	<b>13</b>
2.1	Scenario Thinking .....	13
2.2	Scenario Typology .....	14
2.3	Types of Scenario Contents.....	15
2.4	Dator’s Four Generic Futures .....	17
<b>3</b>	<b>METHODOLOGY</b> .....	<b>20</b>
3.1	Morphological Analysis (MA).....	20
3.2	Field Anomaly Relaxation (FAR) Application .....	22
3.3	Dator’s Four Generic Futures .....	24
3.4	Data Collection .....	26
3.5	Data Analysis.....	28
3.5.1	Futures Table Catalogue .....	28
3.5.2	PESTEC Classification .....	28
3.6	Persona and Storyline.....	29
<b>4</b>	<b>RESULTS</b> .....	<b>32</b>
4.1	Variables Arrangement.....	32
4.2	Personas and Four Scenarios Storylines in Narratives .....	43
4.2.1	Storyline 1: Continued Growth Scenario .....	43
4.2.2	Storyline 2: Collapse/Decline and Stagnation Scenario .....	46
4.2.3	Storyline 3: Toward Disciplined and Sustainable Society Scenario.....	48
4.2.4	Storyline 4: Transformational Scenario .....	51
<b>5</b>	<b>DISCUSSION</b> .....	<b>55</b>

<b>5.1</b>	<b>Summary of Results</b> .....	<b>55</b>
<b>5.2</b>	<b>Limitations of the Study</b> .....	<b>57</b>
<b>5.3</b>	<b>Suggestions for Further Studies</b> .....	<b>58</b>
<b>5.4</b>	<b>Conclusion</b> .....	<b>59</b>
	<b>BIBLIOGRAPHY</b> .....	<b>61</b>
	<b>Appendices</b> .....	<b>70</b>
	<b>APPENDIX 1: CHINA ARCTIC POLICY EXCERPT</b> .....	<b>70</b>
	<b>APPENDIX 2: 中文摘要</b> .....	<b>73</b>

## LIST OF FIGURES

Figure 1	ABEC in the BRI network of corridors (Erokhin Gao & Zhang 2018, 4) .....	8
Figure 2	China's Basic Principles in Arctic Participation in China Arctic Policy (adapted from white paper of the PRC State Council Information Office 2018).....	11
Figure 3	The Scenario Typology Diagram by Notten et al. (1993, 425) .....	14
Figure 4	Four generic futures in illustration (adapted from Dator 2017, 4-6) .....	18
Figure 5	Seppälä's Futures Table Method (adapted from Kureniemi 2001, 3) .....	25
Figure 6	Research Strategy in Progress .....	25
Figure 7	Personas and scenarios creation model (Nielsen 2003, 73) .....	30

## LIST OF TABLES

Table 1	China's participation in and cooperation of Arctic affairs at global level.....	5
Table 2	Chronological Record of China's Bilateral / Trilateral Arctic Events in China's Arctic policy (adopted from white paper of the PRC State Council Information Office 2018).....	6
Table 3	The scenario typology in detail by Notten et al. (2003, 426).....	15
Table 4	"scenarios archetypes schemas" by MacDonald (2012, 287) .....	17
Table 5	Rationale of Dator's four generic futures (adapted from Dator 2009, 8-10).....	19
Table 6	Collection of selected policy documents .....	27
Table 7	Futures Table of the Arctic Maritime Governance .....	33
Table 8	Fabula for "Continued Growth" Scenario.....	43
Table 9	Fabula for "Collapse/Decline and Stagnation" Scenario .....	46
Table 10	Fabula for "Disciplined Society" Scenario.....	49
Table 11	Fabula for "Transformational Society" Scenario .....	51
Table 12	Key characteristics of each scenario from futures table with China's role .....	55

# 1 INTRODUCTION

On the contrast to the impression of the gleaming white snow world with stretching eternal ice, what the fact is, global warming and ice melting away constantly, Arctic issues are becoming uproarious with increasing attentions around the globe. They are from most industrialized countries, and numbers of institutions are growing. By eagerly adopting “the Arctic perspective” in decision-making and constantly influencing the fate of the Arctic, Arctic topics, debates and problems, are not long on the merely agenda within the Arctic. China, with its rapid economic development, has become a rising power in global politics, and published its first Arctic Policy on 6th January 2018. The white paper of State Council (State Council Information Office of the PRC 2018) is China’s rather recent interpretation on the Arctic presenting the self-defined “near-Arctic state” perspective to the world. Thus, it is fair to ask, with changes of the old and new, how the futures of the Arctic would be affected, in picturing the Arctic in 2050s. These explorative questions are worth to ponder.

## 1.1 History and Background of the Arctic in Study

The first part of the white paper states China’s stances and claims on Arctic affairs mainly in the perspective of international politics confronting everlasting changes, and the assertive connections China upholds by tracing back historical records of China’s participation in Arctic affairs. The summary on China’s global activities, participation and cooperation, based on the late updated from white paper are presented in Table 1.

Table 1 China’s participation in and cooperation of Arctic affairs at global level

<b>China’s Global Activities Theme Classification</b>	
<b>Participation (in the formulation of rules)</b>	<b>Cooperation (with various States and international organizations)</b>
Global Environment	Environmental Protection
Climate Change	Promotes Energy Conservation
International Maritime Issues	Emissions Reduction
High Seas Fisheries Management	Low-carbon Development
Fulfills International Lawful Obligations	

The year of 2020 is the 100th anniversary year of the Svalbard Treaty, an important piece in Arctic politics contemporary history. Svalbard Treaty is the outset of classic treaties on International sovereignty dispute settlement. It was signed in Paris during the Versailles negotiations after World War I on 9th, February 1920. From the Arctic Portal Library's database, the key issue from the treaty is on international diplomacy on declare Norway's absolute and unrestricted sovereignty over Svalbard in the Arctic Ocean (The Svalbard Treaty, Paris §1, 1920), put into force until 1925 with a few limitations. With members of ratification among the signatory Powers of the Svalbard Treaty, China's maritime policies are significant components of China's foreign policy representing national strategic values. China's approach in its increasing participation and cooperation in Arctic affairs is supported bilaterally or trilaterally. Arctic activities especially in 2010s are briefly summarised in the policy document.

Table 2 Chronological Record of China's Bilateral / Trilateral Arctic Events in China's Arctic policy (adopted from white paper of the PRC State Council Information Office 2018)

Year	Bilateral / trilateral Country	Event(s)
2010	With United States	An annual dialogue mechanism for bilateral dialogues was set up on the law of the sea and polar issues.
2012	With Iceland	The Framework Agreement on Arctic Cooperation was signed as China's first inter-governmental agreement on Arctic issues with an Arctic State.
2012	With United Kingdom and France	Bilateral dialogues on the law of the sea and polar issues.
Since 2013	With Russia	Arctic issues dialogues.
2016	With Japan and the Republic of Korea	High-level trilateral dialogues on Arctic issues to promote exchanges on policies, practices, and experience regarding Arctic international cooperation, scientific research, and commercial cooperation.

## 1.2 Changes in the Arctic and the Arctic Shipping Development

### 1.2.1 The development of China's Arctic Policy with Changing Arctic

With Climate Change and Global Warming accelerating, ice on the Arctic Ocean is melting, more space is appearing within the Arctic Circle, and ice coverage reaches to "its minimum each September" (NASA 2019). China, as the world second largest economy, after rapid development in the past a few decades, it has been actively participating in



globalization, meanwhile seeking integrations regionally around the world. In this background, China's Arctic Policy, as the product of China's politic system, it functions as guideline of its conduct in Arctic through the party-state, in top-down approach. Moreover, China's Arctic Policy is derived from China's international strategy into the perspective of regions and evolves from abstract to concrete. The predecessor of China's Arctic policy is Xij Jinping's concept of "the Silk Road Economic Belt" (China Daily 2013).

On 7th, September 2013 in Kazakhstan, Xi Jinping announced "the Silk Road Economic Belt". In October, the same year, he addressed "the 21st Century Maritime Silk Road" policy in his speech to the Indonesian Parliament, which are significant elements of Beijing's effort to improve ties and to stimulate growth and development along its geographic periphery. Alzghool (2019, 4) observes that China is building a "mega project" aiming to enhance economy development through peaceful trading to support global cooperation.

During 2015, China had separately issued two policy documents- "The Vision and Actions on Jointly Building the Silk Road Economic Belt" and "the 21st Century Maritime Silk Road". Combined, they are manifesting major perspectives of China's global strategy- "promoting policy coordination, connectivity of infrastructure and facilities, unimpeded trade, financial integration and people-to-people bonds, adhering to the principle of achieving shared growth through discussion and collaboration in propelling the Belt and Road construction." (Xinhua 2017). These major perspectives are rephrased as "One Belt, One Road" (一帶一路) or "Belt and Road Initiative", shortened as OBOR.

Observations, such as OBOR is an answer for the future of Chinese long-term development goals (Imomnazar 2018, 29), or that OBOR is serving China's economic growth and make China became the balancing power, eventually from economic power to military power (Alzghool 2019, 10-13). To some degree, those observations are indicating China's attempt, by promoting its growing economic power position, to increase its peripheral influence in international politics.

### 1.2.2 From "Blue Economic Passages" to Arctic Shipping Routes

"Vision for Maritime Cooperation under the Belt and Road Initiative" is China's administrative policy document, which contains a series of maritime related projections. In the long run, visionary scenarios in China's interpretation mean "a peaceful and prosperous 21st-Century Maritime Silk Road" with the expectation to revive the "Ancient Silk Road"

concept on the sea: Maritime Silk Road the 21st century edition (Xinhua 2017). Currently, to establish “Blue Partnership” model with countries along is the start. By joint efforts in utilizing marine resources, China is aiming at “common development” so that participatory members are included to benefiting from the theme of “ocean cooperation”.

China’s ocean vision: “Maritime Silk Road” consist with three “Blue Economic Passages”:

1. The China-Indian Ocean-Africa- Mediterranean Sea Blue Economic Passage, by linking the China-Indochina Peninsula Economic Corridor, running westward from the South China Sea to the Indian Ocean, and connecting the China-Pakistan Economic Corridor (CPEC) the Bangladesh-China-India-Myanmar Economic Corridor (BCIM-EC).
2. The China-Oceania-South Pacific blue economic passage, travelling southward from the South China Sea into the Pacific Ocean.
3. Envisioned blue economic passage to Europe via the Arctic Ocean.

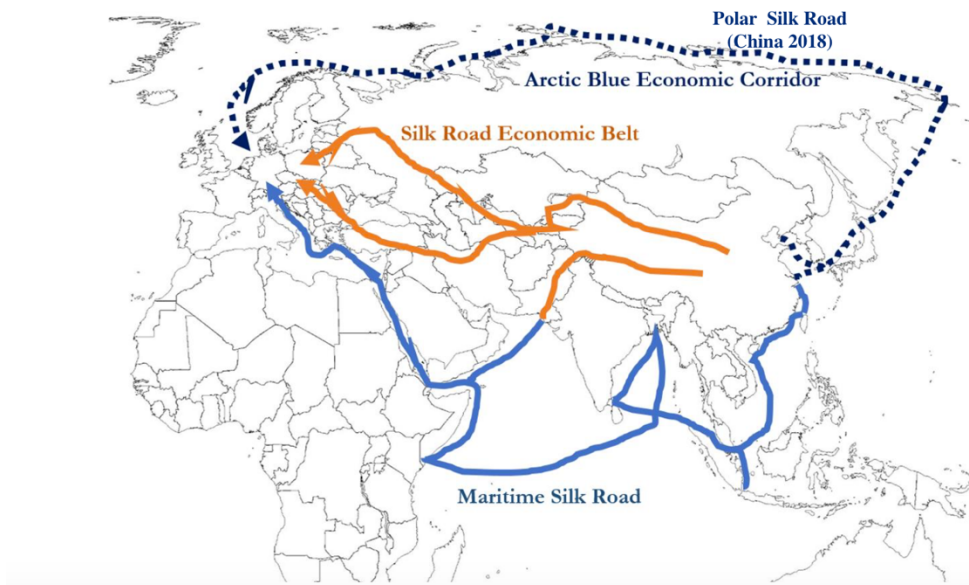


Figure 1 ABEC in the BRI network of corridors (Erokhin Gao & Zhang 2018, 4)

Apart from China’s affinity with the Arctic in contemporary history, China holds growing ambition for the region by increasing participation in Arctic activities (see Zhao 2018) (also see Staalense 2019). Particularly in economic activities, China has been comprising in Nordic shipping route expeditions (Xinhua 2017) (see Li 2019). Regardless the

fact that China is not technically an “Arctic-State”, as the country does not have territories inside the Arctic.

Manicom and Lackenbauer (2013, 1, 4, 5) criticize that East Asian states do not perceive Arctic issues through an “Arctic” lens, that is, from security and global perspectives. They further illustrate that “membership” of the Arctic Council is undermined as these states could pursue “Arctic” interests in other ways, in dealing “maritime” or “polar” issues instead. However, China is among indispensable stakeholders in Arctic affairs such as in Arctic security issue of Global Warming (cf. Goodman & Freese 2018), which holds unparalleled significance of being highly topical, and it links to the alternative futures of the whole mankind.

The definition of “Arctic-States” is generated from Arctic Council’s “member states” concept, which China was excluded as it did not belong to the founding countries of the Arctic Council since 1996. In 2013, the same year as OBOR initiatives firstly announced, China became an accredited observer to the Arctic Council, which enables China to express its interests of the Arctic region with respect to the Arctic Council’s guidelines.

From Arctic scientific research conducts from the 1990s, China’s activities in the Arctic have expanded into diverse areas of affairs including the platforms of global governance, regional cooperation, both bilaterally and multilaterally. The white paper of China’s Arctic Policy was published on 26th January 2018 by the State Council Information Office of China in Beijing. Thus, the Arctic region is facing changing dynamics that come from China’s national top level. The message is delivered: China claims as “Near-Arctic-State” (cf. Descamps 2019). Will China be entitled to expand its influence through considerably strong activities is questionable. In an official media release, Arctic activities refer to “scientific research, ecological environment, climate change, economic development, and cultural exchanges” (Xinhua 2018). Moreover, those are identified key fields of China’s Arctic Activities with priority in the document.

### 1.2.3 China’s Arctic Policy and “Polar Silk Road”

Upon the date of China’s Arctic policy was officially announced to the world, “Polar Silk Road” (冰上丝绸之路) concept was made public. In the context of this thesis, “Polar Silk Road” is taken as a part of OBOR initiatives. The white paper manifests China’s national decision-making in seeks to “continue to play a constructive role in the formulation of Arctic-related international rules and the development of its governance system” (The

State Council Information Office of the People's Republic of China 2018). The white paper includes bequest targets in Arctic context from governmental perspectives. In practice, the experiences gained by Chinese companies while exploring the Arctic shipping routes, have begun the process of probing commercial opportunities in the Arctic, even before publishing the White Paper (Humpert 2018, 2019). In a nutshell, the white paper conveys China's Arctic vision, via "Polar Silk Road" to facilitate connectivity and sustainable economic and social development of the Arctic in the future.

Nevertheless, we see commonly shared perspectives in foreign policies from Arctic-States based on separated sovereignties over Arctic affairs in general (e.g Exner-Pirot 2016), both in cooperation and competition.

For power balancing propose in the Arctic region, Arctic Council is the inner governmental forum that has been instrumental (see Escudé 2016). The success is due to its ministerial meetings to include "board and diverse" participants (Kuivuova 2008, 152). The so far well-functioned platform of Arctic Council consists of Arctic-states, Arctic indigenous people and non-Arctic states in the observer status-found on September 19, 1996 with The Ottawa Declaration in Canada. Arctic Council serves as intergovernmental forum, "promoting cooperation, coordination and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic." (Ottawa Declaration, Canada §1. A. 1996).

In addition to comply within the conduct of the Arctic Council's guidance, governments of different entities are with separately foreign Polar policies in dealing Arctic related affairs. Regardless the fact that Arctic Council has been resistant to change while engaging in strategic discussions, it hence might be supplanted by other forms of governance due to the inner governmental structure (Kuivuova 2008, 1, 153). Notably, China is one of the changes that might result in altering current governance by even creating a new institution to challenge the Arctic Council (see Jakobson 2010). Conflict interests in economic activities in the Arctic are results of states' strategies, which left room for Arctic Council be improved in Arctic governance, for instance, in leading economic activities to sustainable and to combat problems of environmental deterioration.

### **1.3 The Scope of the Study**

Research destined on Chinese policies are plentiful, regardless the difficulties imposed by China's particular features especially from its political system. China's Arctic Policy,

not only the timeliness is up to date, but China and the Arctic futures combined is proving a topic-Arctic maritime governance- that is complicated with uncertainties. By presenting scenarios, it produces explorative interpretations for projecting the Arctic maritime governance in 2050. In addition, themes of China policy studies are in expansion, ranging interpretations to in-depth analysis. For example, most researched dimensions are based on “external speculations” (Woon 2020, 78), that is, themes on China’s policy research activities lean increasingly to a set of international relations focusing on tensions, represented by interpretations both in media and academic from the western critical geopolitics perspective. He further argues against the biased view on “Polar Silk Road”, that is, networks of logistics and transportation by China in Arctic would provide the domination position for it in gaining geopolitical power started from the Arctic area. It might result from lacking the inputs from Chinese elites while seeking the genuine definition of China’s Arctic venture projected by “Polar Silk Road”. Further, his work contributes to China’s policy study by suggesting that “Polar Silk Road” act as a framing theory, it shall be used as conceptual methodological tenets in understanding, debating and initiating discussion on China policy studies.

Based on China’s white paper, “respect, cooperation, win-win result and sustainability” are the basic principles in its participation in Arctic affairs. The inner-relations of each principle are presented in Figure 2.

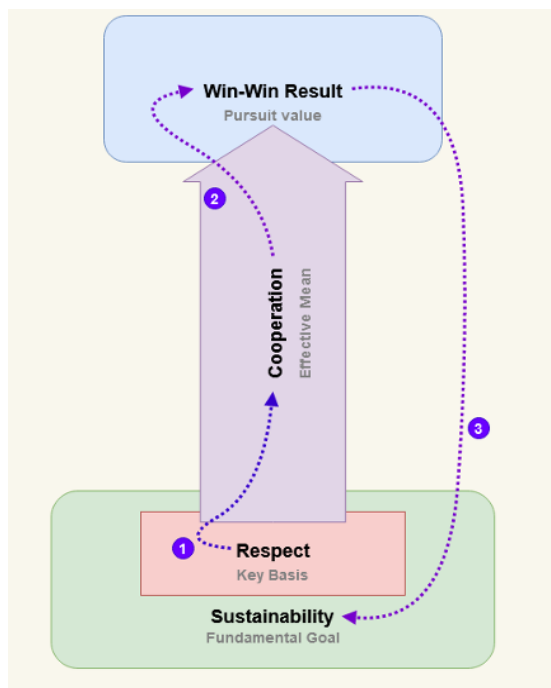


Figure 2 China’s Basic Principles in Arctic Participation in China Arctic Policy (adapted from white paper of the PRC State Council Information Office 2018)

From the illustration above and based on the white paper text, China's Arctic participation include to follow steps as marked. My interpretation on this matter is that steps are supported by reaching to the goals set by each principle and would be proceeded according to the periodic national planning concerning to China's Arctic participation.

In this research, the issue was set on detecting China's influence and its possible effects out of the Arctic Policy in an objective matter. Followed with a selection of polar policy papers from the same time period, 2010-2020, the literature review is performed. As the result, I am mapping out the alternative futures of the Arctic with the old and new changes extracted from them. Policy documents provide expressive political statements, from where subjective descriptions of the futures vary from interpretations as institutions vary. With the mindset that China would be one main player but not the only one in Arctic activities, the explorations for the futures in the Arctic are composing.

China's Arctic Policy document topics provide the starting point of my research, with processing factors that could be used in interpreting other selected polar policy papers as well. From the policy analysis perspectives, foreign polar policy studies from selected countries would form a context with empirical data that consists of a systemic content analysis. Polar policy is among one state's foreign family of policies, indicates the national interests of any confined region, reflecting the nation's legislation process to come (cf. Manicom & Lackenbauer 2013). As polar policy is officially formatted, it sets broadly the guideline and principle for each state's participation in Arctic affairs. Arctic strategy paper is spoken in future tense, making it possible for action plans to be adopted in later phrases. They might be arranged in some "vision". Ideally, the "vision" might be reached after the polar policy in question is fully enforced.

Storylines are the presentation, originated from a systematic context of selected materials, with the emphasis on institutions that well-acknowledged with increasing strategic position of the Arctic. And the research aims to enrich the foreign policy studies with an exploratory perspective. With various categories were set, it prepares the draft of futures table in order to identify drivers from a variety of fields. The composition of scenarios narratives would cover more than the traditional perspectives in policy analysis, such as in geopolitics and international relations. In other words, with selected related policy papers and project materials, with Arctic shipping routes issue being particularly scrutinized, it supports the exploration on futures in the Arctic.

## 2 THEORETICAL FRAMEWORK

What would the futures of the Arctic look like? It is the research question of this thesis. The theoretical framework of the thesis includes scenario thinking, scenario typology and types of scenarios contents and Dator's four generic futures.

### 2.1 Scenario Thinking

There is countless research, focus on Arctic issues from various systematic perspectives such as from policy studies, natural science or social studies. In this futures study's thesis, the presentation of the alternative futures is the priority, consisting the findings of the research. In the tool set of futures studies, scenario thinking, and scenario analysis are fit for explorative study practice. From the author's observation, scenario thinking applies when picturing what plausible futures would be, and gradually shaping alternatives provided by analysis. Instead of seeking the specific images of the Arctic shipping futures, the author's focal point is to discuss on trends and drivers, by classification among which to form the final group of variables and to compose scenario storylines to present scenario narratives.

On the contrast to the impression of "scenarios", it is a rather reliable tool in providing theoretical lattice for explorative research. To some degree, "scenarios" serve similar functions as "models" when uncertainties are the main hue of the topic along changing drivers for futures to come. A "conceptual framework" that "to integrate the objectives of different stakeholder groups" (Priess & Hauck 2014, 1), and they conclude that changes bring impacts both on futures of nature and people after they developed the land-scenarios in their work. Noticeably, scenario development and analysis have been widely used in a number of different fields of research such as industry, military, business, and science. (Raskin et al. 2002) (Börjeson et al. 2006).

Overall, scenarios development and analysis are among thoroughly reviewed approaches due to the common usage in various research subjects of uncertainty in their stratum. Global Scenario Group, from its Urban Futures research in UK, identified and categorised more than 160 scenarios from 1997 to 2011 (Hunt et al. 2012). They work as database for scenario modelling reviews. The contribution of the database is to present the scenarios of explorative nature. As an integrated approach, that are combining modelling of multiple environmental, social, and economic system components with the embedded interactions among them.

## 2.2 Scenario Typology

Scenario thinking and development approach has been applied commonly since the 1960s and has been evolving along the way. When facing various number of scenario types, even more to come, there is the need for assortment on multifariousness of scenarios with sets of rules to exist. “An updated scenario typology” was introduced to provide “common and shared understanding of typical features” by Notten et al. (2003; see Fig. 3). They reached to a renewed scenario typology pattern, with effectiveness tested, to serve as guidelines for classifications of scenarios out of extensive scenario literature reviews and the comparative analysis on case studies from a massive selection of scenario projects. The scenario typology of Notten et al. (2003) was reasoned from three overarching themes: the project goal, process design and scenario content. They restored broadly in the process of scenario development with key questions that we might ponder, which are: the why, the how and the what. Moreover, the typology was not confined by themes, it combines characteristics generated from scenario cases into the pattern, so that meticulous aspects are provided for analyses.

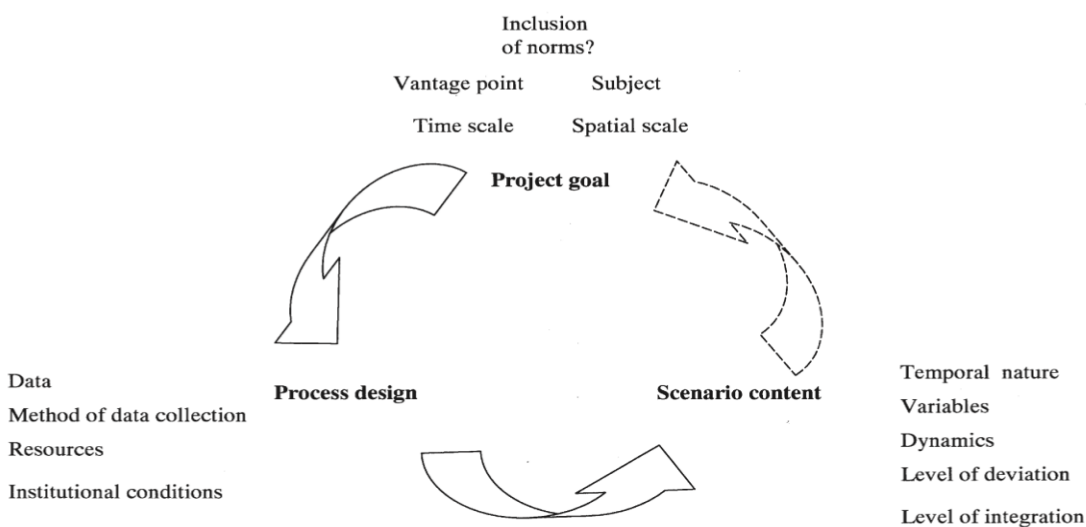


Figure 3 The Scenario Typology Diagram by Notten et al. (1993, 425)

Three themes relate to each other showing the linkage in-between. On the contrast to the others, the linkage between scenario content and project goals is weaker due to the happening of scenario process.



Table 3 The scenario typology in detail by Notten et al. (2003, 426)

<i>Overarching themes</i>	<i>Scenario</i>	<i>characteristics</i>
A Project goal: exploration vs decision support	I.	Inclusion of norms? : descriptive vs normative
	II.	Vantage point: forecasting vs backcasting
	III.	Subject: issue-based, area-based, institution-based
	IV.	Time scale: long term vs short term
	V.	Spatial scale: global/supranational vs national/local
B Process design: intuitive vs formal	VI.	Data: qualitative vs quantitative
	VII.	Method of data collection: participatory vs desk research
	VIII.	Resources: extensive vs limited
	IX.	Institutional conditions: open vs constrained
C Scenario content: complex vs simple	X.	Temporal nature: claim vs snapshot
	XI.	Variables: heterogeneous vs homogenous
	XII.	Dynamics: peripheral vs trend
	XIII.	Level of deviation: alternative vs conventional
	XIV.	Level of integration: high vs low

To some degree, scenario characteristics represent possible extreme ends of each theme, they are forming the base of different kinds of scenario. “Scenarios contain the stories of these multiple futures, from the expected to the wildcard, in forms that are analytically coherent and imaginatively engaging.” (Bishop et al. 2007, 5). In summary, themes with identified 14 scenario characteristics can be used to classify scenarios in practice (see Table 3).

Apropos of my study, when picturing the futures of the Arctic maritime governance and Arctic shipping in the time range of the 2050s, the project goal is rather explorative using intuitive approach, specifically, the composition of storyline to present scenario narratives.

The process design is to represent scenario content in complex form, which is comprised with variables gathered from policy documents and related public news releases.

### 2.3 Types of Scenario Contents

After a brief discussion on scenario methodology above, scenario thinking does not stop at the issue of how scenarios are made. The art is “in the balance” (Paskin et al 2002, 12), “modelling offers structure, discipline and rigor, narrative offers texture, richness and insight.” The meanings of developed scenarios, the scenario contents are essential as the “output” of scenario thinking process.

Scenario can be descriptive, exploratory, and highly subjective. There are bearing little success in the attempts to calculate and record existing types of scenarios. So far, no

chronological annals of scenarios could be produced, as in the fact that the types of scenarios are increasing to appear constantly. Another obstacle is there is no well-acknowledged standards in defining the intrinsic of existing scenarios.

So that we are still facing the obscurity in the catechism of terms to exemplify the content of “scenario types”. The typology provided by van Notten et al. is focused on variation of scenario methodology, but the output of the actual scenario contents is excluded. Here are examples on terms describing types of scenario contents:

- “scenario families” by van Vuuren et al. (2012)
- “scenario archetypes by Sitas et al. (2019)
- “four alternative futures” by Dator (2009)

No matter what is the term that we use as mentioned above or not, the purpose is to explicate the generality in scenarios that would “grouping” scenarios (Sitas et al. 2019). Indicators apply in categorizing scenarios, based on assumptions, inner scenario logic and storylines and characteristics. (see van Vuuren et al. 2012, 885) (see Paskin et al 2002, 14) (also see Dator 2009, 8). There is the need that for a clearer structure to prepare these increasing scenario varieties for analysis. “Scenario archetypes” is a go-for term in this situation. “Scenario families” is another term to conceptualizing different kinds of scenarios. From multiple level scenarios reviews, there are six scenario families in global level: (1) the economic- technological optimism/conventional markets scenarios, (2) the reformed market scenario, (3) the global sustainability scenario, (4) the regional competition/regional markets scenarios, the (5) regional sustainable development scenarios, (6) and the business- as-usual/intermediate scenarios. (Vuuren et al. 2012, 889).

If the combinatorial theme of scenarios is in global level, the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES) assessed its science-policy performances in sustainable development with six scenario archetypes: “Business-as-usual”; “Economic optimism”; “Regional competition”; “Global sustainable development”; “Regional sustainability” and “Inequality”. (Sitas et al. 2019).

The development of scenarios is the inversion process to present how the futures would evolve. In fact, there are many designed archetypes from different futurists in years of scenarios development, and analyses from a wide ranged cases and subjects (see Table 4).

Table 4 “scenarios archetypes schemas” by MacDonald (2012, 287)

Author	Archetypes			
MacDonald	Progress	Catastrophe	Reversion	Transformation
Dator	Continued growth	Collapse	Discipline	Transformation
Bezold	Official future	What could go wrong		Visionary future
Schultz	Business as usual	Ideological exclusionism		Hi-tech transformation
	Environmental sustainability	Collapse		Spiritual transcendence
Inyatullah	Evolution and progress	Collapse	Back to the future	Gaia
				Globalism
Scoles and Biggs	Market forces	Fortress world	Local resources	Value change
	Policy change			

Without any doubts, by applying existing formations among scenarios, it enables research to start without being wasteful in time and resources to created scenario schemas first.

After all, the term “archetypes” stands for the fact that groups of scenarios sharing the similar features with embedded drives and trends of each kind. To some degree, I would like to make a metaphor that scenarios in narratives are alternative futures in walk, with “archetypes” as stem cells. In cellular differentiation, dividing drivers and trends among cells and organs boosting the body to functions. Those formations in scenarios of each group, share characteristics in common, to genes are carrying similar DNAs.

#### 2.4 Dator’s Four Generic Futures

From Macdonald’s empirical research of categorizing scenarios, he summarises that basic features of scenario types are four in common: Progress, catastrophe, reversion and transformation. They are aligning with nature of Dator’s four generic futures, and it is also a rather established structure for mapping out alternative futures. The issue of the Arctic futures is in need for a structure that would produce scenarios narratives with all four basic features of scenarios for the generality.

Dator’s four generic futures is one archetypical structure in building scenario narratives. Jim Dator from Hawaii Research Centre for Futures Studies, his work since 1970s, are seeking alternative futures of both the world and society. Dator’s four generic futures work as futures archetypes bears his formation schema in his scenario thinking practice and guides the process in constructing scenario narratives.

Moreover, there are futures archetypes varieties derived from Dator’s formation assisted by critical thinking, that is, four generic futures have been supporting the futures archetype development since then. “Dator alternative futures archetype” (Bezold, 2009)

is a common equivalent term encountered to address Dator's four generic futures (Dator 2009, 2017). This trivial confusion verifies the fact that Dator's four generic futures serves as one rooting scenario archetype model in projecting alternative futures in scenario exercises. Dator and his approach has been expanding in years of usages and providing the cradle for more varieties in the archetypal aspect of scenarios. "Aspirational Futures" (Bezold, 2009) was developed on the base of Dator's four scenarios, in addition to provide the way to interpreting futures with graphical guide from both individual and societal angles, "Aspirational Futures" covers and emphasizes on the subjective initiative role of community and organizations in scenario thinking. It is a product of one of variations from four generic alternative futures structure by combining features of shared subjects in theme.

Dator's four generic alternative futures are: "Continued Growth", "Collapse", "Disciplined Society" and "Transformational Society". They are visualized in Fig. 4 and compared in Table 5.

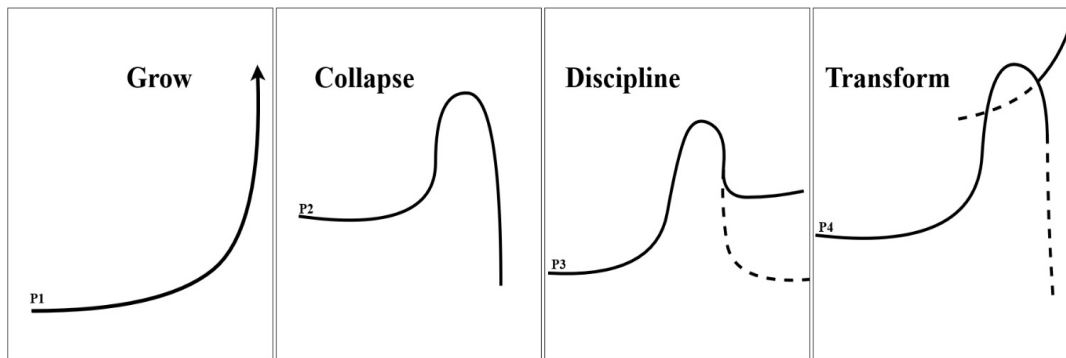


Figure 4 Four generic futures in illustration (adapted from Dator 2017, 4-6)

From the figure above, Dator's futures archetypes is the ramification both in scenarios and futures images. It is the collection of themed scenarios and futures imagines, that is, his formation of projecting what futures could be unfolded while referring to progress of the society (P-lines). "Not THE Futures, but alternative futures" (Dator 2012, 39), and he concludes that these four particular alternatives are the most representative ones after systematic analyses. His approach works effectively in the forecasting and envisioning process for plausible futures, among them the preferred futures would be filtered for further examination. Futurist's forecast is on alternative futures and present them in a form

of “logical statement”. And his structural answer to describe alternative futures is summarised as: “Continued Growth”, “Collapse”, “Disciplined Society” and “Transformational Society”.

Table 5 Rationale of Dator’s four generic futures (adapted from Dator 2009, 8-10)

	“Continued Growth”	“Collapse”	“Disciplined Society”	“Transformational Society”
<b>Description</b>	Continuing past and current trends of material growth to future in a business-as-usual manner.	“The future of our nightmares and growing concerns” but not “worse case scenario”.  "collapse and extinction";	“Sustaining fundamental values and avoiding collapse”;	Big leaps by technology breakthroughs in development.
<b>Key drive(s) and trend(s)</b>	Economic growth.	Social and/or environmental collapse and economic cannot grow infinitely.	Institutional interferences to reserve or restore values.	Technology
<b>Supporting or contributing actor(s)</b>	To build a vibrant economy, and to develop the people, institutions, and technologies to keep the economy growing and changing.	Collapse occurs from economic, environmental, resource, moral, ideological, or a failure of will or imagination.	Refocus economy and society on a set of fundamental values: natural, spiritual, religious, political, or cultural.	Robotics and artificial intelligence, genetic engineering, nanotechnology, teleportation, space settlement, and the emergence of a "dream society" as the successor to the "information society".
<b>Crucial decisions</b>	To keep the economic “engine” running constantly for prosperity.	"Collapse" from some cause or another (or their combination).	Find a deeper purpose in life than the pursuit of endless wealth and consumerism.	Obtain and tame power of technology.

### 3 METHODOLOGY

For the methodology discussion of the thesis, first and foremost, the selection of documents needed to be attentively collected for further scrutinizing. After selected documents were thematically analyzed, it prepares the scenarios creation with Morphological Analysis (MA). The primary stage for preparation is gathering information classified by themes while going through most of policy papers.

As scenario thinking is overall a heuristic process, in addition to the complexity of Arctic issues, which are embedded with a high level of uncertainty, we come across the perfect match with the very mind set in scenario thinking. Undoubtedly, this research belongs to interpretative studies. Most of the data in use were originated from officially policy papers release or policy-related documents. One of the struggles is to make the presentation of findings both being meticulous for display and remain brief to read without losing any crucial data. To some degree, it requires to exhibit “complexity of relations” in a graphically comprehensive manner.

In the toolbox of Futures Studies, a way to do Morphological Analysis (MA), is the Futures Table method. It is competently for the task of thematic structuring of the issues reflected in the documents and accessible for analysing alternative futures afterwards. Futures Table is a conventional method used in scenario thinking, it is the exercise about alternative futures being generated and equipped with scenario narratives for final presentation.

#### 3.1 Morphological Analysis (MA)

Before diving into piles of documents, the prerequisite is to acknowledge the logic on how to process data from a cluster of policy materials for analysis, as it could become overwhelmingly with the enormous workload. Morphological Analysis (MA), as the name suggests, the etymon of morphology is “morphê” in ancient Greek, meaning the study of shape or form (Ritchey 2005-2018) (Ritchey 2009,1). It is fitting and useful in structuring the thematics of relevancy among alternative futures construction, that is the conduct of a systematic scenario analysis, by go through content, managing data for further investigation in various fields of studies.

In the late 1940s, the North American the California Institute of Technology (Caltech) was the cradle of “a generalized form of morphological analysis”, led by the astrophysicist Fritz Zwicky (1898–1974) in aerospace science. Ritchey (2009, 2) comments on

Zwicky's contribution to "the generalized morphological analysis" is "...the method for structuring and investigating the total set of relationships contained in multi-dimensional problem complexes." To some degree, Zwicky's works are pioneers for the method to development.

Ritchey (1997) motioned that the expansion in the practice of morphological analysis (MA) occurs from the late 1960s to the early 1990s, conducted by engineers, operational researchers and policy analysts for structuring complex engineering. The tradition of applying MA for operational research and policy studies, which built the methodological foundation for this thesis. It is one exercise of exploring futures of the Arctic maritime governance due to everlasting changes in emergences resulting in a handful task in study the complexity. MA In Ritchey's word "morphology is associated with a number of scientific disciplines in which *formal structure*, and not primarily quantity, is a central issue." (Ritchey 2002, 3). Moreover, he listed aspects while practiced morphologist in working with small subject specialist groups (Ritchey 2005-2018, 1), including:

- developing scenarios and scenario modelling laboratories;
- developing strategy alternatives;
- analysing risks;
- relating means and ends in complex policy spaces;
- developing models for positional or stakeholder analysis;
- evaluating organizational structures for different tasks;
- presenting highly complex relationships in the form of comprehensible, visual models.

The issue of international maritime governance of the Arctic region counts as a complex in policy, which is dealing with relationships among various organizations that might require tasks of constructing models in seeking strategy alternatives perhaps also with the help of stakeholder and risks analyses. From the exploratory angle, this research mostly constructed on scenarios as the modelling tool in composing alternative futures seeking to reflect on policy and strategies so that the complexity of the research subject could be presented.

In brief, MA is a two-step process:

The first step of the MA is to create a “morphological field”. A “morphological field” is a “parameter space” in developing for fulfilling the mission to address the problematic complex in question. And secondly, each morphological field represents an inference model for investigation to construct the scenarios. This way one can analyse the relationships among multi-dimensional, non-quantifiable, problematic complexes.

In this thesis, we derived most of the data from Arctic policy papers aiming to conduct a thorough content analysis with a selection of policy paragons. Overall, we could conclude that the international maritime governance of the Arctic is rather complicated, and it is a subject of complexity made up by international relations with reflective policy documents from different bodies, showing conflictual standings toward some or a series of topics. With China’s increasing international influence and growing interests in the Arctic affairs, it is contributing to the complex of the de facto international maritime governance of the Arctic. And China’s Arctic paper as is relatively recent and it has not yet fully implemented, both short and long turn effects are unknown, which are already conveying variables and fit perfectly as the entry for analysis and leaving plenty of space to explore on the topic.

### **3.2 Field Anomaly Relaxation (FAR) Application**

Inspired by Douglas Aircraft Company’s work on making the next 10-year corporate plan in the 1960s, Rhyne (1981, 1995) invented the Field Anomaly Relaxation (FAR) method. As FAR is one application in conducting morphological analysis and being developed in projecting alternative futures in a wide range of social fields, both in business and governmental policy making projects. We see the logical consistency throughout the two-step process: to group categories with identified features, dimensions and variables followed by constructing alternative states for each category. The aim of FAR is to present futures of internal consistency- “consistent and coherent views of the future” (Coyle 2009, 2). They provide contexts for, in the latter stage, policy formulation and decision making and echo with referencing function of scenarios toward the future without specificity in settings.

Field Anomaly Relaxation (FAR), it starts with stressing the “field”. To be more precise, interaction of “fields” is the focus of the application to conduct MA exercise. As a result, to create “morphological field”, or “parameter space” of the problematic complex in question is the first step. Rhyne (1981, 339) refer to “field” as “Sector/Factor array”,



and Coyle (2009, 2) defined the “Field” from Field Anomaly Relaxation (FAR) as simplified field of relationships for the societal or business environment in which policy has to be made. Despite the addressing of the term, the purpose of the “field” is constant.

Each of the “field” consist several conceivable conditions in various degrees to create “filing space” for all plausible possibilities to be generated in scenarios. The middle word of “anomaly” describes the dynamic flow of the application process and Geoffrey Coyle’s work contributes to refine it. “Internal coherence” is the standard to test for “ideas” to stay and eventually reach to “internally consistent”, which are base for scenarios composition. (Coyle 2009, 5). Lastly, “Relaxation”, is the referential concept, linking the effectiveness of the method as it yields convergence towards a satisfactory solution.

In brief, FAR application by Rhyne includes four steps, they are consisting a mentality loop. A FAR Rhyne Cycle (Coyle 2009, 3) includes:

- Step 1: requires one to develop some kind of imaginative view of the future into which the decision must unfold.
- Step 2: requires one to identify the critical uncertainties and their ranges of possibility, expressed in a matrix.
- Step 3: eliminates the anomalies
- Step 4 strings the surviving configurations together to form time lines.

From Rhyne’s experience, for the arrival to the “Relaxation”, that is to create four to ten scenarios extracted from collective short stories generated by running the FAR circle for twice at least. A radical modification toward the sector/factor array might occur for adjustment in the second cyclic run. In his additional remarks, in some case, mostly due to the time requirement, the circle could run for once as scenarios are urgently needed for making judgement by decision makers. Meanwhile Simplified versions of FAR application have also been developed, “somehow more satisfactory” Coyle (2009, 12), after Simplified FAR is used in his strategic and forecasting practice, outlining timelines is sufficient to archive consistent configurations for scenario development by means of creating a few consistent futures instead.

### 3.3 Dator's Four Generic Futures

Simplified FAR analysis usually works with other strategic techniques in order to reach to the satisfactory results which is the essence of scenario thinking. “the FAR approach produces the sector/factor matrix” (Coley & McGlone 1995, 75), in a collection of identified factors. In a FAR practice of the South China Sea scenario projection (Coley & Young 1996, 269), they pointed out that generating plausible scenarios for the future evolution of complex socio-political problems is the fundamental research issue in futures studies. And scenario thinking allows several futures technics to work together to fulfil the exaptation of future studies.

From Coley works we could summarize his framework of conducting the Simplified FAR analysis as:

- Step 1: Draw a mind map of the selected socio-political complex.
- Step 2: Derive a Sector/Factor Array from the mind map with main drivers and factors.
- Step 3: Refine the main drivers from the mind map.
- Step 4: Compose the Sector/Factor Array (matrix).
- Step 5: To capture feasible contexts: From the Sector/Factor matrix to develop scenarios of projected futures.

“Futures Table (Morphological Matrix)”, short as “Futures Table” is a well-acknowledged term for making morphological analysis, often used in Finland. Yrjö Seppälä, one of the seminal scholars of the Finnish futures studies, he with his “84,000 futures” developed the Futures Table Method in the 1980s Finland, they are based on Rhyne's FAR approach. Seppälä's Futures Table method flow is reviewed as below:

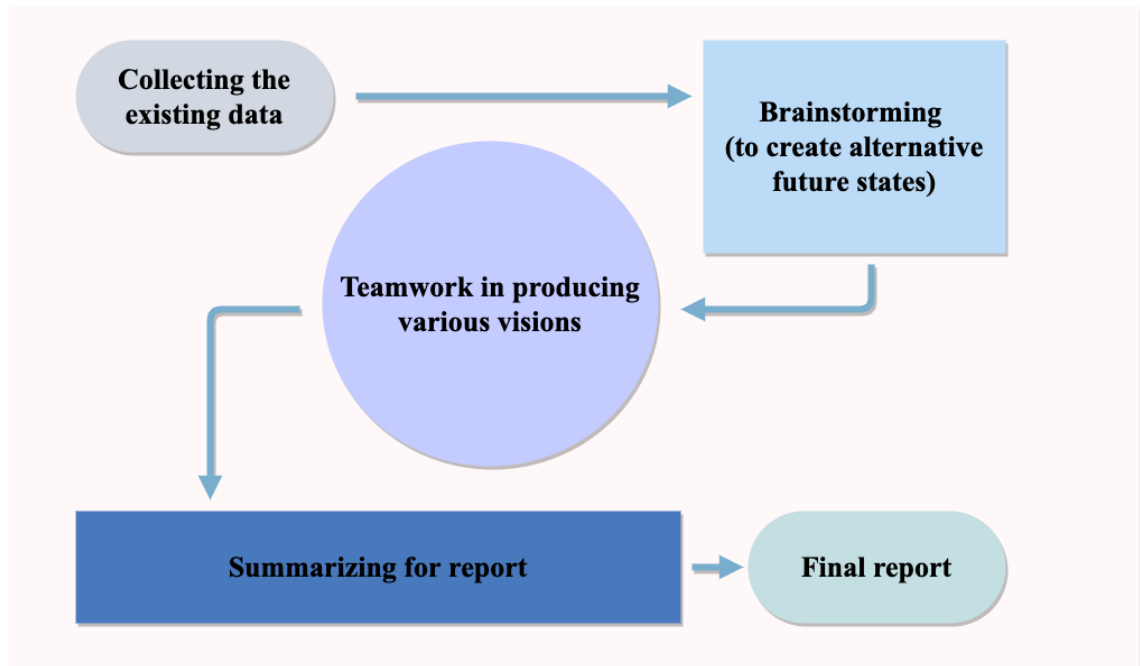


Figure 5 Seppälä's Futures Table Method (adapted from Kureniemi 2001, 3)

Seppälä's the Futures Table method prototype, noticeably, it lacks the ability to define explicitly on the intertwined relations among each "parameter space". Dator's generic futures fill in the place for the task. With this amendment, Futures Table is the fitting tool, as futures studies method in generating scenarios and to complete the scenario thinking related strategic planning and policy studies.

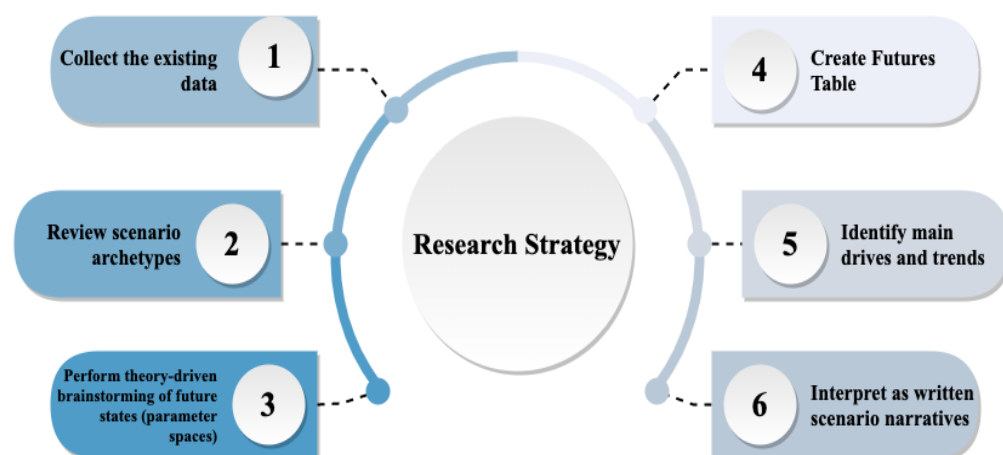


Figure 6 Research Strategy in Progress

### 3.4 Data Collection

The purpose of this chapter is aiming to represent in phrases and playback the futures table's construction, and scenario narratives creation on the explorative project for picturing the ambiances of Arctic shipping and maritime governance in 2050. As my scheme of the thesis is tailor-made with Dator's four generic futures, it provides four alternative futures individually.

In a nutshell, I did simplify version of morphological analysis (MA) on the theme with the Futures Table method to develop four scenarios' narratives.

Before my formal research starts, the Arctic and Arctic activities in recently years are much frequently appearing in the public, I started my own observation on the very collateral Arctic topics between 2017-2018, as the same time, the first China's Arctic policy was prepared and published in 2018. Since then, China has showed increasing participation attempts on the Arctic issues publicly. More crucially, is the concept of China's "near-Arctic state" definition from the white paper, which sparked discussions upon China's input toward the Arctic issues.

To complete my argument, I began to read through Arctic policy papers from the periphery countries inside the Arctic Circle. Selected Arctic policy papers were thoroughly in probe with relative perspectives circled out from China's Arctic policy as references. The standard in sizing down each point is by the relativeness of the issues mentioned in the China's paper and followed in preparing the classification of them into the PESTEC catalogue.

The most accessible materials available to the public about the current situations are originated from official papers, which are revealing details about the maritime governance in practice and it helps to identify the relevance level of each matter. With my research processing, the selected Arctic policy papers collection were enriched. It includes states such as Finland and Norway, EU as integrated party, and documents from the Arctic Council and International Maritime Organization to form my documentary material as well. These materials were complemented with media content and policy papers from 2010s. This approach could be called as a simplified version of horizon scanning practice, helping in the brainstorming phase.

Table 6 Collection of selected policy documents

Institution(s)	Document title	Issuance year	Document type
China's the State Council Information Office	China's Arctic Policy	2018	White paper
European Union's European Parliament and the Council	Joint Communication to the European Parliament and the Council – An integrated European Union policy for the Arctic	2016	European Union policy for the Arctic (52016JC0021)
Finland Chairmanship (AC)	Arctic Council Chairmanship Program Paper 2017-2019	2017	Arctic Policy
Finland: Presidency (EU Council)	EU presidency year on Arctic Policy from EU2019	2019	Arctic Policy
International Maritime Organization	International Code for Ships Operating in Polar Waters (Polar Code)	2017	International maritime regime
Norwegian Ministries	Norway's Arctic Strategy – between geopolitics and social development	2017	Strategy

My research, on the first glance, is leaning toward identify changes from the angle of International relations in the Arctic area, since policy papers are embedded in international policies studies with the fact that Arctic shipping development is among Arctic activities as international issues. However, with Dator's four futures as the main structure to explore what futures of the Arctic would lay ahead in alternatives, the "Futures Table Catalogue" was being advanced. Followed the traditional content analysis technics, in other word, the implementation of MA, my finally PESTEC table is completed for analysis. Futures Table helps to present my four scenarios' narratives about the Arctic shipping and Maritime Management in 2050s with China as a major new player but not its monodrama.

I had discussion and brainstorming with my supervisor in the later stage so that scenario narratives could be improved in order to reach to my research findings. During this stage, I had come across the issue of presenting my scenarios while in prepare for the summary on my research findings. The more individual angle of using "personas" was elected bearing the idea that I would like to project the futures that are highlighting effects on personal fates when confronting the changing worlds toward separated features. Eventually, personas and storylines are my late arrival techniques for "dressing up" my research findings. To sum up, my research subject is on Arctic shipping development

among other Arctic activities of relevance that could influence the Arctic maritime governance in 2050s with the interpretation of China's Arctic policy as the new but not the only index.

### 3.5 Data Analysis

"Futures Table Catalogue" or summary for PESTEC, is the preparation for PESTEC analysis construction. It is necessary to include intensive reading as my strategy for proceed my research design. At the beginning, extracting lines from selected policy papers regarding to the correlation from each perspective were conducted. As my research is triggered by the lasted China's Arctic Policy, and I decided to use the white paper as my references, from where to radiate and spot changes. Moreover, it outlines key points of the completed futures table. The thorough extracted China's Arctic Policy is presented in Appendix I.

#### 3.5.1 Futures Table Catalogue

"Futures Table Catalogue" or summary for PESTEC, is the preparation for PESTEC analysis construction. It is necessary to include intensive reading as my strategy for proceed my research design. At the beginning, extracting lines from selected policy papers regarding to the correlation from each perspective were conducted. As my research is triggered by the lastest China's Arctic Policy, and I decided to use the white paper as my references, from where to radiate and spot changes. Moreover, it outlines key points of the completed futures table (see Table 7). The thorough extracted China's Arctic Policy is presented in Appendix I.

#### 3.5.2 PESTEC Classification

From the selected documents, following relevant themes were extracted to form the main categories (variables) of the morphological fields of the Futures Table.

##### **Political**

- 1.The Arctic Region Jurisdiction and Sovereignty
- 2.Maritime Safety Management: How to Keep the Arctic Peaceful, Sustainable Arctic in Development
- 3.Maritime Safety in Arctic Shipping Development
- 4.Maritime Shipping Routes Conflict Management
- 5.Arctic Affairs Management in High Sea Fishery
- 6.Facilitating Body of Arctic Conflict Management

##### **Economic**

- 7.The Abundance Resources (Fishery and Energy) in the Arctic and the Accessibility of Exploitation

8. Commercial Opportunities of the Arctic Shipping Routes
9. Infrastructure Projects in the Arctic Circle (both Physical and Digital)
10. Investments toward the Arctic Region
11. Maritime Industry Development (Resources and Supply Chain)
12. Blue Economy: Opportunity for Maritime Sustainable Economic Activities
13. View on Fishery Management

#### **Social**

14. Indigenous Society and People
15. Arctic Working Condition
16. Arctic Targeted Social Policy's Input-Output Management
17. The Connectivity of the People of the North: People to People Networking and the Universal Accessibility to Resources

#### **Technological**

18. Arctic Activities in Research, Development and Innovation
19. Emerging New Technologies: provides Possibilities of Exploration and Utilization of Arctic Resources
20. Monitoring the Stages of the Sustainability Advancement and Technology Innovation
21. Space Technology and Satellite Programmes
22. Maritime Rescue Systems and Technologies:

#### **Environmental (Maritime environmental issues)**

23. Ice Meltdown in the Arctic
24. Possible Shipping Routes Appearance in the Arctic
25. The Response of Global Warming by Policymakers of different Nations
26. Future Changes in the Arctic
27. Maritime Environment Protection in the Arctic
28. Environmental Management: Agreements and Implementations of Maritime Affairs

#### **Cultural (Indigenous communities and Arctic Tourism)**

29. Arctic Tourism
30. Arctic Awareness: the Arctic Patterns of Governance and the Arctic Identity
31. Founding Programmes for Local Communities in the Arctic (on preserving indigeneity while promoting sustainable development)
32. Indigenous Cultures and Traditions vs Usage of Arctic Tourism Resources
33. Patterns of Arctic Tourism

### **3.6 Persona and Storyline**

The final stage of this study is the presentation of scenarios, the creation of scenario narratives. In collateral scenario projects analysis, the persona method in scenario narrative creation “aids both communication and design” (Guðjónsdóttir & Lindquist 2008, 165), that is, combine personas and scenarios endowed scenario writing with both “design tool” and “communication device”.

A persona is made up with persona description and a goal. Personas are fictitious characters that represent the needs and requirements of larger groups whose goals are sharing the personal characteristics of similarity (see Cooper & Reimann 2003) (also see

Cooper 1999) (cf. Pruitt & Adlin 2006). Scenarios can be both used to illustrate the present situation of the persona or a vision for the future. In both ways, scenario narratives are illustrative in the presentation of possibilities and uncertainties. And personas and scenarios are complementary to each other. On one hand, the success of persona creation is the key element that will define the performance of the final performances of scenarios narratives. On the other hand, a scenario is usually a description of an activity in which the persona fulfils one of his/her goals by using the system being developed (Guðjónsdóttir 2010, 64). As a result, scenarios narratives provide in maintaining specific environments and surroundings for personas to exist and develop. To some degree, personas are the preparation of the composition of scenario narratives in written. Personas, from the componential point of view, are the combination of personas description and persona's goal. It is the task on creating with characteristics and relevancies through selective information in collection to reach to both being detailed and realistic before scenario narratives could be developed.

However, the creation of neither personas nor scenarios are self-evident. It could be seen as being intertwined between the two-phases of creation structure before the scenario narratives are written. Based on her observations on personas and scenarios writing, Lene Nielsen, pinned down some major knotty obstacles in persona creation. Not only when writing falls in description of stereotypes (Nielsen 2003, 72) contributing the unconvincing scenarios, but also (before scenario narrative creation) connected to the writing process to distinguish between the persona and the scenario creations.

She invented a model as guideline for personas and scenarios creation. A two-phrase model started from the collection of field data and the latter creation of personas and scenarios. In a word, the model indicates the creative process of writing on how personas and scenarios could be made.

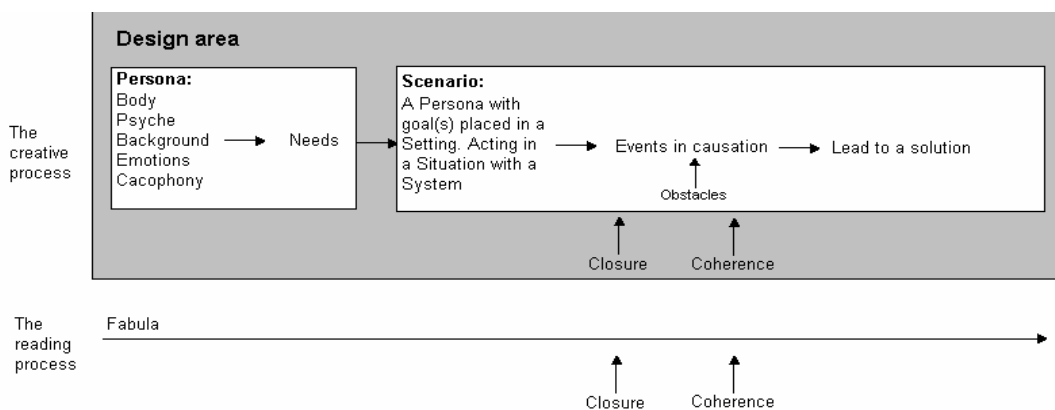


Figure 7 Personas and scenarios creation model (Nielsen 2003, 73)



In the broader sense, we need to choose this pattern to represent our findings in scenario narratives for arrangement purpose. “Storyline” is the alternative approach that would fit in the requirement to display possibilities and uncertainties. In a nutshell, each narrative is the product of each line of story being told aiming in characterizing and exchanging interpretations of uncertainties. Each line is originated from “a fictive world” (Ahlquist 2015, 41). Developing storylines will provide end-to-end and physically self-consistent descriptions of plausible future (Zappa 2019, 358). And storylines should be plausible for understanding factors contributing to each “world”, in this case, the four scenarios we generated from the futures table (see Table 7).

Storyline building is powerful both in reflecting and questioning, matching the themes of explorative research practice. Although there is a lack of research into the uses and effects of storylines, there is anecdotal evidence in the school world of practice this method among common themes to work effective in scenario thinking (Ahlquist 2015, 42). Falkenberg (2007) stresses that storyline is a tool for learning and as it is underpinned by constructivist and social constructivist approaches. Shepherd et al. (2018), in their climate change project practice, they found out that the storyline approach functions in improving risk awareness, strengthening decision-making, partitioning uncertainty and exploring the boundaries of plausibility.

Personas created in this study are based on generalised characteristics, directed by Nielson’s model, the central issue of the sketch of each persona is to determine its “needs” in each “world”. By answering how individual is affected by the surroundings, it serves the purpose of conceptualise the persona goal to assist storyline’s composition. Persona’s background differences are embedded in names, and genders are balanced as they are randomly arranged in each scenario. Bearing the illustrative function to present scenario narratives, personas are being placed in each setting related to the context of the futures table in column (see Chapter 4.2). Persona acts within a system, which are describing scenarios based on the variables with internally consistence. Fabula of each scenario narrative appears as made-up life stories on obstacle versus solution, and the coherence of each storyline made it possible to vividly present four different scenarios generated after the futures table was evaluated.

## 4 RESULTS

The full futures table of this study is originated from PESTEC catalogue, and it is the comprehensive mass of the presentation of the research findings of my thesis. It shall provide, in detail, the selected future variables and their intertwined relations for composing four different scenarios on Arctic shipping and maritime governance futures. Where applicable, specific variables in parameter space are marked with country codes, reflecting the origin of the statement in the policy document. The purpose of the marking is the result of the fact that certain policy does attribute from specific country's perspective. Notably, some attributes are shared, so not all variables could be marked specifically. And Both key issues and all selected variables of the futures table are generated from main research materials, policy paper and related public documents.

### 4.1 Variables Arrangement

Each individual parameter space in the futures table is in contradiction from place to place with the rest. Overall, they are selected from PESTEC catalogue and they are vertically in consistency. There are four manifestations after examination on all parameter spaces was conducted. With remained objectivity in composing the futures table, it is describing changes and potential evolvment toward the alternative futures specifically.

Interestingly, not all variables extracted from current policy document are homogeneously belongs to the continued growth scenario. On the contrast to the fact that, as official papers are the most accessible materials, they could be used to projecting one nation's further development plans under the guide of visionary descriptions. That is, they are not defaulted pieces contributing the continued growth scenario only. After evaluation on variables' generic features, they fit the place as they are at this moment and coherently contributing to each scenario and storyline composition. The selected variables are arranged after several rounds of alteration, generally referring to the structure of Dator's four generic futures, sourcing from policy documents, media materials and brainstorming with my supervisor.

Table 7 Futures Table of the Arctic Maritime Governance

<b>Futures of the Arctic Maritime Governance: How will Arctic Shipping develop in the light of China Arctic Policy</b>				
<b>Dator's Generic Futures</b>	1. "Continued Growth" (business as usual)	2. Collapse/Decline Society (system degradation or failure modes as crisis emerges)	3. Disciplined Society (behaviours to adapt to growing internal or environmental limits)	4. Transformational Society (new technology, business, or social factors that change the game)
<b>Political:</b>				
The Arctic Region Jurisdiction and Sovereignty	Exclusive national jurisdictions. <b>(Arctic states)</b>  Open-bordering and overlapping in high seas of the Arctic Ocean.  Exercise of sovereignty in search and rescue practice.	Unclear sovereignty areas of the Arctic lead to controversial jurisdictions.  Regional tension threatens national security.	"near-Arctic states" verification for the global consensus.  Periphery areas and indigenous communities' recognition.	Defined sovereignty in the Arctic including high seas area.  Arctic Autonomous area: the "Upper Pole".
Maritime Management: How to Keep the Peaceful, Sustainable Arctic in Development	International consensus on maintaining the peace and promoting sustainable development of the Arctic region.  China's cooperation includes concrete steps following principles: "respect, cooperation, win-win result and sustainability" <b>(CHN)</b>  Other countries collaboration efforts maintain current practices. <b>(EU, NOR)</b>	The unevenness of obligation and responsibility of participating countries creates friction, making it the ongoing competitions among countries.	With international collaboration, the peace of the Arctic is achieved while advancing sustainable development progressively.  Collaboration and competition are integrated and intertwined.	Maritime safety is unmanageable due to with rapid and constant changing, there is no "safety" in place.
Maritime Safety in Arctic Shipping Development	Respect sovereignty over oil, gas, and mineral resources under international laws and the interests of the region. <b>(CHN)</b>  Advocate the freedom of navigation of the Arctic shipping. <b>(CHN)</b>	The contamination of illegal discharges into the Arctic by all shipping vehicles such as icebreakers.  Competition and conflict of participating countries in shipping routes planning,	The Arctic shipping is with sustainable standards by using non-fossil energy.  Arctic Council on maritime safety and the sustainable development of shipping in the Arctic sea areas. <b>(AC)</b>	Implemented regulations for Arctic shipping may result in changes in layouts of shipping routes.  Implementation International Polar Code covering shipping-related matters relevant to navigation in Arctic waters, including enhanced Search and Rescue.

		construction, running and maintenances.	Increased cooperation in the Arctic Council in agreements on Search and Rescue and oil spill prevention and crisis response. <b>(NOR, AC)</b>  Shipping routes in the Arctic are entitled to have free navigation and will eventually spread out.	<b>(EU)</b>
Maritime Shipping Route Conflict Management	For intermediation, negotiations are the main resort in Arctic maritime conflict. <b>(IMO)</b>  Increasing participation in the Arctic region, by International collaboration, attempting to manage the Arctic shipping routes. <b>(CHN)</b>	Competition and conflict among boarding countries in designing each shipping route in range, ownership and the right to use.  Regional military frictions may occur out of competition and conflict.  The ongoing and escalating "trade war" due to the protectionism and expanded into "Cold War II".  The increasing yet fluctuating tension levels among competing states leads to "Arctic Shipping Routes Race".  Organised and uncontrolled completions make conflict management invalid and fall in the vicious circle.	With negotiation to reach to solutions for conflicts over issues on shipping routes is in question.  By collaborations to combine each shipping route into the Arctic shipping network for connectivity of the north.	"Arctic Corridor" Modal shift from maritime transport to rail freight. <b>(FIN, NOR)</b>  "Pan-Arctic Logistics": The Arctic region centralized logistics network with multinational participation.  "Arctic Shipping Centre": Multi-dimensional mitigation station with AI support and satellites in service. The Package of air, sea and land transportation with autopilot of vehicles running as remotely directed by algorithm settings to replace communications among managing harbors and political bodies.
Arctic Affairs Management in High Seas Fishery	For commercial fishing, fishery management involves negotiations among major fishing nations. <b>(EU)</b>  High seas fishery is not being confined by countries; open boundary based on the move of the fish stock.	Competition and conflict among periphery countries of new fishing grounds is constant amplifying.  Growth overfishing due to dispersion in supervision over the fishery resources.  Rivalry fishing activities from	Primarily, international collaboration at various levels is applied in Arctic affairs and management.	Drastic alertness of eating habits appears-plant based dietary and synthetic protein sources- replacing fish for consumption once for all, making discussions about fishery resources became trivial.

		non-Arctic states.		
Facilitating Body of Arctic Conflict Management	Arctic Council. <b>(NOR, EU)</b>  Multilateral and bilateral treaties, agreements and regulations.  China fulfils the international responsibilities with IMO. <b>(CHN)</b>	Specific bilateral treaties.	International Maritime Organization and the Arctic Council will expand the thematises in their activity.	Exploring for a new regional fisheries management organisation or agreement.
<b>Economic:</b>				
The Abundance of Resources (Fishery and Energy) in the Arctic and the Accessibility for Exploitation	Enterprises looking for commercial opportunities based on fishery and energy resources. <b>(CHN, NOR, EU)</b>  Biofuel obsoletes fossil fuels.  Opportunities beyond the fishery and traditional energy resources, such as infrastructure construction and renovation for renewable energy resources.	The costs of the recourse's exploitation are beyond budget and the Return-on-investment rate (ROI) is undesirable.	The Return-on-investment rate (ROI) of the Arctic resources is good.  Resources of the Arctic are enlarged and more accessible with lower costs.	Carbon dioxide trade restrictions ('cap and trade').  Only renewable energy and nuclear power in the future.
Commercial Opportunities of the Arctic Shipping Routes	Current Arctic Shipping routes includes Northeast passage, Northwest passage and central passage.  Commercial trail voyages from China Ocean Shipping Company Limited (COSCO). <b>(CHN)</b>  Northern Sea Route (NSR) in Arctic shipping. <b>(RU)</b>  Oil and gas operation and shipping through Northeast passages creates opportunities for supplier	Commercial opportunities of global logistics are lower than the obstacles of the development of the Arctic Shipping Routes.	Companies and enterprises with state support and institutional support in the Arctic voyages practice and are responsible toward their facilitators in pursuing the success of Arctic activities.	Open sea establishes, ship sails wherever is with optimal shipping conditions.  Seasonal shipping routes disappears with majority of the ice in the Arctic cap melted.

	and maritime industries. <b>(NOR)</b>			
Infrastructure Projects in the Arctic Circle (both Physical and Digital)	Blue economic passage linking China and Europe through the Arctic ocean. <b>(CHN)</b>  Completed infrastructure construction such as Halogaland Bridge in Narvik by SICHUAN ROAD & BRIDGE (GROUP) (SRBG). <b>(CHN, NOR)</b>	Infrastructure projects remind individually with limited range for services.  The quality of each project is hard to evaluate as there is no unified standard for evaluation.	The Arctic circle has well-connected infrastructure both on earth and in space to facilitate the growing demands out of sustainable development of the Arctic.	The prevailing Arctic tourism with tourists' flocking to high mountain regions, requires infrastructure for entertainment purpose. "Smart Arctic"-Digitalization of infrastructure networks.
Investments toward the Arctic Region	Investment from European structural and investment funds (ESIFs) and initiatives from the Investment Plan. <b>(EU)</b>  The rising of market demand and the capital flow toward the Arctic resources as oversea investment. <b>(CHN)</b>	Insufficient funding for the Arctic region.  Implied conditions from some investment sources are hard to meet.	The investment toward Arctic Region is in consistency and increasing toward the demand of meet sustainability principles.  Investment of various sources include both private, state-own enterprises and other organizations.	"Cloud funding".
Maritime Industry Development (Resources and Supply Chain)	The planning and expanding of the Northeast passages.  To envision and develop Arctic transportation networks such as Transpolar Sea Routes (TSR) and Arctic Corridor. <b>(FIN, NOR)</b>	Stagnant or declining in the maritime industry.	Associated with the well-connected infrastructure network, the boom of the maritime industry starts with improved transportation network.	Renewable energy sources replace fossil energy in powering vessels both on land and on the sea of the Arctic.  Robotics and automation's popularity in the maritime industry networks.
Blue Economy: Opportunity for Maritime Sustainable Economic Activities	Emerging opportunities to change the fossil fuel's market dominance with clean energy to replace while advancing the economic sustainable development in the Arctic.  The started Arctic tourism. <b>(CHN)</b>	Uncertainty of the result of blue economy and side-effects toward the Arctic in the long run.  Excessively oil drilling due to the market dominance and the heavy use of fossil fuels.	To encourage aquaculture, fisheries and offshore renewable energy and maritime tourism and marine biotechnology. <b>(EU)</b>	The transition toward green economy by creating innovative and adaptable business sectors.  "Wind Farm".
View on Fishery Management	The limited view consists of following standards to both in conservation and rational usage of the fishing resources. <b>(CHN)</b>	Uncontrolled view: peripheral states of the fishery resources act freely. Overfishing due to exhausted fish stocks.	The controlled view: obligation of the conservation of the fishery resources and ecosystem are clear to participating countries and fishery resources are open for them when obligation is fulfilled.	Obligation for conserving fishing resources and the ecosystem should be followed by all states.

<b>Social:</b>				
Indigenous Society and People	<p>The constantly changes of the living conditions and Arctic environment pose challenges towards indigenous communities.</p> <p>Sustainability means to protect the eco-environment that should be out of the interests and concerns of the indigenous people. <b>(CHN)</b></p>	<p>Irreversible and lasting damage toward the indigenous communities due to exploitation of the Arctic.</p> <p>Protectionism brought isolation of the indigenous society.</p> <p>Fixed social mobility among indigenous communities.</p>	<p>Sustainable development result in resilient communities.</p> <p>Indigenous communities are inclusive parts of the functioning society.</p>	Support the people-to-people cooperation.
Arctic Working Condition	<p>The Arctic working conditions are demanding and less desirable, missing relevant support and need to be improved.</p>	<p>The Arctic remains inaccessible without necessary support for the mass.</p> <p>Specialty and scarcity of work positions lead to workforce outflow and brain drain from within the Arctic toward other more desired destinations scattered around the global.</p>	<p>The Arctic region provide employment opportunities regardless of specific requirement.</p> <p>Both indigenous people and work force from the rest of the world are welcomed as the Arctic region is a massive platform.</p>	<p>The Arctic region offers job opportunities with telecommuting based on internet connection.</p> <p>Digitalization of working tasks, and robotic with automation replaces human working in the harsh environment directly.</p> <p>The outside employment could be accessed by the Arctic communities and vice versa.</p>
Arctic Targeted Social Policy's Input-Output Management	<p>To keep high level of financial support for cooperation. <b>(NOR, EU)</b></p>	<p>No actual functioning support mechanism due to lack of functioning mechanism and deteriorating environments.</p>	<p>The Arctic regions has multifaceted cooperation support system, blended by people-to-people, community-to-community and sector-to-sector.</p>	<p>"Cloud funding", which built the platform for both investment from private and public sector, and open to public audit.</p>
The Connectivity of the People of the North: People to People Networking and the Universal Accessibility to Resources.	<p>Even the far North part of Finland has working internet accessibility. <b>(FIN)</b></p> <p>Space infrastructures has raising role in the connectivity of peoples, business and various needs of the Arctic community.</p>	<p>Investment encounters capital chain rupture without completing the space infrastructure system.</p> <p>The practical obstacles in the connectivity projects without yielding solutions at the end.</p>	<p>The digitalization and space infrastructure are well maintained to act as the catalyst for people's connectivity unexclusively and beneficial in business sectors as well.</p> <p>People in the North would access to reliable and functional digital infrastructures.</p>	<p>Balanced online and offline services- "Online diagnose and offline surgery".</p>

<b>Technological:</b>				
Arctic Activities in Research, Development and Innovation	<p>The Arctic activities provides subjects for scientific research in exercise and practices. <b>(CHN)</b></p> <p>Scientific expedition and research are law-binding cooperation. <b>(CHN)</b></p>	<p>The Arctic activities are deteriorating the physical conditions of the Arctic.</p> <p>The Arctic research projects are neglecting and proven to be technically ineffective due to the special circumstances of the Arctic.</p>	<p>Advancing Arctic activities with wider range of scientific research.</p> <p>Systematically arranged Arctic exploration plans enriches human experiences in the Arctic.</p>	<p>“Open source” research activities and fandoms of subjects are forming to support personal-tailed programmes for R&amp;Ds by research enthusiastic in form of “DIY” research.</p>
Emerging New Technologies: Provides Possibilities of Exploration and Utilization of Arctic Resources	<p>The Arctic exploration and utilization of the Arctic resources are fuelled domestically. <b>(CHN)</b></p> <p>The unrenewable fossil energy and running down in reserves both in the Arctic and the rest of the world.</p>	<p>The high costs and lack of technicians for the new technology to be applied from trial to massive production.</p> <p>New technology’s side-effects in the long term are unknown.</p>	<p>More accessible resources of energy supply for the growing global economy.</p> <p>Clean energy resources are attempting to replace traditional foil energy with less costs due to the maturing of the new technology.</p>	<p>Increased usages of Wave energy.</p> <p>“Man-made Suns” with towing satellites after commercially use nuclear fission power is achievable.</p> <p>“Meteorological Mirror System” for solar farms to work as compound of solar ovens to gather, store energy for further usage.</p> <p>Virtual reality-based tourism would reform tourism industry.</p>
Monitoring the Stages of the Sustainability Advancement and Technology Innovation	<p>Intensified information exchange to promote sustainable and responsible development with emerging technology. <b>(AC)</b></p> <p>“Green Economy” to spear technology innovation. <b>(EU)</b></p>	<p>The speed and quality of the advanced technology is uncertain, so does the result.</p>	<p>Climate and environmental monitoring of the Arctic are in real-time.</p> <p>Sustainable development is the reality based on the success of technology innovation.</p>	<p>The Sustainability advancements reach to the stagnant and there is no more changings worth to monitor.</p> <p>Shipping routes being desolated face to global digitalization in logistics.</p> <p>The distance communication and popularized robotics from global digitalization make shipping routes desolated.</p> <p>Distant communication is supported by spirally digitalization process.</p> <p>3D printing changes the global labour division and global shipping.</p>



<p>Space Technology and Satellite Programmes</p>	<p>Space technology and Satellite Programmes are well founded and progressing. <b>(NOR, EU)</b></p>	<p>Satellite wastes in trajectory orbit could lead to space pollution with imponderable damage: "space dump".</p> <p>"Rush hour in the air"- satellite orbits congestion and accidents.</p> <p>The "Inconvenience" caused by satellite wreckages.</p> <p>Space technology is two-sided for national development, another "space race" could occur in the extreme.</p>	<p>The Arctic region is fully covered by geostationary satellites with functional and well-maintained space-based service.</p> <p>Satellite programs contributes to the Arctic's environmental, safety and security needs.</p>	<p>AI terrorism and hastened hacking due to competitions might led to civilization became extinct.</p>
<p>Maritime Rescue Systems and Technologies</p>	<p>Maritime technical standard (Radio technology) in marine entities is changing.</p>	<p>The adaptation to use the new Maritime Rescue Systems takes time.</p> <p>It burdens the weary rescue forces with potential technical error which is unmeasurable in emergency.</p>	<p>Maritime search and rescue are more prepared to face the challenge in Arctic maritime rescue with more rapid and accurate operations.</p>	<p>Pan-national resources utilization in maritime Rescue Systems.</p> <p>"Rescue First".</p>
<p><b>Environmental: (Maritime environmental issues)</b></p>				
<p>Ice Meltdown in the Arctic</p>	<p>30% melted in 2050s.</p> <p>The global warm is constant with ongoing rise in sea level.</p> <p>The impacts of global warming are making the Arctic the new international fulcrum, such as of international shipping routes.</p>	<p>All the ice disappeared in 2050s.</p> <p>The Arctic region's nature suffers the unprecedented damages.</p> <p>The accelerant global warming exceeded human's ability for adaptation and mitigation of the impact.</p>	<p>Half of the ice cap melting down in 2050s.</p> <p>The monitoring and observation network for the Arctic in temperature rise is in place.</p>	<p>Ice cap in the Arctic is with no huge differences between summer and winter.</p> <p>Ice with no melting down due to rapid shift to fossil-free economy world-wide.</p> <p>"Global cooling".</p>

Possible Shipping Routes Appearance in the Arctic	North-West routes through the US and Canada.	Routes across the North pole.	North-East corridor only.	Siberian digitalization completed. Fast rail substituting maritime transport.
The Response of Global Warming by Policymakers of Different Nations	<p>The inconsistent efforts made to reach the targets in reducing the rise of the temperature.</p> <p>China is seeking global coordinated solution for reducing greenhouse gas emissions from maritime transportation. <b>(CHN)</b></p> <p>Signing and ratifying the Paris Agreement. <b>(NOR)</b></p> <p>EU is engaged in multilateral environmental agreements and as well as implementation. <b>(EU)</b></p> <p>Conservative views on global warming mitigations prevail.</p>	<p>Neglecting the global warming importance and reflects in policymaking.</p> <p>Frictions out of the conflicts of interests among nations.</p>	<p>Universal consensus and joint efforts with specific "KPIs" evenly allocated to every country in counterpart global warming.</p>	<p>Global warming steps down from international politics.</p> <p>Policymakers are monitoring the changes of costumer behaviours by aggregate data to help enterprises in structural reforms to adapt the post-Global Warming World without invading privacy.</p>
Future Changes in the Arctic	<p>China is seeking stronger international cooperation in facing the changing Arctic in the future. <b>(CHN)</b></p> <p>EU is working with the Arctic region to draw up action plans focus on the Arctic development and its special nature. <b>(EU)</b></p>	<p>Constant conflicts in the Arctic maritime without effective negotiations nor agreements for the changing circumstances.</p>	<p>Both the Arctic states and non-Arctic states are prepared to face the challenges and opportunities from the changing Arctic.</p> <p>Collaboration out of the benefits toward the future of the humankind.</p>	<p>Increased autonomy of the Arctic.</p>
Maritime Environment Protection in the Arctic	<p>Arctic activities are highly engaged with background investment and impact assessment while respecting environmental laws and regulations. <b>(CHN)</b></p> <p>The IMO standard and fairly allocated responsibilities of each participating countries in maritime environmental protection.</p>	<p>Invalid Arctic protection plans lead to damaging bio-environments of the Arctic.</p> <p>Polluted maritime ecosystem slashed back toward the development of the maritime industry especially hindering shipping routes expansion.</p>	<p>The awareness of maritime environmental responsibilities is clear.</p> <p>Negative environmental impacts are limited.</p> <p>Measurement attempting to reverse negative environmental impacts are being developed and applied in trials with fruitful result.</p>	<p>Maritime environment protection of the Arctic is required and embedded in the maritime industry.</p> <p>"Buyers Choice".</p>

<p>Environmental Management: Agreements and Implementations of Maritime Affairs.</p>	<p>IMO and the Arctic Council served as mainstream maritime environmental management.</p> <p>Other emerging bilateral or multi-lateral treaty and agreements as supplement of the mainstream of the maritime environment management, such as Paris Agreement, ESIFs.</p>	<p>Formalism of the agreement making without actual implementation in maritime affairs management.</p> <p>Inexplicit relations of the maritime obligations and rights.</p> <p>Anarchism in the maritime management packed with vicious competition.</p>	<p>Effective negotiations with affiliations of equal shares of obligations and rights.</p> <p>Unbiased arbitration institutions for conflicts.</p> <p>Rotations of the supervision and auditory rights among participating countries.</p>	<p>Enforcement of any Arctic treaty is conducted by the “Arctic Alliance Consortium”, the failing nation could be kicked out from the AAC and lost permanently the right to participant in Arctic affairs and activities.</p> <p>Environmental protection is among common sense and no extra regulation is needed for maritime industry in the Arctic.</p>
<p><b>Cultural: (Indigenous communities and Arctic Tourism)</b></p>				
<p>Arctic Tourism</p>	<p>Each year more visitors from around the global to visit the North in the Arctic region to boost the tourism industry. <b>(NOR)</b></p> <p>The growth of the outbound Chinese tourists and Chinese agencies and catering services start to emerge in the Arctic region such as Lapland Finland. <b>(CHN)</b></p>	<p>The failure of the attempts of expanding tourism in the Arctic.</p> <p>The Arctic tourism is turned to be the invalid concept due to the limitations of the industrial development in practice.</p>	<p>The new “hot” travel destinations of the tourism industry with well-designed services.</p> <p>The Arctic tourism is low-carbon, sustainable and eco-friendly.</p>	<p>Virtual tourism.</p> <p>“Purchasing Experiences 2.0”.</p>
<p>Arctic Awareness: the Arctic Patterns of Governance and the Arctic Identity</p>	<p>The increasing Arctic awareness in China such as environmental protection and the Arctic Tourism. <b>(CHN)</b></p> <p>Accepted as fact that the Arctic region and tourism in the North is valuable for national economy growth. <b>(NOR)</b></p> <p>Substantially cooperation with the Arctic Council in the collaboration such as research activities and regional development. <b>(EU)</b></p> <p>Continuous multilateral engagement of the Arctic affairs and encourage the implementations afterward. <b>(EU)</b></p>	<p>The Arctic region lost its popularity both regionally and internationally.</p>	<p>The universalness of the Arctic awareness is achieved in concepts such as “the Arctic states”, “the Arctic Periphery states”, “near-Arctic states” and “non-Arctic states”, which are regarding to both identities and stances in governance concerning to Arctic activities.</p>	<p>The Arctic area lost the “uniqueness”, with decreasing international exposure as well as the ramification among other parts of the world.</p> <p>One or more “hot spots” appears, such as “Second American Civil War”.</p>

<p>Founding Programmes for Local Communities in the Arctic (on preserving indigeneity while promoting sustainable development)</p>	<p>There are existing EU funding programs toward local communities. <b>(EU)</b></p>	<p>Shortage of the founding sources and the cut due to possible economic recession.</p> <p>Faulted founding allocation plans.</p> <p>Inadequacy execution in certain founding plan/project.</p>	<p>Enlarged founding sources both from public and private sectors.</p> <p>Local communities being self-sufficient benefiting from Arctic tourism and other industries.</p>	<p>“Cloud funding”.</p>
<p>Indigenous Cultures and Traditions vs Usage of Arctic Tourism Resources</p>	<p>The consistency of Arctic conservation efforts from each Arctic state, the Artic Council, EU and specific organizations.</p> <p>The acknowledgement of the propose and attempt to make contribution to it. <b>(CHN)</b></p>	<p>Destructive toward indigenous cultures and over-exploitation without future consideration.</p>	<p>Well-kept balance between conservation native cultures and the lasting regional development.</p>	<p>The influx of “indigenosness” into the fashion alters mainstream cultures with consumerism enriched.</p> <p>“Indigenosness” is no longer intertwined with “identities”.</p> <p>Reflects on indigenous lifestyles regards to long term sustainability.</p>
<p>Patterns of Arctic Tourism</p>	<p>Gradual digitalization of the whole industry with the intension to fulfil diversified touring purposes.</p>	<p>Short-term, capital centred investments for maximum profits.</p>	<p>Sustainable consumerism and digitalized interactive experience selling.</p>	<p>Tourism Online.</p> <p>The “environmental consciousness” tourism.</p>

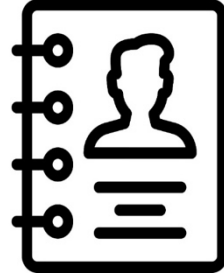
## 4.2 Personas and Four Scenarios Storylines in Narratives

### 4.2.1 Storyline 1: Continued Growth Scenario

**Persona:** Jun Li

**Persona description:** Chinese, Male, Vice secretary general of the IMO, A father.

**Persona goals:** Coordinator of International maritime negotiations activities.



**Persona:** Tony Dahl

**Persona description:** American-Norwegian, Male, Market analyst in market research and analysis division of Arctic Drilling Rigs Association.

**Persona goals:** To provide drilling rig market analysis in Arctic region institutionally, covering Arctic drilling market conditions, activities, customer needs.

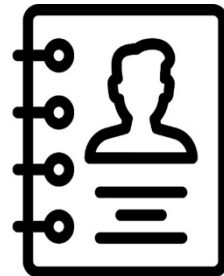


Table 8 Fabula for “Continued Growth” Scenario

Key drivers and trends	Supporting or contributing actors	Crucial decisions
<p>Multiple Arctic Shipping Routes.</p> <p>Arctic States holds advantage over other states.</p> <p>Institutionalized Arctic affair management.</p> <p>Rising global warming rate promoting sustainable development.</p>	<p>Acceding countries in IMO are encouraged to collaborate with AC.</p> <p>Progressive climate mitigation.</p> <p>Expansion of joint inter-institutional programmes between nations, based on improving technologies.</p> <p>Negotiations as main measurement for conflicts.</p>	<p>“Near-Arctic State” is a well-accepted International concept.</p> <p>Consumer behaviour leaning toward environmental consciousness.</p> <p>Arctic Search and Rescue activities are borderless.</p> <p>Law-biding world system.</p>

### Narrative for Continued Growth Arctic Future

One day in 2050, there are three main Arctic shipping routes: Northeast passage, Northwest passage and central passage, which are overlapping and inner-connected. As the Arctic states within periphery areas in the region have been holding the advantages

over the rest of the world in the Arctic shipping participation, the Arctic Council remains the major role in the Arctic maritime management. On the other hand, the IMO, with the “Polar Code” being applied successfully, and its enforcement brought the result: IMO as common entity in participating in the Arctic affairs in collaboration with the Arctic Council became norm. The acceding countries in the IMO are encouraged to join the Arctic Council operations by themes and contributing to maintain the peace while pursuing prosperity in the Arctic. Meanwhile, specialised associations formed in corresponding to Arctic activities. “Arctic Drilling Rigs Association” is one of the major platforms for monitoring Arctic drilling activities with systematic analysis on drilling rigs in market.

Li Jun is the vice secretary general of the IMO; today’s issue is to make the decision on whether to proceed the mid-term evaluations on member states’ performance of the last year before the renewal of their memberships. United States, EU and countries with Arctic strategies worldwide are enlarging agreements on issues such as high sea fishery management. Moreover, major fishing nations are seeking the possibilities to turn bilateral treaties into a multilateral treaty for earning more rights on high sea fishery fields by fulfil responsibilities required from IMO negotiations.

The global warming rate is rising and the conservative view on the climate mitigation facing setbacks, as the sustainable development has been changing the consumer behaviour, the new norm is for the market to provide eco-friendly products with reduced carbon prints. Biofuels altered the structure- traditional energy resource is no longer in the centre. Tony Dahl is finalising his monthly report on the drilling rigs’ market, he concludes that Arctic oil and gas drilling service would be kept in low demands as there are little interests for the business concerning the uncertainty of the oil and gas reserves underneath the surface of the Arctic, and the general negative public image of Arctic drilling for energy is constant while to preserve the current the ecosystem of the Arctic is the main part of global climate change mitigation.

Instead, major underground projects in the Arctic are expanding, drilling rigs are required to be farther deep underground with enlarged capacities, responding to the fact that data storage physically in the Arctic are taking over most of the market shares, with its reduced maintenance fees provides advantage: the locations of the actual storage units are with low temperature underground in the Arctic.

Li Jun remembers that he must pick up his children’s new sheets from the store after work, he must recycle those weary ones first before allowed to pick up his new order shipped from a fabric village in the North. They like the designs from this Arctic village

renowned for combining high textile quality with indigenous patterns replicating from ancient times. And they could afford them without additional costs compared from synthetic materials. Jun's children also glad to know they had donated for raising the sheep in that village farm by each purchase. The farm owner had invited Li Jun's family to come for a visit the next time they are having trips in the Arctic, as their customer loyalty reward for supporting their business. They are welcomed even in the time that some of the farm members are absent in working with Arctic drilling projects, so the time is flexible for Li's trip. Aside from the market report, Tony starts to draft workforce estimation for the upcoming drilling project, most of the working staff could be assembled from nearby the location. "Arctic Drilling Rigs Association" has registered workforce in the Arctic region, and the regular online trainings and offline practices mode, preparing them with the latest technology in drilling with harsh conditions. There is high level of mobilities to work with the platform, regardless of the work tasks and the divisions of "Arctic Drilling Rigs Association". The platform, by far, is proved efficient by facilitating Arctic drilling activities.

Jun turned his bio-gas powered car into autopilot, satisfied with the result of its road performance out of his car's alteration by giving up the original petrol engine. He started to check his schedule for tomorrow's work, and his wife sent one video message, telling him that she will be late home since the satellite of her workplace needed tuning. It is slightly off the track, making the pictures transmitted to the Arctic Yellow River Station sluggish, partially effecting the joint programme with the Arctic Council in monitoring polar bears living in the wild. As the pictures are shared within several different working groups, the picture signal needs to be accurate.

Jun read another news about the sailing accident of a cargo vehicle in the Northeast routes. It was loaded with fresh bamboo for the newly settled panda family in the Arctic zoo. The solar power vehicle's defaulted horsepower was not sufficient against the wave and got sucked in the high seas area. Afterall, it is this carrier companies' first a few voyages in the North routes, and carrier's vehicles are facing adjustment to function better with challenges posed from the different working conditions in the North. Luckily the centre of "Arctic Search and Rescue" received the signal for help and had send the north-east branch squad in time, and the rescue action is broadcasted on air so that audiences like Jun could check on the action among their tailored news feeds.

When he arrived at home, his teenage son was reading the history of the World War II and asking what "war casualty" means. He made a comment of exclamation: "it was

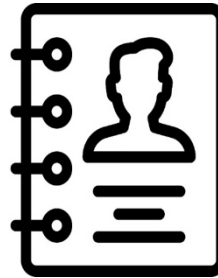
caused by escalated dispute between nations,” he added, “they were obsolete phrase that almost forgotten, and rarely mentioned in the law-biding world system unless referring to history materials.” In today’s world, negotiations are the main resolution and measurement when conflict occurs both regionally and internationally.

4.2.2 Storyline 2: Collapse/Decline and Stagnation Scenario

**Persona:** Luis Bauer

**Persona description:** German, Male, Fishing vessel captain.

**Persona goals:** To keep his fishing vessel safe while discover new fishing fields without thoroughly changing his business in the middle of the chaotic global maritime circumstances.



**Persona:** Olaf Báltu

**Persona description:** Sami descendent, Male, Fishing vessel sailor.

**Persona goals:** To find new job possibilities due to his limited educated background.

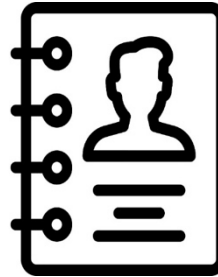


Table 9 Fabula for “Collapse/Decline and Stagnation” Scenario

Key drivers and Trends	Contributing actors	Crucial decisions
Shortage of global fishing resources. The advanced stage of global warming. Employment and education opportunities are in scarcity for Arctic indigenous population.	Technological deficiency in Arctic activities. Competitive international surroundings for every country.	The stressful outcomes of structural transformation of economy. Soaring Sinophobia hinders China’s participation in International affairs.

**Narrative for Collapse/Decline and Stagnation Arctic Future**

One morning in 2050, the alarm goes on sharply on the fishing vessel, on which Luis Bauer and his crew have been working for months. Today, the radar shows that the current sea area has no fish stocks in sight, he must stir the wheel toward the North pole for a better chance. The reason why he had not made the decision yet is that the North pole



area has no patrol ships of any kind, forming a power vacancy, as the jurisdiction partitions had not been classified nor ready for the recognition with multilateral well- acceptance. And if the pole magnetic field interferes with his navigation system on the vessel, it would be a devastating situation and could endanger the safety of the whole crew. He remembered yesterday's broadcasting, one Russian fishing vessel went missing and there is no satellite that could relocate it, as the outer space is too crowded with wasted satellites, congesting signal transmission.

Regardless of his hesitation, Luis and his crew are marching toward the North, Olaf Báltu realized that all the fishing certificates the ship holds, are on the average of out of date for appropriately two months, he suggested that maybe Luis should take the offer from one German company and start to work for cargo transport lines.

Nowadays, most of the ice had disappeared, so commuting in shipping routes are less stressful on capacities for carriers as they are no longer loading the heavy machinery for the task of ice breaking. Luis calmly reminded Olaf that in the shipping lines business, they still need certificates from many countries separately, and most of the shared sea space might need double notary for certificates. Moreover, leases or permissions required are more complicated when arriving at tension areas on the sea, where overlapping lines belong to different countries. And they might have to pay heavy fines, to whom they might have problem to exercise immunity, even with providing certificates they had already acquired. And the startling news from now and then of pirates' activities on the Arctic sea, quenched the thoughts of sailing as a carrier. The world "jungle" came to Luis mind; however, the permafrost is nowhere to be seen. The endless sea surface is extending in dim, and acting as the breeding ground of crisis.

In the lunch break, Olaf remembered the reason why he left the Sami reservation, for a better job opportunity. But at this moment, he was worried that even Luis probably must quit the fishing business in the Arctic, as this area is no different than other seas on earth. Globally, shortage of fishing resources and the plummet of employment in fishing are not new. He remembered that he was in deep appreciation back then that Luis gave him and his friend the chance to work on his fishing vessel. This is a world that they could be turned down by ship owners the moment they heard of their names. They are Sami and from indigenous communities, they are sharing that identity together. Back in his hometown in the remote North, they did not able to complete schooling due to failure of virtual education projects and campus usually located far away and provides limited intake quotation for Arctic indigenous communities, his reservation area included.

One of the technical faults is the inefficiency in infrastructure for catering the purpose of updating telecommunication technology. For what is worse, there is not yet a replacement for better technical support. With the speculation gone wild, funding and invest sources are accused as long as they are originated from China, result in some of the infrastructural projects been interrupted either partly or completely. Mostly China is facing accusations on the transparency of founding allocation and violation of both environmental protection agreements and human rights in oversea activities.

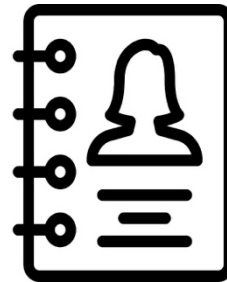
Olaf would like to continue to work with Luis, even after Luis had to return to Germany. However, Luis must make the decision on whether he will continue to work in fishing on the sea with his vessel, regardless of the fact that global fishing industries are encountering the worsening conditions.

#### 4.2.3 Storyline 3: Toward Disciplined and Sustainable Society Scenario

**Persona:** Ada Korhonen

**Persona description:** Finnish, Female, Technician of Arctic Council Project Crew Member.

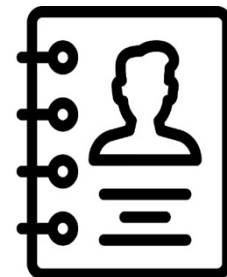
**Persona goals:** According to the rotation of different work tasks of the month, she is in control of Arctic Council fleets' machinery check, to communicate with other fleets on the sea while seeking establishment of connections for possible join-programs in the future.



**Persona:** Kang Yang

**Persona description:** Chinese, Male, Icebreaker Operator of Research Group.

**Persona goals:** He is all-rounder, supervising multiple programs of International Maritime Organization's during the China chairman year. And his tasks with his teams are expanding and highly welcomed. Based on working themes, he is reaching out for collaboration with other international institutions.



**Persona:** Xin Xin Ai

**Persona description:** Chinese, Female, Current executive of the entertainment department of Hoshiyuki’s Arctic Cruise line.

**Persona goals:** To decide cruise lines themes with workshops and stuff training, design performances and rehearsal arrangements.

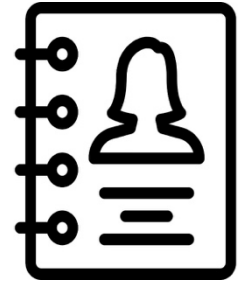


Table 10 Fabula for “Disciplined Society” Scenario

Key drivers and Trends	Supporting actors	Crucial decisions
<p>Broadening and deepening diplomatic policy collaboration in Arctic research activities.</p> <p>Increased utilization of Arctic tourism resources.</p> <p>Extensive apply of clean energy world-wide.</p>	<p>Space technology enables frequent exchanges in cultural and economic activities.</p> <p>Arctic tourism is entertaining with both cultural and environmental consciousness.</p>	<p>Alternative nutritional resources required to combat with food shortage.</p> <p>Multinational corporations allow frequently high level of regional and International mobility and communication.</p>

### Narrative for Limited and Discipline Arctic Future

Ada Korhonen and Kang Yang meet for the first time in person at the power charging station for their vessels from separated fleets. They had been chatting from time to time, while sailing on the sea, they see each other’s dot appears on the satellite radar imagines frequently. Ada works from one programme of the Arctic Council and Kang’s icebreaker is among the main research fleet from the Yellow River Station in the Arctic.

The weather is a bit cloudy, that is the main reason they decided to use the power charging station of the wind farm in the area, as the solar panels on the deck is not in prime capacity on duty. Kang had promised to bring these algal protein bars with the new flavour of Szechuan chili to Ada for a while. It is a quite new flavour in the market for the time being, and Ada prefers stronger chili mix than what she could find in her local market of the algal protein bars. Ada talked about her tasks from the programme and suggests Kang to check with his working crew back in the Yellow River Station. Ada programme is recruiting to deal with the expansion in work tasks. Kang comments that he could ask other workshops’ members working for the International Maritime Organization and the Yellow River Station to join, as he and his crew are quite occupied in designing the satellite recall programme at this moment.

As those vessels are charging, one Arctic sightseeing cruise appears in the sea-level. Ada recognizes the model of the ship, it is among the nuclear-power series for public use, she had participated to design, and they remembered, couple of decades ago, before 2050, commercialised nuclear-power usage sparked heated debates due to high level of controversy. Hoshiyuki cruise line was selected as the most popular Arctic cruise for several years in a row. Besides providing satisfactory sailing experiences in the Arctic, on the vessel, there are different entertainment sessions rotating each month. This month themed on “vertical mini-agriculture”. There is also the permanent exhibition “Old World with Plastic”, which has attracted school groups all over the world for countless times as part of their trips for interactive education.

Hoshiyuki cruise was originally run by a Japanese company when it started to provide services for Arctic trips. Nowadays the ownership had changed several times worldwide, and it has been increasingly participating in public welfare, as governments worldwide have been increasing incentives toward corporations to promote Arctic tourism. As a result, the Hoshiyuki is a brand with the Arctic at heart and acts as the indicator for the Arctic tourism development, it has been providing internships for future employment in tourism, trials for new technologies, etc.

Xin Xin Ai, the executive of Hoshiyuki’s entertainment department at this moment, is scrolling down the second quarterly’s session themes. She thinks “indigenous peoples” would be suitable and started the draft of the proposal for approval from the board. Before that, she would like to organize a workshop consisting of working staff with Arctic indigenous background for start.

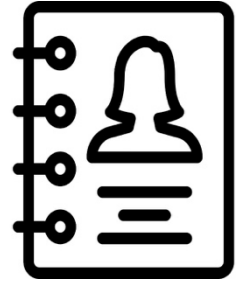
Before Ada and Kang sailing away separately, Kang reminds Ada to bring the latest prototype of nuclear waste holder to the yearly meeting of the Arctic Council as they will be in the same workshop among other national delegates soon after.

#### 4.2.4 Storyline 4: Transformational Scenario

**Persona:** Maaga Utsi

**Persona description:** Female, Sami Nomads Decedent, Entrepreneur of Arctic Tourism and Online Food Store, Mom.

**Persona goals:** To keep her businesses blooming by extending her cliental with Chinese; Adopting cutting-edge technologies and synchronizing with the Internet ecology of information.



**Persona:** Áppo Utsi

**Persona description:** Sami Nomads Decedent, Politician and Presidential Candidate of the Arctic.

**Persona goals:** Taking action in law-making organization concerning to the Arctic Affairs, to maintain the Arctic peace and prosperity by identifying challenges and opportunities for the Arctic.



**Persona:** Ling Chen

**Persona description:** Female, Chinese Entrepreneur as Arctic Tourist Agency.

**Persona goals:** Maintaining connection with delegates from the North in Virtual Reality based tourism and catering popularised Arctic travel demands from Chinese customers.

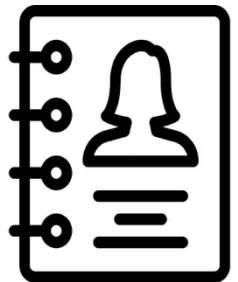


Table 11 Fabula for “Transformational Society” Scenario

Key drivers and Trends	Supporting actors	Crucial Decisions
<p>The application of artificial intelligence in daily life.</p> <p>Virtual reality is replacing physical connections.</p> <p>China’s expanding international influence by contributions from technology innovation and support.</p>	<p>The success of alteration of industrial structures.</p> <p>“Third World War” brought rapid technology development during the wartime and the post-war introspection in the world.</p> <p>The rearrangement of regions with awakening awareness of identities.</p>	<p>Optimal allocation of resources.</p> <p>Escalating political engagement from Arctic representatives.</p>

### **Narrative for Transformation Society Arctic Future**

Ling Chen and Magga Utsi agreed to meet online regularly, the routine is named as “Internet Sundays afternoon”. It is the fixed time for them to discuss next week’s trip located in Magga’s backyard. Stimuli, by connected to human’s nerve directly, with various outer extensions attached, stimuli system had replaced and outdated computer completely in 2050. Ling runs one Arctic tourist agency in China, and her latest renovation was a success, and there is the “Arctic Room”, as the new compartment attached to her office. From now on, Chinese tourists could smell and pet the polar bear cub simulator system again in the building within the improved surroundings. Not long ago, before the renovation, a few Chinese clients complain that those fur surfaces of simulators were a bit cold for a bear, it happened during their last visit to Ling’s Arctic locality in her tourist agency venue.

Magga told Ling that the rain season of this year makes big polar bears so agitated that they are in need to be sent back to the Arctic Centre of Recreation for breaks and she is going to fetching a new patch of polar bears to keep up with the schedule Ling arranged. And there is the possibility that polar bear interactive session could be removed from tours for the time being due to the fewer availability of polar bears, concluded while Magga is checking with the Arctic Centre of Recreation in her stimuli system. However, they might need to apply a backup solution. Ling opened the message Magga sent right away through stimuli system, in which delivering Magga’s blueprints of the new series of Sami wall rag design. There are also hand-made wooden mugs designs in blueprint from Magga’s children. Those are used for the “DIY” programs with 3D printings. And Ling and Magga are discussing further in details to including these programs to fill in the gap left from the absent of polar bear stimulator as the new Arctic tours’ interactive session.

Ling made order with her stimuli system, and approximately three hours later, materials comprised with those wool and log could be delivered by the drones from a neighbouring city of hers in China. Magga asked Ling about her brother’s research projects on the solar farms with artificial sun. Especially on the fund rising situation, she has a great news for Ling, that is, in the local school where Magga’s children go to, there are several parents also interested in investing in that project, and they would like to get notified among the first, right after fundraisings are launched in cloud.

After the meeting, Magga realized that it is time for her to feed her reindeers too, they are living a few blocks away from the house and robotics and automation are running

the range. Moreover, her nutrition descriptions for her online food shop are due, desperately in need to be amended, as it is on hype that the coming back of “fish” to the food table sparked the stimuli-wide discussions, she will update the inventory of her online food shop to catch up the trend.

Magga’s husband, Áppo Utsi, was preparing in the family multimedia studio in the next room, refreshing his materials prepared for the yearly “Upper-Pole” debate, which would be alive this evening, both within and outside the Arctic region throughout the stimuli network.

He had entered the campaign for running as the president of the Arctic with rejuvenating the “Upper-Pole” concept, and he had worked in the facilitator board of the Arctic for several terms before.

His key points of the evening’s debates are:

...

- The Arctic’s solar farm and artificial suns projects and space waste collect programme enlargement in the high seas area.
- Tax reduction for “0” carbon prints products.
- The budget for Arctic Search and Rescue of next year.
- The instalment payment plan of maintenance of mega projects on both telecommunication programmes and trans-Siberian rail transport network to China.
- 10-year anniversary budget proposal for memorizing “Upper-Pole” satellite wastes recall programme.
- The construction proposal for docking ship stations in the free navigation area of the Arctic open seas.
- Reflective of the Nuclear war between the US and North Korea and yearly budget for reconstruction of North Korea capital city and quotation of relocation war refugees from North Korea.

...

While the two adults are busy, dinner is prepared in the kitchen automatically, all set and ready for Magga’s final order to be brought to the table. Magga has three children-Bihto, Dorste and Daehyun. Bihto and Dorste are playing the “Igloo Escape” in their room. Daehyun, who was adopted from North Korea after the nuclear war, could not move his artificial limb due to the freezing temperature while playing with his brother earlier in the game stimulator. Magga ordered a service check for his artificial limb on next Wednesday, it would be a booked session for checking the malfunctions occur in

cooler temperature. The appointment is with a specialist remotely from Singapore and the patient and doctor will communicate through hologram screen in the centre of Magga's house, so she decided to take the nearest empty time slot accessible for the service.

A notice popped up in Magga's stimuli, the notice is showing her reservation for the new polar bears is received and the request is now in the queue. There would be some time before new polar bears would arrive at her backyard. It fits perfectly for her schedule, and Maaga and her family would do the road trip in the new wind-powered family vehicle. She plans to keep video log while passing the famous grand warehouse relics in the trip. The trip could be part of "history study", her children's school projects on the themes of "the past". She believes by learning about "cargo harbours" from the old times with her youngsters in the trip, the experience would gather plenty of materials for the children to use for their school projects.



## 5 DISCUSSION

### 5.1 Summary of Results

This study is an exploratory practice of using futures table to project future scenarios of the Arctic shipping and maritime governance. It was built on the forecasting of the alternative futures in Dator's structural interpretation of how they progress in the changing world. Futures table is the tool for a simplified application of Field Anomaly Relaxation (FAR). It is a rather user-oriented Morphological Analysis (MA) exercise, and turned out to be inspiring in evaluating Arctic policy related materials in general terms, and this research design provides an alternative way to do policy studies on Arctic matters.

Table 12 provides with a summary in brief of the key characteristics from all four scenario storylines for comparison.

Table 12 Key characteristics of each scenario from futures table with China's role

	<b>Scenario 1: Continued Growth</b>	<b>Scenario 2: Collapse</b>	<b>Scenario 3: Disciplined Society</b>	<b>Scenario 4: Transformational Society</b>
<b>Political</b>	Sovereignty and territorial partitions	Conflict escalation as disputes resolution over resource scarcity	Controlled governance by institutionalization	Arctic autonomy area
<b>Economic</b>	Conventional frame of mind toward appearing opportunities	Mistrust of free market economy and infrastructure investment fail to boost productivity	Balanced sustainable development	Innovations
<b>Technological</b>	To facilitate the expansion of ongoing Arctic activities	Faults from technology adaptations and malignant competition	Designated improvement	Think out of the box and break down customs
<b>Environmental (Maritime environmental issues)</b>	Awareness and mitigation attempts	Negligence and formalism	Effectiveness in arbitration, collaboration and supervision	Value change to sustainability as the new norm
<b>Social</b>	Inclusive of individuals	Protectionism triumphs	Resilient and supportive communities	Favourable and preferable communities
<b>Cultural (indigenous communities and Arctic tourism)</b>	Growing and diversifying identities	Inaccessibility and unpopularity of Arctic	The universal consensus and altered consumerism with substantiality	Blurring identities and fading out "uniqueness" of Arctic
<b>China's role in the scenario</b>	"Angel Investor" and "Patronage"	Contender in seeking "Arctic Hegemony"	Advocator and proponent of "Eco-institutionalism"	Technological harbinger of the "Arctic Cosmopolitanism"

The research result encloses political and economic factors, they are more influential toward the Arctic shipping and maritime governance in all four scenarios storylines, which was not a surprise. Environmental and technological factors, work as catalysts, bring more changes toward the futures as we assume into drastic circumstances. China's Arctic policy white paper provides the possibility to deduce China's Arctic involvement varieties in Dator's four generic scenarios. The recognition of how China would react in each of them are primarily built on the information generalised from the white paper while referring to other related documents and public releases. The role of China in Arctic alternative futures is adaptive and altered accordingly based on the nature of each scenario.

**Arctic can be seen as the subject of progress:**

In the continued growth scenario, China, if maintained its development as a world economy of prosperity, it would be seeking the opportunities in expanding its economic activities in the Arctic region, being "Angle Investor" for business which are also in the middle of development, to reach to the "Win-Win" situation. And China has been rather supportive in term of Arctic research activities and the white paper made it clear that China will maintain the "Patronage" role in doing so both for the country's development while contributing to the Arctic regional development.

In the collapsed scenario, driven by "Authoritarian Capitalism", China is ranging in the Arctic with forms of monopolistic competition in economic activities and aiming to permeate the Chinese Communist ideology to promote the "party-state" totalitarian regimes outside its territory. To the extreme, China would be forced to join the "Contenders" by the deteriorating social, political and economic environment, both regional and international, in seeking the "Arctic Hegemony".

In the disciplined society scenario, indicates by China's Arctic policy, China is seeking the institutionalised participation in Arctic affairs and seeking to act by a law-biding world order. The eco-friendly perspectives are emphasised several times scattered through the white paper in different sections. China is targeting to be more influential and to exercise initiatively both in the existing Arctic management frameworks and to establish new bodies to reach the goal.

In the transformational scenario, China's contribution to the Arctic is heavily depending on the technology breakthroughs and value shifting of Arctic. The digitalization of the Arctic, even the world, cannot be halted. China, with firmly assert, respects the Arctic indigenous cultures and traditions, but they are still facing constant impacts from the outside. With deepened communications everywhere, it is impossible to resist changes in

values, especially on the vehicle of technology advancement. And influences are constant and cumulative, and technology is accelerating the process, resulting in a “Cosmopolitan Arctic” including also Chinese cultures, traditions and values.

The groundwork of this particular study is established on acknowledging the fact that China’s increasing participation in international affairs both globally and regionally. China had claimed its position concerning the Arctic affairs as “near-Arctic-state” indicating its augmenting claims about Arctic region, especially economically in the long run. The standard of gathering variables is based on what perspectives China’s Arctic policy are delivering at first. In a nutshell, China’s Arctic policy, the State Council’s white paper conveys the nation’s official cognition of Arctic for the first time in official configuration.

To some degree, my exploratory attempt, in the light of China’s Arctic policy to project Arctic shipping and maritime governance is archived by providing four distinctive storylines after a thorough futures table was made. Scenario thinking aims at the futures to come and are based on logical analysis. And Dator’s four generic futures, a well-designed and fully tested future archetype for scenario thinking, lays out four tendencies, so that I could focus on for my exploration on the question itself instead of falling in to the mist of the arduous tasks of identifying futures genres in scenario typology.

In the scenario narrative presentation process, personal experiences are being emphasised in front of complex issues from international relations perspectives. This is my response to avoid unbalanced scenario narratives concerning to Arctic issues. I believe that in the later decision-making process, policy’s impacts are eventually fall on people, they are part of evaluations of the policy, regardless of the actual length in each catalogue in documents. That is why I applied personas in my scenario narrative creation and yielded four relatively inspiring storylines.

## **5.2 Limitations of the Study**

Aside from historical the current international relations perspectives, this research offers explorative angle to answer the question on futures of the Arctic shipping and maritime governance started from China’s Arctic Policy frame. The limitation of the research is that Arctic shipping and maritime governance projections are made from rather general content due to the fact that China’s Arctic policy is still on its first edition without further illustrations being attached on specific perspectives. However, China is the country I circled out as “the skeleton” while scouting out into other national and institutional Arctic policy documents covering similar topics. This may result in my storylines of the Arctic

futures much narrower in reflecting and identifying challenges and opportunities of the region centred on Arctic shipping and governance issues.

I might have to make compromises in both data collection and data analysis as I am trying to identify trends and drivers mainly from policy papers and other public released documents. The conventional phrases and hyperbolic rhetoric of some diplomatic papers, to some degree, had hindered the specificity in extracting information. Especially in the beginning phase of this study, my mind was buried in Arctic “visionary” materials and the second challenge to me is to place extracted variables into the right place during the construction of the full futures table (Table 7). Fortunately, with my supervisor’s patience for my project, through his guidance by brainstorm sessions, each parameter space was filled accordingly with constant inner logic.

The last challenge is, while I am composing my futures table with Dator’s four generic futures as the structure and classifying materials from policy documents to proceed manually, not all documents I came across could be included. Some materials are excluded due to their lower relevance to selected topics and perspectives. This practice may result in an unsystematic collection of homogenous materials for my research.

### **5.3 Suggestions for Further Studies**

From the content of this research, China is not peerless in expressing its growing interests in the Arctic region. The constant changing Arctic provides more opportunities, partially due to the fact that iced sea is shrinking in coverage, Japan, the neighbour country had also released its polar policy (The Headquarters for Ocean Policy in Japan, 2015). Meanwhile, traditional “Arctic-State” countries are constantly refreshing Arctic policies in adopting changes in the Arctic.

It is necessary to stress that China is not the only country endowing visions through Arctic policies in foreign policy’s lenses. The prejudice or criticism of the country and its policies should not be the dominating nor primary perspective while evaluating long term effects toward the Arctic futures with China’s participation in general. It is still doubtful that to classify “China’s Polar Silk Road” vision as “an extension” of OBOR (Lim 2019, 3). Multi-perspectives should be included when evaluating China’s “near-Arctic-state” identity in Arctic activities, regarding to its self-defined and self-descriptive nature of it. In the mindset of “debts traps and sovereignty threats” (Alzghool 2019, 11), OBOR is one international controversial strategy bearing unceasing critics and speculations of China’s intention to permeating its influence in international affairs through geopolitics.

To be precise, OBOR is China's global infrastructure strategy where its colossal Foreign Direct Investment (FDI) assembles, it results in members of participating countries increasing as well as setbacks as time went by. So far, it is fair to claim that mega infrastructural projects such as a shipping route that links China to the Europe through the high seas in the North accords with China's ambition in global shipping transportation development, with reduced cost while sailing in the more uncontested Arctic Ocean. In practice, State-owned enterprises (SOEs) are the main force of China's FDI along the OBOR countries driven by government efforts than investment decision from firm's level (Liu et al. 2017, 1368). Private owned companies are hesitating to participate in mega infrastructure projects. The massive government subsidies are "the strong validation" (硬撑) for mega infrastructural projects to be "profitable" (Chen, NSPBRI 2017). Plus, based on records from China's world shipping routes development history, China's "Polar Silk Road" is still in its primary visionary stage, and it is unjustifiable to entirely classify it as controversial infrastructural projects of OBOR, instead of being evaluated individually.

On behalf of innovation of futures methodology in use for the Arctic analyses, here are some questions worth to ponder concerning projects on Arctic futures:

- What would be unfolding due to the constantly changing Arctic with uncertainties in the future?
- What is the most fitting way to arrange scenarios to identify and describe the Arctic in change with uncertainties?
- Will we get similar scenarios narratives with different scenario archetypes on the same topic(s) concerning to the Arctic?
- What kind of scenarios would emerge in an Arctic specific data-driven scenario process?

#### **5.4 Conclusion**

Using scenarios to project futures of the Arctic is a visionary task, it fits the dynamic changing theme of the Arctic. We look into each scenario with specific trends in variables to navigate ourselves in the practice of Arctic studies. As a wide-range subject, Arctic studies are timeless. Undeniably, while sketching Arctic futures, we acknowledged that they are accompanied by rapid technology advancements and societal shifts, especially in

the Arctic shipping routes development and maritime governance frameworks in addition to its highly controversy in international political perspectives.

On the condition of fulfilling the attempt to make “unpredictable issues” tangible, for instance, to address the linkage of global warming effects to ice-melting in the Arctic, we build scenarios to present the stage of complexity instead of answering in causation. By thinking about the Arctic in scenarios, futures alternatives also covering multi-levels of human involvements, there are more countries with growing interests in the Arctic, and people’s responses of the changes in the Arctic should be included. The differences in nature of each scenario are rather valuable, and worth attention to go through individually. In fact, more studies on the Arctic futures should be conducted so that we could get better control when facing the changing Arctic.

This study could provide a divergent method for policy studies, if all alternative futures were given equivalent position and could be combined in the decision-making. Instead of selecting the “prime” future, deductions of multiple scenarios are great toolsets in policy design and evaluation afterward.

Arctic is changing constantly, especially with the ice melting away, there are physically more areas emerging: “the promise of wealth” in a massive region that once deterred from human activities. Moreover, it consciously altering the knowledge we have about the Arctic. While observing on the issue about Arctic shipping development and maritime governance, it is hardly relevant to predict the very reality of the Arctic in the future. Driven by curiosity and in the spirit of exploration, to picture alternative futures of the Arctic are needed and could potentially being expanded into one of the rewarding questions in both futures studies and in other studies such as policy studies.

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## APPENDICES

### APPENDIX 1: CHINA ARCTIC POLICY EXCERPT

Key factors	Policy entries
<b>Shipping Routes in the Arctic</b>	Current Arctic shipping routes include Northeast Passage, Northwest Passage and the Central Passage.
<b>Infrastructure Projects</b>	<p>Active participation.</p> <p>International cooperation on infrastructure construction and operation.</p> <p>To build a blue economic passage linking China and Europe via the Arctic Ocean.</p> <p>Global infrastructure network.</p>
<b>International law</b>	<p>China's Arctic Affair legal framework:</p> <p>The Charter of the United Nations, the United Nations Convention on the Law of the Sea (UNCLOS), the Spitsbergen Treaty and other treaties.</p> <p>General international law governs Arctic affairs: Arctic includes the northernmost landmasses of Europe, Asia and North America adjacent to the Arctic Ocean and the relevant islands, and a combination of sea areas within national jurisdiction, high seas, and the Area in the Arctic Ocean.</p>
<b>Companies (State Owned or Private)</b>	<p>Infrastructure construction.</p> <p>They have begun to explore the commercial opportunities of Arctic shipping routes by commercial trial voyages.</p> <p>Exploration and utilization of Arctic resources with capital, technology and domestic market of China.</p> <p>International collaboration is protective and eco-environmentally friendly within the lawful framework and conduct risk assessments for resource exploration and exploitation of oil, gas and mineral resources in the Arctic.</p> <p>Chinese enterprises' Arctic tourism development is by the collaboration with Arctic States and seeking continuous efforts to enhance security, insurance, and rescue systems for the safety of tourists in the Arctic.</p>
<b>Demand for Maritime Transport</b>	<p>Chinese capital, technology and domestic market.</p> <p>China and International Maritime Organization. China fulfils its international responsibilities by ensuring maritime navigational security and preventing its ships from polluting the maritime environment.</p> <p>China is seeking stronger international cooperation in maritime technology and a globally coordinated solution to reducing greenhouse gas emissions from maritime transport.</p>



<p><b>Scientific Research</b></p>	<p>China has the freedom and right in the exercise and practice of scientific research in Arctic within lawful framework.</p> <p>Scientific research and expedition are among China's first engagement of Arctic affairs, which is the base of China's Arctic activities.</p> <p>China respects lawful scientific research with various fields such as in fishery and shipping routes.</p>
<p><b>National Interests of the Countries Involved</b></p>	<p>The Arctic States, indigenous people and non-arctic states are respected in accordance with the law, so are the overall interests of the international community in the Arctic. Under the Belt and Road Initiative's principles of extensive consultation, China's cooperation includes concrete steps.</p> <p>China's Scientific expedition and research in the Arctic in respects to Arctic States' exclusive national jurisdiction and seeking the law-biding cooperation stresses that all States have the freedom of scientific research on the high seas of the Arctic Ocean.</p> <p>In general protecting environment, China is aiming at stronger environmental management and cooperation. Environmental background investigation and the assessment impact on of Arctic activities are actively engaged while respecting the environmental protection laws and regulations of the Arctic States.</p> <p>In marine environment, China supports the Arctic coastal States in raising the environmental responsibility awareness of its citizens and enterprises in issues such as reduce pollutants in the Arctic waters from land-based sources. China will work along in controlling sources of marine pollution such as ship discharge, offshore dumping, and air pollution.</p> <p>China advocates sustainability to protect the eco-environment out of interests and concerns of the indigenous peoples in the Arctic region.</p> <p>In China's management of the Arctic shipping routes and the freedom of navigation. It respects to the water adjudicatory of the Arctic States under the lawful framework of UNCLOS and general international law as well as acts law-abidingly for ensured Arctic shipping routes and settles disputes over the Arctic shipping routes,</p> <p>China respects the sovereign rights of Arctic States over oil, gas and mineral resources in the arctic under international law so as to the interests and concerns of residents in the region.</p> <p>China's energy cooperation with Arctic State is low-carbon and clean energy.</p> <p>Seeking continuous efforts to enhance security, insurance, and rescue systems for the safety of tourists in the development of Arctic tourism in collaboration with Arctic State.</p> <p>China's main tasks related to indigenous peoples are: preserving their unique lifestyles and values; respecting the efforts made by Arctic States to empower the local citizens; foster their social and economic progress;</p>

	<p>China's participation and cooperation is bilateral and multilateral. China had Arctic affairs consultations bilaterally with all Arctic States and propose partnerships between Arctic and non-Arctic States in practical cooperation fields.</p>
<b>The Pace of Global Warming</b>	<p>In accelerated global warming makes the Arctic into international fulcrum of international shipping routes.</p> <p>Changes in the natural environment, rising sea levels, increased extreme weather events, damaged biodiversity.</p> <p>Out of the changes of the Arctic, and the future of Arctic is a matter of the whole humanity, with both the Arctic States and non-Arctic States are concerned.</p>
<b>High Sea Fishery</b>	<p>New fishing ground in the high seas of the Arctic Ocean.</p> <p>Firm stance in conservation and rational usages of the fishing resources.</p> <p>China respects the lawful rights of fisheries research.</p> <p>Obligations to conserve the fishery resources and the ecosystem fell on all States.</p>
<b>Energy Resources</b>	<p>Exploration and exploitation of oil, gas, mineral resources of Arctic.</p> <p>China respects the sovereign rights of Arctic States and interests and concerns of residents in the region.</p> <p>China's energy international cooperation in the Arctic is low-carbon development based on clean energy which includes increase exchanges in technology, personnel and experience; explore the supply of clean energy and energy substitution.</p>
<b>Recreation</b>	<p>China's usage of Arctic tourism resources will include to benefit indigenous peoples in respects of their traditions and cultures.</p> <p>China's Arctic Tourism is of low-carbon, ecotourism and responsible.</p> <p>The worksheets on China's sustainable Arctic tourism consists: training for and regulates Chinese tourism agencies and professionals; endeavours to raise the environmental awareness of Chinese tourists.</p>

## APPENDIX 2: 中文摘要



UNIVERSITY  
OF TURKU

## 摘要

	學士學位論文
×	碩士學位論文
	副博士學位論文
	博士學位論文

主修	未來學	發表日期	30.03.2021
作者	孫 鑫澎	頁碼數	73+附錄
論文名稱	北極 2050 的四種不同選擇的未來: 從中國北極戰略看北極航道以及北極世界管轄		
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## 中文摘要

關於北極的研究逐年增加，無論是出於科學研究還是社會學研究角度。無可否認的是北極面對冰川消化的事實，北極域內外公海範圍內的冰川融化帶來更多空間有益於航道拓展。這一變化影響著國際巡航以及海事管轄的現狀。表象上，對於北極區域事務的探索得以深入，即使面對北極嚴峻的自然環境局限。進而，對北極事務的認知在全世界範圍內得以拓展開來。中國在 2018 年頒布其北極政策白皮書是在國家戰略的高度，和其他國家一道，表明其對北極事務，深入拓展參加的意願和潛在部署。北極域內外的變化和發展充滿不確定性，這將影響地理和社會的方方面面，帶來北極的不同選擇的未來。通過對北極未來的探索研究，宏觀上是經由情境分析之後而搭建和把握變化中的北極。

本研究側重在經由對北極航道發展和北極海事管轄的展開，通過 Dator 的四種未來原型合理搭建和探索北極的不同選擇的未來。四種未來原型包括「成長」、「準則」、「崩解」以及「轉化」。具體研究過程是一次完整的關於不同選擇未來圖表的創作，從相關政策文件以及媒體發布中抽取和總結未來變量，藉由人物誌和故事線的方法展現四種北極的不同選擇未來。

由於北極的衡穩變化常態使得對於北極的不同選擇未來的想像充滿挑戰，這不是對於北極未來發展的預測，而是基於其動態變化特性的探索性研究。

關鍵字	北極未來想像，北極航道，北極世界管轄，中國北極戰略政策白皮書，情節分析，人物誌，故事線，四種未來原型，不同選擇未來圖表
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