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SOCIAL AND ECONOMIC DEVELOPMENT

SPECIAL ISSUE. SOCIAL AND ECONOMIC DEVELOPMENT OF ARCTIC REGIONS

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Editorial. Research on Socio-Economic Development of the Arctic Regions: a Multidisciplinary Approach*

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Until the 20th century, the Arctic was largely considered a remote and freezing wasteland characterized by low tension as well as a low degree of economic exploitation and development of its natural resources. However, the region is currently in a state of flux, due not least to the manifest and controversial effects of climate change taking place in front of our very eyes. In the aftermath of this, most Arctic territories with their extremely rich yet somewhat hard to extract natural resources have gained visibility and the interest of the wider world. It is therefore no coincidence that the development of the Arctic has become by far the hottest economic and political issue not only for the five littoral Arctic Ocean states [Russia, Norway, the United States (Alaska), Denmark (Greenland) and Canada], but also for the three other Arctic nations [Iceland, Sweden and Finland]. As part of the joint effort to deal with the challenges that the Arctic faces, a handful of highly-regarded international organizations have been founded with the active involvement of the aforementioned nations, encompassing the *Arctic Council*, the *Arctic Economic Council*, and *Barents Euro-Arctic Council*, to name just a few.

What is striking here is that some other nations geographically far removed from the Arctic have also demonstrated a keen and ever-increasing interest in the area. China, Germany, Singapore, Japan and South Korea feature prominently among those countries, meaning that what happens in the Arctic has far-reaching implications for the entire world. A great interest on the part of Asian countries is particularly noteworthy. For the sake of illustration, China referred to itself as a “near Arctic state” in its white paper on the Arctic, even though the country’s nearest point to the Arctic Circle over 1,600 km away. Moreover, international corporations, including but not confined to those operating in shipping, fishing, energy and mineral production, have intensified their

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activities in the circumpolar Arctic. All in all, the total value of planned Arctic infrastructure projects estimated by the global investment and advisory firm Guggenheim Partners¹ amounts to an impressive 450 billion USD².

The rise of interest in the Arctic has been reflected particularly in an unprecedented growth in the number of reports and related communication products. Strongly supported by international institutions [as varied as the Arctic Council, the Arctic Economic Council, the Nordic Council of Ministers, and the Organisation for Economic Co-operation and Development], the Arctic reports have addressed various issues of socio-economic development in the macro-region [1, Timoshenko K., Mineev, A., p. 213]. For instance, the reports include topics / themes relating to human development (*Arctic Human Development Report*), northern sparsely populated areas (*OECD Territorial Reviews*), as well as recommendations for an interconnected Arctic (*Arctic Economic Council Broadband Report*). Furthermore, the Arctic reports have shed light on socio-economic drivers of change in the Arctic (*Arctic Monitoring and Assessment Programme*), the economy of the North (*ECONOR project*), sustainable business development in the Nordic Arctic (*NORDREGIO reports*), Business Development Conditions in the European Arctic including Russia (*Business Index North project*), and European High North business and investments (*Arctic Business Forum Yearbooks*).

A comprehensive review of the Arctic reports above has led us to conclude that the Arctic is not a highly homogenous region, but comprises both a number of benefits and drawbacks. What is common to almost all Northern territories is challenging demographic trends, heavy dependence on natural resources, a relative lack of or deficiencies in the transport infrastructure, and social and environmental issues. On the other hand, numerous positive lessons and experiences have been accumulated there over time, encompassing *inter alia* vibrant cities, innovative clusters and entrepreneurs (e.g., in the Nordic part of the Arctic), and huge industrial developments related to e.g. the production of fertilizers and non-ferrous metals, and the oil and gas sector (Northern Norway, Russia, The US Alaska).

What is perhaps more important is that the Arctic area today has been subjected to numerous measurements and quantifications including the use of various metrics and measures of socio-economic progress. While the Arctic reports undoubtedly provide a valuable and comprehensive description of the current status and reveal the major trends, they are unlikely to afford a more profound understanding of the Arctic development in more analytical terms and categories. That emphasized, there is a dire need for more studies that can potentially contribute to further knowledge development on the Arctic in a very much more *interdisciplinary way*. To the best of

¹ Guggenheim. Promoting Sustainable Development in the Arctic. A Private Sector Proposal for Partnership. Presentation at Arctic Economic Council Top of the World – Arctic Broadband Summit. July 2016. URL: https://arcticeconomiccouncil.com/wp-content/uploads/2017/02/Michael-Perkinson_Sustainable-Investment-Strategy_-Guggenheim.pdf (accessed 27 February 2019).

² According to this estimate, the Russian Federation has the highest level of both planned and needed investments among countries in the Arctic region, followed by the USA, Canada, Norway and others.

our knowledge, two of the most recent attempts in this regard that are worthy of mention here are *The Palgrave Handbook of Arctic Policy and Politics* [2, Coates K., Holroyd, C.] and the ongoing book project by the High North Center for Business and Governance at Nord University entitled “*International Cooperation for Global Development: Arctic Scenarios 2035*”.

A search for the word “Arctic” in Google Scholar³ revealed the high and mounting interest in the region among members of the international academic community. As Figure 1 shows, this interest in the Arctic has more than tripled since 2000!

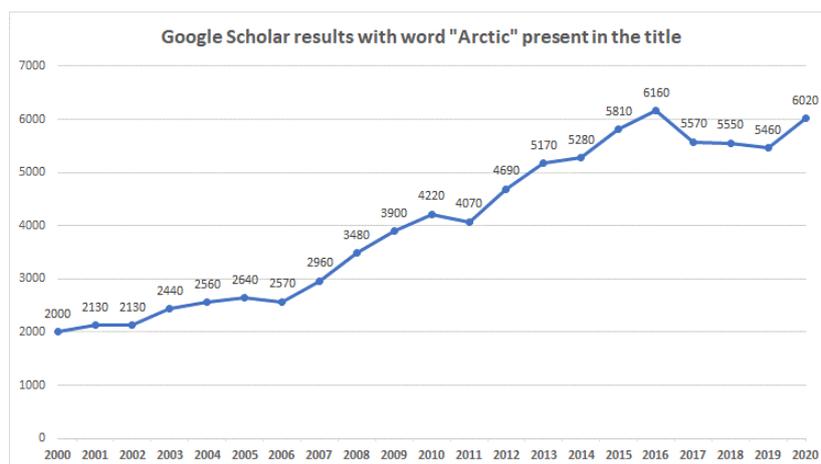


Fig. 1. The number of research publications with the word “Arctic” present in the title over the last two decades⁴.

As a systematic review of the publications over time has clearly evidenced, the Arctic research is undergoing a disciplinary shift away from *natural sciences* towards *social sciences* and *humanities*, thereby inaugurating a paradigmatic change. This new way of thinking about the Arctic delves deeper *inter alia* into the environmental, technological, political and energy-related issues [3, Biresselioglu M.E., Demir M.H., Solak B., Kayacan A., Altinci S., p. 1]. Putting this brand new avenue of thought at the forefront of our attention, we have pleasure, in this special issue, in offering you a curated collection of scholarly works that deal with an analysis of the socio-economic development of the Arctic regions.

Outline of the Special Issue

Our call for papers was announced in December 2019, inviting members of the international academic community, practitioners and policymakers to participate in the ongoing debate concerning various aspects of socio-economic development in the Arctic. According to our original idea, the issue was calibrated to showcase and celebrate the growing body of research on Arctic issues. We were delighted to receive a cluster of high-quality submissions as our call had sparked off a genuine interest among a large group of scholars and experts from different geographical territories and areas of expertise. Submissions encompassed a diverse array of themes, including but

³ Google Scholar is a freely accessible web search engine that indexes the full text or metadata of scholarly literature across an array of publishing formats and disciplines.

⁴ Google Scholar. URL: <https://scholar.google.com/> (accessed 26 November 2020).

not limited to logistics, sustainability, entrepreneurship, economic geography, marketing and tourism. The geographical coverage of the countries studied went far beyond the Russian context to include those of Norway, Finland and the USA. As has been the case everywhere in the world, the outbreak of Covid-19 disrupted our original plans, causing significant delays in the publication process. The publication of this special issue was scheduled for September 2020 but delayed by nearly half a year. That said, some manuscripts representing potentially promising contributions to the topic do not appear here in this edition. However, we are convinced that they would contribute to the discussion either in the forthcoming issues of the *Arctic & North Journal* or in other reputable outlets.

Comprising articles by contributors from varied backgrounds, this edition brings together a range of scholarly perspectives on the Arctic by focusing on the nexus of human, economic and social systems in the Arctic. The list of themes to be covered here is so wide as to include *inter alia* community sustainability and innovation, economic geography, tourism, transport safety, blue economy, public-private partnerships, data centres and connectivity, thus underlining the multi-disciplinary nature of this edition. Written in an accessible manner for the general interested reader, practitioners and policymakers with a keen interest in the Arctic, it sets forth directions for future research in this vital region. It is our profound hope that the current edition will trigger fruitful discussions and widen our comprehension of the Arctic region by providing lessons from the empirical evidence presented in these papers. Needless to mention, all the manuscripts were peer-reviewed by experts within their specific fields of research. The authors are very grateful to the anonymous referees for their many comments and suggestions, which helped to significantly enhance the quality of this issue.

The eight contributions that we have meticulously curated for this collection are as follows, in the order of their appearance:

Drawing upon two case areas in the Arkhangelsk region of Russia, namely the Solovetsky Archipelago in the White Sea and the islands in the delta of the Northern Dvina River, JULIA OLSEN, MARINA NENASHEVA, GRETE HOVELSRUD and GJERMUND WOLLAN provide a captivating account of what factors shape community viability and residents' willingness to stay in these two settlements undergoing massive changes. Their findings clearly indicate that community viability and the reluctance of community members to abandon their traditional settlements are largely impacted by livelihoods, employment opportunities and social capital. Olsen, Nenasheva, Hovelsrud and Wollan reach the conclusion that further enhancement of community viability and support for local livelihoods is to a large extent dependent upon (1) bottom-up initiatives of engaged individuals and their access to economic support and (2) top-down investments that contribute to local value creation and employment opportunities.

In their conceptual study of sustainable tourism development in Norway, OLGA HØEGH-GULDBERG and SABRINA SEELER seek to gauge the potential of the country's unique traditions and attitudes for fostering tourism. Based on a comprehensive review of refereed journal articles,

book chapters, official reports and media publications, they carry out a critical assessment of the degree to which national identity can eventually be converted into a key driver of tourism development. Their theoretical frame of reference develops at the interface between the research on tourism development and marketing, tourist experiences and social identity theory. Høegh-Guldberg and Seeler reach the conclusion that national and regional identity possesses an enormous untapped potential for regional tourism development which, until now, has only fragmentarily been addressed in the context of the Norwegian tourism industry.

Taking a close look at primary sector transformation in the post-Soviet Russian Arctic, GALUSTOV and KHODACHEK seek to delve deeper into some of its key drivers, distinguishing features and development prospects. Relying almost exclusively upon expert survey as the major method of data gathering, the authors highlight the primary sector's role in the economic development of the Arctic regions. Among other things, Galustov and Khodachek point to the prominent role played by the oil and gas sector in the bitter conditions of the Arctic. They caution, however, that in the future heavy reliance on oil and gas may generate visible detrimental effects on the Arctic territories of Russia.

Addressing in her study the practical field of road transportation, KATHRINE GRINERUD considers the important question of whether buyers of road transport services in Northern Norway can contribute to safer road transportation. Adopting a modified version of The Pentagon Model, she conducts a thorough search for organizational characteristics and qualities leading to fewer accidents and near-misses. Her study provides strong evidence that buyers of road transportation services can make a significant contribution to a safer road transport system by emphasizing the following five characteristics and qualities: (1) the importance of developing a detailed formal contract with the provider of road transportation; (2) being aware of the possibilities of new technologies; (3) understanding that the decision criteria for ordering transportation can influence road transportation safety; (4) seeing the importance of good communication with both the transport organization and the authorities; and (5) recognizing that knowledge of and trust in a transportation organization is important but could also affect judgement regarding revisions and controls.

HENNA LONGI and SAMI NIEMELA strive to improve our understanding of the various roles played by the public sector in generating and diffusing knowledge to companies and industrial networks. Their empirical evidence is based on data from experiments in the Oulu region of Finland, which has a long history in developing public-private collaboration and innovation systems. Placing emphasis on knowledge application and exploitation, as well as their implications for the public driven innovation system and activities, Longi and Niemela divide operational tools and activities into the following three categories: (1) company collaboration; (2) business development; and (3) competence development. Their analysis also reveals some vivid examples of the future prospects and challenges in the region.

In their comparative study of the United States (Alaska) and Norway (North Norway), ANDREAS RASPOTNIK, SVEIN VIGELAND ROTTEM and ANDREAS ØSTHAGEN shine a light on how aqua/-mariculture is governed. Tackling the increasingly popular concept of blue economy, they create a solid foundation for *blue* discussions by mapping the current status of regulations and systems in the aforementioned settings. In their assiduous efforts to examine how parameters for blue economic projects are determined at the international, regional, national and local governance level, Raspotnik, Rottem and Østhagen illustrate the complexity underlying the concept in question. As clearly appears from their study, highly complex social phenomena, entailing that of blue economy, play an important and irreplaceable role in initiating debates and impact governance relations that are inextricably linked to the development of the aquaculture industry.

Keeping their eyes on the rapidly expanding global data centre industry, JUHA SAUNAVAARA and ANTTI LAINE seek to raise our awareness, knowledge and comprehension of this phenomenon among all relevant national, regional and local stakeholders and to gauge its role in the Arctic. In order to illustrate the inherent merits and limitations of regional knowledge bases and skillsets, they pave the way for data centre-related research and development activities and education in the Arctic, as well as research concerning the development of the data centre industry in the cold, northern environment. Saunavaara and Laine argue that these specific conditions may offer advantageous circumstances for the construction of environmentally friendly and sustainable data centres.

Putting connectivity issues in perspective for scholars around the world, ALEXANDRA MIDDLETON explores those Arctic institutions dealing with them. In light of Gaventa's framework of power and powerlessness and the stakeholder participation model, she investigates the power and powerlessness and modes of participation of stakeholders at the national and regional levels. Drawing upon an illustrative example of connectivity in the Arctic, Middleton makes a substantive contribution to a clearer understanding of power structures and citizen participation in the Arctic institutions. Her major findings suggest that, due to their composition, working formats and governance structures, Arctic institutions have very limited opportunities for citizen participation. Middleton's paper ends with some promising avenues for opening up closed spaces to be inclusive of Arctic citizens' perspectives.

We very much hope that you will enjoy reading the carefully curated articles on the beautiful and alluring, fragile and overwhelming region of the Arctic and find each of them to be as influential to your thoughts and ideas on the Arctic and its developmental prospects as the editors have!

Acknowledgements

As guest editors of this special issue, we are greatly indebted to all the authors for their enduring efforts to push the quality of their manuscripts to a higher level during the review process. We would also like to express our heartfelt appreciation to the reviewers for providing inval-

uable feedback and suggestions for enhancement within the short, stipulated time frame. Last but not least, we owe a special debt to the academic and administrative staff at the Northern (Arctic) Federal University of Russia in general and Arctic & North Journal in particular for giving us a unique opportunity and enlightening experience to lead this special issue.

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Island Communities' Viability in the Arkhangelsk Oblast, Russian Arctic: The Role of Livelihoods and Social Capital*

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Abstract. Since the collapse of the Soviet Union, local communities have been adapting to new political and socioeconomic realities. These changes have prompted dramatic outmigration among rural populations, especially in the Russian Arctic. Despite these changes, some communities remain viable, with some residents exploring new economic opportunities. This study uses findings from qualitative interviews to understand what factors shape community viability, interviewing residents and relevant regional stakeholders in two case areas in the Arkhangelsk oblast: the Solovetsky Archipelago in the White Sea and islands in the delta of the Northern Dvina River. The results indicate that community viability and the reluctance of community members to leave their traditional settlements are shaped by livelihoods, employment opportunities, and social capital. Social capital is characterized by such empirically identified factors as shared perceptions of change and a willingness to address changes, place attachment, and local values. We conclude that further development or enhancement of community viability and support for local livelihoods also depends on 1) bottom-up initiatives of engaged individuals and their access to economic support and 2) top-down investments that contribute to local value creation and employment opportunities.

Keywords: *Arctic, Arkhangelsk oblast, community viability, livelihoods, social capital.*

Introduction

This explorative study aims to examine the factors that shape island communities' viability and residents' willingness to stay in said communities during periods of multiple changes. The collapse of the Soviet Union prompted dramatic changes in political, economic, and social conditions in Russia and, especially, its Arctic areas. Declining living standards and quality of life, the closure of vital social services, increasing unemployment, aging infrastructure, and high outmigration are just some of the consequences of the socioeconomic transformation faced by the Arctic population since the early 1990s [1, Artobolevsky S.S., Glezer O.B.]. The transition to a market economy led to the loss of state subsidies and the closure of many collective and state farms, social services, and industries [1, Artobolevsky S.S., Glezer O.B.]. The absence of this crucial economic support has challenged the

* For citation: Olsen Ju., Nenasheva M.V., Hovelsrud G.K., Wollan G. Island Communities' Viability in the Arkhangelsk Oblast, Russian Arctic: The Role of Livelihoods and Social Capital. *Arktika i Sever* [Arctic and North], 2021, no.42, pp.13–31. DOI: 10.37482/issn2221-2698.2021.42.13

viability of rural settlements, resulting in high outmigration to larger towns and cities and from north to south [2, Heleniak T., pp. 81–104].

Over the past 30 years, Russia's rural population has decreased from 39.1 million in 1989 to 36.3 million in 2018 [3, Zakharov S.V.]. Climate change is another challenge affecting small, local communities and their livelihoods and socioeconomic development in the Russian Arctic. Recent studies from the Barents region report changes in the cryosphere, increasing precipitation and temperatures, and changes in the distributions of floral and faunal species [4, AMAP; 5, AMAP]. Changes in river and ocean ice conditions have extended the navigation season for water transportation, with implications for local mobility [6, Dumanskaya I.O.; 7, Mokhov I.I., Khon V.C.; 8, Olsen J., Nenasheva M.; 9, Vorontsova S.D.]. The same changes have shortened the operation period for winter and ice roads [10, Prowse et al.], which are sometimes compromised by sudden melts during milder winter temperatures over long periods of time. Ice roads represent vital transportation and supply infrastructure during winter, as they connect various Arctic communities [11, Olsen J., Nenasheva M., Hovelsrud G.K.].

Since the 1990s, the community viability of Russian Arctic settlements has been shaped by multiple interrelated changes, many of which are exaggerated by shifting climatic conditions. Despite these socioeconomic, demographic, and environmental changes, people are willing to stay in Russia's small Arctic communities, dealing with the changes and engaging with or exploring new opportunities for local socioeconomic development. To examine this phenomenon, our study builds on the concept of community viability [12, Rasmussen R.O., Hovelsrud G., Gearheard S.] to examine what factors support and shape community viability in two island communities in the Arkhangelsk oblast. The case communities are located on the Solovetsky Archipelago in the White Sea and on islands in the delta of the Northern Dvina River. Our empirical data derive from interviews with residents in both areas and is supported by interviews of key regional stakeholders in Arkhangelsk.

Study approach

By studying rural island communities, we can examine factors of community viability connected to a community's surrounding environment and to interactions between inhabitants. Community viability refers to a community's ability to stay viable in the context of ongoing changes. Aarsæther, Riabova, and Bærenholdt [13, Aarsæther N., Riabova L., Bærenholdt J.O., p. 139] describe a viable community as "one in which people feel they can stay as inhabitants for a period of their lives, where they find sources of income and meaningful lives." The *Arctic Human Development Report* [14, TemaNord] showed that community viability is related to everyday security needs, socioeconomic and environmental concerns, and the ways in which settlements are developed and maintained [12, Rasmussen R.O., Hovelsrud G., Gearheard S.]. The scientific literature views community viability as connected to economic and financial viability and/or residents' willingness to live in a specific settlement. Economic and financial viability are studied, for example, in communities in which a cornerstone industry plays a central role in the accumulation of capital and, hence, the in-

creased attractiveness of the community. When referring to residents' willingness to stay at a specific settlement, existing studies refer to residents' future perspectives about staying [15, Munkejord M.C.] and describe several subjective motivation factors¹. The same studies specify that these motivation factors vary across communities. For example, using survey results in one Norwegian municipality, Sørli² argued that job opportunities are the main motivations to live in smaller communities. In addition to job opportunities, place attachment, local environment, social networks, and the ability to influence local decision-making are important factors³ [16, Hovelsrud G.K., Karlsson M., Olsen J.].

Though the topic of viability of Arctic communities has received attention in the literature, the factors that shape such viability remain underexplored. Viability can be approached as a dynamic phenomenon, since communities undergo a process of continuous change and are influenced by numerous dynamic factors, including social capital. The linkages among social attributes and community viability have not been broadly investigated. In the study of rural communities in the Alpine region, Wiesinger [17, Wiesinger G., pp. 43-56] argued some communities lacking policy support and economic performance could still be more viable than others. Furthermore, Wiesinger [17, Wiesinger G., pp. 43-56] argued strong social ties allow inhabitants to live vibrant lives, even in communities with unfavorable socioeconomic conditions.

Such strong social ties and networks are related to communities' social capital, or the valued resources that generate return to individuals and collective groups in society and that are captured in people's social relations [18, Mitra J.]. *Social capital* also relates to the ability to act collectively to address changes [19, Adger N.]. According to Bourdieu's empirical approach [20, Broady D., pp. 177–179], social capital exists only if it is activated: that is, if the relations to others (e.g. kinship and friendship) are real and can be converted into other forms of value or capital (e.g. economic or cultural). According to Lin [21, Lin N.], social capital cannot be possessed by individuals; rather, valued resources are embedded in networks themselves and are accessible through direct and indirect ties. What matters are not only the specific social relationships among individuals, but also those social linkages forged in relation to specific places. Such social links may include formal and informal organizations (e.g. the workplace or volunteerism) in local communities. In this study, we examine the relations between a community's quantifiable assets and its actual viability, adopting a community-based approach to empirically explore stakeholders' perspectives and responses to changing ongo-

¹ Sørli K. *Bolyst og stedsattraktivitet- motiver for å flytte og bo i distriktene* (2009:111). URL: <https://fagarkivet-hioa.archive.knowledgearc.net/bitstream/handle/20.500.12199/2492/2009-111.pdf?sequence=1&isAllowed=y> (accessed 20 December 2020).

² Sørli K. *Bolyst og stedsattraktivitet- motiver for å flytte og bo i distriktene* (2009:111). URL: <https://fagarkivet-hioa.archive.knowledgearc.net/bitstream/handle/20.500.12199/2492/2009-111.pdf?sequence=1&isAllowed=y> (accessed 20 December 2020).

³ Sørli K. *Bolyst og stedsattraktivitet- motiver for å flytte og bo i distriktene* (2009:111). URL: <https://fagarkivet-hioa.archive.knowledgearc.net/bitstream/handle/20.500.12199/2492/2009-111.pdf?sequence=1&isAllowed=y> (accessed 20 December 2020).

ing conditions [16, Hovelsrud G.K., Karlsson M., Olsen J.; 11, Olsen J., Nenasheva M., Hovelsrud G.K.] and examine the factors that shape the viability of island communities.

Case area

To examine whether and how small rural communities in the same region (i.e. the Arkhangelsk oblast) perceive and respond to changes and what factors enhance viability, two cases were selected. This qualitative case study was conducted in two island areas: the Solovetsky municipality on the Solovetsky Archipelago and island communities in the municipalities of Ostrovnoe and Oktyabr'sky, situated in the Northern Dvina River delta. The populations in both case areas have experienced dramatic changes in their socioeconomic conditions since the end of the Soviet period, exaggerated by changes in sea/river ice conditions [8, Olsen J., Nenasheva M.; 11, Olsen J., Nenasheva M., Hovelsrud G.K.]. Due to their geographic situation, the populations of the island settlements have limited mobility and connectivity with the mainland. During the ice-free period, both case areas can be reached by water transportation. During the winter period, the communities in the delta of the Northern Dvina River have ice road connections to Arkhangelsk, while Solovetsky is approachable only by plane. There is no land-based infrastructure (e.g. bridges) connecting the island communities with the mainland. The main characteristics of the case communities are highlighted in Table 1.

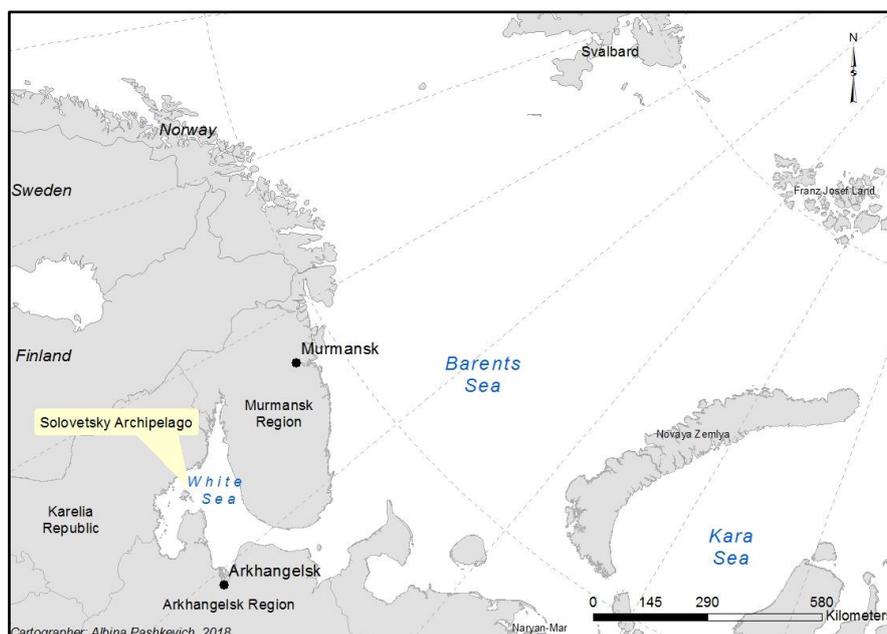


Fig. 1. Map of the study area with adjustment territories.

During the Soviet era, the municipality of Ostrovnoe produced agricultural products for Arkhangelsk. The island also held a space research station, an airport, and a number of social services used by both the settlements and the population of Arkhangelsk. Home to the Solovetsky Monastery, the Solovetsky Archipelago—*Solovki*, in Russian—has a rich history, powerful culture, and unique wildlife composition that have attracted tourists for decades. Though the number of domestic and international tourists to the archipelago has increased in recent years [8, Olsen J.,

Nenasheva M.], the community experienced more tourists during the Soviet era, when a regular cruise route ran between the archipelago and Arkhangelsk [22, Maksimova T.].

Table 1

The main characteristics of the case communities⁴

Characteristics	Ostrovnoe/Oktyabr'sky	Solovetsky
Geographic location	64 °N; the Northern Dvina River delta, Arkhangelsk oblast, Russia	65 °N; Solovetsky Archipelago (also known as Solovki), White Sea, Arkhangelsk oblast, Russia
Major settlements	Pustosh, Vyselki, Odinochka, Adrianovo, Voznesenye, Konezdvorye, Lastola	Solovetsky is a transportation and administrative hub for the Solovetsky Archipelago
Demography	1,896 native Russian inhabitants. The population is declining.	943 primarily native Russian inhabitants, 10% of whom are monks. The population remains stable.
Employment	Museums, municipality, tourism, agriculture, and the subsistence economy	Museum, monastery, municipality, tourism, and the subsistence economy
Transport linkage with the mainland	Shipping (seasonal) and winter roads	Shipping (seasonal) and air transportation (year-round)
Natural environment use	Fishing; collecting wild plants; recreation; agriculture	Recreation; fishing for subsistence and private income (year-round); collecting local resources (berries, mushrooms, seaweed) for subsistence during the summer season

Methods

We apply a community-based approach [23, Hovelsrud G.K., Smit B.; 24, Kelley K.E., Ljubicic G.J., pp. 19–49] to understand local communities' perspectives on the changing conditions and local factors that constitute community viability. Community-based approaches are broadly used in adaptation studies. These approaches facilitate engagement of relevant stakeholders and community residents to examine local perceptions of change, exposure-sensitivity, capacity to adapt to change, and whether and how the community responds to said changes [25, Smit B., Hovelsrud G., Wandel J., Andrachuk M., pp. 1–22]. In this study, we worked closely with community members and/or relevant stakeholders during the preliminary fieldwork and during the data collection period. This allowed us to increase the relevance of the study to residents' needs and changing conditions, and also to explore local perspectives in-depth, adapting to concerns and response strategies regarding on-going changes.

Our empirical data comprise interview and observation data collected by two members of the author team during fieldwork in the case areas: first, in Solovetsky in June 2017, and later, in the Northern Dvina River delta communities in June 2019. Additionally, interviews were conducted in Arkhangelsk, with key stakeholders representing local and regional officials and industrial representatives who influence and support the development of island territories in the Arkhangelsk oblast (Table 2). Some of these stakeholders can be also described as links between local and region-

⁴Number of residents of Municipality "Ostrovnoye". Arkhangelskstat, 2019. Date of request: 10.10.2020; Solovetsky Strategy. (2013). Development Strategy of Solovetsky Archipelago as a unique site of spiritual, historical-cultural and natural heritage. URL: http://solovki-monastyr.ru/media/attachments/Project_strategy.pdf (accessed 20 December 2020).

al levels, as they share knowledge on island communities' current and future development and are often the first contacts for community members working to address local concerns.

Some of the interviewees in both municipalities were identified and contacted prior to the primary fieldwork stage to organize and schedule interviews. However, due to the low number of residents and the limited ability to contact the local population in advance, we applied standard "snowball" sampling methods, in which the respondents themselves suggested other potential candidates to interview [26, Blaikie N.]. To secure the interviewees' anonymity, we use a coding system for citation purposes: interviews A1 through A32 represent the Ostrovnoe case, and interviews S1 through S24 represent Solovetsky.

Table 2

The number and types of interviews

	Type of interview	Interviewees involved in the study
Ostrovnoe/ Oktyabr'sky A1-A32	26 personal interviews with residents of the island villages (The major part are from Ostrovnoe municipality)	24 residents of the villages 2 former residents who still have property in one of the villages and visit it during the summer navigation season
	6 personal interviews with relevant stakeholders in Arkhangelsk	1 public body 5 private and state-owned businesses
Solovetsky S1-S24	12 interviews with residents 12 interviews with relevant stakeholders in Arkhangelsk	12 residents in Solovetsky with knowledge about local socio-economic development and the tourism industry. 12 stakeholders in Arkhangelsk with knowledge about socio-economic development of the Solovetsky Archipelago including private and state-owned businesses

Semi-structured interviews were conducted to examine the interviewees' perspectives on the changing conditions and elements in their communities' social capital that enable adaptation. The interview questions were grouped into the following categories: 1) background, 2) changing conditions, 3) local impacts, and 4) local responses. Most interviews were recorded, transcribed, and analyzed. To accomplish this, we utilized qualitative data analysis software (NVivo) and applied thematic analysis: a method identifying patterns in qualitative data [27, Braun V., Clarke V., pp. 77–101]. We coded our empirical material using codes identified (inductively) during the analysis and not theoretically guided. Then, we grouped the codes under four main categories that we used to structure our results and discuss their relation to community viability. This allowed us to capture the essence of each thematic area from the empirical data.

The materials obtained during the fieldwork were supplemented by secondary data, such as historical and modern-day development records of the islands, statistical information and information about navigation to and from the communities.

Results

Our analysis of the empirical data revealed four categories pertaining to community viability. This section provides insights into those four categories, beginning with a description of the local livelihoods and employment opportunities influenced by the changing socioeconomic and environmental conditions following the collapse of the Soviet Union. The livelihood description is followed by a presentation of local factors illustrating the motivation to stay in local communities. Of particular importance are a shared perception of changing conditions affecting local livelihoods, place connection, and local values (e.g. remoteness and social bonds).

Local livelihoods and employment opportunities

In past centuries, traditional livelihoods in the island population have been connected to the river and marine environment through fishing activities, hunting, and the gathering of wild plants (e.g. berries and mushrooms). During the Soviet era, island communities in the delta of the Northern Dvina River were engaged in agricultural activities and employed in state social services located on the islands. The main means of transportation among the islands were, and still are, passenger vessels and small boats (e.g. small rowing boats and/or motorboats), which are used for local mobility, fishing activities, and recreational purposes (A5, A11, A12). Small boats are an important part of local livelihoods and mobility in Solovetsky, where they are also used for tourism-related activities (S24).

The tourism industry on the Solovetsky Archipelago is several decades old and influences many aspects of local socioeconomic development. Solovetsky is one of the main tourist attractions in the Russian North, offering cultural, historical, natural and religious sites, including the Solovetsky Monastery (Fig. 2). Because of the monastery, pilgrims are among the archipelago's main tourism segments. In addition, Solovetsky is visited by domestic and international individuals and tourist groups (S19, S17, S12), most of which arrive on passenger and cruise vessels during the summer. Given the proliferation of tourists, most residents provide tourism-related services, earning extra income during the summer through one or more tourist services. One resident emphasized that "every second, or even more, resident of Solovki is involved in tourism. Someone fishes, rents out a hotel, someone rents out an apartment... someone transports people" (S19). However, one of the main concerns relating to tourism development is the impact of a growing number of tourists, a topic about which the interviewees held several opinions. The stakeholders in Arkhangelsk operate with an official number of registered tourists that might be lower than the actual count and suggested that the number of tourists increases. Alternately, the residents of Solovetsky experienced negative impacts on the local environment and infrastructure and suggested that the number of tourists visiting the archipelago should be more regulated (e.g. S12, S17).



Fig. 2. The Solovetsky Monastery, the main tourism attraction of the Solovetsky archipelago⁵.

Compared to Solovetsky, tourism development is a rather new industry for the municipality of Ostrovnoe (one of the island communities) and is mostly driven by residents who have received grants to establish tourist services (e.g. A5, A18, A30). One interviewee informed us that one of the villages hosts about 1,000 domestic and international tourists per year (mostly during the summer), but that only a few residents are employed in tourism-related activities (A18). A resident from another village emphasized that the number of tourists has increased since the opening of a local museum and that “life has become more eventful. The influx of tourists to the village plays a big role” (A30). Currently, tourists can visit two museums: a space museum that presents a history of the Soviet research station and a sea pilot museum covering the history of Arkhangelsk, the first port in Northern Russia (e.g. A13, A14, A30). The residents also discussed other products of tourism, such as a new café and organized bicycle trips (A2), as well as weekend tours, including an excursion into the village for school and church visits (A30). One resident identified potential for building guest houses (A23), while those engaged in tourism suggested that further tourism development will depend on marketing (A18, A31). In this context, Solovetsky can serve as a kind of warning of what could happen when island communities experience a higher influx of tourists, since the residents on Solovetsky already report an excessive number of tourists due to unregulated individual tourism (S15, S19).

Finally, agriculture is another form of local livelihood in the Ostrovnoe municipality. It was the dominant livelihood during the Soviet era, but only a fraction of residents currently practice it (A15). One resident remembered that, “before the collective farm collapsed, everyone had work here, nobody [moved to another place], children studied at school, there was a tractor-driving

⁵ Photo: Julia Olsen, June 2017.

class, people moved here from other places, we had a population influx, we produced milk and butter, and we fed [Arkhangelsk] with potatoes" (A 14). Several residents reflected on the potential of rebuilding the island's agricultural industry; however, this development might be jeopardized by changes in the navigation season, which have already created numerous challenges for agricultural transport between the island territories and Arkhangelsk, especially during the *rasputitsa*⁶ season (A29).

Shared perception of changes

Most residents in rural communities, especially in the Northern Dvina River delta, are concerned about local socioeconomic development and emphasize that the settlement population has been declining since the end of the Soviet era, with outmigration driven primarily by the collapse of the Soviet Union and the consequent shutdown of local industries and community services. The respondents in both municipalities were nostalgic for the "old days" (the Soviet period), when the islands' production and social infrastructure were better developed. One Ostrovnoe interviewee compared current development with the end of the Soviet period as follows: "I came here thirty years ago. Kindergarten worked here, we had a sanatorium, there was a boarding school. I never thought that would change" (A23). The interviewee added, "our islands are dying."

Both case areas are characterized by a lack of opportunities for higher education. Hence, younger residents move to other cities and towns for education, and, when finished, do not necessarily return due to a lack of skilled jobs. The permanent residents of Ostrovnoe/Oktyabr'sky are concerned by the lack of employment opportunities, which forces the working population to commute to Arkhangelsk. Young people have moved or are planning to move to cities because, according to one respondent, "there is nothing here... nothing for us and the children to do" (A10). An interviewee who did not work in Arkhangelsk said, "I like to live here with my child since I do not have to travel to the city and it is quiet on the island" (A5).

Given these realities, the demographic trend in Ostrovnoe is characterized by a consistent decline and aging of the population. Pensioners prefer to stay on the islands because, as one respondent said, "I have nowhere to go" (A11). An elder interviewee said, "I like it here. I don't need to go to the city. I might go sometimes but, in the evening, I want to go home. It's good here. We go out, sit together. We go to our cultural house" (A16). Unlike the population in Ostrovnoe, the population of Solovetsky remains stable. The main employers on the Solovetsky Archipelago are the Solovetsky Monastery, the museum, and the local municipality. However, similar to Ostrovnoe/Oktyabr'sky, Solovetsky's youths tend to move to other, larger cities for higher education. Some of them return for a summer period—the tourism season—which provides opportunities for extra income (S15, S17).

⁶ Rasputitsa season is the period when the ice roads are unsafe for transport. Rasputitsa traditionally occurs in the spring, when the river ice begins to melt, but nowadays can also occur in late autumn and winter.

In addition to thinking about the population's outmigration, residents in both communities reflected on changes in navigation seasons, which are becoming more unpredictable. They observed that the sea ice on the White Sea and the river ice on the Northern Dvina River freeze later, making it difficult to plan for the opening of the navigation season. These changes affect local mobility (S24, S15) and transportation connections with Arkhangelsk (A7, S17). However, while daily mobility in the delta of the Northern Dvina River depends on ice conditions, a year-round connection has been established among settlements via ice roads, tugboats, and passenger vessels. The mobility options of the Solovetsky population are quite different. Except for air travel, the Solovetsky residents do not have a connection to the mainland for months during the winter navigation period. This limitation affects local food security; however, the local population is used to these conditions and values the period of isolation (see section: Local values).

Connection to place

Most island residents in Ostrovnoe/Oktyabr'sky were born and raised on the islands. Some respondents initially moved away from the villages, but later returned because the villages were their "parental homes," which they did not wish to lose. One resident described this connection to place as follows: "I was born in this house and I'll die here" (A3). Another said, "I was born here. My parents are from here. I moved away and then returned. It does not matter where you move, you'll return to your homeland" (A14, also A15). Several respondents who chose to keep living on the islands said that they were used to local conditions (e.g. A2, A19, A2), despite the lack of prospects for the villages' socioeconomic development (A15). At the same time, those individuals who were actively engaged in local socioeconomic development were also former or current island residents who sought to explore the community's economic potential and increase its social attractiveness (see section: Local livelihoods and employment opportunities).

Locals and seasonal workers in Solovetsky also mentioned a connection to place. Locals who were born in Solovetsky and had been living there for many years expressed their connection by calling the place *Nashi Solovki* ("Our Solovki") (e.g. S15, S21). The younger population mentioned place connection, coupled with local economic opportunities, as their reason to return to the community, at least during the tourist season. As one resident reflected, "I like it here in the summer and fall, but I do not think that I will live here until old age. Winter is the most difficult period; there is not enough communication or social activities, and having lived in the city, there is something to compare [the rural community to]. But many come back... they come with their families, meaning that this life attracts some. If the living conditions were better here, many would be drawn back" (A21).

Seasonal workers employed in tourism-related companies tend to return to the community during the tourist season to earn extra income and experience the place. One seasonal summer worker on Solovetsky described the place connection as a process of "osoloveli:" that is, becoming

local or becoming a part of Solovki. He explained, “I became a part of this place that is called *osolove!*” (S18).

Local values: Remoteness and social bonds

Given the remoteness of the two municipalities due to their island location and limited accessibility, the locals characterized their small communities as quieter, calmer, and safer than larger cities and towns. The residents of Ostrovnoe described the local conditions as follows: “It is quiet here, and the air is clean” (A28). Those with small children also valued that it was quiet there (A5). Cleaner environments and closeness to nature are other important benefits of the islands’ remoteness. “The air is clean here. I get headaches in the city, but not here” (A11). The natural environment comprises an important part of local food security, as many residents engage in fishing and the gathering of berries and mushrooms. “The forest and the sea will save us” (S20), emphasized a Solovetsky interviewee, while residents of Onstrovnoe stated, “We are fishers and we go fishing” (A14) and hunting (A12).



Fig. 3 Local communities value remoteness, quietude, and the natural environment. A street in a settlement of the Ostrovnoe municipality⁷.

Solovetsky has infrequent transportation links with the mainland outside the tourism season, when passenger vessels stop operation (S19) and only air transportation remains. As one interviewee informed us: “We depend entirely on the navigation, since, for most of the time, we are cut off from the mainland. In winter, the planes fly two to three times a week if the weather allows” (S21). This quiet winter season is an integral part of local lives and the local religious community.

The remoteness and isolation of the communities encourage additional social bonds. As one Solovetsky resident described: “People help each other often here” (S20). In Ostrovnoe, a respondent reflected, “I got used to people here. Everyone helps you” (A27). Moreover, due to the small sizes of the communities, information about topics of concern spreads fast. For example, when speaking about cruise tourist visits, one resident in Solovetsky mentioned that “nobody really informs us about it, but everyone knows anyway” (S15).

⁷ Photo: Julia Olsen, June 2019.

Discussion: Current socioeconomic development

Despite the dramatic changes prompted by the collapse of the Soviet Union, outmigration, changes in climatic conditions and the navigation seasons, residents continue to remain in the Solovetsky and Ostrovnoe communities, engaging in local socioeconomic development and managing the changes that affect local livelihoods. The empirical results indicate that our case communities build community viability via sustained livelihoods, employment opportunities (e.g. tourism) and factors that form social capital. These factors include shared perceptions of change, connection to place, and local values (e.g. remoteness and social bonds). Such factors are not formed individually, and meaning is created when local communities develop formal and informal social ties [21, Lin N.]. These dynamic factors manifested in each of the case areas, but received diverse interpretations due to differences in context.

The literature describes 'livelihoods' as the types of activities in a specific community, that refers to the means of securing the necessities of life⁸ and "comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living" [28, Chambers R., Conway G., p. 6]. Hence, the concept of livelihoods is closely related to viability [12, Rasmussen R.O., Hovelsrud G., Gearheard S.]. This relationship between community viability and local livelihoods is also described in the results section, where we argue that a viable community is one that is able to sustain, adapt, or transform local livelihoods in the face of changing conditions. Despite economic stagnation, locals on Ostrovnoe / Oktyabr'sky believe in the possibility of economic adaptation and social rebirth through the exploration of new types of livelihoods and the attraction of new employment opportunities, such as tourism. On the other hand, a loss or decrease in a key livelihood, such as farming, deeply affects community viability. The shutdown of state farms in the 1990s led to a dramatic decrease in agricultural activities, resulting in outmigration and reduced food security in Ostrovnoe. The community of Solovetsky is working to develop and sustain its tourism economy, which has been reshaped since the 1990s. Sufficient transportation options (e.g. water transportation) between the island communities and the mainland were described as crucial for local development and the tourism industry, since most tourists come to the communities on passenger vessels [11, Olsen J., Nenasheva M., Hovelsrud G.K., pp. 1–19; 8, Olsen J., Nenasheva M., pp. 241–261]. These passenger vessels are used by both locals and tourists and, hence, play a crucial role in community viability.

Communities' social capital is rooted in local initiatives and high social integration [29, Borch J.B., Førde A.] and is linked to place via the ways in which people communicate and mobilize resources for the benefit of the local community. Hovelsrud et al. [16, Hovelsrud G.K., Karlsson M., Olsen J.] identified several factors that comprise social capital in Norwegian communities, including social networks and trust, place attachment, local and experiential knowledge, engaged individuals, and perceptions of risk. Our case communities exhibited two of these factors: a shared perception of

⁸ Oxford Dictionaries. 'Livelihood'. URL: <https://en.oxforddictionaries.com/definition/livelihood> (accessed 20 December 2020).

change and connection to place. The community's values, however, add new insight to the examination of social capital and viability. The following discussion reflects on local interpretations of these factors, which are summarized in Table 3.

A **shared perception of change**, which is linked to a shared perception of risks, is a socially constructed factor affected by worldviews, values, and beliefs [16, Hovelsrud G.K., Karlsson M., Olsen J.]. Moreover, a shared perception is linked to the nature of a community's social ties, which our empirical data show are formed through networks rooted in village history and people's memories. The histories of the case villages date back to the 14th century, and memories about the past (i.e. the Soviet era) influence community perceptions of changing conditions and local impacts. Visions of community development are supported by memories of well-functioning village systems.

The literature describes **connection to place** as the emotional ties to a meaningful location that facilitate social relations and form identity [30, Relph E.; 31, Tuan E.F., pp. 211–252]. This study illustrates that place attachment is a central aspect of social capital in viability creation. In line with Hovelsrud et al. [16, Hovelsrud G.K., Karlsson M., Olsen, J.], we argue that place connection is a motivating factor for handling changing conditions [32, Olsen J., Hovelsrud G.K., Kaltenborn B.P., pp. 305–331]. The villagers that remain in the case municipalities are deeply attached to their communities, to maintaining their livelihoods, and to exploring new economic opportunities. We have observed similar place connections among the key regional stakeholders in Arkhangelsk, who are linked to one or the other of the case areas and express an interest in development. The individuals attached to the villages in Ostrovnoe have lived there all their lives, grew up there and then moved away, or moved away and then bought property in the villages to move back to or visit. For these individuals, the place means home, and it is often associated with care, belonging, attachment, and rootedness [30, Relph E.; 31, Tuan E.F., pp. 211–252].

Individuals without previous connections to Solovki describe the process of becoming emotionally tied to the place as “becoming a part of the place.” This example illustrates that place attachment is a dynamic factor in modern society that can apply to more than one location [33, Haugen M.S., Villa M.]. We could argue that place attachment activates a community's willingness to deal with changes and enhance local socioeconomic development. In Ostrovnoe, this enhancement is also related to the memory of the Soviet era, which was characterized by more residents and better living conditions.

Local values are connected to local culture and comprise contextual aspects that are important for community viability. The values in this study are empirically identified factors described by Wolf, Allice, and Bell [34, Wolf J., Allice I., Bell T., p. 548] as “trans-situational conceptions of the desirable that give meaning to behaviour and events, and influence perception and interpretation of situations and events.” Despite the apparent similarities in values between the case communities, the meanings of these values vary greatly, even within the same region. In our study, both case communities valued remoteness, quietude, and proximity to nature. This corresponds with findings made in the Norwegian High North by Ween and Lien [35, Ween G., Lien M.], who argued that na-

ture is a reason for both staying and moving away. While remoteness and quietude on Solovetsky refer to a period of isolation without tourists, remoteness for the populations of Ostrovnoe and Oktyabr'sky refers to the distance between these communities and the urban setting of Arkhangelsk.

In addition to remoteness, residents in the case communities emphasized having particular social bonds and communication methods that differ significantly from those that take place in urban culture. In small communities, close social interactions clearly influence several aspects of inhabitants' lives. Small communities are characterized by "openness" in communication, since everyone's personal life is largely visible. The community consciousness is formed by a "transparency" in behavior that is influenced by members' opinions and assessments.

Table 3

The factors of social capital that influence community viability

Social capital	Significance for Ostrovnoe/ Oktyabr'sky	Significance for Solovetsky
Shared perception of change	<ul style="list-style-type: none"> - Outmigration, declining populations, and reduced attractiveness - Changes in navigation seasons - Accepting change and adjusting/ to/coping with new local conditions 	<ul style="list-style-type: none"> - Outmigration and attractiveness - Changes in navigation season present both uncertainties and possibilities - The majority of community members provide tourist services - Adapting to new conditions
Connection to place	<ul style="list-style-type: none"> - Place attachment (residents and locals who have moved away) - Individuals engaged with place attachment 	<ul style="list-style-type: none"> - Place attachment among locals and seasonal workers who have "become part of the place" - Engages community members and seasonal workers who wish to return
Local values	<ul style="list-style-type: none"> - Remoteness from Arkhangelsk - Quietness - Safety - Social bonds 	<ul style="list-style-type: none"> - Remoteness - Seasonal "isolation;" a quiet season - Social bonds

In sum, we suggest that the elements comprising social capital are central to community viability and motivate efforts to manage ongoing changes. In line with Wiesinger [17, Wiesinger G., pp. 43–56], we argue that social capital plays a central role in enhancing the socioeconomic development of rural communities through social organization, local engagement, and closer connections to other communities and the surrounding environment. At the same time, the role of social capital should not be overemphasized, as communities' socioeconomic developments can be weakened by further outmigration or jeopardized by new changes, such as changes in the navigation seasons.

Concluding remarks: Further development

In this study, we have examined several factors that form community viability, such as local livelihoods, economic opportunities, and social capital. Based on the results from the Ostrovnoe municipality, we argue that enhancing social capital without supportive top-down initiatives for local development can only maintain the status quo. A lack of economic opportunities, such as local employment and local value creation, can negatively affect community viability and increase outmigration. The findings illustrate that the engaged residents in both case communities see the potential in island tourism development via cultural, historical, and spiritual sites. The number of tourists is in-

creasing every year, and local residents have fruitful ideas for developing tourist attractions. In Ostrovnoe / Oktyabr'sky, several projects have already been realized. We suggest that further development of rural municipalities will depend on engaged individuals who look for ways to enhance economic potential. Such initiatives may proceed from the bottom up, as in grant-based support of local initiatives, or from the top down, as in investments in rural community development. The case of Ostrovnoe / Oktyabr'sky indicates the importance of bottom-up support received by engaged residents, while Solovetsky is more dependent on top-down support combined with local engagement in residents' tourism services.

We argue that social capital is likely a central aspect in enhancing community viability. However, to secure such viability, institutionalized initiatives that support local livelihoods and lead to local employment (e.g. greater access to economic support, investment in territorial development, and sufficient transportation options) would be beneficial. Still, investments in territorial development are challenging, and regional public bodies would need to determine what kinds of development policies and supportive initiatives to implement in communities that experience outmigration.

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National Identity as Driver of Tourism Development — the Study of Norway*

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Abstract. The urgent global need to decrease the dependence on natural resource extraction and find solutions for a sustainable future is also reflected in policies prioritized by the Norwegian government. Among others, tourism has been defined as a promising alternative for future economic development. Tourism in Norway has not remained unaffected by the global growth in international tourist arrivals. This growth is often neither geographically nor temporally equally apportioned, which hampers tourism's transformative power of generating year-round and well-distributed income. Further, tourists are no longer purely driven by hedonic and relaxation needs: they also want to challenge themselves and deeply immerse themselves in foreign nature, culture, and other types of experiences. We argue that better integration of national identity can draw the needs of tourists and hosting communities nearer to each other and, thus, become a driver of tourism development. Based on a comprehensive literature, this conceptual paper explores the core elements of the Norwegian identity, including political and cultural values, national characteristics, interests, and lifestyles, and their integration by the tourism industry. We find that only some of these elements have been used by the industry and have often been commodified for economic gain. We discuss a few examples of how national identity can be translated into unique selling points that could generate sustainable development. This, however, requires strong governance, and coordinated and integrative destination management that involves stakeholders from within tourism and beyond, particularly local communities.

Keywords: *national identity, tourism development, marketing, tourist experience, authenticity, community involvement, Norway.*

Introduction

This paper aims to explore the role of national identity as a driver of tourism development. Against the background of the current global pandemic, there is a pressing need to restart tourism more sustainably. This is particularly the case as tourism had experienced continuous and partly unsustainable growth in pre-COVID-19 times, with growing tensions between locals and tourists. Within these overtourism tensions, it became increasingly obvious that local communities are not sufficiently integrated in tourism development [1, Høegh-Guldberg O., Seeler S., Eide D.]. However, given that locals are the ambassadors of a destination, their empowerment is of critical importance for a sustainable tourism future. This was also acknowledged by the United Nations 17 Sustainable Development Goals (SDGs) that call for holistic approaches to sustainability with bottom-up involvement of all related stakeholders [1, Høegh-Guldberg O. et al.] instead of usually one-sided economic sustainability [2, Harvey D.], [3, Temesgen A., Storsletten V., Jakobsen O.]. It

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also means that tourism marketing needs to be redefined and go beyond the aim to attract as many tourists as possible through partly unrealistic and romanticized, often outdated, images.

Aside from fragmentation and insufficient integration of tourism offerings with other services, tourism activities are often partially or entirely detached from the lives, values, and beliefs of local communities and the identity of a place. It is, however, the local communities that portray the development of that particular destination, explaining its history, culture, and heritage. At the same time, tourist experiences that are authentic, and combine learning, entertaining, and improving social gathering in the process of consumer immersion [4, Hansen A.H., Mossberg L.]; [5, Sundbo J., Sørensen F., Fuglsang L.] are often the reason to visit destinations and are increasingly expected by contemporary tourists. Although the consequences of COVID-19 illustrate the extreme economic vulnerability of countries and regions that significantly rely on tourism, traveling and recreation are not expected to diminish but rather acquire new forms in the long term. We assume that when used strategically for holistic and sustainable destination development, identity can be a source of pride and various benefits for the hosting communities.

Theoretically, the paper distinguishes itself from the more traditional perspective to tourism development and marketing [6, Pike S., Page S.J.], [7, Viken A., Granås B.] by supplementing it with social identity theory [8, Tajfel H.] and experiences as the main tourism product [9, Pedersen A.-J.], [10, Pine B.J., Gilmore J.H.]. We depart from the contemporary tourism marketing research where commercially developed images affect consumer behavior, and move toward a social psychological view of images which is compatible with and ingrained in the identity of communities. Practically, the paper suggests that identities possess large potential to contribute to tourism development, which has only fragmentarily been addressed by the Norwegian tourism industry.

This introduction section of the paper is followed by the theoretical section that first discusses the status quo of using identity in tourism development from the traditional perspective and then looks more closely into the building blocks and core elements of the national identity from the sociological and social psychological perspectives. The central concept discussed by the paper is *national identity*; however, given both the chosen perspective of understanding national identity as grown out of a country's regions and the importance of regional/destination development for the tourism industry, the notion of *regional identity* is naturally touched upon. The theoretical section closes by presenting initial ideas for how identity can be integrated into tourist experiences. The research methods and context of Norway are then presented. Following this, the findings section presents the development and the core elements of the Norwegian national identity and their use by the tourism industry. Later, the discussion section analyzes the results and discusses them against existing literature, and suggests unused potential in the use of national identity for tourism development and implications, before the concluding remarks.

The role of identity in tourism development and promotion

A touristic image is often based on manifestations and stereotypes reinforced by tourism producers [11, Freire J.R.]. France, for instance, is associated with the Eiffel Tower, the Louvre, the French Riviera, and wine, or Germany with Bavaria, Schloss Neuschwanstein, Oktoberfest, and sausages. How true are these stereotypes that travelers have about other nations and do they describe the current generation as much as previous ones? Do these stereotypes reflect the whole nation or only particular regions and specific events, such as the example from Germany whose international image and reputation as a tourism destination is largely driven by Southern Germany landscapes and attributes? It also raises the question of how locals feel about these stereotypes and whether they want to be seen and spoken about in such ways.

Given the unique and salient features of the tourism product, such as intangibility and perishability, while acknowledging that tourism can be a way to learn about other cultures and improve mutual understanding and respect, marketing and branding remains decisive for any tourism business's success. According to White L. [12, p. 12], an image of a nation brand is "based upon people's previous knowledge, beliefs and experiences, or on the stereotypes of its people and the social, political and economic conditions." It is namely the consumers that have until recently primarily been in the focus of the tourism research, leaving the actual process of image development by destination stakeholders less understood [13, Kong W.H., du Cros H., Ong C.E.]. The challenge lies in constructing a destination image that attracts visitors, while at the same time ensuring that residual meaning remains and regional identities are not overpowered by emergent and hegemonic meaning. Jeuring J.H.D. [14, p. 66] notes the simultaneous processes of homogenization and differentiation, and describes the latter as a "rat-race with other destinations, attempting to create a 'competitive identity'." However, Anholt S. [15] argues that national images cannot be constructed but earned, and questions whether marketing communication can shift deeply rooted phenomena such as a national brand.

Using the example of the Dutch province of Fryslân, Jeuring J.H.D. [14] finds that tourism marketing portrayed Frisian identity as static, predefined, and thus materialized. This materialization of regional identity in the past was driven by dominating neoliberal growth strategies and "boosterist traditions of mass marketing" [16, Timothy D.J., Ron A.S., p. 276]. In this vein, Font X. and McCabe S. [17] describe tourism marketing as being exploitive and driving hedonistic consumerism, and Jeuring J.H.D. [14, p. 65] argues that destination identities "may be politically charged [...] and attributed meaning may be far from neutral." Although tourism can contribute to cultural and natural preservation, community pride, and stakeholder unification, the dominant regional identity is often "materialized through hegemonic discourse such as the association of regional identity with tourism and regional development" [18, Paasi A., p. 1209]. In other words, it is a communicated identity, i.e., a desired public image communicated to environments to promote their own interests [19, Cornelissen J.P., Haslam S.A., Balmer J.M.]. The communicated identity should, however, be as genuine and authentic as it can, because images are said to be earned

since “neither a country nor a region [,] really controls its image, especially in today’s transparent, fast-moving and increasingly digital communication landscape” [20, Magnus J., pp. 197–198].

Paasi A. [18, p. 1207] argues that regional identities are “vital in planning and marketing as a means of mobilizing human resources and strengthening regional competitiveness.” Similarly, Timothy D.J. and Ron A.S. [16, p. 277] acknowledge the importance of local empowerment and note that “destinations that are psychologically empowered rejoice in their cultural traditions and happily share them with tourists.” Jeuring J.H.D. [14] proposes that residents are indispensable in destination branding and marketing, as tourism destinations are socially constructed and identities formed through discursive practice that goes beyond the tourism realm. Scholars also note that top-down approaches to tourism branding and marketing prevail and responsible parties, such as destination marketing organizations (DMOs) and governments, fail to embed local stakeholders more strategically [14, Jeuring J.H.D.], [21, Mihalic T.].

The sustained growth of tourism in the past decades and prior to COVID-19 demonstrates the centrality of economic goals and profit maximization over social and environmental concerns and thus a weak form of sustainability [22, McCool S.F.]. As tipping points have been reached in numerous places and tendencies of overtourism evolved, local communities’ goodwill diminished and anti-tourism attitudes increasingly emerged [23, Papathanassis A.]. Not only do locals feel that their own identity and culture are vanishing, but they also realize that their cultural and natural heritage is capitalized on for tourism purposes and economic growth aims. More decentralized forms of destination planning and development are called upon that equally acknowledge economic, environmental, and social sustainability [24, Saarinen J.]. To integrate identity more authentically, respectfully, and sustainably in tourism development and marketing, a better understanding of these deeply ingrained and rooted concepts is required.

National identity and its core elements

National identity and spatial boundaries are usually understood as instrumental in the process of nation building or as interstitial zones in the process of globalization and transnationalization [25, Lamont M., Molnár V.]. In this paper, we adopt a broader perspective and take the development and status quo of identity in mind. In that sense, we depart from an understanding of identities as a matter of “being” to a matter of “becoming,” transcending time and space, and belonging just as much to the future as to the past and present [26, Govers R.]. We understand identity confined to national boundaries as grown out of a country’s regions, which in its turn is based on the overall concept of *social identity*. Thus, the focus shifts from geopolitical changes and primarily top-down approaches to humanistic aspects of identity. Human identity is defined by a set of beliefs, values, and expressions and is, thus, rather a fuzzy concept, especially when moving from personal to social identity [19, Cornelissen J.P. et al.]. A central element of personal identity that has direct implications for understanding identity within tourism destinations is place identity described as belonging to a certain place, and interactions with the physical environment [27,

Hernández B. et al.]. Otherwise, it is the social identity defined as “the individual’s knowledge that he/she belongs to certain social groups together with some emotional and value significance to him/her of the group membership” [28, Tajfel H., p. 31] that is central to understanding communities and their identities. Collective identity complements the social identity based on shared belonging within one’s own group, by recognizing the differentiation of the group by outsiders [29, Jenkins R.].

Thus, social identity is produced and reproduced in relation to other social units and is said to be found at individual, group, organization, and other levels [19, Cornelissen et al.]. Eriksen T.H. and Neumann I.B. [30] expand knowledge on identity and add two characteristics to relationality: identity is in constant change due to dynamics in external relationships, and not all relationships form identity equally. Although abstracted from a specific place (compared to place identity), *regional and national identities*, as a sense of belonging to a region and a nation, can be understood in relation to and by differences from other regions within a country and other nation states. Further, not only is identity formed and reformed at intrapersonal and interpersonal levels, but it also links, informs, and shapes the different levels [31, Albert S.].

On the national level, identity is often mistaken with belonging to a certain culture. Eriksen T.H. and Neumann I.B. [30] distinguish the two as follows: while national culture is about common meaning, national identity is about group formation and social boundaries. “Culture varies along a continuum and is devoid of sharp boundaries, while social identity is discontinuous with boundaries guarded zealously” [30, Eriksen T.H. and Neumann I.B., p. 414]. At the same time, culture and identity are interwoven: a national culture as a set of common symbols (including literate and artistic expression, symbolic achievements, dominating values, beliefs, and way of life) serves as a reference for both orientation and identification, and for the mobilization of collective actions [32, Skirbekk S.N.]. National culture is, however, only one of the building blocks in national identity formation. Seemingly, identity research overall has prioritized the process of identity development over what actually constitutes an identity [33, Galliher R.V., McLean K.C., Syed M.]. Nevertheless, the constitutive elements of national identity and their combinations can be derived from the dominant views of national identity, including essentialist, constructivist, and civic theories as shown in Table 1, and hybrid understandings of the three views [34, Verdugo R.R., Milne A.].

Table 1

Dominant views of national identity

Dominant views of national identity	Central to understanding	Core elements
Essentialist /primordialist	National identity being fixed	Culture, history, language, ancestry, and blood
Constructivist/postmodernist [imagined vs invented for political reasons]	Dominant groups create, manipulate, and dismantle identities for their specific gains	Print languages, symbols, rituals, and other ceremonials, politics, use of power
Civic identity	Membership in a geopolitical entity is unfettered by ethnicity or culture	Shared values about rights and the legitimacy of state institutions to govern

These views are not homogeneous. Some scholars argue that national identity is a combination of natural processes and conscious manipulations found on the scale between essentialist and constructivist views, depending on the weight assigned to it by social systems [35, Smith A.D.]. Postmodernists argue that the constructivist view underestimates the role of power, “and that such an error leads them to incorrectly suggest that influence and agency are ‘a multidirectional’” [34, Verdugo R.R., Milne A., p. 5]. Both arguments reflect the idea that the formation of national identities is dominated by top-down approaches, leaving little space for bottom-up formation processes. Following the debate on the constitutive elements of national identity, Piątek K. [36] suggests the following: common culture, common national interests, national characteristics, community of common history, national solidarity, and political values. Although the elements of national identity can be a subject of dispute, history is a central element [30, Eriksen T.H. and Neumann I.B.] and believed to have the ability to “guide and cement national identities” [37, Gammon S., p. 1]. National history not only describes national developments in the past and present, but also sets an outlook for a nation’s future, i.e., a nation’s potential responses and actions based on historical values [12, White L.]. The individual elements as well as the identity as a whole are relational [18, Paasi A.]. Thus, differences in regional identities can be related to different dialects and even languages, or differences in landscape and way of living within the same country. Such regional differences can be related to a country’s size and disposition. These elements hold potential for sustainable tourism development and can help regions, generalized at the central level, to stand out [38, Lundberg A.K. et al.].

To meet the aims of the paper, we explore the following research question: How are the core elements of national identity being used by the Norwegian tourism industry?

Systematic development and collaborative innovation of authentic, sustainable tourist experiences by the tourism industry can be a way to integrate genuine identity into tourism. Following the experience logic [39, Pine B.J., Gilmore J.H.], the primary product of tourism is an experience that is not only immaterial, interactive, produced, and consumed simultaneously, but is also extraordinary, implies personal involvement, and is memorable and meaningful [40, Mossberg L.]. Successful tourism experiences can be designed in a way to meet tourists’ need for immersing themselves into an experience without compromising local sustainability [41, Breiby M.A. et al.]. Pine B.J. and Gilmore J.H. [39] introduce the experience realms from passive to active participation and from absorbing an experience toward immersing oneself in it. Tarssanen S. and Kylänen M. [42] discuss how an experience can be created in such a way that a tourist being motivated to purchase an experience transcends toward undergoing personal transformation through physical [senses], intellectual [learning], and emotional levels during the experience. This can be done through six main characteristics of an experience: [1] contrast, how an experience is different from the daily life of a tourist; [2] individuality, how unique an experience is and how it appeals to the tourist; [3] authenticity, how an experience’s image matches the experience product; [4] story, how clear the meaningful in an experience emerges; [5] multisensory experience, how and which senses are involved; and [6] interac-

tional, how interactional an experience is [9, Pedersen A.-J.]. These experience characteristics are both further developed, e.g., tourist interactions with the experience room, other tourists, and personnel, as well as physical objects and self-reflection, and supplemented by other tools, e.g., a dramaturgy curve describing intensity and flow in an experience product [43, Eide D., Mossberg L.].

Methods

This conceptual paper builds on a comprehensive literature review and uses Norway as the research context. Given the fragmented nature of research on Norwegian identity, conceptual obscurity, and complexity of the research, a systematic database search seemed less suitable and beneficial, and instead a snowball sampling technique was adopted. A snowballing method is defined as “using the reference list of a paper or the citations to the paper to identify additional papers” and “looking at where papers are actually referenced and where papers are cited” to secure backward and forward snowballing [44, Wohlin C., p. 1]. We used Scopus, Google Scholar, and a broader Google search for the comprehensive literature review. We used Google Scholar for scholarly articles and materials that were missing in the Scopus database [including reports of Norwegian and international organizations], as well as a broader Google search for media articles and statistical data. These complementary search methods can be fruitful in providing credible results for such a multifaceted research topic discussed in the Norwegian, Danish, English, and Swedish languages. We base our analysis on more than one hundred publications that we sourced through our multi-staged database searches. This approach allowed us to identify the relationships among the constructs in the context of the Norwegian tourism industry. The literature was systematized according to the core elements of national identity from the three dominant views [see Table 1] and deductive exploration in relation to destination development and marketing approaches in the context of the Norwegian tourism industry.

National and regional tourism development in Norway as the research context

In order to elaborate on how Norwegian identity can be a driver of tourism development in Norway and its regions, an understanding of the status quo and development of Norwegian’s tourism industry is needed.

Norway is a north-western Scandinavian country with fascinating nature including deep fjords, glaciers, mountains, rugged coastline, islands, and sea. The current population of Norway is about 5.4 million people¹ with the average density of 15 people per km². Norway consists of eleven counties (see Figure 1) with the highest concentration in Southern (Oslo and Viken, 1.9 million) and Western Norway (1.4 million)³.

¹ World Population Review. Norway Population 202. URL: <https://worldpopulationreview.com/countries/norway-population> (accessed 13 October 2020).

² Worldometers. Norway Population. URL: <https://www.worldometers.info/> (accessed 13 October 2020).

³ Statista. Number of inhabitants in Norway in 2019, by region. February 6, 2020. URL: <https://www.statista.com/statistics/586908/population-in-norway-by-region/> (accessed 13 October 2020).

The most densely populated counties in Norway are also most visited by holidaymakers⁴, as shown in Table 2. According to the 2019 tourism industry survey [ibid.], this can be explained by the trend of tourists often coming to Norway by air to the country's largest hub in Oslo, as well as natural beauty of Western Norway which often stars in national promotional campaigns.

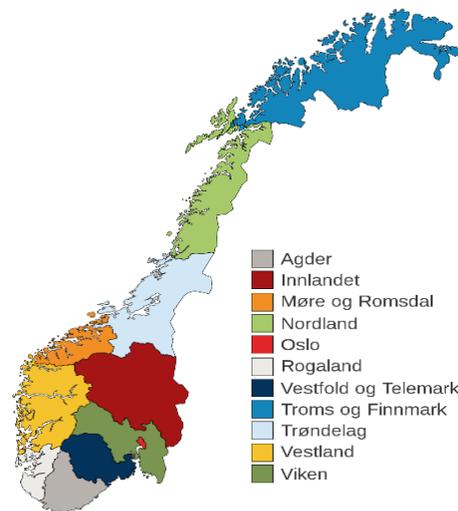


Fig. 1. Norway's counties.

Table 2

Volume of holiday tourism and consumption per region in 2018⁵

Regions	Volume of holiday tourism [in millions of guest-nights]		Total consumption [billions NOK]	
	Norwegian holidaymakers	Foreign holidaymakers	Norwegian holidaymakers	Foreign holidaymakers
Oslo & Akerhus	7.5	3.6	9.7	4.3
Eastern Norway	22.7	2.2	21.2	2.4
Northern Norway	16.2	2.4	14.2	2.6
Trøndelag	7.5	3.6	8.3	1.7
Fjord Norway	15.9	3.8	10.5	4.3
Southern Norway	5.5	0.8	10.3	0.7

According to Innovation Norway, "... nature is the main reason why most people want to travel here [Norway] on vacation."⁶ Tourism demand for nature-based tourist experiences in other parts of the country, for instance in Northern Norway where tourism is one of the top three strategically developed industries [45, Kildal Iversen E., Løge T., Helseth A.], has also grown in the past

⁴ Innovation Norway & Epinion. Reiselivsåret 2019. Turistundersøkelsen -Årsrapport -2019. Innovasjon Norge. 2020. URL:

https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/Turistunders_kelsen_2019_rapport_87c708cf-cdb5-4d65-87bb-675031466ad5.pdf (accessed 13 October 2020).

⁵ Source: Innovation I. Norway, 2019.

⁶ Innovation Norway. Nøkkeltall for norsk turisme 2018. 2019. URL: https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/N_kkeltall_for_norsk_turisme_2018_4e4be163-39d9-4f51-887f-5a9f6ae1c665.pdf (accessed 13 October 2020).

years. With its steep mountains and dramatic landscape, Northern Norway is of critical importance for Norwegian national identity [46, Andersen L.P. et al.]. The region attracts tourists by its natural beauty including the midnight sun, the Northern Lights, dramatic landscapes, and craggy mountains, etc. [47, Andersen L.P., Lindberg F., Östberg J.].

In 2019, tourism contributed 8% to Norwegian's total GDP and generated more than 309,000 jobs⁷. However, the growing number of visitors and strong focus on nature-based experiences may lead to imbalances and unsustainable tourism [48, Heslinga J.H., Hartman S., Wielenga B.]. The importance of developing other types of tourist experiences, for instance cultural, and meeting tourist demand for holistic experiences has recently reached the Norwegian political agenda^{8,9}.

Findings: The role of national identity in tourism development in Norway

"The nation exists in the everyday lives, and the minds, hearts and imaginations of people, who live within a national space" [49, Erdal M. et al., p. 3]

Community of common history. Research discussion on Norwegian identity remained scant until the 1980s when the discussion of nation building in contrast to Danish and Swedish legacies evolved [30, Eriksen T.H. and Neumann I.B.]. One example is a discussion of the formation of national identities in Norway and Denmark before and after 1814 [50, Glenthøj R.], the year when Norway adopted its own constitution and chose its king in the few months between being ruled by Denmark and forced into a union with Sweden. It was namely joint governance rather than nations that formed culture and identities, with Danes and Norwegians seen more as ethnic groups before nationalistic movements in the early 19th century [51, Eisenträger S.]. Strong backlashes among the Norwegian population as a reaction to a number of political and economic decisions upon the "divorce" [50, Glenthøj R.] stimulated the formation of a Norwegian identity as resentment against everything Danish. Although without particular linkage to identity, Norway started talking about its own language and writing its own history, when it had previously been subordinate to Denmark for over four centuries. The union with Sweden started in conditions of deep economic crisis in Norway, with the gradually growing role of parliament and nationalistic expressions ceremonially celebrated each year on May 17th ever since [52, Mardal M.A.]. While May 17th has become an important marker for Norwegian national identity and has also been used in tourism promotions, it often seems to lose touch with history.

⁷ World Travel & Tourism Council (WTTC). Norway: 2020 annual research - key highlights. 2020. URL: <https://wtcc.org/Research/Economic-Impact/moduleId/704/itemId/176/controller/DownloadRequest/action/QuickDownload> (accessed 13 November 2020).

⁸ Nordland Fylkeskommune. Strategi for reiseliv- og opplevelsesnæringer i Nordland 2017-2021. 2017. URL: https://www.nfk.no/_f/p34/i96344880-5cfe-44c4-ba66-aa4fefc79429/strategi-kortversjon.pdf (accessed 13 November 2020).

⁹ Innovation Norway & Epinion. Turistundersøkelsen: Kultur som en del av turismen i Norge sommersesongen 2018. 2019. URL: https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/Ny_Turistunders_kelsen_2018_Om_bruk_av_kulturtilbud_0c98d800-ebde-45d2-877d-6b2c57ff72e6.pdf (accessed 13 November 2020).



Fig. 2. Present-day celebration of May 17th in Oslo ¹⁰.

Political values. Class contradictions in the mid-19th century were reflected in opposition in the parliament structure. Following an agriculture crisis and the formation of peasant associations in the 1860s, a left-wing block was formed [52, Mardal M.A]. Power struggles and dissent between parliament, government, and the king ended in the national court in the 1890s and paved the way for parliamentarism and a government based on a majority resolution [53, Kaartvedt A.]. The dispute about the Swedish Union and setting up a union committee gained in importance. Disagreement on the number of Norwegian representatives in the Foreign Ministry, unofficial war threats from Sweden, and dissolution of the union committee led to strong resentment in Norway and dissolution of the union with Sweden in 1905 [52, Mardal M.A]. The dissolution was not least due to an emerging national identity and a will to establish its own foreign missions and thus have equal union position. Norway proceeded by choosing a Danish prince as its own king, the choice reinforced by political advantages ¹¹. Modern Norway is often characterized by the Nordic model of politics which is built on the “conditions of statehood and representative government” [54, Østerud Ø., p. 705]. It is a country with the strong role of regions reflected, for example, in the Norwegian European Union (EU) debate and voting in 1994, where the majority of the Norwegian population voted against joining the EU, as it would mean greater centralization of the country [30, Eriksen T.H. and Neumann I.B.]. This example illustrates how national identity can reinforce and reproduce its separate elements in the course of commercial and political matters. Relational perspectives and community identity are central in the Nordic context where national and regional identities are shaped by civic order and collective welfare [55, Cassinger C., Lucarelli A., Gyimóthy S.]. Although argued to be under transformation, the Nordic model is a great political example for other countries. Particularly international visitors are drawn by the Nordic model, and the idea of Norway’s independence and neutrality.

National characteristics. Besides its profound role in forming Norwegian identity and pride in the nation’s independency, the common history of Norway and Sweden, and especially Norway and Denmark, remains influential. Thus, it is hard to deny that the Norwegian population has preserved certain Nordic traits in their DNA. Metaphorically calling the year 1814 a divorce, Glenthøj

¹⁰ Sources: Brand Norway, n.d.

¹¹ Kongehus. *Election of a king* [Online]. The Royal House of Norway. 2011. URL: <https://www.royalcourt.no/artikkel.html?tid=30094&sek=28568> (accessed 15 October 2020).

R. [50, p. 27] emphasizes that there are strong feelings at stake when two countries split. For over 400 years, Denmark and Norway had been connected through families and culture. “Ibsen, Hamsun and Bjørnson published their books in Copenhagen, and Danish travelers often described Christiania as a ‘Danish’ city, most of all reminiscent of Christianshavn” [50, Glenthøj R., p. 27]. Throughout the years, the Nordic region has earned its genuine image including the five following strengths: (1) compassion, tolerance, and conviction about the equal value of all people; (2) openness and a belief in everyone’s right to express their opinion; (3) trust in each other and also, because of proximity to power, trust in leaders in society; (4) new ways of thinking, focusing on creativity and innovations; (5) sustainable management of environment and development of natural resources [20, Magnus J.]. At the same time, understanding that all Nordic countries have the same cultural values can be misleading and is not necessarily true, as each nation has its unique cultural practices and interpretations of the shared values. Warner-Søderholm G. [56, p. 1] notes that “Norwegian cultural practices within a Nordic context are seen to be higher gender egalitarianism” compared to other Nordic countries. While Denmark is most often associated with being the leading Nordic country with low power distance, the latter also characterizes Norway: “Being independent, hierarchy for convenience only, equal rights, superiors accessible, coaching leader, management facilitates and empowers”¹². Hofstede Insights¹³ describes Norwegians as individualists and the world’s second most feminist society: the former implies the importance of personal opinions explicitly communicated, while the latter implies an appreciation of consensus and sympathy for others, social solidarity, and taking care of the environment. The country is considered a leader in green and blue sectors, with the idea of being a sustainability pioneer transported through branding and positioning¹⁴. This is also reflected in tourism marketing where images of a green and sustainable destination with environmentally friendly offers are central. Innovation Norway¹⁵ frames this as “greenspiration” and the overall slogan “powered by nature.” However, green travel in tourism marketing goes beyond images of the natural landscape, such as deep fjords and mountains: it also depicts aspects of Norwegian identity and cultural values. On the Visit Norway website¹⁶ green travel is communicated through pureness portrayed in natural water sources and green surroundings: through human nakedness, with the strong and muscular male body which reminds one of the strength of Vikings but also Norwegian’s general interest in physical activities; and through adaptiveness, roughness, and resistance, reflected by moss and grass that defy the rocks, and water finding its ways down the rough rock walls.

Norwegians do not like direct confrontation, which may be experienced by outsiders as being coldhearted. According to Norwegian youth, equality, democracy, and freedom are fundamen-

¹² Hofstede Insights. Country comparison tool. 2020. URL: <https://www.hofstede-insights.com> (accessed 21 October 2020).

¹³ Ibid.

¹⁴ Brand Norway: A national export initiative. URL: <https://www.brandnorway.no/english> (accessed 21 October 2020).

¹⁵ Visit Norway. Green Travel. URL: <https://www.visitnorway.com/plan-your-trip/green-travel/?lang=uk> (accessed 21 October 2020).

¹⁶ Ibid.

tals for Norwegianness [49, Erdal M. et al.]. In the conditions of growing immigration, the same study shows that Norwegianness can also be experienced as a matter of first impressions, i.e., skin color, name, and clothing, although this impression is shared primarily by the informants with immigrant background. Erdal M. et al. [49, p. 27] find that national identity has more recently become “central to public debates on immigration and integration, and managing societal diversity has become highly politicized, with concerns about security and migration often conflated.” Similar debates arose earlier in the context of the Sami population residing primarily in the northern part of the country, such as the Finnmark Plateau. The Sami population experienced oppression of their culture and native language especially in the years of Norwegization and assimilation. With the growing interest in authenticity, immersion, and understanding other cultures and indigenous people, the Norwegian tourism industry has more recently understood the potential of their unique Sami culture for tourism development, and several initiatives have been formulated and product innovations called upon.

Economic dimension: reinterpreting nature. The mid-19th century is called “a new society” in Norwegian history, as that was the time when new business, mechanization, and emigration gradually emerged. After modest development of Norwegian industry until the 1870s, the country experienced a strong growth period in particular with reference to timber, iron, and textile industries [52, Mardal M.A.]. After the economic depression in the 1880s, Norway experienced a new economic leap toward being an industrial society, including the transition to steam shipping and the development of a full-cycle cellulose industry [52, Mardal M.A.]. With the exception of periods of war, the years between 1900 and 1950 are characterized by a steady increase in production volume. This is also reflected in the quadrupling of the gross domestic product calculated at fixed prices of that period¹⁷. Thus, even before the oil, Norway had been “a relatively rich, democratic and industrial nation” [54, Østerud Ø., p. 708]. However, the economic importance of oil is mirrored in the GDP growth per capita from a relatively low level in 1971 to one of four top positions among OECD countries in the past decade¹⁸. The key industries for Norwegian economy before, during, and after the discovery of rich oil and gas deposits on the Norwegian continental shelf are also illustrated in Table 3.

Table 3

Key industries in Norwegian GDP, in %¹⁹.

Main industries	1950	1980	2000
Agriculture, forestry and fishing	23.7	16.7	13.5
Oil operations		15.5	25.8
Industry, mining, power supply	27.0	18.9	12.9
Construction	7.1	5.2	4.1
Transport and communication	15.4	9.4	7.3

¹⁷ Økonomisk utsyn 1900-1950. Oslo: Statistisk sentralbyrå. 1955. URL: https://www.ssb.no/a/histstat/sos/sos_003.pdf (accessed 05 October 2020).

¹⁸ Oecd.Stat Level of GDP per capita and productivity June 10 2020 ed. 2020. URL: https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV (accessed 20 August 2020).

¹⁹ Source: Statistics Norway [2005].

Other services	37.0	46.9	47.8
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Norwegian identity is commonly framed by the country's rich natural resources and international understanding of being an oil nation. And while the identity as a "rich, well-organized, egalitarian and democratic" [30, Eriksen T.H. and Neumann I.B., p. 431] nation holds, the question arises whether such an identity should be sustained by similar means, i.e., the oil legacy, or whether a change is needed, particularly as this national image has already been threatened by discussions around climate change and other unpredicted global threats such as COVID-19. Undoubtedly, the petroleum industry has played an important role in the Norwegian economy and welfare in the past decades²⁰. In the recent COVID-19 pandemic, it also proves to serve as a safety net to cover the deficit in the state budget in recovery during and after the crisis²¹.

Although the general perception of Norway as a "cold and wet" country with "consistently poor growth conditions" [57, Eika T., Olsen Ø., p. 32] before oil has changed, traditional industries of agriculture and forestry have been diminishing ever since. At the same time, the country preserved "the strength of the rural districts and the periphery" [54, Østerud Ø., p. 705] with fish and other seafood suggested as being the new oil [58, Røed H.]. As an important resource base for the population along the coast, fishing is still one of Norway's largest export industries. The long-term expediency of petroleum activities has been debated in South and North Norway, for instance the exploration of oil in the areas around Lofoten, Vesterålen, and Senja in the past years [59, Starnes E.]. In his book "An Ocean of Opportunities", Røed H. [58, p. 1] argues that the oil era is approaching its end while Norway stands with a lottery ticket in its hands: "Norway's biggest values are not as many perhaps believe mountains and valleys, but fjords, coastline and ocean". He further emphasizes the necessity of new and old industries, local produce, and sustainable innovation, which are not least enhancing strategies for other alternative industries, such as tourism.

Meanwhile, tourism has already capitalized on the beauty of Norwegian nature, reflected in the tourism demand largely driven by Norway's natural capital and landscape [60, Øian H. et al.]. As summarized by Andersen L.P. et al. [47, p. 14], "regional branding strategies rely heavily on a rhetoric that cultivates myths, images and ideas of the geographical landscape as terroir". In the case of Norway this means romantic images of deep fjords, long coastlines, and dramatic landscapes with craggy mountain peaks, the Northern Lights, and the midnight sun. The increase in visitors has also added pressure on certain destinations and their resources, and has raised questions related to visitor safety. While measures were implemented, such as stairs at Reinebringen on Lofoten, these often neither reduce the pressure as more tourists are attracted by improved infrastructure which brings new challenges (e.g., parking), nor are they appreciated by locals as they feel that these measures are interfering with their lives and ideas of open space, freedom, and undisrupted nature, and thus their regional identities [47, Andersen et al.], [61, Hagen L.F.,

²⁰ Regjeringen. Bruk av oljepenger. Finansdepartementet 2019. URL: https://www.regjeringen.no/no/tema/okonomi-og-budsjett/norsk_ekonomi/bruk-av-oljepenger-/id449281/ (accessed 10 September 2020).

²¹ Kampevoll F., Norum H., Krekling D. V. Regjeringen pøser på med oljepenger. NRK, 2020. URL: <https://www.nrk.no/norge/regjeringen-poser-pa-med-oljepenger-1.15013316> (accessed 15 July 2020).

Kristoffersen K.J.]. These also evoke perceptions that public access rights to nature are institutionalized and capitalized on [60, Øian H. et al.].

Common national interests and lifestyle. The most common national interests among Norwegians include playing music (9.4%), travel (8.7%), cooking (8%), reading (7.8%), camping (7.5%), health and fitness (6%), interior decorating/renovating (5.3%), technology/computer (5.2%), and arts and crafts (5.1%)²². The majority of Norwegians agree that the country's rich nature unites them in their interests in hiking, skiing, and simply being in nature in all seasons and any type of weather. Norwegians are famous for cross-country skiing, given regular training [also during the non-winter season on roller skis], infrastructure, and respective climate. "Allemannsretten" [right to roam] and the idea of "Friluftsliv" [outdoor recreation lifestyles] are deeply ingrained in the Norwegian identity [46, Andersen et al.], and the ideal of traditional Norwegian outdoor recreation revolves around wilderness purism with minimal resources and infrastructure [62, Martin D.M., Lindberg F., Fitchett J.]; [63, Vistad O.I., Vorkinn M.]. From an early age children are exposed to many hours outside mastering nature, and reviving fairytales and mythical creatures, e.g., trolls.

Norway, particularly the High North, depicts a challenge in itself, and Nordic people share a strong national and regional identity of adaptiveness, resistance, resilience, and traditions. With a recent marketing campaign "We have survived nature for ages"²³ Visit Norway sets an example of how these characteristics of national identity can be translated into unique selling points that can generate sustainable development. The promotional video is narrated by a male Norwegian depicting a "typical Viking style." He shares a story of survival and self-restraint during the darkest times of the year, which is also visually transported by using gray shades and imagery in the video. The power of nature and the centrality of water are not only visually demonstrated but also described as a "constant battle between the West Coast and the North Sea." At the same time, the narrator highlights the adaptiveness and resistance of Norwegians. He clearly addresses the challenges associated with the place yet turns them into strength, with statements such as "These places never cease to surprise" or "We don't live here because it is convenient or comfortable — we explore these narrow fjords to challenge ourselves." This promotional video stands in stark contrast to other campaigns that focus on iconic landmarks, such as the Geiranger Fjord or Lofoten Archipelago, as it focuses on Norwegians, their lifestyles, and attitudes toward the long winter and dark months of the year. It also responds to the assumption circulating that people in the North suffer from depression in the dark months, as it highlights their interpretation of it as being a challenging and demanding yet exciting time.

Another example of successful authentic regional development and promotion is Bodø's entitlement as European Cultural Capital 2024. Bodø has set another example of using the challenging living and climate conditions to demonstrate the uniqueness of the Arctic location and the

²² Statista 2018. Distribution of hobbies and interests in Norway 2017-2018. Statista Research Department. URL: <https://www.statista.com/statistics/687302/netherlands-hobbies-and-interests/> (accessed 11 October 2020).

²³ Visit Norway. We survived nature for ages. 2019. URL: <https://www.youtube.com/watch?v=nRs64AKtnwc> (accessed 13 October 2020).

adaptiveness and resilience of Northern Norwegians. Thereby, the application committee was not shy in articulating that the region understands that the cultural system that has evolved as a response to the challenging environment might seem inhospitable and forbidding to some. However, instead of making this a weakness, it became the strength of the application as they understand that the Cultural Capital “provides an opportunity to show that there is much more to our part of Northern Norway than the stereotypical Arctic image which most Europeans have”²⁴. This bravery and honesty became a success. In their application, they clearly highlighted the extreme changes of light and peculiarities of the season which define the way of life and contribute to national and regional identity; they are described as spring optimism, midsummer madness, autumn storms, and arctic light.

Many Norwegians have their own cabins and holiday houses in picturesque little villages close to their place of residence, in other parts of the country, or elsewhere in the Nordics [increasingly also in Southern Europe], to spend most of their non-working time close to nature. Another trait Norwegians share with their Nordic family is “kos,” implying spending time with friends and family, lighting candles in dark winter days, eating a good meal, or being in a cabin preferably “in the middle of the mountains with no electricity or running water”²⁵. Norway is a spacious country with a rather sparse population, with personal space being important for its inhabitants. The long-standing tradition of second homes and privately owned cabins in the mountains and forests as well as fishing cabins is also being increasingly transformed to meet the growing demand for authentic and unique accommodation types and off-the-beaten-track travel [64, Seeler S., Schänzel H.A., Lück M.]. In comparison to the contemporary utopian view of Nordicness, Andersen L.P. et al. [47] address the evolving conflicts between traditional and modern life. For instance, micro-cabin concepts such as the Arctic Hideaway that markets itself as “simplicity at its finest”²⁶ or Manshausen²⁷, combine modern²⁶ and traditional lifestyles. These micro-cabin concepts have gained international attention²⁸, given the growing trends toward more unique and authentic accommodation styles and the continuous growth of glamping as a more luxurious and glamorous form of camping [65, Brochado A., Pereira C.]. Glamping in general gained in importance in Norway with concepts like arctic domes, yurts, hanging cocoons, glass igloos and ice hotels, or Lavvo tents which are traditional in the Sami way of life. Overall, simplicity, functionality, cleanliness, and closeness to nature as well as traditions and the general idea of coziness remain distinctive in Nordic architecture and design, and are demanded by tourists and consumers of

²⁴ Articulation. Why? European Capital of Culture - more than just art and culture. 2018. URL: <https://bodo2024.no/en/why/> (accessed 05 September 2020).

²⁵ Silvia. 18 ridiculously helpful norwegian habits you should adopt. 2018. URL: <https://www.heartmybackpack.com/norway/helpful-norwegian-scandinavian-habits/> (accessed 10 October 2020).

²⁶ The Arctic Hideaway. URL: <https://theartichideaway.com/en/> (accessed 10 October 2020).

²⁷ Manshausen. URL: <https://www.manshausen.no/en/> (accessed 10 October 2020).

²⁸ Love E. Remote Scandinavian hotels that will blow your mind. 2019. URL: <https://www.telegraph.co.uk/travel/destinations/europe/scandinavia/articles/remote-scandi-stays-hotels-nature/> (accessed 20 October 2020).

Scandinavian products in general [e.g., Ikea, Noma] [47, Andersen L.P. et al.], [66, Pamment J.]. While a segment of the tourist market appreciates infrastructure developments, such as the Reinebringen stairs as they provide access to those who were previously discouraged from experiencing Reinebringen, or the commodification of traditional fishing cabins as they prefer a form of luxurious simplicity, other segments of the tourist market aim for deep immersion into foreign cultures and want to challenge their own status quo.

Common culture and national celebrations. History and nature are fundamental components in national identity and are expressed through multiple cultural elements such as visual arts, literature, and spatial planning [67, Gullestad M.]. Thus, certain historical periods, for instance Viking history as one of the most famous and influential periods in Norwegian history, often become a plot for films, books, cartoons, and toys, and find their expression in thematic events, games, and festivals [68, Løkka N.]. Both past and modern cultural expressions are influenced by the Viking legacy as a part of Norwegian identity and self-understanding: “We refer to ourselves as Vikings when we swim in cold water, when children are encouraged to be brave, when we walk without wool underwear in cold weather or when we win in sports” [68, Løkka N., p. 51]. The big names of Fridtjof Nansen and Thor Heyerdahl complement this picture of being Norwegian. Inspired by Norwegian nature and landscape, the works of Edvard Munch, Henrik Ibsen, Edvard Grieg, and Gustav Vigeland, to name a few, represent well-known Norwegian cultural expression. However, culture is much more than cultural expression, and identity is also reflected through values, beliefs, and way of life. In this vein, Johansen A. [69, p. 100] proposes that “Norwegians are down-to-earth, trustworthy, side-by-side in one version, they are romantic dreamers of the type Peer Gynt and Henrik Wergeland, or they are adventurers with a wanderlust, such as the vikings, Nansen and Heyerdahl in other versions.” Here the author refers to both cultural and historical expressions as well as values and beliefs.

Timothy D.J. and Ron A.S. [14, p. 278] highlight the importance of national cuisine in identity building and state that cuisine is “one of the most salient manifestations of traditional culture, and an important element of intangible heritage”. They further note that “cuisine and foodways are crucial building blocks of regional or national identity” [14, Timothy D.J., Ron A.S., p. 278]. Place is another salient element of cuisine and thus identity. Because of the peculiarities of place, from both natural and cultural perspectives, gastronomies developed in different ways in different places and continue to this day to be one of the most important identifiers of uniqueness of place and sense of place [14, Timothy D.J., Ron A.S.]. Alongside the rich fish diet, smoked whale meat is often served as finger food at different events and arrangements in Norway. Moose meat served with jam often appears as a delicacy on the menu for foreigners in Norway. Furthermore, the Eastern part of Norway is famous for its brown cheese, often eaten on waffles with strawberry jam. And of course, given its closeness to nature, travel food including flatbread and other types of bread with various types of filling [cheese and meat slices or similar] is popular among Norwegians.

National celebrations are endowed with national attributes and traditions, such as wearing national clothes (bunad) for May 17th, or watching crime movies and eating marzipan during Easter holidays. These celebrations, with May 17th being the strongest example, are tailored for specific (international) audiences and commodified for tourism purposes. This is not unique to the Norwegian tourism industry yet is risky as it is a threat to authenticity [70, Sanin J.]. Given that contemporary tourists are increasingly interested in national culture and traditions while at the same time aiming for entertainment and enjoyment, commodification also takes place with reference to national celebrations, cultural attractions (e.g., Viking museums or Sami experiences), food-related experiences (e.g., cod and skrei fishing), or other national interests and traditions (e.g., wild reindeer hunting, dog-sledging). As the national DMO, Innovation Norway promotes Norway's national day, May 17th, as a "party like no other," compares it with the Brazilian carnival or the Irish Saint Patrick's Day, and admits that the celebration is somehow nationalistic and depicts patriotism²⁹. This examples illustrates the seamlessness of national and commercial nationalism [71, Seeler S.] and draws into question whether a celebration for national pride and feeling of belongingness to the Norwegian community should be "sold" and "promoted" as such.

Another commodification of national identity in tourism is through souvenirs. Alongside food souvenirs such as brown cheese, salmon, reindeer meat, and aquavit, traditional costumes and iconic knitwear feature Nordic designs, and Norwegian souvenir shops are packed with trolls as symbols of Scandinavian folklore, Viking jewelry, and Viking drinking bowls that are touristy, tawdry, and less authentic. While some tourists value the symbolic meaning behind souvenirs, others are less concerned about the authenticity of souvenirs [72, Fu Y. et al.]. This raises the question about to what degree the commodification of souvenirs risks the loss of common culture and identity and rather fosters stereotypical assumptions about a place through crude primitive art and kitsch [73, Hume D.L.].

In order to explore the use of national identity in tourism development in Norway, the findings section has provided an overview of the political and economic development of the country that has influenced the formation of the national identity. Given its inherent two-sidedness of being an independent country, yet bound to Denmark and Sweden by common history, it is the identity "as the matter of becoming" [26, Govers R.] that needs to come into the light. This implies not only calling up the central characteristics of Norwegian society, such as gender egalitarianism, low power distance, individualism, and solidarity, but also how these are contrasted with and influenced by the ongoing developments of growing immigration and recognition of the indigenous people. Nature-based recreation and outdoor life, so important for many Norwegians and cultivating their adaptiveness and resilience, has to a growing degree been used by the tourism industry capitalizing on the country's natural resources. While this illustrates the integration of the identity elements into tourism, it may also conceal the negative effects. Firstly, it is the risk of misinterpretation and con-

²⁹ Innovation Norway. Norway's national day. 2020. URL: <https://www.visitnorway.com/typically-norwegian/norways-national-day/> (accessed 10 October 2020).

tradition in nature-based experiences presumably developed to meet existing demand, as in the example of glamping. Namely, experience authenticity is often challenged as commodification changes the actual meaning of culture and results in stereotypes. Although the commodification of traditional lifestyles demonstrates a sense of innovativeness among Norwegians, it has reduced national characteristics, such as the roughness and stamina required that define the national identity. Secondly, the prevailing one-sided focus on nature-based tourism leaving behind the cultural, culinary, and other attributes of the Norwegian lifestyle may lead to overtourism and local conflicts, as in some Norwegian destinations given the pre-COVID-19 industry growth.

Discussion: Norwegian identity — missed potential for tourism development?

Our findings illustrate separate elements of the Norwegian identity that are to some extent already capitalized on in tourism development and marketing, as well as other identity elements implying unused potential. National identity is often commodified for economic gain, i.e., only those aspects that prove beneficial to promote are highlighted and stereotypes are fostered while national identity is only partially transported. Considering changes in tourism demand, such as the desire to immerse oneself more deeply into foreign cultures and landscapes, the wish to experience authentic places, and the willingness to challenge oneself and one's status quo [74, Hansen A.H., Mossberg L.], it seems that the greenwashing and effeminacy of national identity are not necessary. In contrast, the peculiarities of the Norwegian landscape, the extreme light and weather conditions throughout the seasons, and the resistance and adaptiveness of Norwegians, together with other identity elements, can become a competitive strength that can also contribute to sustainable tourism development.

The identity elements can be used to strengthen existing and develop new tourist experiences. To take the example of May 17th, except for a note about the union with Sweden, the “party like no other” celebration of May 17th as a tourist experience of Norway promoted by Visit Norway does not seem to be specifically rooted in the essentialist elements of national identity, and is instead dismantled for economic gains. There is little targeted explanation of the reasons for national pride expressed in the scale of the celebration, also compared to Scandinavian neighboring countries. A mismatch between the story about and the actual core of celebration experience [75, Sundbo J., Hagedorn-Rasmussen P.] may result in inaccurate associations, particularly as “the geographic distance of the nationalities to the target destination” increases [76, Jensen Ø., Kornellussen T., p. 327]. The sensual and hedonic experience being a part of the parade without genuine understanding of the celebration could be enhanced by learning more about the core experience through contrast, authenticity, history, and interactions advancing the holistic experience, starting prior to the celebration day [9, Pedersen A.-J.].

Another example is green travel promoted by Visit Norway that can be challenged by the scholarly discussions of greenwashing for commercial benefits [17, Font X. and McCabe S.], [21, Mihalic T.]. Considering that parts of the country are covered in snow during long winter season and

Norwegian nature is interpreted not only through a green lens, but also more challenging landscapes and weather conditions, it remains questionable whether these sustainable endeavors through marketing and promotion really represent the Norwegian identity as a whole. Besides, it is somewhat surprising that a male character is used in the promotional material, given the gender equality and feminine society. However, since it is the females who are generally more interested in sustainability topics and ethical consumption³⁰ and are often the main decision-makers and gatekeepers for holiday travel [77, Barlés-Arizón M.J., Fraj-Andrés E., Martínez-Salinas E.], it can be assumed that the male character was strategically chosen to be more appealing to the female audience.

A contradiction also lies in the touristification of cabin life. While traditional cabins are defined by simplicity, are less accessible, and require toughness to live in, the second-home tourist villages are often homogenized, easily accessible, and fully facilitated. This not only changes the character and original idea of cabin life from a design perspective, but also leads to conflict among stakeholders. With reference to fishing cabins, conflicts further evolve as traditional cabins (rorbuer), which are important markers of place identity, are commodified and monetized. These changes have also been acknowledged by Andersen L.P. et al. [46, p. 228] who summarize that “[H]istorically the Nordic landscape is both tough and generous, it both nurtures and disciplines the Nordic people, but in the contemporary utopian myth market it is mostly a source of harmony, hygge, and healing”. The reference to tough landscapes and discipline also encompasses the harsh weather and living conditions and long winters that are particularly experienced in the High North and shape not only everyday life, but also regional identity [57, Eika T., Olsen Ø.].

Thus, we suggest that the development and design of tourist experiences [78, Eide D.], [9, Pedersen A.-J.], should be done in a more systematic way in order to ingrain the different elements of identity toward the consistent holistic experiences before, during, and after the tourist journey. The interconnectedness of the identity elements supports the argument that a national identity is not formed in a unilateral way [e.g. top-down] and can hardly be understood from one dominant view as it is a coalescence of civic, constructivist, and essentialist elements [35, Smith A.D.]. This complexity has implications for the development of experiences, where one element can rarely be used detached from other reinforcing identity elements. For instance, the political values of the welfare state where well-being and equal opportunities of individuals mattering combined with national characteristics can serve the purposes of educational and recreational tourism. And while commodification “does not necessarily destroy the meaning” of products [79, Cohen E., p. 371] given the negotiable rather than primitive and existential rather than object-related nature of authenticity [79, Cohen E.], [80, Wang N.], it is the intrinsic identity that attracts the growing number of tourists and could contribute to regional sustainability through bottom-up development processes. Thus, reduc-

³⁰ Hunt E. The eco gender gap: why is saving the planet seen as women’s work? 2020. URL: <https://www.theguardian.com/environment/2020/feb/06/eco-gender-gap-why-saving-planet-seen-womens-work> (accessed 11 November 2020).

ing commodification of the national identity calls on regional and local identities through diversification and stakeholder involvement.

Visit Norway has largely extended the tourist experience portfolio beyond the nature-based experiences: cities and places, art and culture, food and drink, family fun and shopping, and supplementing “powered by nature” with “powered by culture” slogan. While further diversification could be beneficial (e.g., travel for educational purposes or sport training), it is essential that tourism development builds on bottom-up participatory involvement of stakeholders, especially local communities, and dialog between tourism stakeholders on local/regional and national levels to embrace national identity more authentically. Diversification further requires stakeholder collaboration beyond the tourism industry, for instance with food, agriculture, and fishing industries in order to produce food experiences. While involvement of local communities could aid sustainability by integrating identity and values in tourism development, close dialog between local/regional and national tourism stakeholders could help to bring closer the communicated identity to the intrinsic one. The view on sustainability would then also transcend the economic, environmental, and socio-cultural dimensions toward the focus on communities’ quality of life. In this way, tourism could be enriched by translating identity into sustainable tourist experiences, raising “deep, meaningful emotions and memories that can encourage tourists’ contribution toward destination sustainability” fostered in “interaction with the natural environment”, “interaction with the cultural environment”, “insights and views”, and “contextual activities” [41, Breiby M.A. et al., p. 14].

The examples we found consistent with the national identity was the campaign “We survived nature for ages” and Bodø’s application for the European Cultural Capital. While the marketing campaign powerfully synthesizes aspects of Norwegianness, common national characteristics, and common culture in a serious and authentic way, this somewhat different lens is only infrequently used and is often replaced by either greening or humor. If successful, large-scale projects like Bodø Cultural Capital 2024 could generate not only short-term awareness and additional tourism revenues, but could become an accelerator of positive regional development and transformation while building on national and regional identity expressed through common culture, values, and interests as well as national characteristics and economic attributes.

Concluding remarks

The paper has synthesized the use of national identity by the Norwegian tourism industry by combining the dominant identity views, i.e., essentialist, constructivist, and civic [34, Verdugo R.R., Milne A.], and thus supplementing the business perspective on tourism and marketing with the social identity theory [8, Tajfel H.]. We have looked into the elements of common history, political and economic values, and national characteristics and celebrations, and pointed to the necessity of understanding identity being dynamic. There are several contradictory aspects in the Norwegian identity, including political unity and heterogeneity, economic prosperity fostered by oil wealth and sustainability, which have been reinterpreted for tourism purposes. The use of Norwegian national

identity is fragmented and sometimes inconsistent, both in literature and in the practice of developing and marketing tourism in Norway. Only certain elements of identity, such as national characteristics and traditions, have been used for tourism purposes. While Innovation Norway and Visit Norway are innovative and up-to-date in their marketing campaigns, the latter are driven by tourist demand and strikingly communicated top-down identity. We have found only a few examples of a more bottom-up identity communicated by the tourism stakeholders. Naturally, the impact of ingraining national and regional identities into tourist experiences on tourist behaviors and choices needs to be analyzed and requires empirical research.

We have argued that identity can drive sustainable tourism development [41, Breiby M.A. et al.], [81, Spenceley A., Rylance A.], [82, Storrack B.] by further diversification of tourism experiences and bottom-up stakeholder involvement [1, Høegh-Guldberg O. et al.]. Furthermore, the use of experience design and innovation tools [78, Eide D.], [42, Tarssanen S. and Kylänen M.] based on close collaboration of all the parties concerned is essential in this work. Local communities should get a chance to welcome guests to authentic places and share their own stories, which are expected to be even more in demand in post-COVID-19 tourism. Norway has already partly embarked on the Norwegianization journey during summer 2020 due to the pandemics and reorientation in the national market. Future research will be needed to explore whether and how these new directions have contributed to sustainable tourism development, and whether tensions between residents and visitors could be reduced by involving local communities and embracing identities.

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Beyond Statistics: a Qualitative Study of Primary Sector Transformation in the Post-Soviet Russian Arctic*

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Abstract. The Russian Arctic is at the epicentre of economic, environmental, and social changes. At the same time, the peripheral character of the territory, its strong orientation on primary sector makes the region extremely volatile to suchlike shifts. The study concerns primary sector transformation in the Post-Soviet period when after 1991 significant changes in the economy were observed. The main aim of the paper is to identify the specifics, features and development prospects of the recent primary sector transformation in the Russian Arctic. The statistical methods do not reflect the full picture of the transformation. Firstly, Russia has switched to UN national accounts system only in 1994. Secondly, the Arctic statistics after 2009 for regional level is unavailable. That is why the main method of the research is the expert survey method. The results of the study demonstrate the dominant role of the primary sector and the strong dependence of Russian Arctic regions on these activities. The study identifies the key factors and drivers of the transformation, a specific position of the oil and gas sector and the role of natural resources to be traditionally used in the primary sector. Despite the positive role of economic diversification in the long-term economic development, the corresponding effect for the Arctic regions is not fully expressed. The methodological novelty of the research is an unconventional research method of investigating primary sector transformation on the regional level in the Post-Soviet Russian Arctic, i.e. the expert survey. The method can be applied to other countries and industries.

Keywords: *primary sector, the Post-Soviet transformation, the Russian Arctic, Arctic economy, polar geography, qualitative approach.*

Introduction

The Arctic region is of current political and economic concern for its huge resources [1, Käpylä J., Mikkola H., pp. 3–4]. Therefore, the study of the recent transformation of the primary sector in the Russian Arctic is an important and relevant topic. In recent years, the change of the economic pattern, liberalization and shifts in national and international politics have affected developments in the Russian Arctic [2, Perez E.K., Yanevan Z., pp. 441–449]. The study discusses specific pathway of Arctic transformation, i.e. how Russian Arctic primary industries have changed in the last three decades. The *primary sector* is a sector of the economy involving direct use or exploitation of natural resources¹. Moreover, economic and political changes coincide with the cli-

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¹ Rozenberg M. The 5 Sectors of the Economy. Primary, Secondary, Tertiary, Quaternary and Quinary. Thought Co, 2017. URL: <https://www.thoughtco.com/sectors-of-the-economy-1435795> (accessed 05 September 2020).

mate change, which is drastically manifested in the region [3, Crate S., Nuttall M., pp. 85-96; 4, Koivurova T. *et al.*]. In some parts of the Arctic, the temperature has already risen by two or more degrees [5, Ljubicic G. J., pp. 102–104]. The permafrost thaws continuously in Russia and Canada [6, Zubrzycki S. *et al.*, p. 596]. The developments stated can open entirely new opportunities for economic prospects of the Arctic.

The paper focuses on the Russian Arctic economy. We treat the Russian Arctic as per Presidential Decree 296 (2014)², where a term “Arctic Zone of Russian Federation” (further — AZRF) is defined. The Decree lists regions and municipalities comprising this zone. The aim of this study is to identify the transformation specifics and the development prospects of the primary sector in the Russian Arctic. The main objective of this study is to gain insights on causes and implications of the primary sector transformations based on the expert assessment. We rely on expert assessment because the previous analysis of the available statistical data on the primary sector fails to provide us understanding of the implications and the drivers of its transformation in the Post-Soviet period.

The remainder of the article proceeds as follows. The next section offers an overview of state of the art literature addressing the key concepts in the study. A methodology and methods are then elaborated on, where we display the rationale for employing qualitative methodology while addressing our research question. The section afterwards presents the detailed account of the experts’ responses within the interviews. In the penultimate section, we reflect on the experts’ responses in more details and connect their view on Post-Soviet transformation of the Russian Arctic with the available statistical data. The final section presents the study's conclusions and proposals for future research.

Background and Rationale

The background for this study is rich and is therefore displayed in four sub-sections. First, we clarify what we mean by the Russian Arctic as there are plethora of definitions coming from different disciplines and constructed for various purposes. Then, in the next sub-section we review international research literature on primary sector and present one of its classifications. In the third sub-section we address the idea of Post-Soviet transformation, relying on international and Russian research literature. The fourth sub-section presents the regional dimension of primary sector distribution in the Russian Arctic and suggests the research problem we address further in the text, i.e. the rationale for the study.

1. The Russian Arctic

There is a need to define the research context, i.e. what is meant by the Russian Arctic. There are several approaches as to how to determine the inland borders of the Arctic [7, Lukin Y.,

² Ukaz Prezidenta Rossiyskoy Federatsii № 296, ot 02.05.2014 «O sukhoputnykh territoriyakh Arkticheskoy zony Rossiyskoy Federatsii». [Decree of the President of the Russian Federation No. 296, dated 05/02/2014 "On the land territories of the Arctic zone of the Russian Federation".] URL: <http://www.kremlin.ru/acts/bank/38377> (accessed 14 May 2019).

pp. 171–185; 8, Vakhtin N.B., pp. 5–13]. An approach of a legislative and administrative sense is being used [9, Klokov and Khrushchev, pp. 4–5], which defines the area of concern as “**Arctic Zone of the Russian Federation**” (further — **AZRF**) upon Presidential Decree 296. The Decree elaborates the state policy of Russia in the Arctic enabling the listed regions to claim adequate governmental subsidies. AZRF comprises eight regions — **Murmansk Oblast, Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug and Chukotka Autonomous Okrug, Arkhangelsk Oblast, Republic Sakha (Yakutia), Komi Republic, Krasnoyarsk Krai, Karelia Republic** along with offshore islands in the Arctic Ocean³. Four regions are entirely included in Arctic Zone: Murmansk Oblast, Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug and Chukotka Autonomous Okrug. As to the four remaining regions, they are partially included into the Zone with their northern municipalities. In particular, solely former territories of Taymyr Autonomous Okrug present Krasnoyarsk Krai in the Arctic Zone. Furthermore, Republic Sakha (Yakutia) has special administrative units (“uluses”) in the AZRF. The similar situations are for Karelia Republic and Komi Republic. To differentiate regions of Arctic Zone into two specified groups the research explores the following approach: **Group A** includes entire Arctic regions and **Group B** comprises partial Arctic regions (Fig. 1).



Fig. 1. Map of the regions comprising the Arctic Zone of the Russian Federation⁴.

³ Decree of the President of Russian Federation № 287, 13.05.2017. "O vnesenii izmeneniy v Ukaz Prezidenta Rossiyskoy Federatsii ot 2 maya 2014 g. N 296" O sukhoputnykh territorial'nykh territoriyakh Arkticheskoy zony Rossiyskoy Federatsii" (On Amendments to the Decree of the President of the Russian Federation of May 2, 2014 N 296" On the Land Territorial Territories of the Arctic Zone of the Russian Federation). <http://base.garant.ru/71705322> (accessed 14 May 2019).

⁴ Created by the authors according to the Decree 296, 2014 & Decree 287, 2017

We suppose that AZRF approach is the most relevant to the analysis of the primary sector as only regions of Arctic Zone are de-facto located in the Arctic receiving subsidies for their economic development from the Russian Federal government. All AZRF regions have relatively high disproportions in their Gross Regional Product (GRP) per capita. Specifically, GRP per capita in Nenets Autonomous Okrug is equal to \$223,000, Yamalo-Nenets Autonomous Okrug — \$156,500, while Arkhangelsk Oblast is only to \$16,300. Almost half of the Russian Arctic Gross Domestic Product is produced in AZRF with 2/3 of that amount being produced in Yamalo-Nenets Autonomous Okrug [10, Klovov K.B., Khrushchev S.A., pp. 2–10].

2. The Primary Sector

The **primary sector** is a key part of the Arctic economy. Firstly, we are to explain what “primary sector” means. There is a historical approach called a **three-sector model** suggested by A. Fisher and Colin Clark [11, Fisher A. G. B., pp. 24–38; 12, Clark C., pp. 25–26]. This model divides national economy into three main parts: extraction of raw materials (primary sector), manufacturing (secondary sector), and services (tertiary sector) [11, Fisher A. G. B.]. As we have mentioned, the primary sector is the sector of the economy that involves **direct use of resources**. It includes agriculture (grazing, farming), fishery, forestry, hunting and mining industry with no manufacturing. It proves that the primary sector is concerned with the extraction of raw materials [13, Kenessey Z., pp. 359–372; 14, Vagdevi H.S., Kiranbabu P., pp. 2–3]. Prevalence of the primary sector is typical for developing countries that do not have enough financial opportunities for manufacturing and services (secondary and tertiary sectors correspondingly). Also, it is very typical for traditional cultures. Primary sector used to dominate prior to active use of machinery.

French scientist Jean Fourastié uses the theory of three-sector model to explain the transition from the industrial to the post-industrial society [15, Hospers G. J., pp. 11–14]. Also, in recent years a new model has been formulated — quaternary sector including management, science and information technologies. Some research concerns the proportions of BRICS countries (Russia included) in the primary sector [16, Rastyannikova E. V.]. The specifics of such research is that the author separates mining from all other primary activities. We employ this approach due to significance of mining in the Russian Arctic in relation to other industries.

Actually, the primary sector is in a state of extinction on a global scale. This process becomes evident if we combine data in other sectors that permanently supersede the primary sector [13, Kenessey Z., pp. 359–372]. We can see this situation on the graph below.

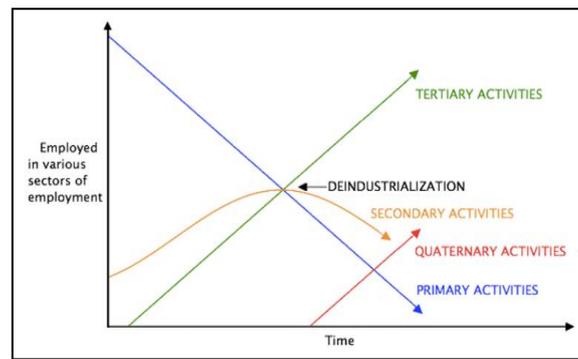


Fig. 2. Changes of employment in economic sectors in the world in historical context [14, Vagdevi H.S., Kiranbabu P.].

There are a lot of approaches to the inner division of the primary sector. In general, it is suggested to split primary activities into separate parts: agriculture, fishery, forestry, hunting and mining. Some researchers include hunting into forestry, reindeer husbandry into agriculture [17, Gorkin A.P., pp. 32–36]. We do not include subsistence into the primary sector. This classification reflects the authors' understanding of what primary sector means.

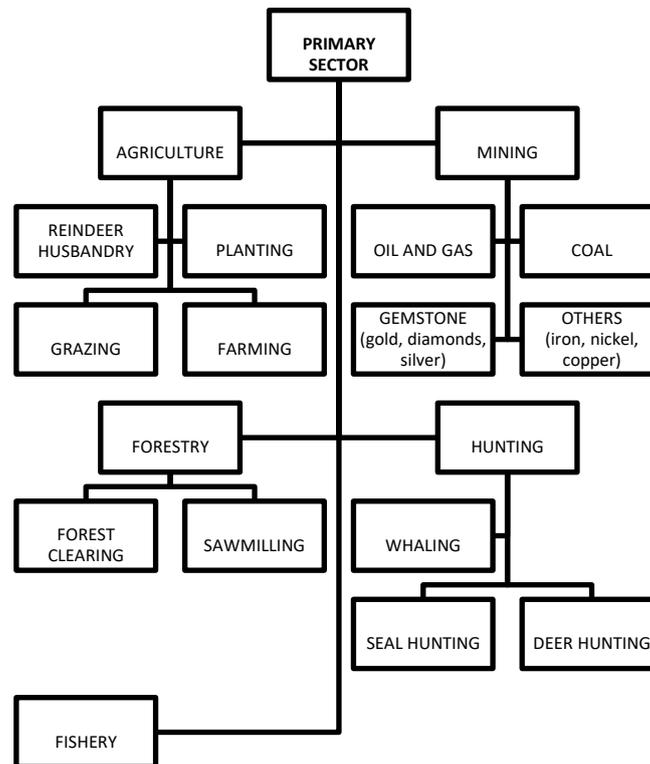


Fig. 3. Division of the primary sector ⁵.

3. The Post-Soviet Transformation

The problem of Arctic primary sector transformation in Post-Soviet period is a topic not thoroughly investigated in literature. Although there are substantial studies of Arctic primary sector transformation, there are still many aspects for further research. Existing works address economic analysis in general. Besides, some papers deal only with particular spheres of the economy like fish-

⁵ Created by the authors according to [12, Clark C.; 14, Vagdevi H.S., Kiranbabu P.; 17, Gorkin A.P.].

ery, mining or husbandry [2, Perez E.K., Yanevan Z.; 9, Klovov K.B., Khrushchev S.A.; 18, Scherbinin A. et al., pp. 3–7].

The Post-Soviet transformation is quite a specific phenomenon. Under this term we understand modernisation of old economic sectors — from industry to services, from industrial to post-industrial society. It also includes change of the political system. The main outcome of the USSR collapse in the Arctic is the uncertainty for further Arctic development. In spite of all this, a substantial scientific and technical reserve accumulated during the Soviet period continues to determine general strategies in the Russian Arctic [18, Scherbinin A. et al., pp. 3–7].

An important feature of the Russian Arctic economy is a broad range of economic activities for historical reasons. This territory is characterised by significant economic disproportions [19, Glomsrød S. et al., 2017]. Value added structure reflects strong reliance on oil and gas and other mining industries. According to the Russian Statistical Agency, these industries have 51.7% share of the gross value of the Russian Arctic ⁶.

Alexander Pelyasov focuses on the comparison between inner dynamics of primary activities [20, Pelyasov A.N.; 21, Pelyasov A.N. *et al.*, pp. 114–125]. Scott Stephenson and John Agnew investigate the Russian Arctic oil and gas sector. They emphasize strong state influence on the Arctic economy [22, Stephenson S.R., Agnew J.A., pp. 558–576]. Some papers are devoted to the environmental risks assessment for sustainable socio-economic development and environmental safety [23, Didenko N. et al., pp. 267–274]. Anthropogenic climate change may affect natural resources and human demand, creating a potential risk for human security [24, Scheffran J. et al., pp. 91–93].

4. The primary sector distribution in the Russian Arctic

The primary sector of the Russian Arctic has a complex regional distribution. Reindeer husbandry, fishing and hunting form the traditional types of economic activities for indigenous peoples [8, Vakhtin N.B., pp. 5-13; 25, Reinert E.S., pp. 522–540]. Forest industry is restricted in the Russian Arctic for climate reasons [4, Koivurova T. et al.]. In some small districts in AZRF tree cutting is allowed. They are so-called northern taiga zone (south of the Murmansk Oblast and Yamalo-Nenets Autonomous Okrug). These factors lead to poor prominence in agriculture and forestry in the Arctic economy [17, Gorkin A.P., pp. 32–36]. Fishery is an important activity for the Arctic. 35% of Russian fish is harvested in the Arctic regions (0,5 mln. tons), and 90% of this amount comes from Murmansk Oblast ⁷. Mining comprises extraction of hydrocarbons (oil and gas), coal, gemstones (gold, diamonds) and other minerals (iron, non-ferrous minerals such as nickel, cobalt, copper, apatite, bauxites). The entire primary sector is represented in different regions of the Russian Arctic (Table 1).

Yamalo-Nenets Autonomous Okrug is a leader in oil and gas industries. Nenets Autonomous Okrug and the Komi Republic are the key centres of the oil industry. However, the influence of Komi Republic is not as significant as it used to be in Soviet times, and oil provinces of this region are not

⁶ United States Geological Survey (USGS): Minerals Yearbook — Russia. URL: <https://minerals.usgs.gov/minerals/pubs/country/2012/myb3-2012-rs.pdf> (accessed 17.06.2019).

⁷ Russian Federal State Statistics Service (FSSS). URL: <http://www.gks.ru> (accessed 06 June 2019).

included in the Arctic Zone [26, Laverov N.P. et. Al., pp. 26–37]. Nenets Autonomous Okrug and Yamalo-Nenets Autonomous Okrug are key centres of oil industry. The Komi Republic is the main coal region while the Murmansk Oblast is a fishery centre [27, Vasilyev A.M., pp. 79–82].

Table 1

*Distribution of key primary activities in the Arctic Zone of the Russian Federation*⁸

Administrative Units	Reindeer Husbandry	Forestry	Fishery	Mining			
				Oil & Gas	Coal	Gemstones	Others
Komi Republic (city Vorkuta)	+				+		
Karelia Republic		+					+
Arkhangelsk Oblast	+	+	+			+	
Nenets Autonomous Okrug	+			+			
Murmansk Oblast	+	+	+				+
Yamalo-Nenets Autonomous Okrug	+	+		+			
Krasnoyarsk Kray (Taymyr Autonomous Okrug)	+		+			+	+
Republic Sakha (Yakutia)	+	+		+	+	+	
Chukotka Autonomous Okrug	+		+		+	+	

Theoretical framework of the paper relies on earlier observed statistical peculiarities of the Post-Soviet transformation reflected in data on oil, gas, coal and fishery dynamics and changes in primary industries Gross Value Added [28, Galustov, p. 15]. We encounter a serious problem of lack of statistics. Since 2009, the Russian Federal State Statistics Service has restricted key primary industries production data. The lack of statistical information creates obstacles for the adequate analysis of the primary sector. The only exception is fishery. Data on fish and aquatic biological resources extraction have reinstated since 2016. Main information available through statistical method is a prevalence of concrete primary activities in different regions. The map that follows is based on statistics.

⁸ Created by the authors based on FSSS & USGS data): Russian Federal State Statistics Service (FSSS). URL: <http://www.gks.ru> (accessed 21.11.2019). United States Geological Survey (USGS): Minerals Yearbook — Russia. URL: <https://minerals.usgs.gov/minerals/pubs/country/2012/myb3-2012-rs.pdf> (accessed 08 June 2020).

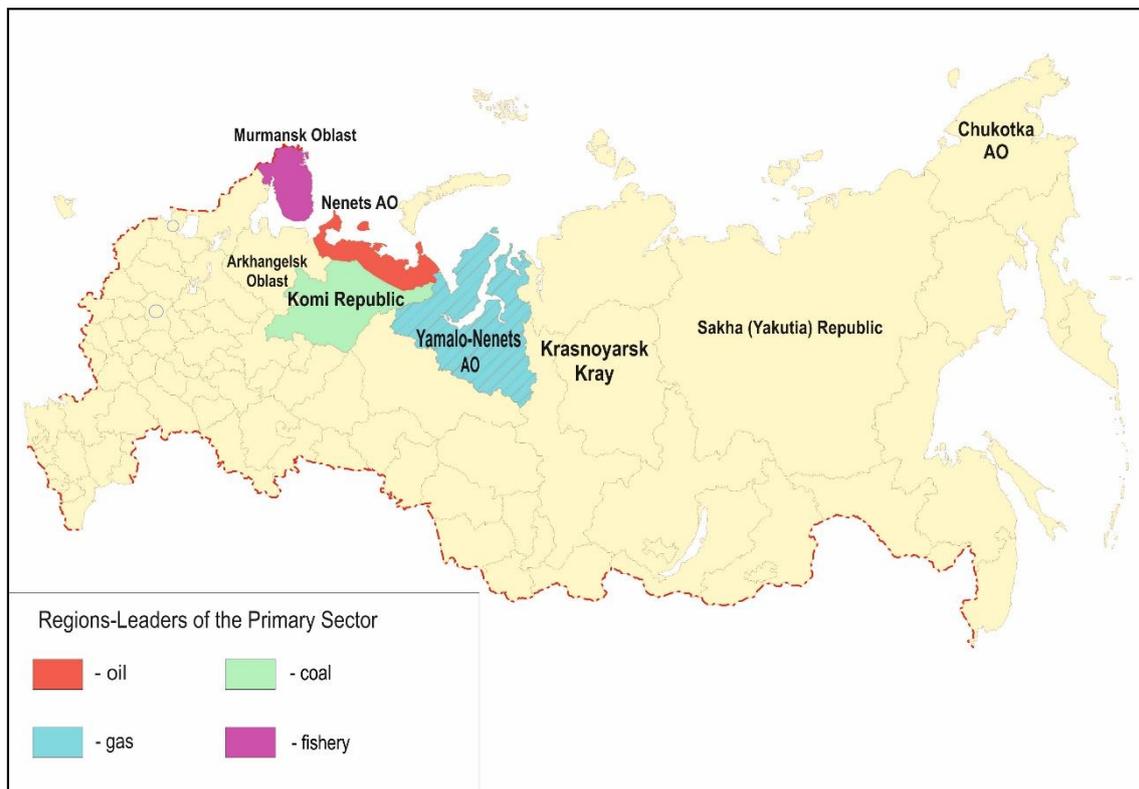


Fig. 4. Map of regions-leaders of the primary sector in AZRF [28, Galustov, p. 11].

We face the similar problem with relative statistical parameters. The Russian Federation has applied UN System of National Accounts since 1994. The first data on Gross Value Added by region was published in 2005. It turns out that it is not possible to evaluate the Post-Soviet transformation by relative data. However, absolute indicators are also complicated for deep analysis due to its restriction since 2010s [28, Galustov K.A., pp. 19–27].

In our study, therefore, we set the goal to test an alternative method that could clarify the nature and implications of the Russian primary sector Post-Soviet transformation. Hence, our first attempt is a qualitative analysis.

Methods

Qualitative method is a continuation of statistical investigation of the primary sector previously published [28, Galustov K.A., pp. 9–34]. Since 2009, the statistics for Federal Districts (Okrug) has substituted statistics for the Arctic regions. In this case, relying solely on statistics, it becomes complicated to identify any trends in the Arctic region. Normally Federal Districts occupy territories stretching far beyond the Arctic Zone. Therefore, by the completion of the expert survey we tend to compare qualitative results with quantitative parameters.

The method includes in-depth interviews with professional scientists involved in relevant research. Qualitative methods are essential to use for impossibility of complex transformation evaluation based on statistical information only. Qualitative research deals with words rather than numbers and constructs new knowledge based on holistic and substantial understanding of a phenomenon. Although qualitative methods are known to be less reliable when it comes to generali-

zation, we consider the use of expert evaluation as a good compromise when other data is unavailable.

The method employed in this study is suggested by Alan Bryman:

- It is an inductive approach to the relationship between theory and research;
- In contrast to natural scientific model in quantitative research, qualitative approach refers to understanding of the world through interpretation of this world by its dwellers;
- Social properties are the result of interaction between people, and cannot be separated from those who participate in its construction [29, Bryman A.].

These features are especially important in the context of this research, since the pattern and the dynamics of primary sector transformation are constructed based on people's vision and reflections. As competence of potential respondents remains unclear, we applied the principle of so-called "snowball sampling". It means that an informant having been interviewed introduces another informant, and further on. This technique is effective as an informant under interview both gives answers and provides details about further informant and it makes the analysis productive [30, Armstrong G., pp. 36–44; 31, Ozalpmann D., pp. 356–357].

We have started with the respondents somehow familiar with research under consideration. We have nominated seven experts in geography, economy, ecology, and ethnography. On the one hand, experts are expected to address the spatiotemporal dimension of the transformation, on the other, they are supposed to consider economic regularities of concern. This method has been applied in our previous investigations [32, Galustov K.A., pp. 163–176].

One co-author comes up with open questions. Respondents can speculate as long as they see it suitable for them. Such kind of speculation is known as semi-structured interview. It means that major part of questions is compulsory for the respondent to answer. However, some questions may be slightly changed depending on an expert's competence. The questions are classified into three groups (the complete interview guide may be found in the Appendix A.2):

- Questions on drivers and causes of the primary sector transformation;
- Questions on state of the art and further prospective transformation;
- Questions on practical results of the transformation for particular regions and industries.

Results

Qualitative evaluation is aimed to clarify transformation drivers, prospects, and subjective views on the progress of particular regions and industries. It also deals with regularities, commonalities and principal differences in expert's opinion.

All experts consider Yamalo-Nenets Autonomous Okrug as the main "region-winner". It means this region has more advantages of the transformation in comparison with others. This view is strongly based on hypertrophic development of oil and gas industry, which fully corresponds to previous observations [22, Stephenson S.R., Agnew J.A., pp. 558–576].

Prof. Habeck states, “old complains about the lack of processing industries in Russia is still true, and it strongly affects the Russian Arctic, which serves as a resource-extraction base but has barely any processing facilities”. Dr. Kaledin admits the fact, but does not call it a problem. According to Kaledin’s opinion, this economic trend is negative for the Russian Arctic, but positive for the whole of Russia as it increases the Russian role in the world economy and politics.

Prof. Habeck and Stanislav Kiselev state the special role of industrial development in the recent transformation processes. Especially it is related to fuel extraction, high demand for oil and gas. Prof. Krasovskaya and Prof. Evseev mark the revival of the economy in the last years. Contrary, Dr. Elsukov and Dr. Khrushchev mention that people deny the model of permanent living in the mining zone. A more popular model for them is so-called “vakhta” (shift): people live in the mining region during a limited time and return to their main residency when the shift is over.

Actually, the idea of Russian dependence on resources explains causes of the privileged position of the Yamalo-Nenets Autonomous Okrug. Nevertheless, we cannot talk about a long-term stability of the region. Demand on resources can change due to introduction of new ecological standards and prominence of new energetic sources. In this context, Yamalo-Nenets Autonomous Okrug does not have obvious sustainable development prospects with the dominance of two industries: oil and gas extraction. According to Stanislav Kiselev, reindeer herding in Yamalo-Nenets Autonomous Okrug is prospective as well. This is opposite for other regions due to the mining development [25, Reinert E.S., pp. 522-540; 33, Stern J.P., pp. 55–58].

Climatic issues have some specific implications. Northern Sea Route has been revived as a result of sea ice reduction. This can redirect Russian Arctic economy towards export and create opportunities for ocean shelf oil and gas extraction. Another aspect is permafrost thawing that has a negative impact on the development of transport communications and social infrastructure. It is a serious limitation for the sustainable development of the Arctic. Some primary activities such as reindeer herding and fishery are partly dependent on climate change, only noticeable in the long run [25, Reinert E.S., pp. 522–540; 34, Klovov K.B., Mikhailov V.V., pp. 28–42].

The economic factor mostly defines prospects of the transformation processes. Oil prices volatility, limited amount of resources and dependence on loans — all these factors do not contribute to the successful planning of the social and economic development of the Russian Arctic. Political factor exacerbates the geo-economic prospects of the region. Prof. Habeck assumes that this situation becomes more complicated due to social problems as gender-specific rural out-migration and state-induced programs for taking people back from the Arctic to the cities. Nevertheless, Dr. Kaledin thinks that it is compensated by the strategic role of the Arctic region for the Russian Federation, which implies military industrial development of the Arctic.

Most of the experts agree that all regions are in fact dependent on the transformation. For instance, Prof. Dr. Habeck states that “primary industries have been dependent on the transformation of the economic system, though in different ways. Agriculture, including reindeer herding and hunting, cattle breeding and other forms of animal husbandry, has suffered strongly in the

1990s and did not recover fully in the 2000s, with a few notable exceptions. The Soviet Union invested very much into the development of renewable resource use (animal husbandry) in the Far North, whereas Russia nowadays does not invest as much.”

Important point is that Chukotka Autonomous Okrug is defined as the most unstable and vulnerable region. Some areas such as Yamalo-Nenets Autonomous Okrug gas fields and other mature oil and gas provinces are not so dependent on the fast transformation changes. However, positive changes in mining can be accompanied by negative tendencies for reindeer herding and vice versa. Non-ferrous mining, agriculture, fishery, industries of traditional natural resources use are more affected by the transformation, because of low significance of these industries in the regional economy and strong dependence on social factors. Responses about regions and industries, where benefits of transformation outweigh losses, show curious regularities as shown below (Table 2).

Table 2

Regions and industries-“winners”⁹

EXPERTS	“Regions-winners”	“Industries-winners”
Prof. Dr. J.O. Habeck	Yamalo-Nenets Autonomous Okrug, Murmansk Oblast	Oil & gas mining, fishery
Dr. S. Khrushchev	Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug, Norilsk (Krasnoyarsk Krai)	Non-ferrous metallurgy
Dr. M. Elsukov	Murmansk Oblast, Arkhangelsk Oblast, Chukotka Autonomous Okrug	No, only transport
Dr. N. Kaledin	Yamalo-Nenets Autonomous Okrug	Oil & gas mining
Prof. T. Krasovskaya	Murmansk Oblast, Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug	Oil & gas mining
Prof. A. Evseev	Nenets Autonomous Okrug, Yamalo-Nenets Autonomous Okrug	Oil & gas mining, transport
S. Kiselev	Yamalo-Nenets Autonomous Okrug	Oil & gas mining, reindeer husbandry

Regions and industries with the biggest benefits from the transformation are reflected in the experts responses. As we have mentioned, there are similar opinions on these issues. The overwhelming majority of experts suppose that oil and gas mining is the “industry-winner” in the region. Reindeer husbandry, fishery and non-ferrous mining are also considered as industries with lots of benefits, but their benefits are less noticeable. From experts’ opinions, Yamalo-Nenets Autonomous Okrug is more often called as the most beneficial region in the Russian Arctic. Six experts mention Yamalo-Nenets Autonomous Okrug as a winner. Three responses referred to Murmansk Oblast and Nenets Autonomous Okrug.

As revealed in the context of the transformation impact regions of the Group A — Yamalo-Nenets Autonomous Okrug Murmansk Oblast, Nenets Autonomous Okrug and Chukotka Autonomous Okrug — are mentioned more often than other regions. These regions are directly associated with the Arctic being more sensitive to changes. Chukotka Autonomous Okrug is the most af-

⁹ Created by the authors based on informants.

affected region. Yamalo-Nenets, Nenets Autonomous Okrug and Murmansk Oblast have benefited mostly from the transformation (Table 1). This can be explained through their specialization in economy, close location to the ocean and distance to the main industrial centers.

Discussion

There are some common regularities in experts' responses. The answers are repeated more than once. Research results demonstrate features and regularities for each transformation aspect as follows:

1. **Drivers and Specifics of Transformation.** Ethnographers emphasize industrial development; ecologists pay attention to economic revival. Experts mention transitional features of the market economy invasion and Russian Arctic resource orientation.

2. **Factors of transformation.** All experts agree that economic and political factors are the main implications for the transformation.

3. **Role of Climatic Factor.** Responses to this question are strongly related to the professional background of the respondent. Economist (Elsukov) and economic geographer (Khrushchev) respond straightforward that climate factor is of no importance.

4. **Industries Affected by Transformation.** This reflects the consequences of transformation for particular industries. Responses vary. The most popular responses relate to non-ferrous industries (three experts), agriculture (three experts) and coal mining (two experts).

5. **Regions Affected by Transformation.** Experts think that all regions are affected. There is an opinion that the most affected regions are those with losses from transformation. Chukotka Autonomous Okrug is mentioned as the most affected region by five experts. In general, all regions are affected by the transformation. Few provinces and districts secure stability.

6. **Industries-“winners”.** Fuel industries such as oil and gas mining are mentioned by five experts, apart from Khrushchev and Elsukov. In some responses specific primary industries like reindeer husbandry, fishery and non-ferrous complex are specified.

7. **Regions-“winners”.** General expert opinion is that Yamalo-Nenets Autonomous Okrug is the main beneficiary. Murmansk Oblast and Nenets Autonomous Okrug are the second best (mentioned by three experts).

The study identifies features of the transformation, its factors, main industries and regions. Some responses can be compared irrespective of their difference.

The main conclusion deals with an observation of shifts in the primary sector in specific regions. Yamalo-Nenets Autonomous Okrug is an obvious leader in oil and gas industry, which is clearly reflected in experts' responses. There is a wide-spread opinion that the Russian budget is strictly dependent on the exploitation of hydrocarbons on the continent and in the shelf zone [26, Laverov N.P. et. al., pp. 26–37]. Yamalo-Nenets Autonomous Okrug accommodates significant Russian oil and gas reserves in AZRF. Nevertheless, economy of Yamalo-Nenets Autonomous Okrug is more diversified in comparison with Nenets Autonomous Okrug. Yamalo-Nenets Autonomous

Okrug boasts the most developed reindeer herding in AZRF [35, Klokov K.B., pp. 19–33]. These two regions belong to Group A. Its Arctic location and small population are reasons for their high economic growth per capita.

Most experts suppose that oil and gas has more advantages than all other industries in AZRF. Experts confirm that Group A regions, especially Yamalo-Nenets Autonomous Okrug, are “winners” of the transformation. Gas mining of Yamalo-Nenets Autonomous Okrug is the only industry that keeps and outperforms Soviet extraction volumes. Oil industry lost its position in the 1990s. However, Yamalo-Nenets and Nenets Autonomous Okrug have become leaders in oil industry superseding Komi Republic.

We compare how this expert assessment of oil and gas corresponds to available statistics. Matching expert responses to statistical data for 30 post-Soviet year period we can see that oil dynamics in AZRF becomes less noticeable in 21st century (Fig. 5). Since the Soviet era maximum value was achieved in 2005. For the whole period of observations Yamalo-Nenets Autonomous Okrug has remained to be a leader in the Arctic oil sector. Komi Republic hosts “Timano-Pechora energetic province” that used to be a key centre of oil industry in the USSR. Since early 1990s the role of Komi oil has drastically decreased. The similar tendency is observed for Yamalo-Nenets Autonomous Okrug. Other Arctic regions (like Nenets Autonomous Okrug) would have no oil mining on industrial scale.

Since 2000s role of Yamalo-Nenets Autonomous Okrug and Komi Republic has increased again. Nenets Autonomous Okrug demonstrates rapid growth of oil exploration. Yamalo-Nenets Autonomous Okrug reaches the peak in 2004 (50 mln tons), and then the extraction stabilises on 37-38 mln tons. Thus, we observe effective diversification of oil mining within Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug, Komi and prospective region of Sakha Republic (Yakutia).

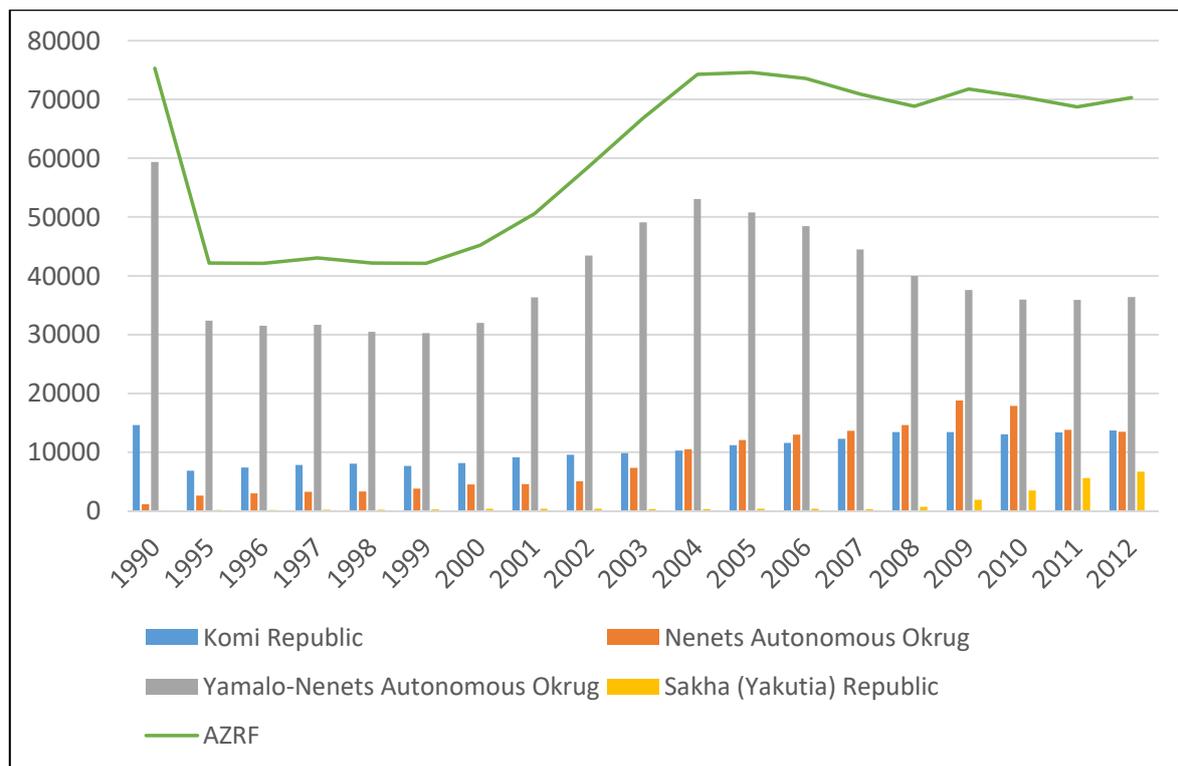


Fig. 5. Volume of the oil extraction in the AZRF regions, 1990–2012, tons¹⁰.

However, the curve for the Russian Federation (Fig. 6) demonstrates little significance of AZRF in national oil sector. Its dynamics corresponds to the volumes of Arctic extraction. Average amount of extraction is less than 100 mln tons.

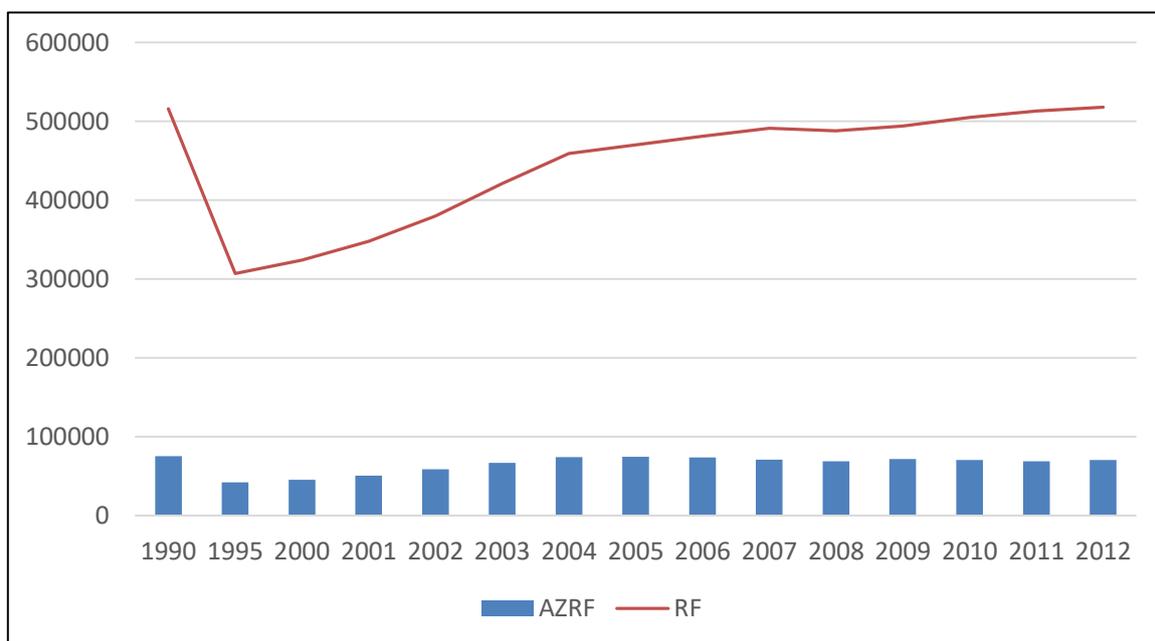


Fig. 6. Volume of oil extraction in the RF and AZRF, 1990–2012, K tons¹¹.

¹⁰ Created by the authors based on FSSS & PolitInform. Russian Federal State Statistics Service (FSSS), <http://www.gks.ru> (accessed 21 November 2019). Political Information Journal (PolitInform). URL: <http://www.politinform.ru/ekonomika-i-finansy/59822-nadolgo-li-nam-hvatit-poleznyh-iskopaemyh-trafik.html> (accessed 13 November 2019).

¹¹ Created by the authors based on FSSS & PolitInform.

Natural gas extraction has a quite different tendency in comparison with the oil industry. Statistical analysis also shows that Yamalo-Nenets Autonomous Okrug is an absolute leader in the gas sector not only in the Arctic, but also in the entire Russian Federation. That explains why the separate graphs for other regions trends are displayed (Fig. 7). The gas reserves in Yamalo-Nenets Autonomous Okrug comprise 90% of the total Russian volume (Fig. 8).

All other Arctic regions have underrepresented mining. Komi, Sakha, Nenets Autonomous Okrug and since 2006 Chukotka Autonomous Okrug have had a tiny volume of gas extraction. Komi is the second region in gas extraction. It is a traditionally oil, gas and coal mining orientated region. There is a large amount of combined oil-gas deposits in the region. For a strong crisis of gas extraction at the beginning of 1990 many deposits got conserved. Importantly, since the end of 2000s oil extraction has grown up. However, gas mining has contracted. This demonstrates the tendency of monopolising gas extraction in one region — Yamalo-Nenets Autonomous Okrug.

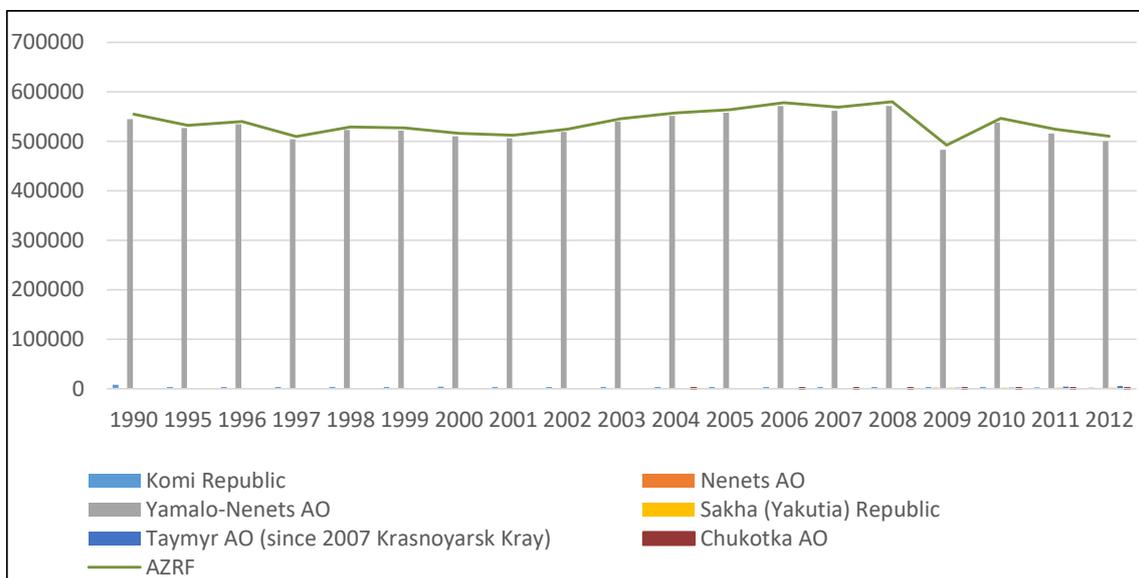


Fig. 7. Volume of gas extraction in AZRF regions, 1990-2012, K m³¹².

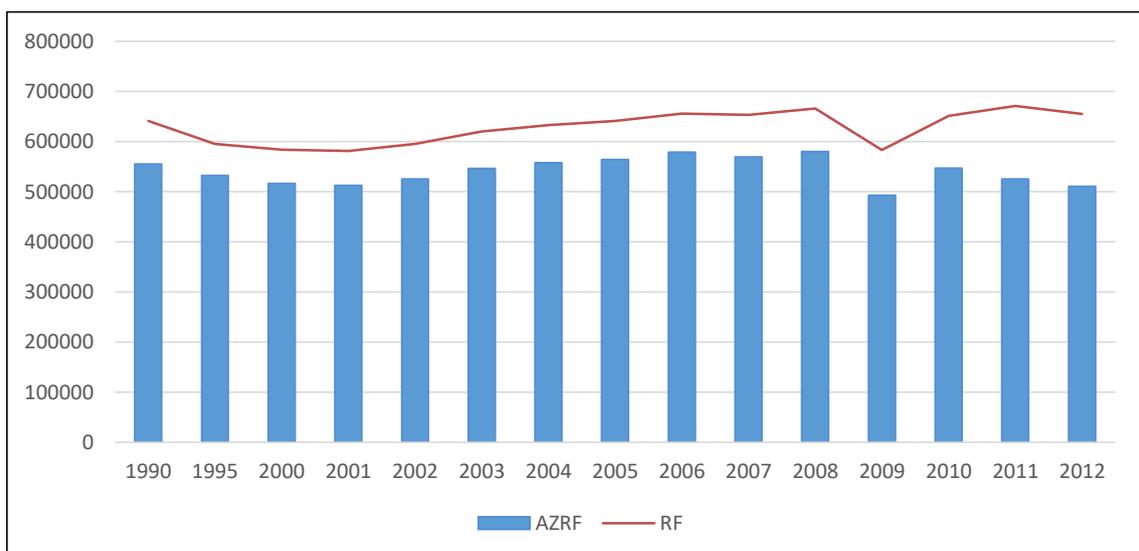


Fig. 8. Volume of gas extraction in the RF and AZRF, 1990-2012, K m³¹³.

¹² Created by the authors based on FSSS & PolitInform.

AZRF gas exploitation trend is diverged from that of oil exploitation. In 1990s the amount of gas extraction remained relatively stable with steady decline. In period 2002–2006, small increase was noticed, but there were practically no fluctuations. The only low dip happened in 2009 for the export crisis. This bottom dip is quite visible on the general Russian curve as well.

These statistical trends explain “Yamal-oriented” and “oil and gas-oriented” expert responses. Firstly, they emphasize the role of oil and gas sector in the Arctic economy. Secondly, they nominate Yamalo-Nenets Autonomous Okrug as the Arctic region of the most importance. Thirdly, the majority of experts recognize Chukotka Autonomous Okrug as the most transformation affected region while Republic Sakha (Yakutia) is recognised as of the most stability.

The primary industry concentration is a positive effect and is an example how the industry benefits from the transformation. Yamalo-Nenets and Nenets Autonomous Okrug effectively use their oil and gas exploration potential. In the case of Yamalo-Nenets Autonomous Okrug, the transformation has a positive impact on another primary industry — the reindeer husbandry. Murmansk Oblast benefits from the convenient geographical location for fishery development [36, Tortsev A.M., pp. 131–141]. The region has secured its potential in times of the economic crisis. Prof. Dr. Krasovskaya mentions, these developments can be linked to permanent intensification of the economic activity.

The analysis definitely shows that the regions of Group A are the most dependent on the transformation. Some of them like Nenets Autonomous Okrug, Yamalo-Nenets Autonomous Okrug and Murmansk Oblast benefit most from the transformation. Contrary, Chukotka Autonomous Okrug is strongly affected by the transformation. Yet, whether it is beneficial or not remains unclear. Specialisation has a local positive impact for the Arctic regions. Regions specialising on particular primary industries are more stable and their economic patterns are predictable.

Conclusion

The study examines a wide range of elements and features of the primary sector transformation in the Russian Arctic. The experts mention economic development as the main factor for the transformation that strongly depends on the industrial activities. Also, the study confirms the key role of oil and gas mining among other industries. The study also shows the outstanding of Yamalo-Nenets Autonomous Okrug, Nenets Autonomous Okrug and Murmansk Oblast among other Russian Arctic regions. Chukotka Autonomous Okrug is recognized as the most unstable region in AZRF. On the one hand, there is a clear positive effect from deep specialization for some regions. On the other hand, these advantages can vanish in the long run. Dependence on oil and gas industries might bring severe consequences for the regions in case of energy market revolution or simply a noticeable price drop of minerals. The policy of traditional natural resource use could improve the situation and create conditions for the regional independency on the economic volatility.

¹³ Created by the authors based on FSSS & PolitInform.

A lack of statistical information is an important limitation for research on the transformation. A large amount of statistical information is of restricted access and therefore, is unavailable for investigation. To make the transformation analysis efficient, it is preferable to liberalise the statistics availability. This will help to identify economic warnings earlier. Besides, the availability of statistical data will make primary industry analysis on the municipal level possible. If implemented, these suggestions may become a strong motivation for future research on primary industries transformation.

This study suggests a novel methodology of how to address primary sector transformation on a regional level along with or outside statistical investigation. Expert assessment gives us another view on transformation implications in the Arctic. The special value of the methodology is that the investigation for other economic sectors (secondary, tertiary) in different regions becomes available. Methodology used may also be expanded for other countries.

The limitations of the study are also rooted in the methodology. The conducted expert assessment cannot provide a solid fundament for quantitative modelling and forecasting. Therefore, while we suggest applying our framework for other countries, if better statistical infrastructure is available other methods to assess primary sector transformation should be considered first.

Further avenues for research are of great potential. Prospects of the study are connected with a search of the future of primary sector transformation. Modern global economy needs an enhanced ability to predict crises. That is why it is necessary to find out the ways to overcome the transformational consequences for the different countries and industries. Besides, the important prospect of the study is a joint assessment of economic and climatic factors on primary sector transformation. Thus, the suggested research framework may be relevant to other countries with large Arctic territories and poor statistical infrastructure to trace changes in primary sector.

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Road Transport Safety in Northern Norway: How Buyers of Road Transport Services Can Contribute to a Road Transport with fewer Accidents and Near-misses*

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Abstract. This paper contributes to filling a knowledge gap by presenting new research within the practical field of road transport. It takes the buyers of road transport services as its point of entry and seeks to answer the follow question: How can buyers of road transport services contribute to safe road transport in northern Norway? A qualitative approach was selected for this study, and semi-structured interviews were conducted with six different buyers of road transport services. By using a modified version of The Pentagon Model, different aspects were analyzed in order to identify organizational characteristics and qualities that will improve the possibility for buyers of road transport to contribute to a safer road transport in Northern Norway and thereby contribute to fewer accidents and near-misses. The following characteristics and qualities were identified: 1) the importance of developing a detailed formal contract with the provider of road transport; 2) being aware of the possibilities with new technologies; 3) understanding that the decision criteria for ordering transport can influence road transport safety; 4) seeing the importance of good communication with both the transport organization and the authorities; 5) recognizing that knowledge of and trust in a transport organization is important but could also affect judgement regarding revisions and controls. This study suggests that buyers of road transport services can contribute to a safer road transport in northern Norway by emphasizing these five characteristics and qualities.

Keywords: heavy goods vehicles, road transport safety, buyers of road transport services.

Introduction

In January 2019, in the northern part of Norway, a young man died in a traffic accident involving an HGV (Heavy goods vehicle). The weather conditions were variable, with wind and precipitation in the form of snow. The young man was on his way back to school in a passenger car after celebrating Christmas with his family. Driving in the opposite direction was a Lithuanian HGV. The HGV was travelling at a speed of 88 km/h at the time of impact. The tires on the trailer were considered unsuitable for driving on snow and ice-covered roads, and the driver had not fitted the tires with snow chains at the time of the accident. The driver lost control of his trailer, which strayed into oncoming traffic. Approximately two and a half months after the accident, the young man died as a result of the injuries he sustained in the collision¹.

This chronicle is one of several severe accidents that occur between foreign HGVs and passenger cars in the northern part of Norway. The above-mentioned accident has, however, been of considerable importance in drawing attention to this predicament.

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¹ Accident Investigation Board Norway. Thematic report on serious accidents involving heavy goods vehicles: Framework conditions for ordering goods transport by road. AIBN report 2020/02. URL: <https://havarikommisjonen.no/Vei/Avgitte-rapporter/2020-02-eng> (accessed 25 August 2020).

Research shows that foreign drivers only account for 6 % of the average domestic transport in Norway, but they account for 11% of the HGVs involved in personal injury accidents. Furthermore, foreign HGVs are three times more likely to cause single vehicle accidents and twice as likely to be involved in head-on collisions. In addition, they seem to be more likely to trigger fatal accidents [1, Nævestad T.-O., Phillips R.O. et al. pp. 16–19]. In the years 2014–2018, HGVs were involved in 140 accidents with casualties in Norway. 34 (24%) of the accidents involved foreign HGV drivers, and these drivers were the triggering party in 10 (7%) of the accidents. Moreover, in 2010–2013, foreign HGV drivers were the triggering part in 58% of the accidents with casualties². These numbers indicate that there has been a decrease in accidents where foreign drivers have been the triggering part; however, to achieve further decline, new interventions and measures must be put into place.

For new interventions and measures to apply foreign road transport organizations and drivers, it must be possible for Norwegian authorities to control and monitor them. This in order to ensure that foreign road transport organizations and their drivers meet Norwegian demands and standards for road transport with HGVs. Relatively new research in this field shows that: 1) management's commitment to safety is of importance regarding the organization's accidents rate [2, Mooren L., Grzebieta R. et al., pp. 86–88, 3, Newnam S., Warmerdam A. et al.]; 2) safety/driver training is associated with a reduced crash and accident risk [2, Mooren et. al.]; and 3) pay systems may negatively influence safety outcomes [3, Newnam et. al.; 1, Nævestad et.al., pp. 16–19]. These findings are important to address with interventions and measures, but regarding foreign drivers and organizations, it is unlikely that the Norwegian authorities can regularly control and monitor such factors, in particular, that concerning safety and driver training.

It is difficult to predict the future, but the amount of domestic and foreign road transport is unlikely to decrease in the years to come. It is therefore essential to put new interventions and measures into place. Forecasts for the years 2015–2030 indicate a 25% growth in traffic along Norwegian roads. Moreover, it is expected that the growth of HGVs will be significantly higher than for passenger cars. If new interventions are not implemented, there could be an increase of 175 people involved in deaths and severe injuries in 2030 compared to 2015³ To counteract this presumed development, The Ministry of Transport and Communications has highlighted concrete measures directed towards HGVs and their organizations. Research supports that new measures should be directed towards the HGV industry and emphasizes that there is a need to look deeper into the underlying causes of accidents involving HGVs [4, Newnam S. and Goode N., 5, Njå O. and

² Ministry of Transport and Communications. Veitrafikkulykker med tunge kjøretøy involvert [Roadtraffic Accidents involving Heavy Vehicles]. Report 2019. URL: <https://www.regjeringen.no/contentassets/ec3cbab7ecef413bbe00888f3ba8f8cf/veitrafikkulykker-med-tunge-kjoretoy-involvert.pdf> (accessed 27 August 2020).

³ Meld. St. 33 (2016-2017) (2017). National Transport Plan 2018–2029. Oslo: Ministry of Transport and Communications. URL: <https://www.regjeringen.no/en/dokumenter/meld.-st.-33-20162017/id2546287/> (accessed 27 August 2020).

Fjelltun S.H., 6, Nævestad T.-O., Phillips R.O. et al., 7, Grytnes R., Shibuya H. et al., 8, Nævestad T.-O., Elvebakk B. et al., 9, Nævestad T.-O., Hesjevoll I.S. et al.]. Traditionally, interventions intended to decrease accidents involving HGVs have often been directed at the individual level (driver-level). However, newer research emphasizes the importance of taking a more holistic and systematic approach to this matter [4, Newnam S. and Goode N., 10, Larsson P., Dekker S.W.A. et al.].

Therefore, in order to contribute to the research field of transportation safety, this study expands the view of possible actors that could affect safe road transport and through this takes a more holistic view of road transport safety. This study will accordingly take the perspective of those actors that purchase road transport assignments — that is, the buyers of road transport services. This study will explore how buyers of road transport services can contribute to safe road transport of goods in northern Norway and through this become important actors in reducing fatal traffic accidents. More specifically, knowing that foreign drivers might lack experience driving in severe weather conditions, which often appear in northern Norway, and drive vehicles not suited for that environment [1, Nævestad T.-O., Phillips R.O., 11, Langeland P.A. and Phillips R.O.], this study focuses on those who hire foreign road transport organizations to transport their goods to/from northern Norway. There has so far been little research that takes this approach, thus this study aims to contribute by filling this knowledge gap.

Road transport in Northern Norway

In the Northern part of Norway, there is, amongst others, two challenges that could especially affect the safety of road transportation: the scattered locations of businesses and the road environment [11, Langeland P.A. and Phillips R.O.]. The road environment consists of conditions such as challenging topography, vast mountain areas, deep fjords and adverse climatic conditions [12, Bardal K.G., p. 49]. In the years 2015–2019, 28 individuals were killed and 213 were injured in accidents involving HGVs in the northern part of Norway⁴.

There are many businesses in need of road transport in northern Norway. As an example, salmon farming is one of the largest industries in this region, and it has considerable road transport needs. One of this study's interviewees, who represents a large salmon farm, stated that their need for transport was approximately 6000 HGVs each year. The amount of salmon slaughtered in 2018 illustrates this need for road transport. In 2018, 551,000 tons of salmon were slaughtered. This accounts for 43 percent of the Norwegian volume of salmon and approximately 20 percent of total world production⁵. The road transport of salmon is mainly and mostly carried out by foreign road transport organizations and their drivers, according to this study's interviewees. Research indicates that there is a specific challenge associated with foreign road users who

⁴ Statistics Norway. Trafikkulykker med personskaade [Traffic Accidents with human injuries]. (2020). URL: <https://www.ssb.no/transport-og-reiseliv/statistikker/vtu> (accessed 28 August 2020).

⁵ Nordland Research Institute. Nord-Norge er en "supermakt" for oppdrett av laks [Northern Norway is a "Superpower" for Salmon Farming]. (2019). URL: <https://www.kbnn.no/artikkel/nord-norge-er-en-supermakt-for-oppdrett-av-laks> (accessed 28 September 2020).

lack experience in navigating narrow roads with high gradients/many curves and winter driving conditions [1, Nævestad et al., p. 4] yet it is just these circumstances that characterize the road environment in northern Norway in general, and even more specifically the road environment surrounding Salmon farms as they are mostly scattered across rural areas.

This notwithstanding, instead of exploring interventions and measures directed towards these foreign road transport organizations and their drivers, this study focuses on the buyers of road transport services in Norway. By setting demands on the foreign road transport organizations and their drivers, it is assumed that the buyers of road transport services in northern Norway could play an important role in positively affecting safe road transport [1, Nævestad T.-O., Phillips R.O., 13, Grinerud K., Sætren G.B. et al.]. Norwegian laws and regulations do, to some extent, impose responsibility on buyers of road transport services in this matter.

Regulations directed towards buyers of road transport services

There are currently some regulations that are directed towards buyers of road transport services and their responsibility when placing an order. These regulations are at best unclear and difficult to determine, especially for new actors in the industry. They are not to be found in paragraphs that are typically directed towards road transport. Rather, they are to be found in more general laws and regulations. This means that, in order to become familiar with these provisions, you must learn through experience.

The first regulation that is of interest here is stated in the Norwegian Penal Code. This is the law that regulates all criminal actions in Norway, and one paragraph has a provision about general complicit responsibility. It is stated that a penal provision also applies to any person who contributes to the violation, unless otherwise provided⁶. The interpretation of this provision is that it will come into force for buyers of road transport services if the transport organization they have hired violates current laws and regulations. Examples of this include overloading their vehicles, not obeying regulated driving hours or not paying their drivers the minimum regulated salary. It is the Norwegian Public Road Administration and the Norwegian Labor Inspection Authority that follow up on such cases, but a challenge is proving that the buyer of road transport services has not done their utmost to prevent the situation.

In addition to the provision about general complicit responsibility, there are provisions about information and duty of control. These provisions are provided for in regulations on information, duty of control and right of access⁷, which regulate the responsibility of the transport organizations to inform buyers of road transport services about the salary and working conditions of their drivers. This is information that the buyers of road transport services must have before they decide to enter a collaboration with the transport organization.

⁶ Penal Code (2005) The Norwegian Penal Code. URL: <https://lovdata.no/NLE/lov/2005-05-20-28> (accessed 30 June 2020).

⁷ Regulations on Generalizations (2008) Information-, duty of care and right of access code. URL: <https://lovdata.no/LTI/forskrift/2008-02-22-166> (accessed 30 July 2020).

Further, there is also a provision about duty of control. The buyers of road transport services must ensure that the information they receive from the transport organization about their drivers' salary and working conditions is accurate. Moreover, they have the right to demand documents, etc., that confirm the information they received [1, Accident Investigation Board Norway]. These provisions are made to ensure that the drivers are working under good conditions.

This paper outlines important aspects that buyers of road transport services in Northern Norway should take into consideration when ordering road transport from foreign road transport organizations. It takes the buyers of road transport services as its point of entry and seeks to answer the follow question: *How can buyers of road transport services contribute to safe road transport in northern Norway?* In addition, the paper outlines some practical implications for buyers of road transport services and Norwegian authorities.

Further, a presentation of the theoretical framework will be given before the method and results are presented. This will be followed by a discussion linking the findings and related theoretical framework, and lastly, a conclusion.

Theoretical framework

In this study, a modified version of the Pentagon Model, originally developed by Schiefloe [14, Rolstadås A., Tommelein I. et al.] is used as an assessment tool to analyze five different features of six different buyers of road transport services.

In this section, a detailed explanation of the Pentagon Model [14, Rolstadås A., Tommelein I. et al., 15, Kongsvik T., Albrechtesen E. et al., pp. 68–72], and our modified version, will be given to explain its use in the analysis.

Pentagon Model

When an unwanted incident occurs, it is of vital importance its cause be found to prevent it from happening again. It is possible to investigate an incident on an individual or system level. Traditionally, traffic accidents have been investigated on an individual level, holding the driver responsible [4, Newnam S. and Goode N., pp. 141–142, 10, Larsson P., Dekker S.W.A. et al.]. When investigating on an individual level, the aim is to understand why humans act like they do. When investigating on a system level, the aim is to investigate the whole organization in order to identify its ability to avoid unwanted incidents [15, Kongsvik T., Albrechtesen E. et al.].

The Pentagon Model is an assessment tool that can analyze why unwanted incidents occur from a systems level perspective and can also be used to prevent them. Moreover, a Pentagon Model analysis can be used for planning and organizational development, for example by determining what kind of organizational characteristics must be in place in order to achieve certain qualities [15, Kongsvik T., Albrechtesen E. et al., pp. 68–72].

A Pentagon Model analysis combines a system-oriented approach and social constructivist theoretical approach to understand the working situation for the different actors involved. The

model places special emphasis on keywords like interpretation, sense-making, and interests and takes both formal and informal aspects into account [14, Rolstadås A., Tommelein I. et al.]. The model analyzes five different aspects: structure, technologies, culture, interaction and social relations and network. These are the most important variables that characterize an organization [15, Kongsvik T., Albrehtesen E. et al.]. *Structure* covers how the organization has defined roles, responsibility and authority. *Technologies* refers to tools, equipment, IT-systems and infrastructure that are essential to the activities of the organization. *Culture* consists of attitudes, values, norms and knowledge and establishes expectations for how "work is done here". *Interaction* involves communication and cooperation, while *Social relations and network* refers to important factors in all kinds of work, such as trust, friendship and access to knowledge [14, Rolstadås A., Tommelein I. et al., 15, Kongsvik T., Albrehtesen E. et al.].

In this paper, the Pentagon model has been modified to fit this research project. The model is adjusted so it can be used to determine the important aspects that buyers of road transport services should take into consideration before deciding which road transport organization should transport their goods. From the original aspect, *structure*, we have constructed the factor *formal contracts*. This concerns how the buyers of road transport services formalize their business relationship with the transport organization. *Technologies* is also included in the modified version. This factor covers whether there are formal criteria for the vehicle and equipment the transport organization must provide in order to acquire transport contracts with the buyers. The third aspect, *culture*, has been modified into *decision criteria*. Underlying this factor is what criteria are of greatest importance for the buyers of road transport services when deciding on which transport organization they want to hire. *Interaction* has been modified to *communication*, a factor that involves how the buyers of the road transport services perceive the importance of communication with the road transport organizations and governmental institutions. The last original aspect is *social relations and network* and from this the factor of *knowledge/trust* has been developed. It investigates whether knowledge and trust are important attributes when deciding on which road transport organization they want to contract with.

This modified version of the Pentagon Model analysis has been used to determine what kind of organizational characteristics must be in place in order to achieve certain qualities, qualities that are essential for buyers of road transport services who wish to contribute to safer road transport in Northern Norway.

Method

In the following section, a description of the research design, research participants, data collection and analysis method used in this paper will be provided. A qualitative approach was selected for this study, which seeks to gain in-depth knowledge about how buyers of road transport services can contribute to safe road transport in Northern Norway. To achieve such knowledge, it is essential to acquire the participants' experience and opinions about the topic [16, Langdridge D.

and Hagger-Johnson G.]. Data collection was therefore conducted through semi-structured interviews.

Research Participants and recruitment

Six interviews were conducted with six different buyers of road transport services. The interviewees were recruited due to their relevance in the road transport sector [17, Kvale S.]. All were employed in positions of responsibility for ordering road transport for their products. Participation was voluntary, and all the interviewees agreed to participate after being informed about the project and that they were able to withdraw at any time. The study was approved by the Norwegian Centre for Research Data (NSD).

The interviews were mainly carried out by two or three researchers in a face-to-face setting. The interviews were not recorded, but validity was ensured by sending all interview transcripts back to the informants for feedback. Each interview lasted approximately 45 minutes.

Data Collection and Analysis

A semi-structured interview guide [17, Kvale] was used to ensure the researchers were able to cover similar themes across the interviewees. The semi-structured interview guide included different topics.

First, the interviewees were asked to talk about their organization's formal structure.

Second, they were asked to discuss the criteria they use to determine from whom they order transport. Third, they were asked how they made sure the transport they ordered was safe and carried out according to laws and regulations. Finally, they were asked to add any additional information relevant for the study. During the entire interview, the researchers concentrated on allowing the interviewees talk and only interrupted if there were follow-up questions.

As an analysis tool, the Pentagon Model [14, Rolstadås A., Tommelein I. et al., 15, Kongsvik T., Albrehtesen E. et al., pp. 68–72] has been modified and applied to determine what kind of organizational characteristics must be in place in order to achieve certain qualities, qualities that are important for buyers of road transport services to have in order to contribute to safer road transport. The results are presented in the next section.

Results

By using the modified Pentagon Model, the following aspects have been analyzed for six different buyers of road transport services in order to identify the organizational characteristics and qualities that will improve their ability to contribute to a safer road transport with fewer accidents and near-misses: *formal contracts, technologies, decision criteria, communication and knowledge/trust*. First, an overall summary of the results will be presented for each aspect. Second, an overview of the results for each organization will be outlined (Table 1).

Formal contracts: All the interviewees stated that formal contracts were signed with the road transport organizations that transported their goods. Any demands directed towards the transport organization were detailed in the contracts, such as insisting that it must follow laws and regulations and use appropriate equipment and vehicles. However, in busy times, transport assignments were also carried out by transport organizations with whom they did not have a formal contract. Several interviewees stated that: *We create formal contracts with our main providers of transport, but we also use transport organizations ad-hoc in busy times* (Interviewee A, B, F). As maintaining a driver's license and CPC (Driver Certificate of Professional Competence) was an obvious requirement, only one interviewee stated that extra driver competence, education and courses were imposed. *The driver must participate in a course on customer service and optimal driving in order to be able to transport our goods* (Interviewee F). One of the interviewees also set demands in their contracts regarding the use of a driver computer, driver behavior, monitoring, etc.

Technologies: Five out of six interviewees stated that only new and modern vehicles could be used when transporting their goods. *The vehicle must be suited for Norwegian conditions, meet environmental demands, have at least a Euro 6 engine* (Interviewee A, B, D, F). One interviewee stated that in addition to this, the vehicles must also be fitted with alco measure (making the vehicle impossible to start if the driver has been drinking alcohol). One of the interviewees also demanded the use of driver behavior monitoring.

Decision criteria: All of the interviewees stated that the cost of the transport was of considerable importance when deciding with whom they should sign a transport contract. *We are concerned with cheap transport and use only foreign transport organizations when exporting our goods out of Norway* (Interviewee C). Another stated that *our biggest clients are in low-cost chains, so big volume is of great importance for us to be profitable. Therefore, transport prices are important when we make our decision to order transport* (Interviewee A). Some of the interviewees also stated that quality and flexibility in transport assignments were of importance, but in the end it all came down to the price.

Communication: Five out of six interviewees highlighted good informal communication with the road transport organization as very important. *We discuss delivery times, etc., openly and come to an agreement if there are any challenges* (Interviewee A). A day-to-day communication to clarify deviations in delivery or loading/unloading times was highly appreciated. Formal revisions of contracts and follow-up on the transport organization's compliance with laws and regulations were mostly absent. *We see it as other authorities' responsibility to control and follow up road transport organizations regarding laws and regulations* (Interviewee D). Most of the interviewees pointed out that communication with authorities about their responsibility when ordering road transport services is lacking. *How can we do things right when no one provides us with this important information?* (Interviewee E). More information about this matter is thus required.

Knowledge/trust: Five out of six interviewees chose a transport organization based on former knowledge of the organization, and the relationship is often based on trust. Because of their knowledge of and trust in their transport organization, follow-up concerning demands in contracts, etc., are often absent. *We trust our main contractors to carry out their job in line with the written contract, therefore we don't do follow-ups* (Interviewee D).

Table 1

Overview of the results — Buyers of road transport services

	Formal / informal contracts	Technologies	decision criteria	communication	knowledge/trust
Organization A	Large organization that orders approximately 500 road transport assignments each day. Creates formal contracts with their main providers of transport, but they also use transport organizations ad-hoc in busy times. The contracts set demands that the transport organization must follow laws and regulations, use appropriate equipment and vehicles, etc. However, the contracts do not set demands directed towards the competence of the driver except that the driver has a driving license and CPC (Driver Certificate of Professional Competence).	Set demands for their transport organizations that they must use appropriate vehicles and equipment. The vehicle must be suited for Norwegian conditions, meet environmental demands (at least Euro 6 engine). However, they do not set any demands regarding a driver computer, driver behavior monitoring, etc.	Concerned with environmental concerns. Transport organizations that transport their goods must use HVO fuel during the summertime and seek the possibility of using electric vehicles. Further, they only allow transport organizations that are considered "serious" and "lawfully" to carry their goods.	Close interaction with their transport organizations. They follow up with revisions each year where they control that the laws and regulations are followed. On a day-to-day basis they can discuss delivery times, etc., openly and come to an agreement if there are any challenges. Good communication is highlighted.	Highlighting the importance of using transport organizations they are familiar with. The relationship is based on trust.
Organization B	Large organization that orders approximately 6000 road transport assignments each year. Significant export need. Uses mostly foreign road transport organizations for this purpose. Creates formal con-	Set demands for their transport organizations insisting they must use appropriate vehicles and equipment. The vehicle must be suited for Norwegian condi-	Concerned with fast, cheap and punctual transport. They perceive the transport of their goods as a part of their value chain and only allow transport organizations that are consider "seri-	Follow up their transport organizations with ad-hoc controls of tires and chains during the wintertime. However, a lack of communication between those who order the transport and the management is mentioned	Strives to have a close interaction with their transport organizations, but numerous transport assignments in the ad-hoc market are compromising this.

	<p>tracts with their main providers of transport, but also use transport organizations ad-hoc in busy times. The contracts set demands e.g. the transport organization must follow laws and regulations, use appropriate equipment and vehicles, etc. However, the contracts do not set demands directed towards the competence of the driver except that the driver has driving license and CPC (Driver Certificate of Professional Competence).</p>	<p>tions, meet environmental demands (at least Euro 6 engine). However, they do not set demands regarding a driver computer, driver behavior monitoring, etc.</p>	<p>ous" and that"lawfully" to carry their goods.</p>	<p>as a challenge.</p>	
<p>Organization C</p>	<p>Mid-size organization that orders approximately 140-240 road transport assignments each day. They create formal contracts with their main providers of transport. The contracts set demands e.g. that the transport organization must follow laws and regulations, use appropriate equipment and vehicles, etc. However, the contracts do not set demands directed towards the competence of the driver except that the driver has driving license and CPC (Driver Certificate of Professional Competence).</p>	<p>Set demands for their transport organizations by insisting that they must use appropriate vehicles and equipment. The vehicle must be suited for Norwegian conditions. However, they do not set any demands regarding a driver computer, driver behavior monitoring, etc.</p>	<p>Concerned with cheap transport and use only foreign transport organizations when exporting their goods out of Norway. They acknowledge that transport is a part of their value chain but do not execute revisions or controls when their main contractors use subcontractors.</p>	<p>Emphasizes good communication with their main contractors regarding deviations. For example, regarding loading/unloading times, delivery times, etc. They do not follow up with regular revisions in order to make sure laws and regulations are being followed</p>	<p>Considers the relationship with governmental institutions of great importance. They find laws and regulations regarding their transport buyer responsibility as unclear. They request more information and better cooperation between the government, road transport organizations and buyers of road transport services</p>
<p>Organization</p>	<p>Concerns a munic-</p>	<p>Set demands</p>	<p>Concerned with</p>	<p>They see it as other</p>	<p>Trust their main</p>

D	<p>ipality. They order transport like snow plowing and asphalt paving. They have formal contracts with their main providers of transport. The contracts set demands e.g. that the transport organization must follow laws and regulations, use appropriate equipment and vehicles, etc. However, the contracts do not set demands directed towards the competence of the driver except that the driver has driving license and CPC (Driver Certificate of Professional Competence).</p>	<p>for their transport organizations e.g. that they must use appropriate vehicles and equipment. The vehicle must be suited for Norwegian conditions, meet environmental demands (at least Euro 6 engine). However, they do not set any demands regarding a driver computer, driver behavior monitoring, etc.</p>	<p>cheap transport. They do not demand extra education of the driver, as long as the formal licenses are obtained. They have the possibility to set more demands in their contracts but have chosen not to do this.</p>	<p>authorities' responsibility to control and follow up on road transport organizations regarding laws and regulations. Day-to-day communication with main contractors are absent. There are meetings regularly.</p>	<p>contractors to carry out their job in line with the written contract. Do not follow-ups.</p>
Organization E	<p>Small start-up business with a limited road transport buyer need. It is expected that the need for transport will increase in the years to come. They have a contract with one large road transport organization. They have not set any demands in this contract. Instead, it is the transport organization that has designed the contract.</p>	<p>Has not set any demands regarding the vehicles and equipment the road transport organization uses when transporting their goods.</p>	<p>States that price is the most important factor when they order transport. Second in importance is flexibility.</p>	<p>Has little to no communication with the road transport organization and governmental institutions. They were not aware of their responsibility as a buyer of road transport services and call for more information in this matter.</p>	<p>Did not have any relation to the road transport organization before they hired them to transport their goods.</p>
Organization F	<p>Large organization that has contracts with 15 main contractors. They have formal contracts with their main providers of transport, but</p>	<p>Set demands for their transport organizations e.g. that they must use appropriate vehicles and equipment. The</p>	<p>Concerned with quality in road transport. The transport must be safe. Further, they have environmental concerns and aim to</p>	<p>Value close interaction with their transport organizations. They follow up with revisions each year where they control that laws and regula-</p>	<p>Highlight the importance of using transport organizations they are familiar with. They tend to use small and middle-sized transport organi-</p>

	they also use transport organizations ad-hoc in busy times. The contracts set demands e.g. that the transport organization must follow laws and regulations, use appropriate equipment and vehicles, etc. In addition, the contracts set demands directed towards the competence of the driver. Their drivers must participate in optimal driving course	vehicle must be suited for Norwegian conditions, meet environmental demands (at least Euro 6 engine). Also, they set demands regarding a driver computer, driver behavior monitoring, etc.	be a market leader in environmentally friendly transport. Finally, they are concerned with transport prices. They find it very important that all drivers have taken a course in optimal driving in order to decrease the number of accidents.	tions are followed. On a day-to-day basis they can discuss delivery times, etc., openly and come to an agreement if there are any challenges. Good communication is highlighted.	zations because trust and easy to access and communication is highly valued.
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Discussion

Previous research shows that buyers of road transport services have the possibility to influence safe road transport by setting demands directed towards road transport organizations [1, Nævestad T.-O., Phillips R.O. et al., 13, Grinerud K., Sætren G.B. et al.]. However, to set such demands, the buyers must possess some organizational characteristics and qualities. By using the modified version of The Pentagon Model as an assessment tool, some of these characteristics and qualities have been identified:

- Understand that their decision criteria for order transport can influence road safety
- The importance of entering a formal contract with their provider of road transport
- Being aware of the possibilities and use of new technologies
- See the importance of good and even communication with both the transport organization and the authorities
- Recognize that knowledge and trust with the transport organization is important but could also affect judgement regarding revisions and control

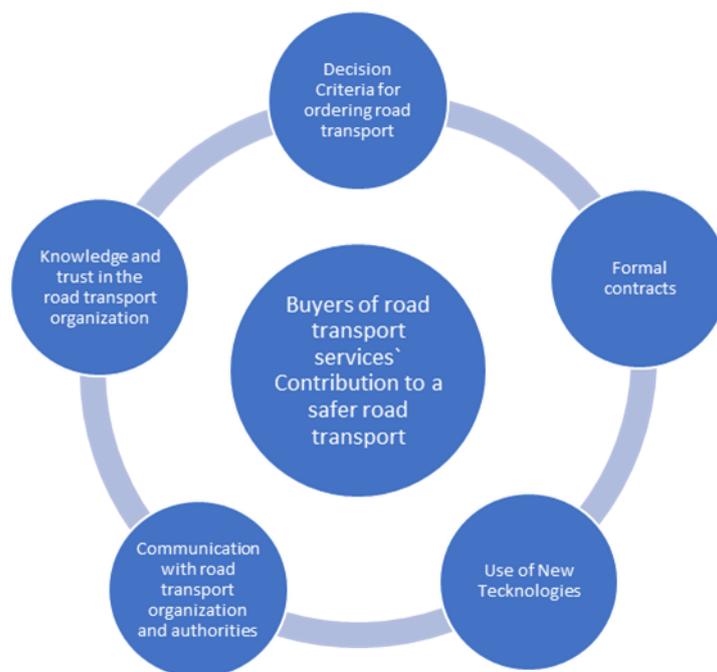


Fig. 1. Buyers of road transport services` contribution to a safer road transport

Decision criteria

The road transport industry is a low-earning industry, and the average financial result for a transport organization is between 2–5 % [13, Grinerud K., Sætren G.B. et al.]. This leads to a stringent prioritization of assets. By constantly pushing prices down, the buyers of road transport services influence the ability of the transport organizations to prioritize safety work, such as safety/driver training. In our interviews, most participants stated that they did not demand additional safety/driver training, and consequently, they were unwilling to pay extra to provide this. Some interviewees even said that additional safety/driver training was not taken into consideration at all when deciding on a transport assignment, this despite the fact that additional safety/driver training is associated with a reduced crash and accident risk [2, Mooren L., Grzebieta R. et al., p. 79].

Buyers of road transport services should be concerned with this fact, especially when ordering road transport to/from northern Norway from foreign road transport organizations during wintertime. It is stated that local knowledge about weather and driving conditions is of importance [12, Bardal K.G., p. 50] to ensure road transport is carried out in a safe manner. It is likely that foreign drivers who lack winter driving skills would improve their driving competence if those who purchase their services would demand additional knowledge and safety/driver training. This would in turn imply that road transport organizations must offer such training in order to gain transport assignments.

However, for the road transport organization to follow through with this, there must be assets available to fund such training. The responsibility for this matter should lie on both the road transport organization and the buyer of the road transport service. Consequently, the decision criteria applied by buyers of road transport services cannot be restricted to choosing the cheapest

provider. In this sense, the grounds on which the buyers of road transport services make their decision could influence how they contribute to safer road transport.

Formal contracts

Before transport organizations can carry out the transport, it is essential that a formal contract between the buyer and provider is established. In this study, all interviewees state that formal contracts are generally in place before the transport is carried out. However, these contracts seem to be concerned about topics such as following laws and regulations, using modern vehicles, the consequences if the transport is delayed, etc. There are seldom demands directed towards, specific driver competence, the use of management systems to monitor driving behavior and driving/resting times, etc.

To increase road safety, buyers of road transport services could consider crafting more detailed contracts with their transport organizations. Contracts that state that the transport organization shall follow laws and regulations seem to wage in this context. Instead, the buyers of road transport services should set demands that are clear and concise, e.g. demand that the road transport organization have a safety management system like ISO 39001 or similar [8, Nævestad T.-O., Elvebakk B. et al., p. 387].

However, it is not enough to simply set detailed demands into a contract. The contract needs to be followed up with revisions and control on a regulatory basis. Several of the interviewees in this study stated that they do not follow up on the demands in the contracts, trusting instead the transport organization to carry out the transport in line with the contract. It could be assumed that depending on such trust makes it difficult to discover any deviations from the terms of the contract, as there is a complete lack of regulatory revisions and controls. In comparison, following up formal detailed contracts with regulatory revisions and control could be a factor that increases road transport safety.

Use of new technologies

The use of new technologies is stated to be one of the most important factors for reducing casualties and injuries in traffic accidents⁸. A way to make the contracts more detailed would be to insist on the specific use of new technologies, especially the technologies that new vehicles is equipped with. By including such demands, it would be easier to track and monitor driver behavior, driving-resting time and loading-unloading time. Measures can thus be put in place to avoid certain situations and create safer transport routes.

The use of new technologies such as GPS and tracking systems would be of specific help in planning transport routes. For example, if a driver experiences some challenges on one route, a

⁸ Meld. St. 33 (2016–2017) (2017). National Transport Plan 2018–2029. Oslo: Ministry of Transport and Communications. URL: <https://www.regjeringen.no/en/dokumenter/meld.-st.-33-20162017/id2546287/> (accessed 27 August 2020).

message could go out to the rest of the drivers in his/her road transport organization to inform them of this issue. For foreign drivers, this would assist in choosing another route and acquiring important local knowledge about the area without being present. The consequence could be that the drivers receive better background information on which to base their decisions.

Demanding the use of new technologies in contracts would also encourage transport organizations to integrate this into their management system and use it more consciously. An on-board safety monitoring system is a good example of how new technologies can help identify risky driving behavior [18, Luke R. and Heyns G.J.].

Communication with road transport organizations and authorities

For buyers of road transport services, good communication with road transport organizations will likely contribute to road transport safety. The interviewees in this study highlight the importance of day-to-day communication with their transport providers. If any deviation in the transport route occurs, good communication and a strong relationship allow any misunderstandings to be resolved. For example, if a road transport organization knows it will be fined by their buyer if the transport is delayed, they are more likely to carry out the transport assignment in unsuitable weather conditions, which makes them more vulnerable to accidents. On the other hand, if a road transport organization can call the buyer, explain the situation and thereby avoid a penalty, then they are more likely to stop and wait for better weather conditions.

The value of good communication can also be extended to the relationship between the buyers of road transport services and the authorities. There are several laws and regulations directed towards buyers of road transport services^{9, 10}, but these are not easily discovered, especially by new organizations and start-ups. One of the interviewees (a start-up organization) stated that, even though they scheduled a meeting with the Norwegian labor inspection directly after opening their business, no information about their responsibilities were mentioned. Other interviewees stated that they knew about them, but only vaguely.

If new and small buyers of road transport services are to set the necessary demands for their transport organizations, information regarding this matter must be a priority. There is, however, currently a lack of both information and education directed towards buyers of road transport services regarding their responsibility for a safe road transport.

Knowledge and trust in the road transport organization

Most of the interviewees in this study emphasize the importance of choosing a road transport organization they are familiar with, and this business relationship is built on knowledge and trust. On the one hand, this reasoning can be important to safer road transport because it

⁹ Penal Code (2005) The Norwegian Penal Code. URL: <https://lovdata.no/NLE/lov/2005-05-20-28> (accessed 30 July 2020).

¹⁰ Regulations on Generalizations (2008) Information-, duty of care and right of access code. URL: <https://lovdata.no/LTI/forskrift/2008-02-22-166> (accessed 30 July 2020).

might facilitate communication and lead to a relationship where challenges and deviations can be quickly resolved. On the other hand, choosing transport organizations based on knowledge and trust could lead to a situation where contracts are not important and regular revisions and controls are absent. Consequently, this can affect the buyers' possibility to set demands on their transport organizations, thereby affecting the safety of the road transport.

Practical implications

This study has shown that there are some characteristics and qualities that buyers of road transport services should take into consideration to contribute to a safer road transport in Northern Norway, that is, a road transport with fewer accidents and near misses.

First, buyers of road transport services should be aware of how their decision criteria for ordering transport can influence road safety. If their decision is made solely with respect to price, it puts the transport organization in a position where they have few resources to spend on safety work. Second, a detailed formal contract with their transport providers is essential in the sense that demands can be made to increase road transport safety. Third, demanding the use of new technologies can make road transport more transparent and put necessary measures in place. Fourth, facilitating good communication with the transport organizations can help avoid misunderstandings regarding transport delays and other unforeseen challenges. Fifth, buyers should choose transport providers they are familiar with, but must be aware of the pitfalls if their relationship is based solely on knowledge and trust.

As for the Norwegian authorities, it is important to be aware of the lack of knowledge buyers of road transport services have regarding their responsibility for a safe road transport. More education and information must be given in this matter, and directed especially towards new organizations, start-ups and small business that order road transport.

Implications, Limitations and Further Research

This study is of value to buyers of road transport services, as it can increase their awareness of how they can contribute to a safer road transport. This is especially true for those buyers of road transport services located in and scattered across rural areas in northern Norway, as the driving conditions in these areas often demand very skilled drivers with good local knowledge about the area.

Further, this study can assist the Norwegian authorities by identifying the lack of knowledge buyers have about their responsibility for safe road transport. Recommendations include developing education and courses and directing relevant information towards the group in question.

The numbers of interviewees can be a limitation in this study. However, the researchers sampled interviewees with diversity, ranging from large organizations to new start-ups. All partici-

pants were experienced and knowledgeable, and substantially information was given to the researchers. Nonetheless, more research on the topic should be conducted.

There is little research on buyers of road transport services and their role in contributing to a safer road transport. Further research should focus on the aspects mentioned above, especially with the aim of acquiring in-depth knowledge from buyers of transport services and decision makers in these organizations.

Conclusion

The research question for this study is as follows: *How can buyers of road transport services contribute to safe road transport in northern Norway?* By using a modified version of The Pentagon Model, different aspects were analyzed in order to identify organizational characteristics and qualities that will improve the possibility for buyers of road transport to contribute to a safer road transport in Northern Norway and thereby contribute to fewer accidents and near-misses.

There are two challenges in particular that affect the safety of road transportation in northern Norway: the scattered locations of businesses [11, Langeland P.A. and Phillips R.O.] and a road environment with challenging topography, vast mountain areas, deep fjords and adverse climatic conditions [1, Nævestad T.-O., Phillips R.O. et al., p. 4, Bardal K.G., p. 49]. These challenges demand that drivers have skills and knowledge about driving in such an environment with such conditions.

Consequently, buyers of road transport services need to be sure that the drivers they hire have these skills and knowledge. Therefore, buyers of road transport services should consider: 1) developing a detailed formal contract with the provider of road transport; 2) seizing the opportunities with new technologies; 3) whether their decision criteria for ordering transport could influence road transport safety; 4) the importance of good communication with both the transport organization and the authorities; 5) that knowledge of and trust in a transport organization is important but could also affect judgement regarding revisions and controls.

This study suggests that buyers of road transport services can contribute to a safer road transport in northern Norway by emphasizing these five characteristics and qualities. By doing so, it will be the buyers of road transport services that set the demands for the transport organizations as they will choose to hire only those that fulfill them. In this way, foreign, as well as domestic, road transport organizations will be forced to comply with these demands to acquire transport assignments.

Conflict of interest

The author declared no potential conflict of interests with respect to the research, authorship and/or publication of this article.

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Drivers of the Innovation System and Role of Knowledge Application in Regional Innovation System — Case Oulu Region, Finland*

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Abstract. In the northern periphery, actions are needed to support regional economic development. According to widely shared understanding, innovations are at the core of sustainable economic growth. The regional innovation system (RIS) approach is a framework that has been developed for the design and implementation of innovation-based regional policies. This concept implicates new roles for public and private actors in the system. The role of the public sector is related to generating and diffusing knowledge to the companies and industrial networks. On the other hand, companies have increased collaboration with other actors and utilization of external knowledge for innovation and commercial purposes. The case analysis in this study is based on data from experiments in Oulu region, Finland, which has a long history in developing public-private collaboration and innovation system. The focus of the analysis is on knowledge application and exploitation, and their implications for the public driven innovation system and activities. Operational tools and activities are divided into three different categories: company collaboration, business development, and competence development. The analysis also reveals some examples of the future prospects and challenges in the region.

Keywords: *regional development, innovation, innovation system, public-private collaboration, knowledge.*

Introduction

For regional economies, innovation has become vitally important to gain and maintain competitive strength [1, Asheim B. T., Smith H. L., Oughton C., p. 1]. Socio-institutional environment from which innovations emerge is essential, and innovations are an outcome of interactive learning in localized innovation networks that are embedded in this setting [1, Asheim B.T., Smith H.L., Oughton C., p. 1–3; 2, Doloreux D., Parto S.]. Knowledge plays a central role in creating and maintaining innovation, and knowledge networks have an important role in regional success. Literature suggests that regional actors in science and technology and policies play critical roles in creating appropriate contexts for knowledge creation and transfer [e.g. 3, Huggins R., Kitagawa F.]. On the other hand, an interactive innovation system involves the users of new knowledge who are exploiting it for practical (including commercial) use [4, Cooke P., Uranga M. G., Etxebarria G., p. 478].

Innovation is recognized as being an outcome of the interaction between heterogeneous actors and resource combinations [5, Cantù C., Corsaro D., Snehota I., p. 148]. Interaction includes e.g. knowledge exchange between companies and universities. There has been pressure for the

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public sector to enhance the company collaboration and companies to utilize the external knowledge for innovation. For example, universities have been pushed closer to the industry as governments have sought to encourage these institutions to undertake more industrially relevant research, assisting competitiveness of the industry [6, Tether B.S.]. For the industry, there has been radical change in the competitive environment, and companies have incentives to, for example, increase competitiveness, shorten product life cycles and get cost savings [7, Ankrah S., Omar A. T., p. 392]. Innovation networks are enabling the use of external knowledge in the innovation actions of companies, and this is especially important for SMEs, which have fewer employees and limited resources for their own in-house R&D¹. Different variables on how and why companies are utilizing external sources of innovation on their operations are studied in multiple studies [e.g. 8, West J., Bogers M.].

The regional innovation system (RIS) involves various innovative networks with different kinds of social relationships. These relationships consist of different strong and weak ties. Strong ties mean high-level network density and norms important for innovation, but also weak ties can be fruitful for innovation as they enable breaking away from established practices and information can flow more freely [9, Granovetter M., p. 34, 45]. Innovation potential is dependent on how information is transferred between research and practice-oriented partners as well as differences in horizontal knowledge interests — potential innovating partners may have difficulties in starting the processes, as rules for communication are lacking [10, Uotila T., Harmaakorpi V., Melkas H., p. 52]. In addition, the internal capability of companies to utilize external knowledge through the learning processes of acquisition, assimilation, transformation, and exploitation (absorption capacity) is important to recognize [11, Lewin A. Y., Massini S., Peeters C.]. This capacity is easily neglected in innovation policies, especially in less favored regions [12, Tödtling F., Tripl M., p. 1203].

Moreover, in research focusing on higher education institutions (HEIs) and the public sector, attention is mostly laid on interaction and relationships between the actors within the system [e.g. 13, Schartinger D., Rammer C., Fröhlich J.]. There are some studies trying to investigate how HEIs and SMEs can work better together in the context of a RIS [14, Cooke P.], as well as trying to explain how HEI-industry-interaction works from the industry perspective [15, Cantù C., Corsaro D., Tunisini A., de Zubielqui G. C., Jones J., Seet P. S., Lindsay N.]. This paper contributes to understanding the heterogeneous roles that public actors play in facilitating knowledge application by companies and innovative system development.

The public sector has an essential role in knowledge generation and diffusion and public sector involvement in innovation development actions are needed in the northern areas. Thus, the focus of this study is on the public sector perspective on the importance of company engagement. The case area is the Oulu region, Finland, where there has been an experimental orchestration of

¹ Løkkegaard S., Lykke M. Knowledge exchange between universities and SMEs: The 'Situation' of SMEs. In University-Industry Interaction Conference, Amsterdam, Netherlands, 2016. URL: https://vbn.aau.dk/ws/files/234695585/Paper_UIIC.pdf (accessed 20 September 2020).

substantial public driven innovation activities. This focus of the public driven innovation system differs from the company sector driven innovation system, where the initiatives and guidance are private sector driven (e.g. Silicon Valley). In this study research data is not based on companies [e.g. 15, Cantù C., Corsaro D., Tunisini A., de Zubielqui G. C., Jones J., Seet P. S., Lindsay N.; 16, Santoro M.D., Gopalakrishnan S.]. The primary material consists of a massive amount of data, including, for example, meeting memos, workshop materials, and reports related to public sector innovation system activities². The material is based on engaging different stakeholders to qualitatively collect and synthesize prospects for strategies and development plans. Additional secondary material is formed by two informant interviews (one practical and one strategy orientated) to complement the synthesis based of the primary material.

This article is based on the following research questions:

- Based on the case of Oulu, what can be learned about the drivers and conditions of regional innovation system development?
- How is the connection between knowledge generation and application levels built? What incorporated services, tools and collaboration models can be initially identified?
- What kind of challenges and future prospects can be identified from the synthesis of vast data from regional decision making?

Framework of the study

The regional innovation system (RIS) approach was developed to better understand the sources of competitive advantage and to devise policies addressing regional inequalities [17, Asheim B. T., Smith H. L., Oughton C.]. An interactive innovation system involves the users and producers of new knowledge exploited for practical (including commercial) use. Interaction is a social process, involving feedback at different points in the innovation process as it involves knowledge development, diffusion and deployment [4, Cooke P., Uranga M. G., Etxebarria G.]. These interactions must be systemic and long-term in character to be qualified as an innovation system [1, Asheim B. T., Smith H. L., Oughton C., p. 8]

The two main building blocks of an RIS can be identified as the knowledge generation and diffusion subsystem, and the knowledge application and exploitation subsystem. The knowledge generation and diffusion subsystem include, among others, universities and other public and private educational and research organizations, technology transfer organizations, and workforce mediating institutions. The knowledge application and exploitation subsystem mainly consists of companies and their clients, suppliers, competitors, as well as their industrial cooperation partners, and industrial networks. In knowledge application and exploitation, there is vertical network-

² Unpublished material of the Oulu Innovation Alliance (2009-2019): innovation collaboration documents, including strategic and operative steering board documentation, agreements, special reports and metrics. The Oulu City Business Development Plan from 2019 and policy papers, UO and OUAS strategies and policy papers, some of which are publicly available. Unpublished documentation is available from corresponding author upon request.

ing between customers and contractors, and horizontal networking between collaborators and competitors — the former has more correlation to company growth and the latter has a positive impact on profitability [18, Autio E., p. 134–135]. Tödtling F. and Trippl M. also highlight the regional policy dimension, as the policy actors are playing a role in shaping the regional innovation processes [12, Tödtling F., Trippl M.]. For an RIS existence, interactive learning—engaging and connecting these two subsystems— is needed [4, Cooke P., Uranga M. G., Etxebarria G.]. It is worth noticing that the performance of a RIS does not only depend on what happens inside the system, but also on processes that take place outside the territorial boundaries of system [1, Asheim B. T., Smith H. L., Oughton C., p. 9]. In the ideal case, in this framework there are interactive relationships within and between these subsystems facilitating a continuous flow of knowledge, resources and human capital. In practice, several types of problems and failures, such as lack of relations within and between the subsystems, can occur [12, Tödtling F., Trippl M., p. 1206].

A regional innovation system includes a great number of actors, relations and activities. In this study, the focus is on BusinessOulu, a business development organization of the city of Oulu, two HEIs (University of Oulu and Oulu University of Applied Sciences) and Oulu Innovation Alliance (OIA), a strategic collaboration model, and how they are enhancing the interaction and development of knowledge application level. Therefore, it should be noted that these actors and collaboration models only partly cover the activities done overall in the regional innovation system. The framework of this study is built based on the work of Autio E. and Tödtling F., Trippl M.; it is adapted to the case of Oulu, seen in Figure 1.

As this analysis is based especially on the city development organization, BusinessOulu, and two HEIs, these organizations ought to be introduced. *BusinessOulu* is the business division of the City of Oulu, holding the responsibility for the municipality's business politics and business development, as well as services towards the business sector. The City of Oulu aggregated six different organizations together in 2011 to BusinessOulu. BusinessOulu has also been responsible for organizing and executing city branding and marketing since 2011. The key services are company services (for individual companies), company network development (e.g. incl. innovation services, job creation and entrepreneurship programs), marketing, and event planning.

Oulu University of Applied Sciences (OUAS) focuses on training professionals with emphasis on developing and implementing education in cooperation with businesses and industries. OUAS is conducting RDI activities that are closely integrated with education and projects implemented in cooperation with businesses and industries. University of Applied Sciences has a very clearly legislated objective in regional development. The strategy for 2020–2030 highlights strong networks and ecosystems in the implementation of the strategic aims. In the OUAS strategy, it is stated that the OUAS and UO form a core structure in the local ecosystem, which also comprises the City of Oulu, secondary education providers, sectoral research institutions, industries, and public-sector employers.

The University of Oulu (UO) works as part of the international science community to produce new scientific information and science-based solutions, and train future pioneers to build a more sustainable, intelligent and humane world (Strategy for the 2020s). Collaboration between the two universities is increasing; in 2018, the University of Oulu became the principal owner of Oulu University of Applied Sciences, some of the services have been merged, and both universities are located in the same campus areas starting from 2020.

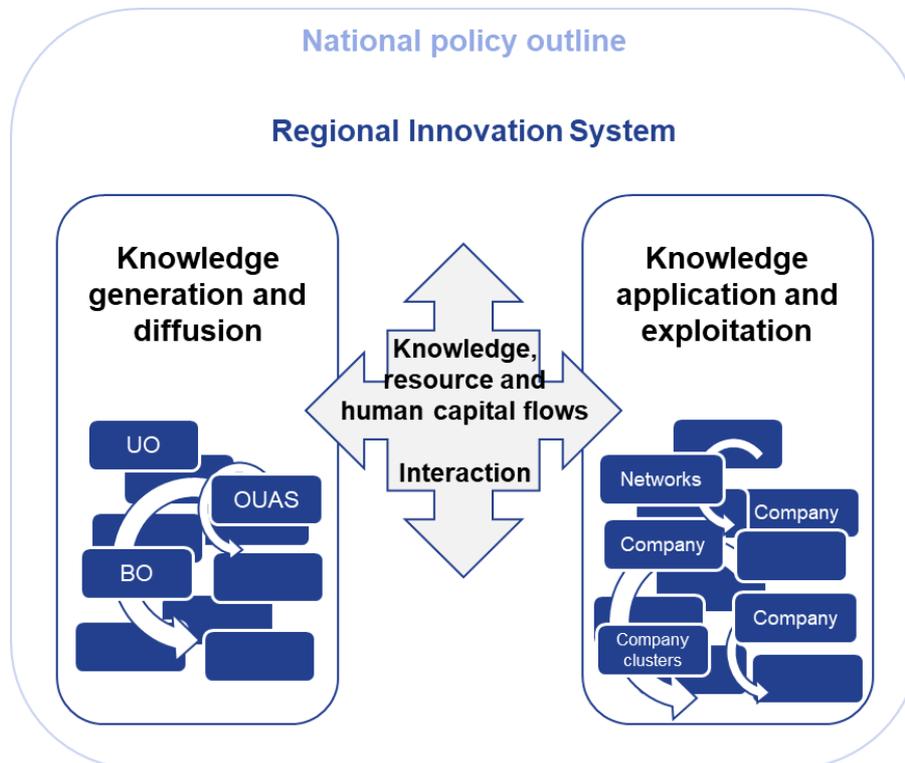


Fig. 1. Regional Innovation System framework and case Oulu.

Regional innovation system as a part of Finnish regional policy

The location of Oulu in the arctic brings some specific characteristics to the orchestration of the innovation collaboration, but there are also national and regional factors influencing the development. Therefore, it is important to highlight the effects that the Finnish regional policy development has on the development of the regional innovation system and collaboration.

As an example of an industrialized, modern economy, Finland has rapidly transformed from an agrarian society into an economy built increasingly on the service sector. Alongside this general development, during the post-war period, the Finnish economy has become a part of the global economy and fluctuating international markets. These simultaneous development trends have indisputably affected the design of the Finnish regional development policies that otherwise can be seen to stem from the rather typical and universal desire to secure balanced development in different parts of the country.

The general outline of Finnish regional development policies has rather clearly followed a three-step process [e.g. 19, Sotarauta M.; 20, Tervo H.;³] starting from the industrialization policy in the 1960s, which was followed by a period of planned regional development policy from mid-1970s to late 1980s. The last step in this development is considered to have ignited in the late 1980s, when the manifold of program-based regional development policy was introduced and launched.

In Finland, the third step of regional development at the beginning of the 1990s defined various development programs as the cornerstones of policy. Globalization as a megatrend and Finland's membership of the EU as a major driver at national level have most certainly affected regional economic policies, along with the ongoing discussions about the competitiveness of Finland as a nation in the global economy. Program-based development aims at collecting singular development activities in larger entities and hence improving the strategic coordination of projects⁴. The nature of the role of public sector actors in development has changed from being an active—sometimes even decisive—agent, injecting and administering local economies with investments and public services, to a more supplementing actor, ensuring that there are adequate inputs to selected development activities.

Even though the program-based development per se does not indicate increasing or decreasing emphasis on the regional development, it most certainly intertwines with the thoughts on regional development introduced by Porter in his widely cited studies [e.g., 21, Porter M.E.; 22, Porter M.E.]. Local clusters, networks, or innovation ecosystems refer to a setting in which the public sector investigates economic development in regions and induces progress with appropriate means along with private sector actors. Tervo H. summarized the relation between regional policy and markets and concluded that economic growth cannot be generated by public sector activities alone [20, Tervo H.]. The public sector does not possess the means to affect the general economic development—interplay between markets and the public sector is required.

Assessing the development path of Finnish regional policy for the past decades confirms the assumption that in different contexts and situations, different policies are required. The most recent policy orientation towards innovation systems or ecosystems would not have been the most suitable choice during the post-war rebuilding period in Finland. At the moment, the grand design of Finnish regional policy is supporting rather than preventing the emergence of modern

³ Vartiainen P. Suomalaisen aluepolitiikan kehitysvaiheita. (Developmental phases of the Finnish regional policy), Sisäasianministeriö, aluekehitysosaston julkaisu, Helsinki, 6/1998.

⁴ e.g. Mäkinen M. Yhteisöaluepolitiikan periaatteiden teoreettinen erittely ja soveltaminen Suomessa. Doctoral thesis. Acta Universitatis Tamperensis 691. Tampere, Finland, 1999. URL: <https://trepo.tuni.fi/handle/10024/66509> (accessed 20 September 2020).

regional innovation systems, enabling the co-existence and networking of the public and the private RDI actors, as well as experimentation of different regional concepts ⁵.

Building the regional innovation system in Oulu

In the northern city of Oulu, first steps in the development of the regional innovation system were already taken in the early 1980s when a technology park was established to stimulate collaboration between higher education, research, and companies. The technology park or village was branded as Technopolis and it set a framework for rapidly growing the high-tech sector in Oulu. ICT and mobile phone industries quickly acquired a dominating position in local economy with, as an example, 16% of total employment linked to relevant industries [23, Herala J., Simonen J., Svento R.]. This strong dependence on one industry and even more strikingly in one company (Nokia) was identified as a risk to stable regional development. To alleviate the consequences of one-sided production structure in the region, there were growing desires to expand the collaboration between high-level research and companies to other research areas. In 2008, the key RDI actors ⁶ in the Oulu region initiated a development process to secure necessary resources for innovation activities. This development led to the strategic collaboration agreement of Oulu Innovation Alliance (OIA) ⁷, which can be identified as one form of systematic cooperation in the Oulu region.

The first stage of Oulu Innovation Alliance covered the years from 2009 to 2015. The operational model for OIA's first stage was built on the simultaneously established innovation centers. These centers focused on RDI projects and were able to obtain RDI funding as well as introduce new multi-disciplinary themes such as digital health. During the first stage of OIA, the mobile industry faced a rapid and radical downturn, which led to pervasive consequences in the development of the Oulu region, and the emerging innovation system was put to a serious test. As one of the numerous responses to the difficult situation, both universities in Oulu brought their entrepreneurship and innovation activities together and launched Business Kitchen, the universities' entrepreneurship hub. Business Kitchen acted as a platform for experimentations in start-up development and for a new entrepreneurial culture ⁸.

⁵ Niemelä S. Essays on regional economic development and innovation ecosystems in the arctic context. Doctoral thesis. Turku School of Economics, Finland, 2018. URL: <https://www.utupub.fi/handle/10024/145045> (accessed 20 September 2020).

⁶ the City of Oulu, University of Oulu (UO), Oulu University of Applied Sciences (OUAS), Oulu University Hospital, Technological Research Centre of Finland Ltd (VTT), Technopolis plc, and since 2016 Oulu Region Joint Authority for Education (OSEKK) and Natural Resources Institute Finland (Luke)

⁷ Iloranta E., Isokangas, J., Niemelä, S. Suomalaisten korkeakoulujen inkubaattoriverkosto – yhdessä kohti yritteliäämpää yhteiskuntaa. Entrepreneurship Education Conference Articles. Ed. by K. Peltonen, H. Laakso, P. Kuru, L. Oksanen. LUT Scientific and Expertise Publications – Research reports 84, 2018. URL: <https://lutpub.lut.fi/handle/10024/158942> (accessed 20 September 2020).

⁸ Isokangas J., Kosonen K., Niemelä S., Savela T. Oulun ammattikorkeakoulu yrittäjyyskasvattajana. Oulun alueen ja Pohjois-Suomen kehitystä tuetaan monipuolisella tutkimus-, kehitys- ja innovaatiotyöllä. Ed. M. Paldanius. ePooki. Oulun ammattikorkeakoulun tutkimus- ja kehitystyön julkaisut 89. Oulu, Finland, 2018. URL: <http://urn.fi/urn:nbn:fi-fe2019102534867> (accessed 20 September 2020).

Due to these significant changes in local economy, decision makers decided to renew the concept of OIA for the second stage that started in 2016. At the core of OIA's second stage are innovation ecosystems, and the main operational principle is to embed the majority of activities and, hence, the direct operational costs to member organizations as part of their normal operations. In the formulation of the strategic spearheads and goals for the second stage of OIA, the rising number of start-up companies and growing interest in entrepreneurship activities steered focus more on commercialization and business development and less on the basic research. The second stage of OIA, running until the end of 2020, is oriented towards agile experimentations aimed at improving and accelerating innovation and commercialization. These foci reflect the joint understanding of member organizations that the regional development is eventually dependent on the success of companies in markets. In practice, the second stage of OIA has generated new services and concepts. One example from HEIs actions is the University Innovation Centre. It was established in 2019 to serve both universities and RDI communities in innovations, commercialization and company collaboration, following the example of Business Kitchen in seamless cooperation. [24, Hintsala H., Niemelä S., Tervonen P. ⁹].

Company collaboration, knowledge and development services

The role of regional public sector actors continuously changes according to the prevailing regional policy. As different publicly funded projects have been dominating in applying regional policy, the public sector has been focusing on its activities accordingly. For example, the key activities have used to focus on cost-benefit analyses of proposed projects, ex ante comparisons of different alternative projects, and ex post assessment of the effectivity of executed projects. However, as concepts such as innovation ecosystems have been introduced to the practical framework of regional development, the public actors have adapted new tasks, such as the continuous updating of a complex picture of the regional system, input-output analysis on system's level and administration of composition of heterogeneous projects and activities instead of singular projects. In the Oulu region, this shift in the role of public sector is particularly evident due to the determined desire to develop the regional innovation system.

In this analysis, as the main focus is on BusinessOulu and two higher education institutions of the region and especially on their roles in generating and diffusing knowledge, a simple, yet robust classification of activities is applied. The rather exhaustive list of different procedures and activities can be summarized under three headlines: company collaboration, business development and competence development. However, it should be noted that the examples given are not exe-

⁹ Isokangas J., Kosonen K., Niemelä S., Savela T. Oulun ammattikorkeakoulu yrittäjyyskasvattajana. Oulun alueen ja Pohjois-Suomen kehitystä tuetaan monipuolisella tutkimus-, kehitys- ja innovaatiotyöllä. Ed. M. Paldanius. ePooki. Oulun ammattikorkeakoulun tutkimus- ja kehitystyön julkaisut 89. Oulu, Finland, 2018. URL: <http://urn.fi/urn:nbn:fi-fe2019102534867> (accessed 20 September 2020); Niemelä S. Essays on regional economic development and innovation ecosystems in the arctic context. Doctoral thesis. Turku School of Economics, Finland, 2018. URL: <https://www.utupub.fi/handle/10024/145045> (accessed 20 September 2020).

cuted to the same extent. Classification of services, platforms and collaboration models is shown in Table 1.

Table 1

Services, platforms and collaboration models

		Examples
Company collaboration	Mapping RDI-needs and conducting projects	Designing of and applying funding for joint RDI projects
	Themed business events and meetings	Events and meetings with public and private parties to discuss ideas, share information, peer-to-peer experiences, workshops
	Guided collaboration of business networks	Introducing, building, incubating and coordinating themed clusters/alliances
	Joint marketing and visibility measures	Collaboration with local businesses in local, national and international marketing and communication
	Strategic partnerships	Tailored strategic partnership agreements between public organization and a company
Business Development	Services for companies (commercialization process, internationalization, growth, financing)	Test labs, piloting and prototyping services, platforms and data, consulting and advisory services in business modeling, business incubators and accelerators, assistance in funding
	Assessing the idea flow	Events, competitions and services to harvest and assess emerging ideas
Competence development	Training, educational programs, continuous learning	Entrepreneurial and innovation-related training
	Human resources: talent attraction and acquisition	Identifying the needs of the companies, collaboration between educational organizations and companies, establishing hubs or centers for talent mobility in regional, national and international level

One dominant form of company collaboration in the region has been joint RDI projects, as well as organizing events based on different themes. HEIs have a more emphasized role in joint RDI projects, and BusinessOulu in other company collaboration activities. A few more recent forms of collaboration are strategic partnerships (e.g. between university and individual company) and coordination of company networks. Functional company networks are very important in the RIS — how different companies are connected and how knowledge and resources flow between them, horizontally and vertically. It cannot be clearly concluded from the documentation which level activities have been more dominant. Especially in the northern regions, the economy is usually based on natural resources¹⁰ and large industrial companies, and SMEs evolved in their value chains. Based on this, it is not surprising that a lot of emphasis in the Oulu region has been laid on generating talent, knowledge and innovation in order to enable economic growth in dominant industrial sectors. In 2018 and 2019, efforts seem to aim to increase the support of company-based ecosystems and how the public sector can support this development in the future. One activity has been the company clusters and networks enhancing the intersectoral and interdisciplinary col-

¹⁰ Middleton A., Hersinger A., Bryksenkov A., Mineev A., Dybtsyna E., Bullvåg E., Simonen J., Pesämaa O., Dahlin P., Ovesen S. Business Index North 2019: People, Business and Development conditions. URL: <https://businessindexnorth.com/reports/?Article=70> (accessed 20 September 2020).

laboration in specific themes to make sure that the most relevant knowledge can be applied and commercialized. The public sector actors see this as a collaboration model in which the companies are more involved and active. However, the role of the public sector in enhancing or coordinating these activities is not yet systematic and fully defined, and the models seem to be still developing.

Business development mainly means different services providing support for commercialization, internationalization, finding funding, and growth. BusinessOulu can be seen to be one of the key actors in this category, as it is responsible for the business development of the municipality. However, e.g. assessing the emerging ideas are many times joint actions between various public and private actors. Investigation of documentation reveals that traditional business incubators or accelerators have not been in the core activities of the public sector in the Oulu region, but for example, private companies have also been fulfilling this task (e.g. Kielo Growth Ltd).

One important development area in innovation collaboration is competence development. The most common forms are internships and the thesis work of students, entrepreneurial and innovation-related training, and joint forums for universities and companies for curricula development to better meet the needs of companies. During the past few years, for example continuous learning has been more highlighted to respond to the educational and training needs arising from changes in the working life and to better match the needs of companies and the society as a whole.

In the analyzed documentation, activities of different sized companies are not usually described in detail. In general, SMEs are seen as working with large companies and knowledge generation organizations. The so-called leading companies have international experience, bigger size and market position to enhance associated SMEs to grow and internationalize. SMEs on the other hand are more agile and open-minded, which can help large companies to boost their growth. Through collaboration, knowledge generating institutions have the opportunity to test and apply knowledge in real conditions, but also to find new areas to apply the research in. One informant described that this can be a more precise description of the process industry dynamics, where there are a few large companies and many of the small companies are dependent on them. However, in some of the new emerging sectors, there are many small companies and the logic of business operations is different.

In the OIA material from 2019, one of the main challenges in company collaboration is identified to be the passivity of the companies. By this, the actors refer to findings such as, for example, local branch offices of large companies not being active, some companies resorting to in-house RDI development, there not being defined models of co-creation between actors, and companies not being proactive to pursuit new collaboration. On the other hand, it is identified that the public organizations should be more active in marketing their services and delivering those services to companies.

According to analyzed documentation, different sectors are more highlighted in the innovation collaboration at the strategic level — and these sectors reflect the Smart Specialization

themes of the region¹¹. Different sectors are noticed and there are different collaboration models in different sectors. However, the same OIA metrics are used in all of the identified sectors and the metrics used in evaluating the success of the innovation collaboration are mainly focused on the quantity of companies participating in different activities instead of the heterogeneity of participating companies. However, new value chains and success stories have been recently added to OIA metrics. It is worth noticing, like one of the informants highlighted, that there are some sectors, such as construction, that are important in the regional economic development, but do not have great visibility in these innovation development activities.

From HEI perspective, the enhancement of cooperation between university and business has been taken forward in the form of the recently established University Innovation Centre (UIC), by the appointment and actions of the vice rector for cooperation at the University of Oulu, and by the increasing number of strategic partnerships which are developed into more systematic direction regarding the goals and actual activities. Oulu University of Applied Sciences is, by definition, more practical in its innovation activities and especially in company collaboration. The University of Oulu, on the other hand, has a long tradition in academic research and education, but is constantly focusing more on the commercialization of new ideas being developed in the academia and joint RDI projects. The business development activities of HEIs seem to be in the designing stage — clearly, there are desires to increase the role of universities in business development, but exact procedures and operational models are yet to be defined. Motivation for increasing activities in business development can be seen to differ from the more traditional university-industry collaboration [7, Ankrah S., Omar A.T., p. 392].

Identified challenges and development prospects

Collaboration has mainly involved joint RDI-project activities, but especially during the past few years the focus has been moving towards the coordination of larger and more versatile entities of activities, and it seems there is need and desire to develop this type of coordination further. Analyzing the Oulu City Business Development Plan 2019¹² reveals some of the main drivers, thematic areas, and activities related to collaboration with HEIs and companies. The synthesis of the aforementioned findings is presented in Figure 2.

As seen in Figure 2, it seems to highlight, among other, the role of digital solutions and platforms, competence development, and supporting company clusters. Overall, these elements also reflect the national policy development, for example Reform of continuous learning in HEIs¹³

¹¹ Focus areas of the Oulu Region's smart specialization: ICT and software sector, including integration with businesses in different fields, Basic industry's value chains: metal industries, refinement of timber raw material, Clean technologies, including energy, Healthcare and wellness technology.

¹² Over 150 external experts from companies, non-profit organizations, Ministry of Economic Affairs and Employment and education institutions participated for the ideation and preparation of the Oulu City Business Development Plan (2019) for the years 2019-2026.

¹³ Ministry of Education and Culture (Minedu). Reform of continuous learning. URL: <https://minedu.fi/en/project?tunnus=OKM033:00/2019> (accessed 22 May 2020).

and sustainable urban development¹⁴. These drivers and thematic areas can mainly be seen to reflect the general global and EU-level trends, and the northern regional context related themes are not emphasized.

Combining information from the Oulu City Business Development Plan with HEIs strategic perspectives, some examples of the identified challenges and development prospects in overall system development, company collaboration, business development, and competence development can be identified. These emerging challenges and development prospects can be embedded in the research framework described earlier in this article (Fig. 3).



Fig. 2. Some of the main drivers, thematic areas and activities in Oulu City Business Development Plan 2019.

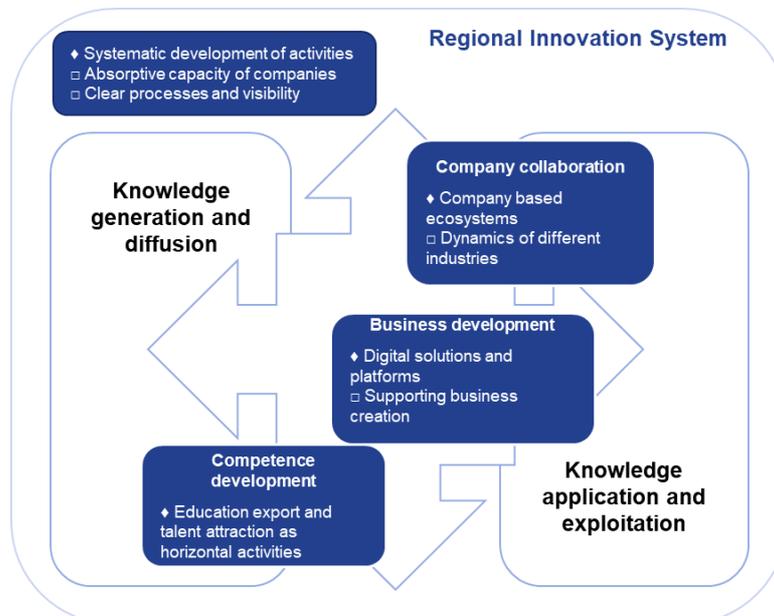


Fig. 3. Development prospects (◆) and identified challenges (□) in Oulu region innovation collaboration.

¹⁴ Ministry of Economic Affairs and Employment (TEM). Innovaatiotoimintaa vahvistavat sopimukset solmitaan kaupunkien kanssa [Agreements to boost innovation to be concluded with cities]. URL: https://tem.fi/artikkeli/-/asset_publisher/innovaatiotoimintaa-vahvistavat-sopimukset-solmitaan-kaupunkien-kanssa (accessed 25 May 2020).

Especially the main public sector actors are involved in innovation system activities, but relationships between the actors are not systematically developed. Since innovation collaboration is public sector driven, private sector actors and their variety is not considered fully in the systematic development and resourcing of the activities. In general, as one of the informants pointed out, common development aims and commitment is important, but, additionally, it is essential to have very concrete goals that can be executed in practice. The material and especially informant discussions highlighted that clear processes and actors' knowledge of them is important. For example, if a person has an idea for commercialization, there should be understanding on how to enhance this idea leading possibly to the commercialization phase. The material in general suggests that the system needs to be agile for new openings and ideas, and have piloting and testing facilities and resources for joint usage.

Based on the primary material and informant discussions, it can be interpreted that company collaboration should be based on the potential of collaboration with new partners rather than only focusing on the existing collaborative actions and partners. This means, first of all, to define the business basis of the region and its potential, and, secondly, to analyze how the horizontal competence like digitalization is related to different sectors (e.g. health, metal industry). Additionally, interaction and working models and the needs are different in different industry sectors and companies. Relevant actors should be identified according to their needs e.g. in the strategic development of the industry, piloting and commercialization. As noted before, based on the analyzed material, company-based ecosystems seem to be the future orientation of the company collaboration in the Oulu region. This can be seen as a shift from the situation where supporting start-up firms and re-training of unemployed people were the key measures of the region [25, Simonen J., Herala J., Svento R., p. 2]. In the company-based ecosystems, the role of the public sector can be a collective one, bringing the actors together, helping in configuring the joint product or service packages, and enhancing the knowledge of the services provided by the public sector.

In literature, absorptive capacity is highlighted as an important factor in defining the success of the innovation performance [26, Lau A. K., Lo W.]. In the Oulu region, more attention should be paid on networking and learning and on intensifying the utilization of knowledge in business development and innovation, especially with actors who are further away from actions and strategic decision-making. In practice, as one informant noted, a public sector actor can, with practical benchmarks and examples, concretize different collaboration models to a potential company to help the company to perceive the value of external knowledge in developing practices and innovation processes of a company. Especially from the point of view of SMEs, the practical implications are more effective than strategic, high-level statements.

A developing regional cluster for education export and putting more effort into competence development and continuous learning have been in more focus for the innovation network development for the past few years. One element is also talent attraction, to make sure that the

region is getting the best talent from abroad, and making sure that the education institutions are providing education to better match the competence sought by the employers, especially related to the high-tech industry. These activities have mainly involved HEIs, but in recent years this has been increasingly focused on the city business development (BusinessOulu). It could also be analyzed from the material that the talent attraction and education export are becoming more horizontal activities, rather than individual competence development activities.

Conclusion

This study aimed at deepening the understanding of the heterogeneous roles that public actors play in improving knowledge application by companies and in innovative system development in the Oulu region. The focus of this study was on the public sector perspective, and the material used for this paper consisted of primary material of OIA and secondary of two informants.

This study pointed out the main drivers and conditions of regional innovation system development in Oulu. National-level drivers are important in the regional level. National policy and its relation to innovations, as well as different funding mechanisms to the public and private sector activities affect regional decision-making. In the Oulu region, because of the structural changes in the regional economy, the decision has been made to invest in the innovation and network-driven development, including strategic agreement in public sector actors to unite and jointly boost the developing sectors and companies in the area. Public actors have also gone through organizational changes, partially due to these national and regional drivers, but they have also made new strategic choices in education, which have their influence on the innovation activities in the region. The northern or Arctic context is not represented clearly in the research data, even though it obviously affects the practicalities of the SME companies. Analyzing this contradiction was not a particularly essential aspect of this study, but it deserves attention in future studies.

Based on the material, the services, tools and collaboration models that are incorporated by the three public sector actors analyzed in this study can be roughly divided into three categories: company collaboration, business development and competence development. Some of the identified activities are already executed at operational level, but some are still in the early stage of development. However, it is noted that the aforementioned drivers and conditions continuously affect the strategic choices and practical activities done in the Oulu region, which seems to lead to a certain consistency in regional decision-making.

The identified challenges and future prospects of innovation system collaboration can also be analyzed through three identified categories. Some practical examples refer to the building and development of company clusters, the role of digital solutions and platforms in business development, and education export and talent attraction as horizontal activities. However, at the level of innovation system, more emphasis should be laid on themes such as the systematic development of innovation collaboration, the absorptive capacity of companies, and variety of needs for external knowledge and services depending on the industry and company-wise differences.

In the studied region, there has been a long tradition of collaboration between public and private sector in innovation to increase regional growth. There are no signs of collaboration diminishing, but there are indicators showing the changing orientation of the activities. Company-based ecosystems seem to be the future orientation of the collaboration. However, as Autio E. states, there is a difference in supporting horizontal and vertical networking at the knowledge application level [19, Autio E., p. 134], and this should be noted in policy intervention and planning future activities. What company network orientation means for joint business development activities, and for the role of the public sector in general, remains to be seen. Additionally, there seems to be desire to invest in business development instead of business creation, but this finding would require more in-depth analysis. Overall, the practical aim of this paper is to contribute to improving the future performance of RIS in Oulu.

Different RIS have different configurations and there is no all-purpose, “one-size-fits-all” RIS model to apply. Tailored innovation policies addressing specific innovation barriers in different types of regions seem to be necessary [13, Tödtling F., Trippel M., p. 1204]. The Oulu region has its own resources, capabilities, industrial contexts and innovation actions, but what could be taken into consideration in other regions as well is investigating the innovation actors, their interaction and innovation processes in the region more closely. For further research, as the number of SMEs is high and they are generating a lot of regional growth, it would be beneficial to further analyze how SMEs access knowledge and apply it, and what the roles of RIS and external elements are. Additionally, it would be beneficial to develop and test different tools aimed at measuring innovation performance at the system level instead of the traditional input-output analysis of singular projects and activities.

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The Blue Economy in the Arctic Ocean: Governing Aquaculture in Alaska and North Norway*

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Abstract. In the Arctic, the concept of the blue economy is increasingly dominating discussions on regional development. This entails utilising the region's ocean-based resources in a sustainable way — both from a global and local level, as well as from an environmental and economic perspective. A crucial aspect in this development is how blue activities are regulated. The UNCLOS-regime plays a vital part in providing the mechanisms and procedures for states to manage marine resources more broadly. However, the predominant mode of governance for Arctic maritime activities will remain unilateral management by each of the coastal states. Thus, the national and local legal and political framework needs to be mapped. In this article we will explore and explain how aqua-/mariculture is governed in the United States (Alaska) and Norway (North Norway). This will be done by examining how parameters for blue economic projects are defined and determined at the international, regional, national and local governance level. Thus, our article will illustrate the complexity behind the blue economy. There is no such thing as one blue economy and no such thing as one Arctic, but it is still possible to find common ground and avenues for knowledge and best practice exchange. By this we will bring the academic and political discussions about the blue economy on the right track.

Keywords: *blue economy, Arctic, law of the sea, aquaculture, mariculture, sustainable development, governance.*

Introduction

Over the last two decades, retreating sea ice, changing distribution of marine natural resources, and demand for the same resources have combined to create a 'perfect storm' for increased economic interests in the Arctic region. With the rapid changes underway across the Circumpolar North, questions are being asked about both the sustainability and profitability of northern economic ventures, together with conditions for local and regional development [1, Nymand Larsen J., p. 4]. Today's political Arctic agenda is not only occupied by questions on how to sustainably manage regional resource exploitation and extraction but increasingly also on how to best govern emerging disputes among the various industries involved.

It comes an allegedly new concept, involving every aspect of national and global governance, economic development, environmental protection, sustainability and international communication: *blue economy* [2, Wenhai L., Cusack C., Baker M., Tao W., Mingbao C., Paige K., Xiaofan

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Z., Levin L., Escobar E., Amon D., Yue Y., Reitz A., Neves A.A.S., O'Rourke E., Mannarini G., Pearlman J., Tinker J., Horsburgh K.J., Lehodey P., et al., p. 3]. Recently, the term 'blue economy' has come into widespread use to describe sustainable uses of ocean resources — an allegedly new catchphrase aiming to combine the apparently antithetic context of the oceans being areas of both growth and development, as well as threatened and vulnerable spaces in need of protection. The blue economy basically constitutes an evolution of ideas about sustainable economies, used to denote an expansion of economic wealth derived from the oceans and coasts in such a way as to maintain or improve the natural systems that various economies depend on [3, Voyer M., Quirk G., McIlgorm A., Azmi K.].

Although increasingly invoked by stakeholders and international organisations, as well as by national, regional and local governments to tackle both ocean-related opportunities and challenges, the clarity of both the term and concept remain vague, as do the steps required to achieve a balance of ecological and economic concerns in the practice of sustainable exploitation. While the term 'blue economy' has been globally embraced, it lacks substance and is often used by a broad variety of stakeholders who all attempt to sustainably manage the exploitation of a global marine environment under increased pressure. In addition, the similar term 'blue growth' increasingly shapes global policy processes that 'purportedly aligning the concerns of coastal communities, the environment and investors all at once' [4, Barbesgaard M., p. 145]. With the blue economy gradually moving from a 'largely discursive construct towards practical applications', also debates over the legitimacy of particular manifestations of the idea increase [5, Voyer M., van Leeuwen J., p. 102].

As the blue economy provides for many different and often conflicting meanings, it is necessary to delineate — step-by-step and case by case — every potential pillar of the blue economy to eventually unravel the mystery of what the blue economy is and could be. Particular ambiguity concern the implications of the term's vagueness on matters of ocean governance [6, Hadjimi-chael M.], relating to questions of the geographic (e.g. how does the concept interact with land-based management systems) or the sectoral scale of the concept (e.g. which industries are considered *blue*, which one not and how are marine interactions between various stakeholders governed) [3, Voyer M., Quirk G., McIlgorm A., Azmi K., p. 599]. Similarly, the concept's questioned legitimacy is debated on three levels — at the scale of an individual project or activity, of an entire sector or use, or at the overall conceptual level [5, Voyer M., van Leeuwen J., p. 102].

These on-going debates form the departure for the analysis on hand. However, by providing an overview mapping of the current status of regulations and systems governing the blue economy in Alaska and North Norway and analysing related consequences for intra-Arctic cooperation, we will add another missing puzzle to global *blue* discussions. An overview and analysis of this kind is a precondition for identifying areas for improvements; be they a lack of adequate regulations in certain areas, inconsistencies between or within current regulations, or a lack of consistent implementation and uniform enforcement of rules. In the following, we will provide a case

study on the current governance architecture for the blue economy, in the context of aqua- and mariculture in Alaska and North Norway. We then employ a comparative methodology based on these specific case-studies, in order to draw wider lessons concerning the blue economy in an Arctic context. We will start by briefly discussing the term/concept 'blue economy' as an emerging idea of how to sustainably — from both an ecological and economic understanding — manage and use the world's oceans and its resources. Then we turn to an analysis of the existing legal and policy frameworks at national, regional and international levels in order to unravel some complexity behind the blue economy in one specific case study.

The Blue Economy: A New Sustainable Catchphrase?

The global oceans are not only vital for human wellbeing as climate-regulator and oxygen producer (through the plants such as phytoplankton, kelp, and algal plankton that live in it), they also provide invaluable ecosystem services, contribute to global food security, and offer opportunities for economic growth and development¹. Valued at 1,5 trillion USD in 2010 — about 2,5% of the world's gross economic value — the economic value of the ocean outputs could be doubled by 2030, reaching over 3 trillion USD and approximately employing 40 million full-time jobs².

Over the past two decades, the 'blue economy' has slowly but steadily emerged as both a term and a concept to embrace the manifold economic opportunities associated with the ocean, while at the same recognising, accounting and — in some cases — addressing related threats of climate change, overfishing, pollution or habitat destruction [3, Voyer M., Quirk G., McIlgorm A., Azmi K., pp. 595–596]. Most often, the 2012 UN Conference on Sustainable Development (Rio +20) and its explicit focus on ocean-related challenges is considered the catalyst for a broader use of this relatively new term in the global environmental governance arena [7, Silver J.J., Gray N.J., Campbell L.M., Fairbanks L.W., Gruby R.L., p. 136]³. Essentially, the 'specification of 'blue' makes explicit the focus on oceans, as opposed to land-based resources' [8, Keen M.R., Schwarz A.M., Wini-Simeon L., p. 334]. As such, the term blue economy emphasises the multifaceted economic and social importance of the ocean (and inland waters) [9, Eikeset A.M., Mazzarella A.B., Davíðsdóttir B., Klinger D.H., Levin S.A., Rovenskaya E., Stenseth N.C., p. 178].

The blue economy is subject to multiple interpretations because of the coverage of activities, geographical locations and sectors involved. Thus, prior to the attention on the blue economy, or as part of it, is the question of what is the 'ocean economy'. Basically, ocean economic activities can be distinguished between established and emerging marine industries. As well as the traditional indus-

¹ OECD work in support of a sustainable ocean. URL: <https://www.oecd.org/ocean/OECD-work-in-support-of-a-sustainable-ocean.pdf> (accessed 29 February 2020).

² OECD, The Ocean Economy in 2030. URL: <http://dx.doi.org/10.1787/9789264251724-en> (accessed 29 February 2020).

³ The term blue economy emerged before and during Rio +20 in four prominent discourses on human-ocean relations, all representing different ways of approaching the ocean and its economic use: the ocean as natural capital; the ocean as good business; the ocean as integral to Pacific small island developing states; and the ocean as small scale fisheries livelihoods [7, Silver J.J., Gray N.J., Campbell L.M., Fairbanks L.W., Gruby R.L., pp. 143–149]

tries of shipping, capture fisheries, tourism, and marine recreation; there is now large-scale industrial activity associated with exploitation of offshore oil and gas, the harnessing of marine renewable energy, and aquaculture-based food production, as well as emerging new activities, such as ocean mining and marine biotechnology [10, Rayner R., Jolly C., Gouldman C., p. 2]. The blue economy, however, both encompasses ocean-based industries and the natural assets and ecosystem services that the ocean provides (for example, fish, shipping lanes, and CO₂ absorption) [10, Rayner R., Jolly C., Gouldman C., p. 2].⁴

Table provides an overview of the various blue economy sectors and activities.

Table 1

*Taxonomy of Blue Economy Sectors and Activities*⁵

Sector	Activity
Fishing	Capture fishery, Aquaculture, seafood processing
Marine Biotechnology	Pharmaceuticals, chemicals, seaweed harvesting, seaweed products, marine derived bio-products
Minerals	Oil and gas, deep-sea mining (exploration of rare earth metals, hydro-carbon)
Marine Renewable Energy	Offshore wind energy production, wave energy production, tidal energy production
Marine manufacturing	Boat manufacturing, sail making, net manufacturing, boat and ship repair, marine instrumentation, aquaculture technology, water construction, marine industrial engineering
Shipping, Port & Maritime Logistics	Ship building and repairing, ship owners and operators, shipping agents and brokers, ship management, liner and port agents, port companies, ship suppliers, container shipping services, stevedores, roll-on roll-off operators, custom clearance, freight forwarders, safety and training
Marine Tourism & Leisure	Sea angling from boats, sea angling from the shore, sailing at sea, boating at sea, water skiing, jet skiing, surfing, sail boarding, sea kayaking, scuba diving, swimming in the sea, bird watching in coastal areas, whale/dolphin watching, visiting coastal natural reserves, trips to the beach, seaside and islands
Marine Construction	Marine construction and engineering
Marine Commerce	Marine financial services, marine legal services, marine insurance, ship finance & related services, charterers, media & publishing
Marine ICT	Marine engineering consultancy, meteorological consultancy, environmental consultancy, hydro-survey consultancy, project management consultancy, ICT solutions, geo-informatics services, yacht design, submarine telecom
Education and research	Education and training, R&D

Today, the blue economy basically constitutes an evolution of ideas about sustainable economies used to denote an expansion of economic wealth derived from the oceans and coasts in such a way as to maintain or improve the natural systems upon which economic systems depend. As such, the very essence of a blue economy internalises the common understanding of sustainable development to meet the needs of the present without compromising the ability of fu-

⁴ OECD, *The Ocean Economy in 2030*. URL: <http://dx.doi.org/10.1787/9789264251724-en> (accessed 29 February 2020).

⁵ Roy Al *Blue Economy in the Indian Ocean: Governance Perspectives for Sustainable Development in the Region*. 2019. URL: <https://www.orfonline.org/research/blue-economy-in-the-indian-ocean-governance-perspectives-for-sustainable-development-in-the-region-47449/> (accessed 01 January 2020).

ture generations to meet their own needs. Essentially, it shares the idea that economic activities/growth are not antithetical to ecological conservation and sustainability but are rather complementary, or even reinforcing [11, Boonstra W.J., Valman M., Björkvik E., p. 341].

Although increasingly conceptualised in these multidimensional sustainable terms of growth and conservation, and accordingly invoked by governments, international organisations and relevant stakeholders to tackle both ocean-related opportunities and challenges, the clarity of the term/concept, as well as the implementation steps to achieve an ecologic-economic balance of sustainable maritime exploitation remain vague [8, Keen M.R., Schwarz A.M., Wini-Simeon L., p. 333]. Moreover, while some focus on the economic pillar of the term, e.g. with regard to the development of an innovative (marine) economy [12, Pauli G.A.], others tackle the management aspect and broadly focus on the sustainable development perspective and related blue growth considerations [8, Keen M.R., Schwarz A.M., Wini-Simeon L.; 13, Lillebø A.I., Pita C., Garcia Rodrigues J., Ramos S., Villasante S.; 14, Sarker S., Bhuyan M.A.H., Rahman M.M., Islam M.A., Hossain M.S., Basak S.C., Islam M.M.].

Generally, most definitions today emphasize environmental sustainability, economic growth and social equity, driven by an integrated oceans governance approach and technological innovation [3, Voyer M., Quirk G., McIlgorm A., Azmi K., p. 598]. This 'all-in-approach' has led to the blue economy being considered a rather fluffy concept — employed differently in different contexts and by different actors, depending on the respective need and economic activity; (too) often used to discursively support certain economic sectors, development initiatives, or conservation programs [7, Silver J.J., Gray N.J., Campbell L.M., Fairbanks L.W., Gruby R.L., p. 153]. Although the term closely interacts with other ocean governance tools such as marine spatial planning or ecosystem-based management, the blue economy essentially lacks established frameworks, guidelines or toolkits through which objectives can be developed, action plans implemented and assessment and monitoring programs devised [3, Voyer M., Quirk G., McIlgorm A., Azmi K., p. 599].

The very absence of both a clear definition, as well as related implementation frameworks and strategies, has led many international actors to progress with a broad range of actions all subsumed under a blue economy umbrella [15, Winder G.M., Le Heron R., p. 5]. Thus, the precise nature of the 'blue economy' and its related development strategies remain vague and basically a piecemeal process dependent on both the narrator of the blue economy development story and its related interests, as well as the economic sector and geographical location under analysis. Accordingly, the blue economy and framed development strategies (often) depict a competition among different users of the oceans in the production, distribution, and consumption of ocean-related projects [2, Wenhai L., Cusack C., Baker M., Tao W., Mingbao C., Paige K., Xiaofan Z., Levin L., Escobar E., Amon D., Yue Y., Reitz A., Neves A.A.S., O'Rourke E., Mannarini G., Pearlman J., Tinker J., Horsburgh K.J., Lehodey P., et al., p. 1].

As there is no common international agreement on what the blue economy could mean — either in principle or in practice — the eventual interpretation and implementation of what will be considered sustainably blue will operate within mismatches of the scale, power relations, objectives, values and worldviews of the actors involved [16, Garland M., Axon S., Graziano M., Morrissey J., Heidkamp C.P.; 5, Voyer M., van Leeuwen J., p. 102]. This might lead the blue economy to remain as an extension of a ‘new’ extractivism in ocean and coastal zones in which ad hoc planning authorities, poorly developed planning practices and overlapping, missing or fragmented jurisdictions compromise prospects for good governance in the name of a new *sustainable* oceans’ management approach.

Given this inherent terminological ambiguity, one wonders how the evolution of a new management and governance concept — the blue economy — can help improve the coexistence of industries in the *blue* space, such as aquaculture/mariculture, and thus provide a blueprint for dealing with competing interests, as these are only likely to increase in years to come. In order to unravel some of the inherent ambiguities of the term/concept ‘blue economy’, it is necessary to illustrate — step-by-step and case-by-case — every little aspect of the blue economy. In the following, we will provide an overview of the governance aspects of Arctic aqua- and mariculture, particularly in Alaska and North Norway. A detailed analysis of these elements allows for a better comparison of related challenges and opportunities and thus constitutes one piece of the blue economy puzzle. This will illustrate the complexity of the blue economy — as we showcase how there is no such thing as *one* blue economy and no such thing as *one* Arctic — and its relevance for specific parts of the Arctic.

Governing Blue Arctic Aquaculture/Mariculture

The Arctic is the ideal case to examine how a new concept with practical consequences — the blue economy — is being utilised and implemented. As a *blue* region, the Arctic has only recently risen to the foreground of the respective littoral states’ economic agendas. Always of importance to Arctic inhabitants (indigenous and non-indigenous alike), large-scale industrial ventures in the North have emerged over the last decades, in tandem with high prices for raw materials and the increased melting of the Arctic sea-ice. Moreover, marine resource activities such as aquaculture or fisheries have rapidly expanded in recent years, as Arctic fish stocks have expanded and/or ventured further north, while the global demand for fish products has skyrocketed. Consequently, the ‘blue economy’ has found its way into broader public debate over the past few years.⁶

Here we focus on a specific blue sector, namely aquaculture/mariculture⁷ — an industry that has undergone major global expansion over the past decades, often referred to as ‘blue revo-

⁶ Winther J.-G., Dai M., Douvère F., Fernandes L., Halpin P., Hoel A.H., Juinio-Meñez M.A., Li Y., Morrissey K., Rist T., Scarano F.R., Trice A., Unger S., Whitehouse S. Integrated Ocean Management. URL: www.oceanpanel.org/blue-papers/integrated-ocean-management (accessed 20 May 2020).

⁷ The word ‘aquaculture’ is normally used to describe the art, science and business of producing aquatic plants and animals; often also referred to as ‘mariculture’ [17, Roderburg J., p. 161]. However, globally, it is difficult to distinguish

lution' [17, Roderburg J., p. 161]. Fish farming is the fastest growing food producing sector, accounting for half of world seafood consumption⁸. Currently, three global developments increasingly affect aquaculture/mariculture in the Arctic and related economic considerations: climate change, technological development and global economic demand⁹. However, these changes have varying impacts on the region's blue economy due to the simple fact that the Arctic is not simply the Arctic but consists of many Arctics¹⁰. Thus, also the manifold blue economies of the Arctic vary with culture, bathymetry, politics, geology, currents and several other variables, which in turn create different levels of importance for the governance of economic activities.

In the following section, we examine the governance structures on various levels of relevance to the Arctic, starting with the international level, before turning to two parts of the Arctic that are markedly different while they also share many similarities concerning their dependence on, and potential for, blue economic activities, especially with regard to aqua-/mariculture: Alaska and North Norway¹¹.

International Law

As of today, no specific international aqua-/mariculture legislation exists. However, several legal instruments are directly or indirectly relevant for the development of the sector. First and foremost, all activities at sea are determined by the provisions of the United Nations Convention on the Law of the Sea (UNCLOS). Aquaculture is not outlined in UNCLOS, but its provisions on the protection and preservation of the oceans is broad and thus also include several aspects of aquaculture/mariculture.

First, we need to distinguish between the areas where fish farming can take place. Coastal states have sovereignty in the twelve nautical mile zone of the territorial sea, and this is where most aquaculture sites are. Thus, legislation concerning the sector is mainly national law. Second-

between mariculture and coastal aquaculture production with mariculture – as a broad term – generally referring to the cultivation of a wide variety of species of aquatic organisms, including both plants and animals. According to the UN's Food and Agriculture Organization (FAO), marine aquaculture (= mariculture) is practised in the sea, in a marine water environment, coastal aquaculture is practised in completely or partially human-made structures in areas adjacent to the sea, such as coastal ponds and gated lagoons, see FAO, *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. URL: <http://www.fao.org/3/i9540en/i9540en.pdf> (accessed 29 February 2020). For this article, we use the term 'aquaculture' when discussing the North Norwegian case and 'mariculture' when referring to Alaska.

⁸ FAO, *The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals*. URL: <http://www.fao.org/3/i9540en/i9540en.pdf> (accessed 29 February 2020).

⁹ Raspotnik A., Østhagen A. and Colgan C.S., *Discussing the Blue Arctic Economy: A Case Study of Fisheries in Alaska and North Norway*. URL: http://www.research.kobe-u.ac.jp/gsics-pcrc/pdf/PCRCWPS/PCRC_12_Raspotnik.pdf (accessed 01 May 2020).

¹⁰ Despite often being publicly considered a homogeneous region, the Arctic entails many different regions: Arctic sub-zones that vary greatly in their physical geography, accessibility, climate and population [21, Raspotnik A., p. 36].

¹¹ Neither Norway nor the United States have distinct programs specifically targeted at promoting the concept of the blue economy; however, both countries are leaders in developing measurement of ocean economic activities [22, Colgan C.S.], see also Raspotnik A., Østhagen A. and Colgan C.S., *Discussing the Blue Arctic Economy: A Case Study of Fisheries in Alaska and North Norway*. URL: http://www.research.kobe-u.ac.jp/gsics-pcrc/pdf/PCRCWPS/PCRC_12_Raspotnik.pdf (accessed 01 May 2020).

ly, however, fish farms could be expected to be set up in offshore waters, in the Exclusive Economic Zone (EEZ) or in the high seas. Here states do not have complete sovereignty, but have the right to control and exploit natural resources and gives coastal states jurisdiction and sovereign rights over environmental matters, economic activity and scientific research.

In UNCLOS Art. 60 a coastal state is given the right to construct 'installations and structures'. Although this term is not defined, aquaculture facilities are likely to qualify as structures in this context [17, Roderburg J., p. 169]. Furthermore, in its continental shelf zone coastal states are not granted an exclusive right to build structures. Thus, one could argue that other states may set up aquaculture sites without the coastal states' permission. While due regard shall be paid to the interest of other states, one could also argue that the construction of aquaculture sites constitutes a part of the freedom of the high seas. UNCLOS also addresses environmental law by underscoring the importance of securing the seas from pollution and conserve them as a source of food. However, the requirements set by UNCLOS are often described as weak leaving legislative gaps, also in the aquaculture sector. The expansion we have seen in this sector since states agreed on UNCLOS in 1982 has revealed gaps in the legal regime [17, Roderburg J., p. 174].

Moreover, the expansion in international environmental regulation has had consequences for the aquaculture industry. The 1992 Rio Conference on Environment and Development is considered a watershed event in international environmental politics. It was during this period the UN-appointed World Commission on Environment and Development launched the versatile concept of sustainable development, a term that also play an important role in the debate on the growth in aquaculture. At the 1992 summit the Convention on Biological Diversity (CBD)¹² evolved, which relates to elements of aquaculture, e.g. the introduction of alien species and other externalities. Furthermore, as part of the implementation of the CBD the Jakarta Mandate of 1995 calls for sustainable aquaculture operations, including the use of local rather than alien species in fish farming¹³. The work under CBD has continued having aquaculture on its agenda, but without leading to legal binding regulations in this issue area.

Additionally, also the UN's Food and Agriculture Organization (FAO) has played an important role as knowledge sharer and by formulating international rules and standards on aquaculture. In 1997, the Code of Conduct for Responsible Fisheries (hereinafter, the Code)¹⁴ included a section on aquaculture. The intention was to create a template for domestic regulations. The Code is, however, voluntary and does not create any legal obligation. Moreover, FAO has also drafted technical guidelines for aquaculture development and certification [24, FAO]¹⁵. Over the past decades, also intergovernmental organizations have addressed aquaculture planning. In that regard, Regional Fisheries Bodies (RFBs) have an important role to play, e.g. the North Atlantic

¹² Convention on Biological Diversity. URL: <https://www.cbd.int/> (accessed 28 October 2020).

¹³ The Jakarta Mandate. URL: <https://www.cbd.int/doc/publications/jm-brochure-en.pdf> (accessed 28 October 2020).

¹⁴ Code of Conduct for Responsible Fisheries. URL: <http://www.fao.org/3/v9878e/v9878e00.htm> (accessed 28 October 2020).

¹⁵ FAO International Guidelines. URL: <http://www.fao.org/fishery/code/guidelines/en> (accessed 28 May 2020).

Salmon Conservation Organization (NASCO). It has among others adopted measures to protect wild stocks from the effects of aquaculture, for example by pushing member states to implement action plans to reduce the escape of farmed fish¹⁶. Yet, similar to the work of FAO, these guidelines are not mandatory. The Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR Convention) has also initiated measures affecting aquaculture. The most important is PARCOM Recommendation 94/6 on 'Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemical from Aquaculture Use'¹⁷. Moreover, several other international arrangements have direct or indirect relevance for the aquaculture sector, e.g. World Trade Organization, World Organisation of Animal Health, Convention on International Trade in Endangered Species of Wild Fauna and Flora and Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean.

Turning to the Arctic specifically, it is worth mentioning that the Arctic Council (AC) is yet to develop guidelines and best practices on aquaculture, but measures have been discussed. The AC is, however, engaged in numerous projects, directly or indirectly concerning the use of Arctic waters and thus aquaculture¹⁸. For Norway, the economic arrangement with the EU — the Agreement on the European Economic Area (EEA) — imposes several legal obligations. In that regard, legislation on veterinary inspection, aquatic animal health and food hygiene being to most important regarding aquaculture. Lastly, certification of aquaculture products has played an increasingly prominent role in 'governance' of this increasingly important industry. As such, *Friend of the Sea* runs a certification programme for sustainable aquaculture and in 2011 the World Wildlife Fund launched *The Aquaculture Stewardship Council* which created an eco-label for farmed seafood.

National and Local Framework Alaska

In Alaska, mariculture is a relatively new but developing sector [25, State of Alaska]. While fish farming in Alaskan waters is prohibited, the farming industry of aquatic plants and shellfish has been thriving and rapidly increasing, with the State of Alaska having set up a process for the permitting of aquatic farms [18, Kim J.K., Stekoll M., Yarish C., p. 451]. For 2016, the overall sales of shellfish and aquatic plants for all permitted operations, including seed suppliers totalled 1,2 million USD. Approximately 29 (32%) of the aquatic farm operations had sales and sold over 1,32 million Pacific oysters, 42,695 lbs of Pacific geoduck, and 4,975 lbs blue mussels, with a total farm gate value of 1,23 million USD. Although for several years there has been interest in seaweed farming, commercial-scale farming of seaweeds has only occurred relatively recently [18, Kim J.K.,

¹⁶ North Atlantic Salmon Conservation Organization. URL: <http://www.nasco.int/> (accessed 28 October 2020).

¹⁷ PARCOM Recommendation 94/6: <https://rod.eionet.europa.eu/obligations/478/legislation> (accessed 28 October 2020).

¹⁸ Arctic Council – Ocean: <https://arctic-council.org/en/explore/topics/ocean/> (accessed 28 October 2020).

Stekoll M., Yarish C., p. 453], however gaining more and more momentum¹⁹. As such, the 2014 Alaska Mariculture Initiative aims to grow a 100 million USD industry in the next 20 years²⁰.

Mariculture in the United States is regulated at both the federal and state level. The federal government regulates aquaculture activities that involve the trade of goods and services between the states, or foreign trade. The Food and Drug Administration (FDA) of the Department of Health and Human Service (DHHS), the Department of Agriculture (USDA), and the Environmental Protection Agency, are the leading agencies that regulate aqua-/mariculture at the federal level. FDA is responsible for protecting public health by ensuring among other things the security of human and veterinary drugs and the safety of US's food supply. The USDA, working on food, agriculture, natural resources, rural development, has set up Regional Aquaculture Centers (RACs), which support aquaculture research aiming to enhance viable and profitable U.S. aqua-/mariculture production. The Environmental Protection Agency's mission is to protect human health and the environment by implementing U.S. law by writing regulations and setting national standards that states enforce through their own regulations. Other agencies and programs at the federal level involved in aqua-/mariculture activities include the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce, the Joint Subcommittee on Aquaculture, the Center for Veterinary Medicine (within FDA), the Animal and Plant Health Inspection Service (within USDA), and the U.S. Fish and Wildlife Service (FWS) of the Department of the Interior. Especially, NOAA also has a number of important roles, including both NOAA Fisheries, Coastal Management, and Sea Grant.

In federal waters, fish farming is technically not banned, but rather the federal political and regulatory obstacles are too high for fish farming to have developed to date almost anywhere in U.S. offshore waters. The development of aqua-/mariculture in the United States has been greatly hampered by the lack of an 'enabling regulatory framework' which makes it extremely difficult or impossible to get permission to start a fish farm anywhere in U.S. federal waters [19, Knapp G., Rubino M.C.]. On the federal level, regulations rarely address aqua-/mariculture directly, however, and more detailed legislation exists at the state level. For example, acts like the Federal Water Pollution Control Act, the Food, Drug & Cosmetic Act, the Animal Drug Availability Act, and the Magnuson-Stevens Fisheries Conservation Act do not address aqua-/mariculture specifically, but provide the regulative framework for food safety, veterinary medicines, coastal zone management, and other activities related to it²¹. Additionally, it is most often the state that monitors and enforces both federal and state aqua-/mariculture regulations. Generally, federal regulations only become applicable within the state when aquaculture activities involve interstate modes of transport, or interstate waters. The state owns tidal and submerged land up to three miles away

¹⁹ Welch L. Interest in growing seaweed in Alaska is gaining momentum. URL: <https://www.adn.com/business-economy/2019/12/10/interest-in-growing-seaweeds-in-alaska-is-gaining-momentum/> (accessed 01 January 2020).

²⁰ Welch L. Interest in growing seaweed in Alaska is gaining momentum. URL: <https://www.adn.com/business-economy/2019/12/10/interest-in-growing-seaweeds-in-alaska-is-gaining-momentum/> (accessed 01 January 2020).

²¹ FAO Fisheries and Aquaculture Department, National Aquaculture Legislation Overview: United States of America. URL: http://www.fao.org/fishery/legalframework/nalo_usa/en (accessed 28 May 2020).

from any given shoreline. There is, however, a growing pressure to promote aquaculture in federal waters²².

Many would claim that Alaska's coastal areas make it a perfect place for mariculture. However, Alaska has banned fish farms, and Pacific oysters, littleneck clams, and mussels make up most Alaska's aquatic farm products. Furthermore, Alaska's mariculture industry is rather young and small. In 1988, the Aquatic Farm Act was signed into law authorizing the commissioner of the Alaska Department of Fish and Game (ADF&G) to issue permits for the construction and operation of aquatic farms and hatcheries. Within ADF&G, the Division of Commercial Fisheries, Aquatic Farming carries out the statutory and regulatory responsibilities of the department relating to aquatic farming in Alaska. Further complicating this issue is the fact that while net-pen farming (like Norwegian salmon aquaculture) is banned, a specific exception is made to allow a very extensive of salmon hatcheries which release salmon smolt into the ocean, the returns of which account for a very significant share of total Alaska 'wild' salmon catches (as high as 30–40% in some years). This very important salmon hatchery system, or in effect a salmon ranching industry, was initially developed by the State but subsequently taken over by regional private non-profit associations, financed by taxes on fishermen and a right to harvest part of the returning hatchery system. This salmon ranching industry is in effect halfway between a wild fishery and aquaculture.

Furthermore, several agency authorizations are mandatory to site, construct, and operate an aqua-/mariculture site. An aquatic farm applicant can fill out one Joint-Agency Aquatic Farm Program Application. This application makes available information for every agency that has authority to supervise aspects of the aquaculture project. The process goes through several steps. First, the Alaska Department of Natural Resources Division of Mining, Land, and Water (DNR/MLW) when receiving a proposal will review it, make preliminary decisions, and provide a public review and comment period. If approved the proposed project is issued a ten-year aquatic farm site lease. Secondly, once an aquatic farm site lease agreement is complete and approved, the ADF&G can issue permits, including an Operation Permit. Furthermore, for aquatic farms located in a critical habitat area such as a state game refuge or game sanctuary, the ADF&G Habitat Division must issue a Special Area Permit. The purpose is to protect essential fish and wildlife habitat.

After going through this process and receiving State agency authorizations, an operator must make a request to the U.S. Army Corps of Engineers for setting up aqua-/mariculture sites within the navigable waters of the US. Finally, the Department of Environmental Conservation must do a survey including Water quality classification; shellfish harvester permit, processing, and shipper permits; paralytic shellfish poisoning testing; export certifications, and authorizations for dive boats to be used for shellfish harvesting. Others and more specific permits may also be need-

²² Resneck J. Alaska wary of federal push for marine aquaculture. URL: <https://www.alaskapublic.org/2018/09/06/alaska-wary-of-federal-push-for-marine-aquaculture/> (accessed 01 January 2020).

ed, as for instance a stock transport permit when transferring aquatic farm stock to, from, or between an aquatic farm, hatchery, or nursery site, an aquatic stock acquisition and transport permit to collect wild stock from outside an aquatic farm site, and an approval as a seed distribution source to distribute shellfish seed to a permitted aquatic farm, nursery, hatchery within Alaska or for export.

North Norway

Norway is the world's largest producer and exporter of salmon with salmon being the most important product in Norwegian fish farming. While it was rapidly growing in the southern parts of Norway, aquaculture was seen as mostly inapplicable to the climatic conditions in North Norway, mainly due to the low sea water temperature. However, North Norway has turned out to benefit exactly from these circumstances, as they limit the development of salmon lice and other diseases, and stands currently for between 40% and 50% of the farmed fish produced on a national level²³. With farmed salmon constituting traditionally more than 90% of the production, followed by trout and other species, aquaculture in North Norway is projected to have the highest potential for growth, compared to the rest of the production regions in the Nordic country²⁴.

In 2018, the landed value of the production from Norway's (then) three northernmost counties (Finnmark, Nordland and Troms) was 28 billion NOK, reflecting a rapid increase for the last 10 years. The region's contribution to the national value creation from aquaculture is estimated to have grown from 28% and 1,1 billion NOK during 2008, and despite significant variations, it grew up to 42% during 2016 and additional created values were estimated to be 13,2 billion NOK during 2016²⁵. With regards to the economic significance, it has to be pointed out that although the seafood with aquaculture origin represents around 1/3 of the seafood produced in North Norway, the sector has been responsible for the greatest part of the value created in the seafood industry as a whole, and estimated almost three fourths of the export value²⁶.

²³ Elde S., Kvalvik I., Nøstvold B.H., Rødbotten R., Dalmannsdottir S., Halland H., Uleberg E., Reykdal Ó., Árnason J., Pálsson P.G., Halldórsdóttir R., Hilmarsson Ó.P., Þórðarson G., Valsdóttir Þ., Knudsen R., Natcher D., Sidorova D. The Arctic as a Food Producing Region. Phase 1: Current status in five Arctic countries. URL: <https://nofima.no/en/pub/1581246/> (accessed 30 June 2018).

²⁴ DNV GL. Sustainable Blue Economy in the Norwegian Arctic (Part 1: Status). 2019. URL: https://www.havarktis.no/files/Sustainable-Blue-Economy-in-the-Norwegian-Arctic-Part-1-Status_FINAL.pdf (accessed 01 May 2019).

²⁵ Breimo G., Leitet M., Høyli R., Stoud Myhre M., Richardsen R. Havnæringene i nord: Næringsutvikling og verdiskaping frem mot 2040. 2018. URL: <https://sintef.brage.unit.no/sintef-xmlui/handle/11250/2600772> (accessed 24 December 2018).

²⁶ Elde S., Kvalvik I., Nøstvold B.H., Rødbotten R., Dalmannsdottir S., Halland H., Uleberg E., Reykdal Ó., Árnason J., Pálsson P.G., Halldórsdóttir R., Hilmarsson Ó.P., Þórðarson G., Valsdóttir Þ., Knudsen R., Natcher D., Sidorova D. The Arctic as a Food Producing Region. Phase 1: Current status in five Arctic countries. URL: <https://nofima.no/en/pub/1581246/> (accessed 30 June 2018).

One of the most important factors for the growing value of Norwegian farmed seafood has been the safety of production and the reputation both locally and internationally²⁷, not least because of the cooperation of the businesses with research institutions for increased fish welfare and quality as food. Reduced use of medication, vaccine development and stricter monitoring have been in the focus of the aquaculture research and innovation. The Norwegian aquaculture governance regime is based on the Aquaculture Act (2005, No. 79). The Act covers aquaculture of any aquatic organism and regulates both aquaculture carried out for scientific or educational purposes and commercially. It regulates areas such as land use and coastal area management, emission and pollutants, animal health and genetic effects of escaped fish on wild populations. The Ministry of Trade, Industry and Fisheries (MTIF) oversees the administration of the Act and the Directorate of Fisheries is responsible for enforcing it. The regime can be described as a multilevel management system and several sector-based ministries and directorates (e.g. coastal, environment, food and agricultural, fisheries and transport) are involved and decision-making authority is divided between three levels of administration: national, county and municipal. The management system can be divided in three: planning, operation (production) and food safety²⁸. The first step when planning for a new fish farming site is to get a permit through an allocation round. Aquaculture cannot be carried out without a licence. The power to grant licenses is vested in MTIF, who has delegated this power to the Directorate of Fisheries. The Aquaculture Act also regulates the use and access to land and water for aquaculture. A licence to operate may not be given in contravention of land use plans. The municipalities must implement a land use plan, including relevant use within internal waters bordering the municipality. The municipalities, thus, have the power to facilitate (or not) the establishment of new aquaculture sites.

Furthermore, a license may not be granted if the applicant does not get a permit from the National Coastal Administration pursuant to the Act relating to harbours, fairways, etc. Moreover, a permit for abstraction of watercourse may be required from the Water Resources and Energy Directorate pursuant to the Act relating to watercourses and ground water. This is, however, primarily relevant for land-based hatchery production. The Directorate of Fisheries can limit the number of licenses out of environmental considerations. The most pressing concern over the last several years has been the negative impact on wild salmonids caused by lice infection pressure from the salmon farms, as well as interbreeding due to escape of cultured salmon into the wild. A short description of regulation efforts regarding these issues can thus tell us something about how aquaculture is regulated in (North) Norway [20, Vormedal I., Skjærseth J.B., pp. 9–11].

The fish-farming industry is governed by a permit system that allows companies to produce fish at specific sites. Permits are subject to a maximum allowed biomass (MAB). The MAB is higher

²⁷ Norwegian Ministry of Climate and Environment, Oppdatering av forvaltningsplanen for det marine miljø i Barentshavet og havområdene utenfor Lofoten (Melding til Stortinget 10, 2010-2011). URL: <https://www.regjeringen.no/no/dokumenter/meld-st-10-2010-2011/id635591/> (accessed 01 January 2019).

²⁸ FAO Fisheries and Aquaculture Department, National Aquaculture Legislation Overview: Norway. URL: http://www.fao.org/fishery/legalframework/nalo_norway/en (accessed 29 May 2020).

in North Norway than in southern and western part of the country. These permits are, as previously mentioned, distributed by the MTIF through allocation rounds. Companies compete to comply with the criteria for new permits. The Fisheries Directorate then distributes to successful firms, for a fixed price. Permits can also be subject to open or closed auction (the latter requiring pre-qualification), and issued to the highest bidders [20, Vormedal I., Skjærseth J.B., pp. 9–11]. Awareness of the environmental impacts of fish farming has grown, with growing public concerns that the proliferation of sea lice is threatening the survival, of wild salmon populations. The Norwegian government has faced criticism for having prioritized growth over the protection of wild salmon²⁹. Growing resistance to medical treatments and increasing stocking density, have increased sea-lice proliferation. In response, the government begun to enact increasingly stricter sea-lice regulation from 2012, all farms were now obliged to keep adult female lice per fish levels below 0.5. These regulations were made stricter in 2013, and, in 2015, after heated debate over whether further growth in salmon aquaculture was environmentally justifiable, the government made capacity increases conditional on a use of max. 2 medicinal delousing treatments per production cycle and a sea-lice limit of 0.2.

Moreover, a new category of ‘Development Permits’ was introduced for large-scale and capital-intensive demonstration projects, that would develop radical innovative environmentally technology. Furthermore, a new lice management and growth regime — the Traffic Light System (TLS) — was implemented in 2017 through the new ‘production-area regulation’. Norway was divided into 13 production areas, where the sea-lice pressure in the commons are monitored. An ‘unacceptable’ impact in a production area means a red light for area, leading to a reduction of production capacity up to 6%. With ‘moderate’ impact (amber light), increased production volume will not be allowed. If the impact is deemed acceptable, the area is given the green light for growth. Most ‘green’ areas are in North Norway, where the sea-lice problem is less severe. However, there is an exception to the rule, firms within amber or red zones can increase capacity if they can enforce sea-lice levels below 0.1, and maximum 1 medicinal treatment per production cycle. Subsequently, sea-lice standards have become significantly more stringent after 2012 [20, Vormedal I., Skjærseth J.B.].

After receiving a licence and starting production several acts relating to e.g. disease control, animal welfare, feed and drugs, fish movement and water and wastewater are of relevance. Important here and showing the power of the county in this management system is that according to the Pollution Control Act, disposal or discharge of waste is prohibited unless permission by law or through a permit given by the County Governor. Furthermore, several requirements connected to water quality and surveys shall be carried out by the operator. Breeding of alien species is regulated as well and prohibited unless a specific permit has been granted. This is also regulated under

²⁹ Vormedal I., Larsen M.L., Flåm K.H. Grønn vekst i blå næring? Miljørettet innovasjon i norsk lakseoppdret. URL: <https://www.fni.no/getfile.php/1310934-1571995826/Filer/Publikasjoner/FNI-Report-2019-03-Vormedal-Larsen-Flam-Gronn-vekst-i-bla-naering-miljorettet-innovasjon-i-norsk-lakseoppdrett.pdf> (accessed 28 May 2020).

the Food Safety Act. Under the Aquaculture Act, regulations related to preventing fish from escaping and recapturing of escaped fish, floating aquaculture installations must be certified in compliance with Norwegian Standard NS 9415 or comparable international standards. Regulations adopted under the Food Safety Act concern several aspects of aquaculture production, e.g. movement of fish, disease prevention and control, importation of aquatic animals, the use of veterinary drugs, feed, food safety in general and animal welfare. The Act Relative to Prevention of Cruelty to Animals has also several legal implications for the operating of aquaculture facilities regarding animal welfare.

Alaska and North Norway — Similarities and Differences

Internationally, and as of today, no international aquaculture specific legislation exists. However, several legal instruments are directly or indirectly relevant for the development of the sector. First and foremost, all activities at sea are determined by the provisions of international law. Aquaculture is not outlined in UNCLOS, but its provisions on the protection and preservation of the oceans is broad and thus also include several aspects of aquaculture. Coastal states have, however, sovereignty in the twelve nautical mile zone of the territorial sea, and this is where most aquaculture sites are. Thus, legislation concerning the sector is mainly national law. There are however several agreements and guidelines that are of relevance in the sector, but none of them regulate coastal aquaculture directly. Exchanging best practices on broader issues of aquaculture could, however, be done in regional bodies like the AC and by looking at the potential for a certification program on sustainable Arctic aquaculture.

If specifically looking at our case at hand, aqua-/mariculture in Alaska and North Norway, it becomes obvious that both are set in very different economic and legal contexts. Both regions represent vastly different regulatory and political approaches to aqua-/mariculture, which have resulted in aquaculture becoming a major industry and global leader in Norway, while remaining insignificant in Alaska. Moreover, Alaska's wild salmon fisheries are very abundant and healthy while Norwegian commercial wild salmon fisheries are insignificant. Alaska has banned fish farms and Norway is a world leading producer and exporter of salmon. There is, however, a growing pressure to promote fish farming in federal waters outside Alaska. At time of writing mussels, clams and oysters make up the bulk of aquaculture production in Alaska.

However, there are some similarities in the two sectors. Alaskan fisheries management is divided between the federal and state governments, with federal government having responsibility for three nautical miles out from shore and state governments within three nautical miles. The joint responsibility is coordinated through the North Pacific Fishery Management Council which includes representatives of federal and state governments as well as industry. In contrast, Norway does not operate a management level below the national one. Although the Norwegian system is more complex, both regimes can be described as multilevel management systems where different levels of administration are involved. Several agency authorizations are needed to get a licence to

start up with production and aquaculture is regulated at the national (federal) and local (state) level. Regulations are e.g., related to food safety, environmental issues, use of medicines and coastal state management. In Alaska, several fees must be payed when applying to set up an aquaculture site. In Norway a company may only be subject to market and research fees in connection to export. Fees that are financing the Norwegian Seafood Council and the Fishery and Aquaculture Industry Research Fund. In general, an aquaculture company operating in Norway is subject to corporate income tax (22%) following ordinary tax principles. But a company may also be subject to municipal property tax. There is, however, an ongoing debate in Norway on the aquaculture tax regime³⁰. In Alaska, the federal income tax is 21% but companies will also be subject to state taxes.

Towards a Sustainable Governance Framework for Blue Arctic Aquaculture?

In conclusion, as the blue economy provides many different pathways to enabling further expansion of ocean-based industries, delineations of the concept, as well as a mapping of relevance practices across national contexts, are needed. This article has provided an initial comparative outlook at one specific industry under that framework: aqua- and mariculture in North Norway and Alaska.

The blue economy is obviously a complex concept that a) lacks a consensus definition and b) requires multifaceted understanding of interacting ecological and socioeconomic systems. Because there is no single definition, the precise nature of the 'blue economy' will only emerge from the way in which the term is conceived and implemented in specific locations and situations. Thus, any blue economy is essentially a very regionalised one and there is no such thing as *one* blue economy. However, one thread that is likely to be consistent across all the places where the definition evolves is that the blue economy represents a new and different way of using the ocean. The key to any blue economy is found in changing the way in which we use the ocean. Change, particularly at so large a scale as human-ocean interactions, is extraordinarily difficult. Therefore, the blue economy needs to be thought of as much as a process as an outcome. Yet, how is such regionalised blue economy process currently governed in Alaska and North Norway with regard to aqua-/mariculture? And what does the mapping of specific aqua-/mariculture legislation — both international and national/regionally — reveal about the concept of the blue economy and related discussion on sustainable development, environmentally and economically?

In this article, we provided a point of departure for *blue* discussions by mapping the current status of regulations and systems governing the blue economy in Alaska and North Norway. An overview of this kind is a precondition for identifying areas for improvements; be they a lack of adequate regulations in certain areas, inconsistencies between or within current regulations, or a lack of consistent implementation and uniform enforcement of rules. The current process towards

³⁰ Norges offentlige utredninger (NOU), Skattlegging av havbruksvirksomhet: Utredning fra utvalg oppnevnt ved kongelig resolusjon 7. september 2018. Avgitt til Finansdepartementet 4. november 2019.

a regionalised blue economy relevant to Alaska and North Norway (but also other areas of the world) can be described in very general terms as having four phases: attention, planning, focused and broad implementation³¹.

Basically, a general commitment to the blue economy must be narrowed to the specific economic sectors ecosystems where attention will be focused. This planning stage identifies sectors such as fisheries, minerals, transportation, tourism, energy, and the very specific context of coastal regions. Such a planning process will focus on identifying the ways in which economic activity and ecosystems interact with one another both positively and negatively and which actions are likely to expand the former and reduce the latter. Planning, as one of the four phases, can take many forms, but also includes some assessment of the governance structures available.

Furthermore, best practices applied by each state in fisheries management and policy could provide with key lessons for the future. For instance, both Alaska and (North) Norway are global players in the salmon industry. Salmon production is an extremely profitable source of income and employment for both regions. Keeping in mind that the salmon industries in Alaska and Norway are carried out in a fundamentally different manner, there is great potential for them to learn from each other's practices, with Alaska's successful development of hatcheries and sustainable management. In some aspects, Alaska and North Norway are two competitive regions in the global market. However, they share one major common characteristic: a high dependency on the Arctic Ocean and its resources. Subsequently, transnational and multi-sectoral approaches in (fisheries) management, science, policy, industry and business connecting across disciplines are imperative for the future of the region.

As such, social development in the Arctic is characterized by generally growing, often highly innovative Arctic cities and thinning-out rural areas that face demographic and resource challenges. However, both regions have maintained management models and practices in order to promote local socioeconomic growth, that can be worth exchanging. Alaska's several community-based fisheries, such as the Tamgas Creek Hatchery, and initiatives such as the Community Development Quota or the Local Fish Fund program of the Alaska Sustainable Fisheries Trust, aiming to protect and support local fishing businesses and revitalize fishing communities in Alaska, could be inspiring for similar approaches in Norway. Meanwhile, the established management regime of the red king crab in Finnmark could serve as an example for maintenance of a small-scale fishery for the benefit of the local communities while preventing ecological impacts on the native ecosystem, with reported increased appeal and value of the end product.

As northern waters are set to change more rapidly than any other part of the world, the (sustainable) exploitation of ocean resources is also likely to expand. Unpacking the complexities, challenges and best practices to governance of this emerging blue economy — across regional and

³¹ Raspotnik A., Østhagen A. and Colgan C.S. Discussing the Blue Arctic Economy: A Case Study of Fisheries in Alaska and North Norway. URL: http://www.research.kobe-u.ac.jp/gsics-pcrc/pdf/PCRCWPS/PCRC_12_Raspotnik.pdf (accessed 01 May 2020).

national contexts and sectors — will thus be a continuously worthwhile (academic) endeavour. As we have showcased, there is no such thing as *one* blue economy and no such thing as *one* Arctic. Yet, it is still possible to find common ground and avenues for knowledge and best practice exchange. By this we will bring the academic and political discussions about the blue economy on the right track.

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Research, Development, and Education: Laying Foundations for Arctic and Northern Data Centers*

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Abstract. The global data center industry is a huge and rapidly growing sector. This growth has resulted in the development of significant data center clusters in various northern regions. Furthermore, the desire to attract new data center investments has been incorporated into regional development plans and strategies in different parts of the Circumpolar North. Although the policy-makers seem to have great expectations, they and the general public often know little about the industry, which consumes huge amounts of electricity and plays an immense role in the digitalization process that the world is experiencing. This article attempts to increase awareness, knowledge, and understanding of these matters among all relevant stakeholders by introducing data center-related research and development activities and education in the Arctic and the North, as well as research concerning the development of the data center industry in the cold, northern environment. After all, it is often argued that these particular conditions offer advantageous circumstances for the construction of environmentally friendly and sustainable data centers.

Keywords: *data centers, communications infrastructure, information technology, Arctic, North.*

Introduction

After Google opened its data center in Hamina, Finland in 2011 and Facebook established its data center in Luleå in 2013, the regional governments in northern Sweden recognized a need for — and created — a coordinated data center industry strategy. Completed in 2014, this document proposed, among other things, that northern Sweden should place emphasis on and invest in the development of data center-related research and education. Today, the Luleå–Boden–Piteå region forms a globally recognized data center cluster, and it hosts RISE ICE Datacenter, which is one of the leading data center research and innovation facilities in Europe. Therefore, it is clear that data center-related expertise has successfully been added to the local and regional skillset. They are seen as a new type of mission-critical infrastructure, adding to the traditional mining, hydropower, pulp and paper, and steel industries that are located in the region, and they have strong backing from the research, development, and education conducted in local universities and research facilities.¹

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¹ Minde T. B. Strategi för att skapa en världsledande teknikkregion i Norrbotten för klimatsmarta effektiva datacenter. Länsstyrelsen Norrbotten, 2014; Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018.

The strong regional technical know-how and availability of skilled staff has also been emphasized when Mo i Rana in northern Norway has marketed itself as a great location for data centers.² However, it is obvious that the Nordic countries' success in attracting data center investments is not based only on their human capital. Rather, the abundant reserves of power and the low price of (often green) energy, together with a cold climate, a stable society, suitable fiber-optic connectivity, reasonable land prices, low risk of natural hazards, and low seismic activity, have played a significant role as well. Although great developments have taken place in various Arctic and Northern regions since the late 2000s and early 2010s when these characteristics were first recognized as assets, both the industry itself and its presence in the circumpolar north is not well known among the general public. Furthermore, despite the existence of national and regional data center policies, it can be argued that the rapidly growing industry, which consumes huge amounts of electricity has not received a sufficient amount of attention from decision-makers and researchers.

The aim of this article is two-fold. First, it attempts to increase awareness, knowledge, and understanding among all relevant national, regional, and local stakeholders concerning data centers, the data center industry, and its role in the Arctic and the North. The data centers have been described as a type of building that most distinctly embodies the 21st century culture, and they are [1, Varnelis K.], together with the global fiber-optic cable network, at the core of the so-called Society 5.0, where cyberspace and physical space are highly integrated. Therefore, questions concerning data centers may no longer belong only to the sphere of information and communications technology (ICT), as they could be considered a new type of basic infrastructure upon which society is dependent. Second, in order to demonstrate the strengths and weaknesses of regional knowledge bases and skillsets, this study introduces data center research and education that was conducted in the Arctic and the North, as well as research concerning the past, current, and future development of the data center industry in the cold, northern environment.

The importance of the study of local and regional knowledge networks and skillsets can be traced back to discussion concerning clusters, regional development and competitiveness and even resilience. In general, clustering refers to the concentration of industries and companies in a specific geographic area and to their interrelationships. Furthermore, features such as the great number of firms in close proximity, competition and cooperation between these firms, the high proportion of small firms, dense social and economic networks, the rapid diffusion of information and ideas, adaptability and flexibility are typical for industrial clusters [2, Dawkins C.; 3, Piperopolous P.G.]. Due to the emergence and evolution of knowledge-based economies, universities have become recognized as key players in regional economic development and cluster formation [4, Wolfe D. A.]. Similarly, a growing body of literature highlights the importance of innovations and research and development (R&D) activities to the resilience of individual firms and regional

² Arctic Circle Data Center. URL: <https://arcticcircledc.com/> (accessed 13 April 2020).

economies [5, Bristow G., Healey A.]. Rather than giving a detailed description of the role of R&D and higher education in the formation of a data center cluster in any pre-determined case study region, this article takes a holistic approach and attempts to identify characteristics common for several cold and northern regions.

The challenges of researching data centers, which are due to a limited amount of information that is openly available and an element of secrecy surrounding these industrial spaces, have been recognized by various researchers [6, Vonderau A. pp. 702, 707; 7, Hogan M., Vonderau A.]. While the information produced as a result of R&D activities of private enterprises is more difficult to access than the output of researchers who are committed to the principles of open science, this article covers both private and public knowledge production, as well as the cooperation between them. To achieve the set objectives, the authors interviewed stakeholders representing the data center industry, different levels of government, and academia to supplement the information that can be traced from openly available sources or from different media outlets covering issues concerning data centers. A significant portion of the information has also been collected through the process of participatory observation. Juha Saunavaara has approached the data center industry, government officials, and researchers to conduct highly technical studies as an outsider with a background in the social sciences. Meanwhile, Antti Laine has worked as a practitioner for ten years in private enterprises that design data centers. He also acted as the director of the Finnish Data Center Forum between 2019–2020, where he continues to serve in an expert role, and represented the industry in negotiations with public authorities. Therefore, the balance between the dimensions of ‘observation’ and ‘participation’ varies between the authors.

The particular features of the Arctic and Northern data center R&D activities

Although a recent study has shown that data centers’ overall energy consumption has increased less than previously expected due to development of technology [8, Masanet E., Shehabi A., Lei N., Smith S., Koomey J.], it is an extremely energy-hungry business that does not seem to fit with energy-saving policies and goals to reduce carbon emissions. Therefore, the question of why many countries, regions, and cities try to attract data center investments through measures ranging from tax policies and supportive infrastructure construction to municipal zoning, helping with permits, and organizing communication with local contractors, may be a valid one. Besides approaching the answer from the viewpoint of employment and tax revenues, the rationale behind these attempts can also be found in the relative environmentally friendliness of data centers, especially those located in the North. Although data centers, which are facilities designed to enable concentrated and efficient usage of software and hardware in one place, consume vast amounts of energy, their consumption is still much less than it would be if the computing power/servers were distributed between various locations. In other words, significant savings in energy use can be achieved if a server running in a data center makes it possible to shut down a large number of other devices outside of the data centers [9, Peuhkuri M., Lääkkölä R., Costa-Requena J., Manner

J.]. The cold climate partially explains the high energy efficiency of the data centers located in the Circumpolar North, but it is worth noting that the increases in energy efficiency are often due to the R&D activities conducted in the area.

The content of the studies and projects carried out in the Arctic and the North have often been connected with the prevailing conditions. In other words, while the cold climate, the presence of wide district heating networks³, and the abundance of water and wind power resources may seem to be far from the core business, i.e. the storage of data, they have affected both the research into and the actual design of the data center facilities. Furthermore, the research concerning data centers have not started from scratch but rather been built on an existing knowledge base. The researchers involved in data center research, as well as the personnel who have started to work in the data centers, come from various backgrounds. The design and construction of the buildings require experts, for example from architecture and construction, fire protection, power distribution and energy systems, cooling, (fluid) mechanics, and automation. Meanwhile, the running and optimization of the data centers demand knowledge of embedded systems, cloud, software, big data, and so on. Some of the skillsets needed already existed in the northern regions, and it has been possible to recruit researchers from other fields and skilled labor from other industrial sectors⁴.

The labor mobility between firms leading to knowledge transfers and fostering of innovations as well as the possibility to hire experienced workers from the local labor market are identified as typical features for established clusters [10, Lundmark M., Power D.; 11, Simonen J., Svento R., Karhinen S., McCann P.]. However, as a result of inter-sectoral mobility, many northern data center companies have been able to benefit from these kinds of fruits of agglomeration already at the early stage of the cluster formation processes. While it can be challenging to indicate what R&D (issues related to heat, ventilation and air conditioning, for example) is directly or only related to data centers, the need for expertise on how to coordinate and synchronize the design of various systems in data centers has become obvious⁵.

Although cooling and energy efficiency of facilities have attracted the attention of data center operators and researchers globally as a means to reduce energy costs and lessen the carbon footprint [12, Wahlroos M., Pärssinen M., Rinne S., Syri S., Manner J., p. 1750], the utilization of the cold climate can be recognized as one of the particularities of the R&D conducted in the North. The idea of utilizing the cold climate is not new. Microsoft, for example, opened a data center in Quincy, Washington, in 2006, and in 2007 it was reported that the company had signed a memorandum of understanding with regional authorities from Irkutsk, Russia, one of the coldest places on earth, concerning the possibility of building a data center. While Quincy also had other

³ In Finland, for example, district heating produces approximately 90 percent of the total heat demand of the largest cities.

⁴ Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018.

⁵ Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018.

assets, such as extremely low power costs and access to 100 percent renewable hydro-power, that had drawn data center investments prior to the arrival of Microsoft and the project in Russia did not materialize, the attractiveness of a cold climate for free-air cooling as a competitive solution was recognized⁶.

When the data center industry emerged in Iceland, in particular on the Reykjanes Peninsula, as a new avenue for economic growth during the years following the collapse of the banking business in 2008, the cold climate and abundant renewable energy resources were identified as highly valuable assets. Similarly, Canada, which hosts various co-location data centers, has advertised its cheap energy, stable society, and data sovereignty (relevant when compared with the Patriot Act in the United States, which enables governmental access to data) when describing itself as a natural fit for free-air cooling since the beginning of the 2010s⁷.

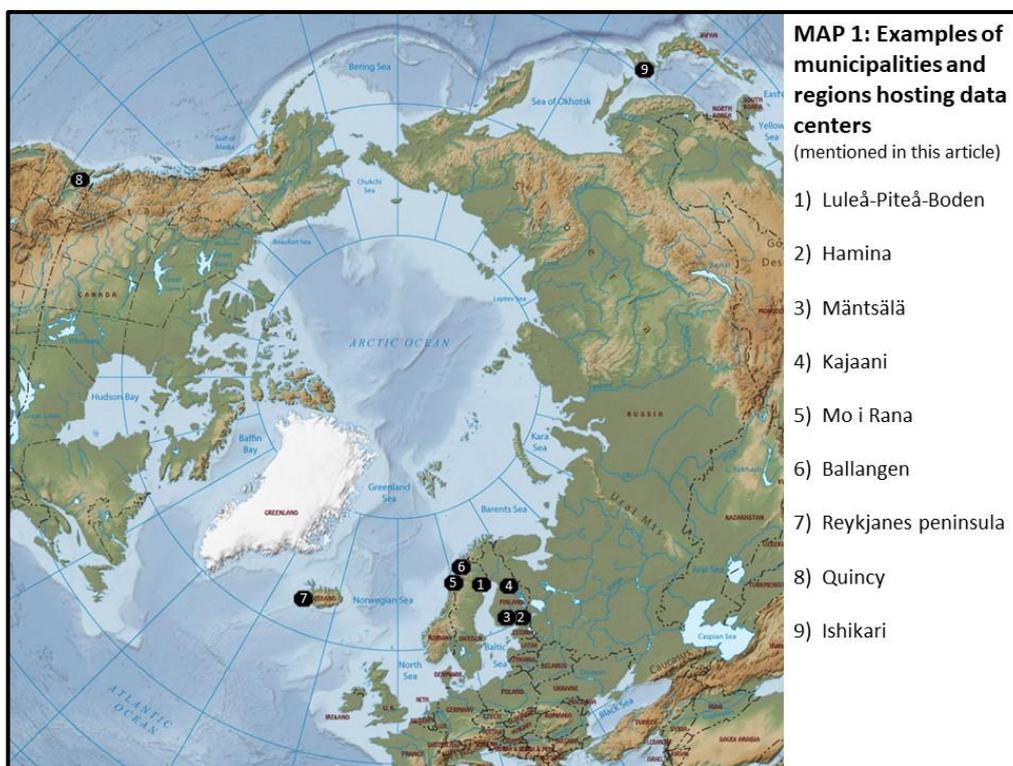


Fig. 1. Examples of municipalities and regions hosting data centers.

⁶ Fried I. Microsoft plans Russian data center. URL: <https://www.cnet.com/news/microsoft-plans-russian-data-center/> (accessed 13 April 2020); Miller R. Microsoft Plans Data Center in Siberia. URL: <https://www.datacenterknowledge.com/archives/2007/11/26/microsoft-plans-data-center-in-siberia> (accessed 13 April 2020); Hassell J. Take a look inside Microsoft's Quincy, Wash. Data center. URL: <https://www.computerworld.com/article/3136160/take-a-look-inside-microsofts-quincy-wash-data-center.html#slide2> (accessed 13 April 2020); Chernicoff D. Inside Microsoft's Quincy data center. URL: <https://www.datacenterdynamics.com/en/analysis/inside-microsofts-quincy-data-center/> (accessed 13 April 2020).

⁷ McCarthy S., Saitta E. IMMI Research Report: Islands of Resilience – Comparative Model for Energy, Connectivity and Jurisdiction. Realizing European ICT possibilities through a case study of Iceland. September 2012. URL: https://www.greens-efa.eu/files/assets/docs/study_islands_of_resilience.pdf (accessed 15 April 2020); BroadGroup. Iceland's competitive advantages as a global Data Centre location. URL: <https://docplayer.net/6699149-Iceland-s-competitive-advantages-as-a-global-data-centre-location.html> (accessed 13 April 2020); Beal V. Why Putting Your Data Center in Canada Makes Sense. URL: <https://www.cio.com/article/2391505/why-putting-your-data-center-in-canada-makes-sense.html> (accessed 13 April 2020); Brent P. Quebec firm investing in Canadian data centres. URL: <https://renx.ca/quebec-firm-investing-canadian-data-centres/> (accessed 13 April 2020).

Free-air cooling is not the only method that has been adopted in the Arctic and the North; Google, for example, utilizes sea water to cool its hyperscale data center in Hamina, Finland. However, in order to lower the Power Usage Effectiveness (PUE) ratio describing how efficiently a data center uses energy, free-air cooling has inspired various studies in the past decade. One article, published in 2011 by researchers from Aalto University and claiming to be the first research paper on data centers from Finland, concentrated on the air management and energy performance of the cooling system and paved the way for further studies to be conducted in this Helsinki-based university [13, Lu T., Lu X., Remes M., Viljanen M.].

RISE ICE Datacenter⁸, the Infrastructure and cloud research and test environment in northern Sweden, was inaugurated in January 2016 with close proximity to the Luleå University of Technology. From the very beginning, initiatives to minimize energy consumption in data centers have belonged to its research portfolio. While the early projects, initiated in cooperation with the local university to develop new ways to utilize the air pressure differences within the data center in order to control the air flow and reduce the use of fans received funding from national and regional sources⁹, the ongoing BodenTypeDC-project has earned awards, attracted attention in the media, and received funding through EU's Horizon 2020 program. During the project, a highly efficient prototype data center with low PUE (reportedly as low as 1.007) was built and tested. The data center, located in the city of Boden, uses only renewable power and advanced cooling technologies¹⁰.

Table 1

*Different types of Data centers*¹¹

Hyperscale DC	Facilities above 20 MW. Owned and operated by the company it supports. Offer robust, scalable applications and storage portfolio of services. Normally located close to the power grid in areas with power abundance. Has typically more than 500 Cabinets (minimum of 5,000 servers) and is at least 10,000 sq. ft. in size.
Enterprise DC	Owned and operated by the company it supports and often built on-site. May use external companies for initial fit-outs and network installation before being maintained internally. Has more than 10 Cabinets and can be as large as 40MW.
Co-location DC	Data center owner selling space, power, and cooling to multiple enterprise, cloud, and hyperscale customers in a specific location. Offers interconnection to Software as a Service (SaaS) or Platform as a service (PaaS). Enables enterprises to grow with minimum complexity at a low cost. Customers can rent as many cabinets they need. Can house hundreds to thousands of individual customers.
Cloud	Facilities owned and operated by the cloud companies delivering the on-demand availability

⁸ The ICE Datacenter facility is operated and owned by RISE SICS North, which is a subsidiary of the non-profit organization RISE SICS that carries out advanced and focused research in strategic areas of computer science in close collaboration with Swedish and international industry and academia.

⁹ ICE RISE SICS North, DRAFT: A new project to save energy in datacenter. URL: <https://ice.sics.se/draft-new-project-save-energy-datacenter/> (accessed 13 April 2020).

¹⁰ European Commission, Novel data centre enters the spotlight thanks to its energy- and cost-saving concept. URL: <https://cordis.europa.eu/article/id/413286-novel-data-centre-enters-the-spotlight-thanks-to-its-energy-and-cost-saving-concept> (accessed 13 April 2020); ICE RISE SICS North, Inauguration of the Boden Type Data Center One. URL: <https://ice.sics.se/inauguration-boden-type-data-center-one/> (accessed 13 April 2020).

¹¹ Based on: Nordic Council of Ministers. Data Center Opportunities in the Nordics. An analysis of the competitive advantages, 2018; AFL Hyperscale, Understanding Different Types of Data Center. URL: <https://www.aflhyperscale.com/understanding-different-types-of-data-center> (accessed 14 April 2020).

	of computer system resources, especially data storage and computing power, to clients. Available to many users over the Internet. Large cloud providers build multi-site networks.
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Hokkaido, the northernmost island of Japan, is south of the Arctic, but its natural conditions, i.e. cold winters with heavy snowfall, have a great resemblance to those of higher latitudes. Its cold climate has been recognized as a potential asset in regional development plans, and attempts to attract data centers began to be launched already a decade ago [14, Saunavaara J., p. 329]. While cheap land prices and low-risk of earthquakes have been utilized in the marketing, Hokkaido-based actors have also carried out R&D activities utilizing snow that is collected during the winter for cooling during the summer. Although the different techniques of snow and ice cooling have a longer history in other sectors of industry in Hokkaido, applications suitable for data centers have already been introduced¹². However, the utilization of snow has not spread widely in other northern regions.

While PUE is clearly the best-known data center infrastructure metrics, it has been criticized as an imperfect measurement if one wants to describe overall energy efficiency. The PUE equation does not, for example, take into account how energy efficient the IT equipment is, and there is no globally agreed-upon standard to measure PUE. The emergence of new metrics, such as Energy Reuse Effectiveness (ERE) or Energy Reuse Factor (ERF), reflects recent developments in the data center industry and research. In other words, largely due to the greater attention being paid to the ecological footprint of the industry, questions concerning the collection and re-use of waste heat that is born inside data centers have attracted attention within both the industry and academia. Although the re-use of heat is studied in different parts of the world [15, Patterson, M.K., VanGeet O., Tschudi W., Azevedo D.; 16, Marcinichen J.B., Oliver J.A., Thome J.R.; 17, Ebrahimi K., Jones G. F., Fleischer A.S.; 18, Ebrahimi K., Jones G.F., Fleischer A.S.; 19, Davies F.F., Maidment G.G., Tozer R.M.]¹³, the Nordic countries are considered to be the global forerunners in research and the pioneers in the actual utilization of data center waste heat¹⁴. Therefore, they are well prepared if legislation either guides or forces the data center industry toward the re-use of heat in the future.

The utilization of the side streams of an industrial process is according to the widely supported principles of a circular economy; however, the waste heat that can be captured has problems as well. Most notably, the temperature of data center waste heat is often too low (30–40 degrees Celsius) to be used as-is in many applications and processes. However, this problem has

¹² Hokkaido Government, Hokkaido Business Location Guidebook – As of May 2019; Kyocera Communication Systems, 100% saisei kanō enerugii, zero emisshon – deeta sentaa wo hokkaidō ishikari ni kaigyō. URL: <https://www.kccs.co.jp/news/release/2019/0107/> (accessed 13 April 2020).

¹³ However, for example the 682-page long Data Center Handbook (edited by Hwaiyu Geng) published in 2015 (by Wiley) dedicates only one short paragraph to this topic.

¹⁴ Examples of data center heat reuse in the Nordics: Vela J., Helsinki data centre to heat homes. URL: <https://www.theguardian.com/environment/2010/jul/20/helsinki-data-centre-heat-homes> (accessed 14 April 2020); Lähienergia.Mäntsälässä hukkalämpö on arvokas energianlähde. URL: <https://www.lahienergia.org/mantsalassa-hukkalampo-arvokas-energialahde/> (accessed 21 April 2020).

been at least partially solved through the development of heat pump technology. Furthermore, the recovery of data center waste heat only makes sense technically if meaningful ways to utilize it are available. Economically, the re-use of data center waste heat is only reasonable if it is priced competitively against heating plants and waste heat flows from other industries. In the Nordic countries, for example, the high-quality (high-temperature) waste heat of the forest, chemical, and steel industries is already relatively widely utilized¹⁵.

MAP 2: District heating plants in Finland, 1

July 2015. (Author: Energiategollisuus ry. Kaukolämpö Suomessa.png. This file is licensed under the Creative Commons Attribution 4.0 International license.)



Fig.2. Map 2: District heatingplants in Finland, 1 July 2015

The research on the re-use of heat can be divided roughly into two tracks. The first track includes research concentrating on the re-use of heat through the district heating system and has been conducted both in the RISE ICE Datacenter¹⁶ and at Aalto University [20, Wahlroos M., Pärsinen M., Manner J., Syri S.; 12, Wahlroos M., Pärsinen M., Rinne S., Syri S., Manner J.; 21, Pärsinen M., Wahlroos M., Syri S., Manner J.]. These studies have often focused on attempts to increase the temperature of heat coming out of data centers. While heat pumps, which have often been at the core of such research, are already in use (for example, the Yandex data center in

¹⁵ Interview with Tor Björn Minde, Luleå, Sweden, 2 March 2018; Interview with Petri Hyyppä, Oulu, Finland, 5 February 2020; Interview with Suvi Linden, Oulu, Finland, 06.02.2020.

¹⁶ Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018; ICE RISE SICS North, Our challenging and exciting EU H2020 project application on datacenters and fuel cells was granted. URL: <https://ice.sics.se/challenging-exciting-eu-h2020-project-application-datacenters-fuel-cells-granted/> (accessed 13 April 2020); ICE RISE SICS North, We have received a positive funding decision from Energiforsk for our project Virtual heating plants. URL: <https://ice.sics.se/received-funding-decision-energiforsk-project-virtual-heating-plants/> (accessed 13 April 2020).

Mäntsälä, Finland, sells its waste heat to the local energy company, utilizing heat pumps to reach 85 degrees Celsius), liquid cooling methods have also been tested for reaching higher temperature levels to make the use of data center waste heat in district heating more efficient. At the same time, attention has been paid to the efficiency of the heat pumps and the development of district heating networks, as the new networks will be better suited for the utilization of lower temperature waste heat. The research on these technologies have been accompanied with an economic investment assessment and studies analyzing business models and the district heating system level operational cost savings in the case data center waste heat is utilized. Map 2 uses Finland as an example to demonstrate the wide distribution of district heating systems (exceeding 15.000 kilometres and expanding) in the Nordic countries. The availability of the district heating network in different parts of the country makes decisions concerning the location of data centers more flexible.

The second track of research on the re-use of heat has concentrated on other applications in need of low-grade heat. Greenhouses, fish farms, and biomass drying are examples of potential activities that both academic researchers and data center businesses have paid attention to. While these applications might bring greater energy efficiency, as they would not demand the use of heat pumps, they are not without trouble. Most importantly, the utilization of the low-temperature waste heat demands that the interdependent facilities are located close to each other.¹⁷ Although the limitations of the existing sites and question of business models acceptable to all parties may have hindered the development, there are already examples of synergetic cooperation between data centers and greenhouses¹⁸.

The discussion concerning Smart Grids and industrial facilities' capability to respond, for example to grid emergencies or congestions jeopardizing the electricity supply-demand balance, is not new [22, Ghatikar G., Piette M. A., Ganti V., p. 577]. However, the integration of data centers into the national and regional energy supply-demand system can be recognized as another distinctive feature of the R&D activities conducted in the North. The attempts to answer questions concerning the optimization of energy supply and consumption, smart grid integration, and data centers' role in grids where the increased renewable electricity production that is dependent on natural conditions increases volatility has led to academic research papers and cooperation between

¹⁷ Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018; RISE, Data Center for Greenhouse farming. URL: <https://www.ri.se/en/what-we-do/projects/data-center-greenhouse-farming> (accessed 13 April 2020); ICE RISE SICS North, Vinnova has granted funding for our project DC-Farming together with LTU and The Food Print Lab. URL: <https://ice.sics.se/vinnova-granted-funding-project-dc-farming-together-ltu/> (accessed 13 April 2020); ICE RISE SICS North, Vinnova granted a pre-study on heat re-use from datacenters in biomass drying. URL: <https://ice.sics.se/vinnova-granted-pre-study-heat-re-use-datacenters-biomass-drying/> (accessed 13 April 2020); ICE RICE SICS North, Biomass drying using residual heat from datacenters. URL: <https://ice.sics.se/biomass-drying-using-residual-heat-datacenters/> (accessed 13 April 2020).

¹⁸ ePressi, Yritykset laajentavat ja rakentavat uutta Mänsälässä. URL: <https://www.epressi.com/tiedotteet/yritykset/yritykset-laajentavat-ja-rakentavat-uutta-mantsalassa.html> (accessed 13 April 2020); Phone interview with Ari Kurvi, Finland, 20.04.2020.

industry and academia, as well as to concrete actions taken by commercial data centers operating in competitive markets.

One of the earliest projects in northern Sweden to recognize the growing amount of intermittent power sources and increased need for pro-active load and power balancing was launched in 2016 and aimed at data center operations with a local power supply of both solar panels and grid power. This study concentrated on the data center's interaction with the grid power supply and examined possibilities to balance the power requirements. As an example, the project tested local thermal storages, such as whether chilled water could be produced when the electricity demand was low and used when the electricity demand was high¹⁹. The succeeding projects in RISE ICE Datacenter have been aimed at electricity cost and peak loads reduction by studying how to optimize the operations for a data center with its own microgrid. Through the implementation of machine learning, optimal decisions were to be made after the forecasts for the temperature, solar radiation, electricity costs, and working load had been analyzed. Recently, these kinds of questions have also been studied in cooperation with partners from Central Europe²⁰.

The particularities of renewable energy and the need for flexible power reserves have been recognized in the industry. For example, the Aurora Datacenter, which is located in Oulu in northern Finland, has initiated a pilot project in cooperation with Eaton and Fortum to transfer their data center from a facility that demands power to a facility that can support the grid and generate revenue through this kind of activity. The data center that hosts two 3000 kilo lithium batteries and has its uninterruptible power supplies (UPS) connected to the national grid can make immediate adjustments in its power consumption and receive compensation from the transmission system operator²¹.

The capability to balance the demand and make adjustments if natural conditions become temporarily unfavorable for wind or solar power is not the only connection between data centers and renewable energy production. The data center operators with facilities in different parts of the world can control their energy consumption by producing the same services in different geographical locations at different times of day. This method, which allows data center companies to consume cheaper electricity during off-peak hours, can also be used to avoid regions where, due to the environmental conditions, the amount of renewable energy available is temporarily low. Furthermore, many data center companies, especially those that are consumer brands, already advertise that their data centers run with renewable energy, and the pressure toward an industry-wide shift to green data centers is getting heavier. If the roots of this trend are studied, one runs into projects like the GreenStar Network project, which originated in Canada in 2010. The aim of

¹⁹ ICE RISE SICS North, Swedish energy agency is funding our project on data center and grid integration. URL: <https://ice.sics.se/swedish-energy-agency-funding-project-datacenter-grid-integration/> (accessed 13 April 2020);

²⁰ ICE RISE SICS North, Swedish Energy Research Centre has granted a project on AI for datacenter micro-grid integration. URL: <https://ice.sics.se/swedish-energy-research-centre-granted-project-ai-datacenter-micro-grid-integration/> (accessed 13 April 2020).

²¹ Interview with Petri Hyyppä, Oulu, Finland, 5.02. 2020.

the project, which focused on data centers built in proximity to green energy sources, was to provide cloud-based ICT services based entirely on renewable energy [23, Nguyen K. K., Cheriet M., Lemay M., Reijs V., Mackarel A., Pastrama A., pp. 2538–2539]. Nowadays, the data centers either purchase green energy from conventional producers or make direct investments in renewable energy.

Sakura Internet has established one of Japan's largest data centers in Ishikari, Hokkaido and built its own solar power capacity. In addition, Kyocera Communication Systems, which is planning to build Japan's first data center using 100 percent renewable energy in the same city, will invest in wind, solar, and biomass energy²². While the high local price of electricity may partly explain these companies' decisions to invest in own-energy production, examples of similar activity can also be found in other northern regions that are much closer to the Polar Circle and where energy is cheaper. An informant representing a data center in northern Finland pointed out that solar power is a good match for the data center industry. This is especially true in the North, where the number of annual sunlight hours can be relatively high, as the midnight sun in the summer compensates for the lack of sunny days during the winter, creating an annual balance that is a good fit for data centers, which have higher energy needs during the summer months due to a need for cooling²³. However, it is doubtful whether the data center giants, such as Amazon, Apple, Facebook, Google, or Microsoft, will take a positive stance toward regulation as is planned, for example, in Denmark, which would force them to build and operate powerplants serving their hyperscale data centers.

According to one definition, a green data center is all about getting the most computing productivity out of least energy [24, AlLee G., p. 416]. This concept is used in, for example, the Cloudberry Datacenters research project, which has been coordinated by the Luleå University of Technology to bring a wide array of activities, ranging from cooling and energy recovery and reuse, to resource efficiency in software processes, to integration with national and local energy systems, under one umbrella. The studies from this research regarding automated control, maintenance, and management have preceded the development of autonomous data centers, which can be recognized as another trend of current and future R&D activities²⁴. In principle, an autonomous data center should be able to continue its operations effectively and self-heal without any human intervention, even when facing unexpected circumstances, such as a power failure or faulty components. In the North, questions related to this kind of paradigm shift in data center operations have led to cross-border cooperation involving academic research institutes and pri-

²² Sakura Internet. URL: <https://www.sakura.ad.jp/en/corporate/datacenter/> (accessed 13 April 2020); Kyocera Communication Systems, 100% saisei kanō enerugii, zero emissjon – deeta sentaa wo hokkaidō ishikari ni kaigyō. URL: <https://www.kccs.co.jp/news/release/2019/0107/> (accessed 13 April 2020).

²³ Interview with Petri Hyypä, Oulu, Finland, 5.02.2020.

²⁴ Cloudberry. URL: <https://www.cloudberry-datacenters.com/subprojects-20315292> (accessed 14.04.2020); ICE RISE SICS North, A holistic approach on automation in data centers – a new EUREKA project. URL: <https://ice.sics.se/a-holistic-approach-on-automation-in-data-centers-a-new-eureka-project/> (accessed 14 April 2020).

vate enterprises. For example, in the case of the AutoDC project, the partners come from Sweden, Finland, and Canada²⁵. Meanwhile, already in 2016 Google had reported successful use of artificial intelligence (AI) — controlling about 120 variables, such as the cooling system, in the data center — to achieve significant reductions in power consumption²⁶. Although there is still some skepticism, the future steps in the field of AI remote monitoring and optimization may lead to the establishment of the human-free data centers. This concept would take the already existing ‘lights out’ model further, striving for higher efficiency by abandoning energy consumption related to on-site staff, such as human comfort needs and access²⁷.

Decentralization and the growing importance of edge computing is another trend taking place, and it is molding the future of Arctic and Northern data center business. Edge computing is real-time (or extremely low response time) processing of huge volumes of (sensor) data. If and when smaller computing and data storage units are created and a large number of them are brought closer to the users, the concept that the sparsely populated Arctic and northern regions can best serve as the hosts of a data that is not latency dependent may be strengthened. However, there are also great differences within the Arctic countries, and different regions are not equally matched to fulfill the demands of different types of data. In the case of Russia and Canada, the development of edge computing will likely concentrate on the largest metropolitan areas. Furthermore, the southern parts of Sweden, Norway and Finland as well as Denmark (excluding Greenland and Faroe Islands), which are close to major data hubs in Europe and where population and industry have concentrated, are clearly better suited to serve latency-dependent services than areas in the north. While not an issue that could be identified as a particularly strong point for the R&D carried out in the Circumpolar North, the examples of studies concentrating on edge data centers and a link between different types of data centers can be found²⁸.

Studies describing the economic impact of northern data centers and their societal meaning

While the research concerning data centers have been conducted in various locations in the Circumpolar North, the data center industry, as well as the individual sites and facilities that exist in the region, have also inspired a number of studies. The reports and articles produced can

²⁵ AutoDC. URL: <https://autodc.tech/about/> (accessed 14 April 2020).

²⁶ Moss S. Google uses DeepMind AI to cut data center PUE by 15%. URL: <https://www.datacenterdynamics.com/en/news/google-uses-deepmind-ai-to-cut-data-center-pue-by-15/> (accessed 15 April 2020); DeepMind. DeepMind AI Reduces Google Data Centre Cooling Bill by 40%. URL: <https://deepmind.com/blog/article/deepmind-ai-reduces-google-data-centre-cooling-bill-40> (accessed 15 April 2020).

²⁷ Donoghue A. Beyond Lights-Out: Future Data Centers Will Be Human-Free. URL: <https://www.datacenterknowledge.com/design/beyond-lights-out-future-data-centers-will-be-human-free> (accessed 21 April 2020).

²⁸ Interview with Tor Björn Minde, Luleå, Sweden, 02.03.2018; Mehta R., Are Autonomous data centers on the horizon? URL: <https://www.datacenterdynamics.com/en/opinions/are-autonomous-data-centers-on-the-horizon/> (accessed 15 April 2020); RISE. Inauguration of a unique edge test datacenter. URL: <https://news.cision.com/rise/r/inauguration-of-a-unique-edge-test-datacenter,c2720659> (accessed 15 April 2020); Nishimoto S. Hakodate miraidai – sakura intaanetto kyōdō kenkyū. [chūshō] renketsu de nōryoku kōjō. Hokkaido Shinbun, 14.11.2019.

be divided into two categories. The first consists of research concentrating on the data centers' economic impacts and regional advantages and investment decisions. The papers representing the second category have typically been interested in the materiality of clouds/internet and approached data centers through the lenses of anthropology or media studies. These articles have been written in and published through academic institutions, but the studies falling into the first category have often been commissioned by private enterprises or public authorities and conducted by consultants.

The reports describing the overall economic impact of the hyperscale facilities that Google and Facebook have established in the Nordic countries are well-known examples of business and regional development-oriented studies. According to these reports, which were commissioned by the companies in question and carried out by international consulting companies, the investment decisions concerning hyperscale data centers are measured in hundreds of millions of euro, and they can create tax revenue and employment (directly and through subcontracting) for thousands of people. While the impact on local employment is the highest during the construction period, the cases studied have shown that this phase can continue for years as the companies continue investing in their selected sites ²⁹.

Furthermore, several reports concentrating on the development of industry in general or on the (hypothetical or previous) arrival of hyperscale data centers into northern communities have been made, for example in Sweden and Norway, based on initiatives taken by national and regional authorities ³⁰. Although competition between different countries attempting to attract data center investments is a reality, a report commissioned by the Nordic Council of Ministers is an example of intergovernmental cooperation. In describing the factors affecting site selection and the strengths of the Nordic region, the report seems to suggest that the markets are growing rapidly and opportunities are available for all countries involved ³¹. What this and other reports concerning the young industry often seem to miss is an analysis that covers the entire life cycle of the data centers. Although many data centers have been opened within facilities that were originally serving other types of heavy industry, hardly any attention has been paid to the question of what happens to the data center facilities when they eventually close.

²⁹ The Boston Consulting Group. Digital infrastructure and economic development. An impact assessment of Facebook's data center in Northern Sweden, 2014; Oxford Research. Finland's Giant Data Center Opportunity. From the Industrial Heartland to Digital Age, 2015; Copenhagen Economics. Finland's economic opportunities from data centre investments: A study prepared for Google, 2017; Copenhagen Economics. Google's Hyperscale Data Centres and Infrastructure Ecosystem in Europe: Economic Impact Study, 2019.

³⁰ Ylinenpää H. Etableringen av Facebooks europeiska datacenter i Sverige och Luleå. Tillväxt Verket Rapport 0170, 2014; Granberg A. Effecten av Facebooks etablering för Luleå Science Park som regional nod. Luleå Science Park, 2014; The Boston Consulting Group. Capturing the Data Center Opportunity: How Sweden Can Become a Global Front-Runner in Digital Infrastructure, 2016; Menon Economics. Rapport: Gevinster knyttet til etablering av et hyperscale datasenter i Norge. Menon-Publikasjon Nr. 39/2017, 2017; Sweco. Effekter av Facebooks etablering i Luleå: En studie av effekter på regional och nationell nivå, 2017.

³¹ Nordic Council of Ministers. Data Center Opportunities in the Nordics. An analysis of the competitive advantages, 2018.

The anthropological studies focusing on data centers in Sweden, Denmark, and Iceland have been conducted by researchers who are affiliated with universities both inside and outside of the Arctic and the North. This kind of research has typically included long-term field work, interviews, and participatory observation in northern communities that host large-scale data center facilities. The scholars have investigated the infrastructures that comprise cloud computing and thus challenged and problematized the myth of an immaterial or ethereal internet, which has been described as something appearing to be everywhere and nowhere in particular. These studies have described the cloud infrastructures' philosophical, political, social, and environmental impacts, as well as the socio-technical assemblages that emerge in the course of infrastructuring processes. Some scholars have emphasized the influence of infrastructural inheritances and studied localization and integration in industrial landscapes. They have pointed out that many data centers have been built in the premises of other industries that are no longer functioning and shown how the new industrial activity becomes a part of state-making and regional identity-building processes. Finally, attention has also been paid to the lack of public engagement, as well as to the expectations and imaginings woven into data center projects that are often carried out in great secrecy [25, Vonderau A.; 6, Vonderau A.; 26, Johnson A.; 7, Hogan M., Vonderau A.; 27, Johnson A.; 28, Maguire J., Winthereik B.R.].

Challenges of educating and recruiting a competent workforce

The general level of education and technological knowhow is high in the Nordic countries and the above-mentioned report commissioned by the Nordic Council of Ministers, for example, emphasizes human capital as an asset to the region. However, the report also points out that when the attractiveness of the Nordic region is compared to Frankfurt, London, Amsterdam, Paris and Dublin (so-called FLAP-D), the latter scores better in a category referring to the availability of competent workforce³². Participatory observation and discussions with representatives of various companies have also shown that the lack of a workforce and problems in recruitment are familiar to data centers in many northern regions including the Nordic countries. Due to the rapid global growth of the industry, skilled workers can choose the company and region where they want to work. Furthermore, although the need to mobilize educational systems to better serve the demands of the data center industry and the importance of establishing educational programs have been recognized³³, these tasks have not been enacted. Degree programs are infrequently revised, often inflexible, and do not necessarily meet the changing requirements of the data center industry. With rapid advances of technology, new types of jobs demanding a particular core competence appear and disappear quickly, and a need for supplementary and task-specific education often emerges. In addition, tailor-made solutions that serve only one or a few sites have also been

³² Ibid.

³³ See for example: Oxford Research. Finland's Giant Data Center Opportunity. From the Industrial Heartland to Digital Age, 2015, p. 18.

typical for the industry where many R&D breakthroughs have been achieved — often learning by doing — within private enterprises that may be unwilling to share their knowledge.

While the lack of institutionalized university education in many places has led to the establishment of trainings provided by private companies and consultants³⁴, there are also examples of Arctic and northern higher educational institutes that offer formalized data center education and thesis supervision. In the Nordic countries, several MA and BA theses have already been completed in the already mentioned LTU and Aalto University³⁵ and in other universities³⁶. One thesis, completed at the Lappeenranta University of Technology, even played an important role in the creation of the Mäntsälä region's successful policy aimed at attracting data center investments through the utilization of waste heat³⁷. Furthermore, South-Eastern Finland University of Applied Sciences (XAMK) and the Joint Authority of Education of Kotka-Hamina Region Group (Ekami), which are in close proximity to Google's hyperscale data center in Hamina, have offered study modules and programs concentrating specifically on data centers³⁸. The highly specialized data center cluster in the city of Kajaani is also an interesting case, both because of the strong presence of the public sector and because of the investments made in the development of the data center-related education.

The origins of these activities go back to 2012 when the IT Center for Science (CSC), which is owned by the Finnish state, and higher education institutions established a data center and supercomputer, and Herman IT, a locally owned private enterprise, opened its data center in the Renforsin Ranta business park. Despite Kajaani's early success owed to the business park, which

³⁴ Examples of education: Uptime Institute. URL: <https://uptimeinstitute.com/education> (accessed 29 September 2020); CNet Training. URL: <https://www.cnet-training.com/programs/masters-degree/> (accessed 29 September 2020); CISCO. URL: <https://www.cisco.com/c/en/us/training-events/training-certifications/certifications/associate/ccna-data-center.html> (accessed 29 September 2020); DCPro. URL: <https://www.dcpo.training/allcourses> (accessed 29 September 2020).

³⁵ Examples: Sorvari J. Konesalin ylijäämälämmön hyödyntäminen Levin Koutalaella. Aalto University, MA Thesis, 2015; Stenberg Å. Tietokonesalien hukkalämmön hyödyntämismahdollisuuksien teknis-taloudellinen optimointi. Aalto University, MA Thesis, 2015; Pärssinen M. Analysis and Forming of Energy Efficiency and GreenIT Metrics Framework for Sonera Helsinki Data Center HDC. Aalto University, MA Thesis, 2016; Linna O. Kansainvälinen katsaus datakeskusten hukkalämmön hyödyntämiseen. Aalto University, BA Thesis, 2016; Olofsson M. Use of Waste Heat from a Data Center. Luleå University of Technology, Independent thesis Advanced Level, 2013; Gille, M. Design of Modularized Data Center with a Wooden Construction. Luleå University of Technology, Independent thesis Advanced Level, 2017; Erikson, M. Monitoring, Modelling and Identification of Data Center Servers. Luleå University of Technology, Independent thesis Advanced Level, 2018.

³⁶ Kupiainen M. Lämpöpumppu konesalin jäähdytyksessä ja lämmöntalteenotossa. Mikkeli University of Applied Sciences, BA Thesis, 2014; Juvalainen J. Initial Business Concept for the Neighborhood Data Center. Helsinki Metropolia University of Applied Sciences, MA Thesis, 2016; Vuorinen L. Kannattavuusmalli datakeskuksen hukkalämmön hyödyntämiseen kaukolämpöverkossa. Lappeenrannan Teknillinen Yliopisto, Diplomityö, 2019.

³⁷ Porkka A. Matalalämpöisen hukkalämmön hyödyntäminen kaukolämmön tuotannossa. Lappeenrannan Teknillinen Yliopisto, Diplomityö 2013; Lähienergia.Mäntsälässä hukkalämpö on arvokas energianlähde. URL: <https://www.lahienergia.org/mantsalassa-hukkalampo-arvokas-energialahde/> (accessed 21 April 2020); Phone interview with Ari Kurvi, Finland, 20.04.2020.

³⁸ Oxford Research. Finland's Giant Data Center Opportunity. From the Industrial Heartland to Digital Age, 2015, pp. 15–16, 18; XAMK, Datakeskuksen korkeakouludiplomi, 60 op. URL: <https://www.xamk.fi/avoimen-amkn-kurssit/datakeskuksen-korkeakouludiplomi-60-op/> (accessed 14 April 2020); YLE. URL: <https://yle.fi/uutiset/3-7763608> (accessed 14 April 2020); EKAMI, Green Data Center. URL: <https://www.ekami.fi/kehittaminen/hankkeet/green-data-center> (accessed 14 April 2020).

had been set up on the former premises of a paper mill that offered ready-made facilities, great amounts of power, and fiber-connectivity, the attempts to attract further (private) data center investments and anchor clients failed in the succeeding years. However, this did not lessen the region's commitment to the development of data center-relevant skillsets that took form in the education offered by the local University of Applied Sciences. This data center specialization program has provided students with skills related to the key server and workstation products and modern organizational network solutions. During their training, the students of the Kajaani University of Applied Sciences have been able to work in their own data center training facility, the DC lab, and attempts have been made to widen the ecosystem around the data centers, for example, in the direction of data analytics. Another big step was taken in 2019 when it was announced that the CSC datacenter in Kajaani had been selected to host a pan-European high-performance supercomputer supported by the European countries and the European Union. The supercomputer is expected to start operations in 2020, after which the waste heat produced in the data center will contribute up to 20 percent of the district heating needs of the region ³⁹.

While the possibilities of the re-use of heat produced by supercomputers have also been realized elsewhere, such as at the University of Tromsø (UiT) the Arctic University of Norway ⁴⁰, informants representing private enterprises have pointed out that some of the Arctic universities that seem to have had opportunities to develop a data center-related education have failed to do so due to a lack of vision and leadership. In the meantime, the data center industry has organized, and the national data center associations in Sweden, Finland, and Denmark have emphasized the importance of education and training in their activities. The practical methods for reaching the set objectives have ranged from seminars in which students can participate to networking, exchange of information, and cooperation with the public sector and institutes of higher education ⁴¹.

Conclusion

Currently, most of the data center clusters utilizing the cold climate are located on the outskirts of the Arctic or in sub-Arctic areas. In Russia, for example, the data center industry is heavily

³⁹ Interview with Petri Hyyppä, Oulu, Finland, 05.02.2020; Phone interview with Jukka-Pekka Partanen, 21.02.2020; KAMK University of Applied Sciences, Data Center Specialization. URL: <https://www.kamk.fi/en/KAMK/Schools-at-KAMK/School-of-Information-Systems/Data-Center-Specialization> (accessed 14 April 2020); KAJAK DC. URL: https://kajakdc.fi/?page_id=772&lang=en (accessed 14 April 2020); KAMK University of Applied Sciences, CSC ja KAMK käynnistävät Data-analytiikan kiihdyttämön Kainuussa. URL: <https://www.kamk.fi/news/CSC-ja-KAMK-kaynnistavat-Data-analytiikan-kiihdyttamon-Kainuussa/hh0ylnqe/e80efd92-c4cc-49e6-8168-5b7e9e0ea1cf> (accessed 14 April 2020); CSC, News. URL: <https://www.csc.fi/en/-/one-of-the-most-competitive-supercomputers-in-the-world-to-be-placed-in-kajaani-finla-1> (accessed 14 April 2020); Granlund, Environmentally friendly cooling for a supercomputer. URL: <https://www.granlundgroup.com/finland/news/environmentally-friendly-cooling-for-a-supercomputer/> (accessed 14 April 2020).

⁴⁰ HPC Wire. UiT Recycles Supercomputing Power with Asetek's RackCDU. URL: <https://www.hpcwire.com/2014/06/23/uit-recycles-supercomputing-power-aseteks-rackcd/> (accessed 14 April 2020).

⁴¹ Swedish Datacenter Industry. URL: <https://sdi.se/about/> (accessed 14 April 2020); Finnish Data Center Forum. URL: <https://www.fdcf.fi/> (accessed 14 April 2020); Danish Data Center Industry, Skills & Education. URL: <https://datacenterindustrien.dk/focusareas/skillsandeducationworkinggroup/> (accessed 14 April 2020).

concentrated, both in terms of market share (the top three companies have 42 percent of the market) and spatial distribution favoring southern locations (65–70 percent of all data center racks are in Moscow, and a further 15–18 percent are in St. Petersburg). The Russian market is, however, developing rapidly, and growth is expected outside of the traditional focus regions. Therefore, the peripheral Russian areas, some of which already host large-scale cryptocurrency mining activities, that can offer both a cold climate and one of the cheapest forms of electricity in the world may be potential locations for data centers as well ⁴². Meanwhile, Toronto, Montreal, and Vancouver have dominated the data center markets in Canada ⁴³. The submarine fiber-optic cables projects, most notably the Arctic Connect and that of the Alaska-based company Quintillion, aiming at the improvement of international connectivity in and through the Arctic may, however, alter this situation in the future. Regional development plans in Alaska have referred to the importance of improved connectivity, and cities such as Rovaniemi and Kirkenes have directly invested in the Arctic Connect project, materialization of which is hoped to bring data center investments. The fiber-optic cables form the backbone of international communication, and the planned cables would surely cause a huge change in the Arctic regions' strategic position within the global flow of information [29, Saunavaara J.]. However, they would not be the only factor considered by companies that are choosing locations for new data centers.

Many of the Arctic and northern areas, which may soon see their international connectivity problems largely solved, may also lack human capital and regional skillsets that are clearly factors affecting site selection and the potential development of a data center cluster. Therefore, despite the inter-sectoral worker mobility may help in regions that have hosted other types of industrial activity, new investments in research and education may be needed. Otherwise, the skilled workers have to be brought into northern communities from outside. This may lead to recruitment problems, creation of different types of incentives increasing the personnel cost and challenging the competitiveness of remote areas, and to the underdevelopment of regional knowledge networks important for the cluster formation.

It is also worth emphasizing that the market-driven data center business is aimed at the maximization of profit. Therefore, the incentives affecting the return on investment, the total cost of ownership through the set-up, and long-term operational costs impact locational decisions. While the national regulations concerning the level of energy tax paid by data centers have played

⁴² Moss S. Rostelecom opens a data center next to a nuclear power plant, could be Russia's largest in 2021. URL: <https://www.datacenterdynamics.com/en/news/rostelecom-opens-data-center-next-nuclear-power-plant-could-be-russias-largest-2021/> (accessed 14 April 2020); Willner G. Why the Russian Data Center Market Is the Next Frontier. URL: <https://www.datacenterknowledge.com/industry-perspectives/why-russian-data-center-market-next-frontier> (accessed 14 April 2020); Baydakova A. Bitcoin Mining Farms Are Flourishing on the Ruins of Soviet Industry in Siberia. URL: <https://www.coindesk.com/bitcoin-mining-farms-are-flourishing-on-the-ruins-of-soviet-industry-in-siberia> (accessed 14 April 2020); Fedorinova Y., Atkinson G. Russia's Largest Bitcoin Mine Turns Water Into Cash. URL: <https://www.bloomberg.com/news/features/2019-11-24/seo-inside-russia-s-largest-bitcoin-mine> (accessed on 13 April 2020).

⁴³ Data Center Map. URL: <https://www.datacentermap.com/> (accessed 14 April 2020).

a significant role in the Nordic countries by defining their attractiveness when compared to one another, the competition between states and counties in the United States has led to generous incentives and aggressive promotional activities. The data center companies have thus been able to shop around with the potential hosting communities in the US. However, EU legislation has curbed the possibility for similar activity in Europe⁴⁴. Despite the competitive nature of business, the kind of cross-border research cooperation that has already taken place in the Nordic countries could help the small Arctic and Northern regional and national economies in competition against Frankfurt, London, Amsterdam, Paris and Dublin, which are still hosting a great majority of data centers in Europe.

The rapid growth of the data center industry has already caused counter-reactions in some key areas in Central Europe. Amsterdam, for example, has temporarily banned the construction of new data centers, and other regions, such as Stockholm, face challenges with the capacity of their grid. Although these kinds of developments may strengthen the position of the energy-rich northern regions, the failure of, or at least significant delays in, previous large-scale data center projects that received a lot of publicity, such as the Kolos Data Center project in Ballangen, Norway and the Silent Partner Group's gigantic plans including three sites in northern Finland⁴⁵, may cause suspicion toward the industry among local inhabitants and decision-makers. Furthermore, decisions concerning investments are always made by humans. Ken Baudry has used to term "server huggers" when referring to business leaders who want to have their IT equipment nearby in spite of being located in areas facing serious natural hazard risks [30, Baudry K., p. 99]. It can thus be argued that the future development of Arctic and northern data center business is not only connected with the measurable technical, economic, or environmental parameters, but it also depends on human perceptions and attitudes.

When investigating the role that data centers can play in the advancing of green information technology (IT), Santhanam and Keller performed a literature review studying peer-reviewed journal articles and conference papers in the Scopus database. They identified five pillars of a framework describing the role of data centers in green IT: (1) power savings, 2) cost savings, 3) sustainability and green energy, 4) information technology for greening data centers, and 5) aligning business requirements with resource utilization [31, Santhanam A., Keller C.]. All of these features are also present in the R&D activities in the Arctic and the North. However, the results of this study further reinforce the idea that studies related to power savings have concentrated on

⁴⁴ Interview with Petri Hyyppä, Oulu, Finland, 05.02 2020; Interview with Suvi Linden, Oulu, Finland, 6.02.2020; State of Washington Department of Commerce. State of Data Center Industry: An analysis of Washington's Competitiveness in This Fast-Growing High-Tech Field. Report to the Legislature, January 2018.

⁴⁵ BBC. Record-sized data centre planned inside Arctic Circle. URL: <https://www.bbc.com/news/technology-40922048> (accessed 14 April 2020); Smolaks M. Kolos data center park in Norway is being acquired by cryptocurrency miners. URL: <https://www.datacenterdynamics.com/en/news/kolos-data-center-park-in-norway-is-being-acquired-by-cryptocurrency-miners/> (accessed 14.04.2020); Opiah A. Silent Partner Group To Build Up Four Hyperscale Data Centre Hubs in Finland. URL: <https://data-economy.com/silent-partner-group-to-build-up-four-hyperscale-data-centre-hubs-in-finland/> (accessed 14 April 2020); YLE. URL: <https://yle.fi/uutiset/3-10492984> (accessed 14 April 2020).

energy efficiency and cooling, and the interest in renewable energy and the re-use of heat can thus be identified as a feature particular to northern, especially Nordic, data center research. Besides the academic publications, similar trends can also be seen in private companies' R&D activities and in the composition of organizations bringing actors involved in the data center industry together.

The concept of green IT, which, according to one definition, "denotes all activities and efforts incorporating ecologically friendly technologies and processes into the entire lifecycle of information and communication technology" [32, Hedwig M., Malkowski S., Neumann D., p. 2], guides in the taking of a long-term perspective with questions concerning the sustainability and carbon footprint of the data center industry. Although energy-related issues play a significant role, they are only a part of the package including also the materials used during both the construction and operative phases. Discussions concerning the efficiency, costs, and environmental friendliness of materials is relevant at all levels, whether the materials be for the computer components or are what will be used in the data center buildings. In this respect, the wooden data center constructed in Sweden⁴⁶ should be mentioned, as it is an example of cooperation between the emerging data center industry and the more traditional industries that utilize northern natural resources.

Finally, in order to make sense of the discussion concerning the sustainability of data centers and energy consumption, it should be emphasized that data centers are built to answer the demand originating from the growth of other businesses that utilize their services. The servers never run (and consume energy) without reason. While the pressure from legislators and consumers will most likely push the data centers to perform in more sustainable ways in the future, the initiatives carried out by the industry have already made the situation much better than it was, for example at the end of the 1990s. Back then, an article published in *Forbes* titled 'Dig more coal — the PC's are coming' opened many peoples' eyes to the connection between electronic equipment and energy consumption⁴⁷. However, the data center industry is not immune to a divergence in ways of understanding the meaning of 'sustainable' or 'green', or to the differences between the various Arctic and northern countries that affect the operational conditions of other industries as well. Therefore, the pressure and methods utilized to achieve greater energy efficiency will most likely continue to vary in the future, and there will be different opinions, such as those concerning the combined development of nuclear power and data centers⁴⁸.

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⁴⁷ Huber P., Mills M., Dig more coal — the PC's are coming. URL: <https://www.forbes.com/forbes/1999/0531/6311070a.html#4b8baf822580> (accessed 14 April 2020).

⁴⁸ Example of such development: Moss S. Rostelecom opens a data center next to a nuclear power plant, could be Russia's largest in 2021. URL: <https://www.datacenterdynamics.com/en/news/rostelecom-opens-data-center-next-nuclear-power-plant-could-be-russias-largest-2021/> (accessed 14 April 2020).

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The Power of Connectivity in the Arctic: Citizen Participation in Arctic Institutions*

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Abstract. Increasing business opportunities in the Arctic in the spheres of tourism, transport, mining, oil and gas and creative industries require efficient connectivity. Arctic territories offer an attractive place for data servers running on green energy. The subsea fiber cable connecting European High North territories with the US and Asia is an opportunity to improve connectivity in the Arctic. The opening of the Arctic sea creates preconditions for such a project. In this paper, I study existing Arctic institutions that deal with connectivity issues in the Arctic. As theoretical frameworks, I use Gaventa's (1982) framework of power and powerlessness and stakeholder participation model. The power and powerlessness and modes of participation of stakeholders at the national and regional levels are investigated. I use secondary data, such as the EU and regional policies, statistical data on the topic of connectivity in the Arctic. The study contributes to the understanding of power structure and citizen participation in the Arctic institutions by using an example of connectivity in the Arctic. The findings suggest that Arctic institutions have very limited citizen participation opportunities due to their composition, working formats, and governance structures. Several suggestions for opening-up closed spaces to be inclusive of Arctic citizens perspectives are suggested.

Keywords: *Arctic, power, Arctic institutions, citizen participation, connectivity.*

Introduction

Arctic development has been under the radar of media and governments worldwide [1, Larsen J.N., Fondahl G., p. 22]. The Arctic is a prospective place for the development of tourism, transport, mining, oil and gas, food and creative industries. The Arctic region, however, requires substantial investments in the infrastructure such as urban, industrial, transport and telecommunication infrastructure¹. Connectivity is defined as the quality, state, or capability of being connective or connected, the ability to connect to or communicate with another computer or computer system². In the Arctic, context connectivity covers such topics as broadband accessibility for population and businesses, fibre network (including subsea cables), and data centres, amongst others.

Current modes of cooperation in the Arctic include a plethora of intergovernmental organisations and other fora that contribute to regional, national and global Arctic agenda. What remains uncertain is the role of Arctic citizens in these fora. The article's title is the power of connectivity, which metaphorically relates to the aspects of power and how Arctic citizens are connected to existing representations of power. As a demonstrative example, the issue of connectivity is chosen to limit the focus of the paper. However, the paper aims to investigate the power and powerlessness of citizen participation in the work of Arctic institutions. The study answers two research questions: 1) what work on connectivity is produced by the Arctic institutions? 2) how is citizen

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¹ Guggenheim Partners. Financing sustainable development in the Arctic: Responsible investment solutions for the future, 2019. URL: <https://www.guggenheiminvestments.com/GuggenheimInvestments/media/PDF/Financing-Sustainable-Development-in-the-Arctic.pdf> (accessed 05 June 2020).

² Merriam-Webster dictionary

participation supported in the Arctic institutions? I find that while many institutions address Arctic issues, the Arctic Council (AC) and the Arctic Economic Council (AEC) have been most active in producing research and evidence concerning connectivity issues. Regarding citizen participation, the Arctic institutions (i.e., AC and AEC) have very limited citizen participation opportunities due to their composition and governance structures.

The remainder of the paper is organised as follows. First, Gaventa's power cube and citizen participation's theoretical background is summarised, followed by an overview of connectivity in the Arctic. Second, Arctic institutions and their work on connectivity are examined. Finally, the Arctic connectivity domain is analysed via power cube and citizen participation theoretical lenses. In conclusion, several solutions are offered for opening existing power spaces for citizens' participation. The paper contributes to the discussion on the efficiency of Arctic organisations [2, Smieszek M., pp. 3–26] and to the research highlighting the need to reform current Arctic institutions [3, Stokke O.S., pp. 13–26]. The article provides suggestions on the improvement of citizen participation in the work of Arctic institutions.

This paper uses the power cube theory by Gaventa (2003) to demonstrate the power and powerlessness of citizen participation in the Arctic institutes by using an example of connectivity [4, Gaventa J., pp. 1–267]. By Arctic institutions, I mean different intergovernmental and regional organisations and other institutional forms involved in promoting Arctic research and cooperation³.

Power cube by Gaventa

The distribution of power can be deconstructed using Gaventa's power cube framework that includes power, places and spaces (see Figure 1). The power cube helps to understand how power operates, how different interests can be marginalised from decision making, and the strategies needed to increase inclusion [5, Luttrell C., Quiroz S., Scrutton C., Bird K., pp. 1–16.].

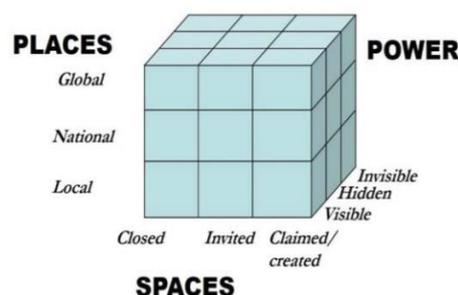


Fig. 1. The power cube framework⁴.

Spaces relate to the arena of power and how they are created. Three types of power spaces are distinguished [5, Luttrell C., Quiroz S., Scrutton C., Bird K., pp. 7–8]:

³ for a list of Arctic institutions see Table 1

⁴ Source: Institute of Development Studies.

- 1) Closed spaces. These are spaces reserved for elites, empowered groups and individuals. Decisions are made with little consultation or involvement of other actors
- 2) Invited spaces. Under external pressure or faced with legitimacy concerns, authorities may create opportunities for involvement and consultation, often legally constituted
- 3) Claimed/created. These are spaces often created outside formalised policy arenas. When external voices are excluded from formal organisations, they create collective action by themselves, through social movements or community associations.

Power in the power cube framework refers to the degree of power visibility. It can be regarded as the way the power is communicated.

- 1) Visible power is the conventional understanding of power that is negotiated through formal rules and structures, institutions and procedures. It can result in written policies, strategy and budget documents [7, Harris J., pp. 207–215]

- 2) Hidden power focuses on the controls over decision making, and the way certain powerful

institutions maintain their influence over the process and often exclude the views of less powerful groups. It can be viewed as mostly informal decision-making that set or influence the political agenda [6, Jacobi J., Llanque A., p. 4001]

- 3) Invisible refers to peoples' attitudes and consciousness, i.e., what people think and how this influences their psychological and ideological boundaries of participation in decision-making. Invisible power reflects how individuals think of their place in society and explain why some are prevented from questioning existing power relations [5, Luttrell C., Quiroz S., Scrutton C., Bird K., pp. 1–16].

The third dimension on the power cube framework is “places,” meaning the levels and places of engagement. Places are categorised into local, national, and global places. Local places include NGOs and local governments, national places refer to national governments, and global encompass international organisations and international NGOs.

Gaventa's power cube framework has been applied in studying ownership dynamics in local multi-stakeholder initiatives (MSI). Biekart and Fowler [8, Biekart K., Fowler A., pp. 1692-1710.] studied 17 MSI cases using a power cube framework and stakeholder engagement. They find that that “government ownership is less likely to arrive at successful outcomes unless there is a move towards more inclusive and broader societal ownership with its implications for how MSIs are governed” and “that top-down aggregated imperatives are simply too coarse to be relied on as a foundation for ownership-based agency” [8, Biekart K., Fowler A., p. 1706]. Furthermore, Gaventa's power cube' is applied in the exploration of food security in Zambia [7, Harris J., pp. 207–215] and local communities and in analysing tourism industry development in the Yamal Peninsula [9, Gorbuntsova T., Dobson S., Palmer N., pp. 67–79].

Citizen participation is tightly linked to the analysis of power relationships because the degree of citizen participation can shed light on the power dynamics of the system. Different models

include, e.g., a ladder of citizen participation [10, Arnstein S.R., pp. 216–224], five rungs of citizens participation [11, Thomas J.C., pp. 1–211], three models of citizens participation- active, passive and transitional [12, Timney M.M., pp. 88–101]; an evolutionary continuum of public administrator and citizen interaction [13, Vigoda E., pp. 527–540], *etc.* When pondering on the effect of citizen participation in governance, Agrawal and Ribot comment that “decentralisation is a strategy of governance to facilitate transfers of power closer to those who are most affected by the exercise of power.” [14, Agrawal A., Ribot J., p. 475]. In Arnstein’s view, “citizen participation is a categorical term for citizen power. It is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic process, to be included in the future.” [10, Arnstein S.R., p. 216]. The advantages of citizen participation include some control over policy process, better policy and implementation decision. In contrast, disadvantages encompass cost and time constraints, worse policy decisions if heavily influenced by opposing interest groups and loss of decision-making control [15, Irvin R.A., Stansbury J., pp. 55–65].

In the EU context, the EU Lisbon Treaty (2007)⁵, through its Article 11 initiated transparency, civil society dialogue, and participatory tools. The implementation of Article 11 resulted in better regulation agenda and the creation of consultation platforms that give room to a more efficient collection of stakeholders’ opinions. The current concerns include standardisation of the consultation process and the new platforms’ setup balancing between the business-oriented lobby and citizen participation⁶. Still, the studies confirm that there has been some visible progress towards the implementation of Article 11 of the Lisbon Treaty in the EU context. Yet, at the same time, participation is used at times as a rhetorical device to imply that the European political process is more open than it is [16, Marxsen C. M., pp. 151–169].

For the purpose of this study, I do not submerge into the theoretical underpinning of citizen participation, but rather investigate its simplistic forms by addressing a question if current Arctic institutions allow any degree of citizen participation either by an opportunity to provide ideas, feedback or whether consultation process (stakeholder dialogue) is offered to the Arctic citizens. By Arctic citizens, I mean people (indigenous peoples and local people) who live in the Arctic regions of eight Arctic states.

Overview of Connectivity in the Arctic

First, I look at the Arctic strategies of the Nordic Arctic countries (Norway⁷, Sweden⁸, Finland⁹ and Denmark¹⁰) and Russia¹¹. Norway, Denmark, Sweden and Russia’s Arctic strategies have

⁵ The Treaty of Lisbon 2007. URL: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Aai0033> (accessed 05.09.2020).

⁶ Citizen’s participation and transparency: closing the gap. URL: <https://europeanmovement.eu/citizens-participation-and-transparency-closing-the-gap/> (accessed 11.09.2020).

⁷ Norway’s Arctic Strategy, 2017. URL: <https://www.regjeringen.no/en/dokumenter/arctic-strategy/id2550081/> (accessed 07 September 2020).

⁸ Sweden’s strategy for the Arctic Region, 2011. URL: <https://www.government.se/49b746/contentassets/85de9103bbbe4373b55eddd7f71608da/swedens-strategy-for-the-arctic-region> (accessed 10 September 2020).

no mentioning of connectivity¹². Out of investigated strategies, only Finland's strategy mentions that Finland "is seeking to establish itself as a new major centre for the cloud industry. Moreover, the weather conditions in the north are perfect for computer centres requiring efficient cooling. Exploiting northern connections greatly improves Finland's competitive position as a site for the information-intensive industry as the connections can be built in the direction of the North-East Passage linking Europe and Asia"⁸ [p. 11 and p. 37]. During its chairmanship in the Arctic Council 2017–2019, Finland had connectivity as one of its priorities. It is worth noting that all strategies mentioned above will be replaced by newer versions in 2020–2021, but what remains to be seen is whether connectivity in the Arctic is going to play a more significant role in them.

Business Index North report (2018)¹³ investigated the state of connectivity in the Arctic in Norway, Finland, Sweden and Russia. Currently, the northern regions do not have a direct subsea cable connection with Europe, the US, or Asia. All sub-sea cables land in the southern parts, creating a disadvantage of the Arctic region in terms of attractiveness for data centre players. Middleton and Rønning¹⁴ emphasise that lack of infrastructure capacity and diversity within the region applies both nationally and internationally [18]. The connectivity issue needs to be solved before the data centre value proposition can be fulfilled in the Arctic. The importance of connectivity solutions in the Arctic regions is essential for tourism development, telemedicine, and online teaching.

Further, to answer the research question of what work on connectivity is produced by the Arctic institutions, I identify Arctic institutions and search for their work on connectivity issues. In order to answer the research question on the availability of citizen participation, I look at the working format and engagement opportunities for stakeholders.

Table 1

*Arctic Institutions*¹⁵

Organisation	Established	Representation	Work format	Openness for citizen participation
Arctic Council ¹⁶	1996	Arctic States Observers Six indigenous Permanent Participant	Six permanent working groups	Potentially possible for indigenous

⁹ Finland's Strategy for the Arctic Region, 2013. URL: <https://vnk.fi/documents/10616/334509/Arktinen+strategia+2013+en.pdf/6b6fb723-40ec-4c17-b286-5b5910fbecf4> (accessed 11 September 2020).

¹⁰ Denmark, Greenland and the Faroe Islands: Kingdom of Denmark Strategy for the Arctic 2011–2020. URL: <https://um.dk/en/news/newsdisplaypage/?newsid=f721f2cb-aff1-4cf7-a3e7-14fda508690a> (accessed 10.09.2020).

¹¹ Strategia razvitiya arkticheskoy zony Rossiskoy Federatsii, 2013. URL: https://minec.gov-murman.ru/upload/iblock/b36/strategy_azrf.pdf (accessed 11 September 2020).

¹² Search words used: broadband, internet, connectivity, IT, ICT

¹³ Business Index North report, 2018. URL: <https://businessindexnorth.com/reports/?Article=61> (accessed 17 May 2020).

¹⁴ Middleton A., Rønning B. Data centers as critical infrastructure in the Arctic, High North News, 2020. URL: <https://www.highnorthnews.com/en/data-centers-critical-infrastructure-arctic> (accessed 17 June 2020).

¹⁵ Source: Compiled by the author.

¹⁶ Arctic Council. URL: <https://arctic-council.org/en/> (accessed 15 September 2020).

		organisations		peoples via Six indigenous Permanent Participant organisations
Barents Euro-Arctic Council (BEAC) ¹⁷	2007	Cooperation on intergovernmental Barents Euro-Arctic Council (BEAC) and interregional level Barents Regional Council (BRC).	Working groups (7 individual and six joint working groups)	No
Nordic Council (NC) ¹⁸	1952	Official body for formal inter-parliamentary co-operation. It has 87 members from Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland.	Funding agendas	No
Northern Forum (NF) ¹⁹	1991	NF is a non-profit, international organisation composed of fourteen sub-national or regional governments from five northern countries.	Work organised in 10 working groups	No
Northern Dimension (ND) ²⁰	1999	The Northern Dimension (ND) is a joint policy of four equal partners: the European Union (EU), Russian Federation, Norway and Iceland. The USA and Canada hold observer status in the ND.	Work organised in 4 partnerships: The Northern Dimension Environmental Partnership (NDEP), The Northern Dimension Partnership in Public Health and Social Well-being (NDPHS), the Northern Dimension Partnership on Transport and Logistics (NDPTL) and the Northern Dimension Partnership on Culture (NDPC). The structure, nature and tasks of partnerships vary from project-centered financing to export-oriented cooperation.	No
Standing Committee of Parliamentarians of the Arctic Region (SCPAR) ²¹	1993	A parliamentary body comprising delegations appointed by the national parliaments of the Arctic states (Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the USA) and by the European Parliament. It also includes Permanent Participants representing indigenous peoples, and observers.	The conference meets every two years.	No
Arctic Economic Council (AEC) ²²	2014	The AEC is open to corporations, partnerships and indigenous groups with an economic interest in the Arctic.	Six working groups conduct work	Potentially possible for indigenous

¹⁷ Barents Euro-Arctic Cooperation. URL: <https://www.barentscooperation.org/en/About> (accessed 10 August 2020).

¹⁸ Nordic Council (NC). URL: <https://www.norden.org/en/nordic-council> (accessed 10 August 2020).

¹⁹ Northern Forum. URL: <https://www.northernforum.org/en/> (accessed 10 August 2020).

²⁰ Northern Dimension. URL: <http://www.northerndimension.info/northern-dimension> (accessed 10 August 2020).

²¹ Standing Committee of Parliamentarians of the Arctic Region (SCPAR). URL: <http://www.arcticparl.org/> (accessed 10 August 2020).

²² Arctic Economic Council. URL: <https://arcticeconomiccouncil.com/> (accessed 12 August 2020).

		Voting and non-voting members		peoples via Six indigenous Permanent Participant organisations nominations
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Seven different institutions promoting research and cooperation in the Arctic have been identified (see Table 1). Some are devoted to funding research (Nordic Council), some are dedicated to regional cooperation (BEAC and NF) and some have a clear emphasis on business cooperation (Arctic Economic Council).

Further, I list the work produced by these institutions that is related to connectivity in the Arctic. Table 2 summarises the findings. While the Northern Dimension produced three reports related to connectivity with the scope was on the Baltic Sea region without a specific focus on the Arctic challenges. Ministers of the Arctic Council established Arctic Council's Task Force on Telecommunications and Infrastructure in the Arctic states at the Iqaluit 2015 Ministerial Meeting.

Table 2

Arctic institutions' work related to connectivity

Organisation	Work related to connectivity
Northern Dimension	State of the Digital Region 2017: Exploring Automation, Education and Learning in the Baltic Sea Region Towards a Cross-border Open Data Agenda — A Case for a macro-regional agenda on open government data in the Baltic Sea Region (2016) State of the Digital Region 2016 — Cities Connecting the Digital Economy in the Baltic Sea Region
Arctic Council	The Task Force on Telecommunications Infrastructure in the Arctic (est. 2015) Report Improving Connectivity in the Arctic (2019)
Arctic Economic Council	AEC Working Group (WG) on Infrastructure Arctic Broadband — Recommendations for an Interconnected Arctic (2017)

The Task Force, co-chaired by Norway and the Kingdom of Denmark, has the mandate to “... develop a circumpolar infrastructure assessment as a first step in exploring ways to improve telecommunications in the Arctic”. The report by Task Force Report Improving Connectivity in the Arctic (2019)²³ highlights that the cost for connectivity in the Arctic communities is often significantly higher than in less remote, more densely populated communities; there is less access to high-speed networks in remote communities, and network outages occur more often. The report comments that future telecommunications infrastructure should be built to enable sustainable economic development.

²³ Arctic Council Task Force on Improved Connectivity in the Arctic. Improving Connectivity in the Arctic. Arctic Council Secretariat, 2019. URL: https://oaarchive.arctic-council.org/bitstream/handle/11374/2369/SAOXFI205_2019_RUKA_06_TFICA_Report-3rd-Draft%206%20May.pdf?sequence=1&isAllowed=y (accessed 17 August 2020).

Finally, the work produced by Arctic Economic Council, “Arctic Broadband — Recommendations for an Interconnected Arctic” (2017)²⁴ provides an analysis of the state of Arctic broadband. It also presents different funding options applicable in the Arctic, an overview of planned and ongoing projects related to connectivity, and recommendations for the future. The report also outlines building, maintaining and providing affordable communication services to end-users challenging in the Arctic due to dispersed population, geography, harsh climate, higher costs and human resource gap. The report brings forward the challenge: the lack of a comprehensive strategy for connecting all Arctic communities and the rest of the world. Overall, the analysis identified that two institutions Arctic Council and Arctic Economic Council, are the ones that produced work most relevant to connectivity issues in the Arctic.

The analysis of Arctic institutions’ work regarding openness for citizen participation included studying their websites and working formats. In most institutions, the work is conducted in closed working groups that predominantly constitute scientists and experts. Next, I looked at the Arctic institutions’ websites to access opportunities to provide feedback, consultation opportunities, and opportunities by the citizens to submit ideas and proposals. Based on the website information, none of these institutions offers such options (see Table 1). It should be noted that citizen participation in AC work can be deemed possible for indigenous Arctic people via Six indigenous Permanent Participant organisations. Furthermore, citizens may consider becoming politically active and get selected to national parliaments and then from there get nominated for Standing Committee of Parliamentarians of the Arctic Region (SCPAR).

Moreover, citizens can potentially join some observer organisations in the AC, e.g., the World Wide Fund for Nature, Arctic Programme (WWF), that offer avenues for citizens’ participation. In AEC working groups consist of AEC members that are represented by businesses operating in the Arctic. Arctic indigenous peoples have an opportunity for a mediated citizen participation in AEC’s work if nominated by Six indigenous Permanent Participant organisations. Still, based on the analysis, it is inferable that conventional models of citizen participation (opportunities of providing feedback, consultation opportunities, and options to submit ideas and proposals by the citizens) are not supported by the working format and governance structure of the Arctic institutions.

Since the article’s focus is connectivity, I study in more detail Arctic Council and Arctic Economic Council as institutions that produced most work on this subject. I evaluate the power dynamic of the Arctic connectivity domain by applying Gaventa’s power cube framework [4, Gaventa J., pp. 1–267].

Analysis of connectivity domain via power cube and citizen participation

The Arctic Council (AC) is an intergovernmental forum for promoting cooperation, collaboration, and integration between Arctic nations, indigenous communities, and other Arctic inhabit-

²⁴ Arctic Broadband report- Recommendations for an interconnected Arctic, 2017. URL: https://arcticeconomiccouncil.com/wp-content/uploads/2017/03/AEC-Report_Final-LR.pdf (accessed 19 August 2020).

ants. Founded in 1996 by the Ottawa Declaration, the Arctic Council comprises eight member nations and six permanent indigenous groups. The Arctic Council has been responsible for negotiating international agreements on oil spill response, search, and rescue and scientific cooperation in the Arctic. At the same time, the Arctic Council's work has been criticised for being ad-hoc and without due recourse to planning [17, Barry T., Daviðsdóttir B., Einarsson N., Young O.R., p. 102099].

Arctic Economic Council (AEC), established in 2014, has amongst its objectives to facilitate Arctic business-to-business and economic development and provide advice and a business perspective on specific areas of cooperation in the circumpolar region and the activities of the Arctic. The AEC consists of up to 42 representatives (each of the eight Arctic state and six Permanent Participant of the AC is entitled to name up to three business representatives to the AEC). AEC comprises solely business representatives [18, Łuszczuk M. pp. 37–48].

Next, I construct connectivity domain in the Nordic part of the Arctic by placing the work of AC and AEC and other organisations in the facets of power cube [4, Gaventa J., pp. 1–267; 5, Luttrell C., Quiroz S., Scrutton C., Bird K., pp. 1–16.] and paying attention to citizen participation availability. By connectivity domain, I mean a collection of relevant actors, stakeholders, places, spaces and power representations as in Gaventa's power cube. The analysis is summarised in Figure 3 with further description below.

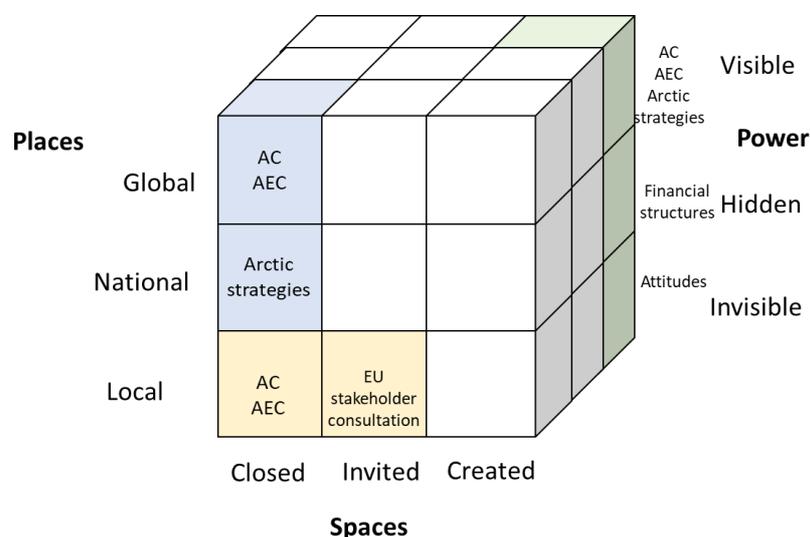


Fig. 3. Analysis of connectivity domain in the Nordic Arctic states.

Discussion on connectivity in the Arctic is done predominantly in two **places** global and national. AC and AEC represent **global places** since, in theory, they are open for participation to global players. For instance, "Arctic Council is open to non-Arctic states, along with inter-governmental, inter-parliamentary, global, regional and non-governmental organisations that the Council determines can contribute to its work." Observers can attend all Council meetings alongside member states and permanent participants. Currently, there are 13 non-Arctic states, 13 Intergovernmental and interparliamentary organisations, and 12 non-governmental organisations.

Similarly, apart from Arctic businesses, AEC is potentially open for stakeholders from across the globe as non-voting members. **National places** are represented by national Arctic strategies that currently do not consider connectivity as one of the priorities (except for Finland).

When analysing **spaces**, I look at the arena of power in the Arctic. Both AC and AEC represent **closed spaces** since they are reserved for elites, empowered groups, and certain selected individuals. Decisions are made with little consultation or involvement of other actors; moreover, both organisations are not open for citizen participation in a conventional format. The public sector (traditional government) is represented by the eight Arctic nations. In the case of AC, ministers and SAOs are politically appointed to the position by the state and citizens cannot vote for them. While business stakeholders are not represented in AC, they are the only stakeholder in the AEC. According to power cube both AC and AEC are considered closed spaces because of the lack or unavailability of publicly open information. In the case of AC, there are minutes of the meetings available on the website, but “minutes from Council meetings do not record any comments from observers during general plenary discussions”²⁵. In the case of AEC, minutes of the meetings are not available. There is no opportunity to watch meetings online or have access to recorded meetings. Access to the meetings is by invitation only.

Moreover, there is no opportunity to provide feedback or propose initiatives to Arctic citizens. Recently, AC launched a new marine cooperative initiative to discuss the increasing pressures on the Arctic marine ecosystem and coastal communities in the circumpolar North. Still, participation in the webinars is limited to Arctic Council delegates and invited external experts²⁶. Some degree of openness is pertinent to this new initiative as keynote, and expert presentations will be shared publicly on the Arctic Council’s Vimeo channel after the respective thematic session.

Why is the lack of access to meeting minutes or videos a challenge? Why should Arctic citizen participation be deemed important? As it stands, Arctic citizens do not have a direct communication channel with the two most influential organisations in the Arctic matters. Arctic citizens can potentially communicate their concerns via democratic institutions of their own countries, but this is time-consuming and a lengthy endeavour. Indigenous peoples that have representation in the AC as permanent participants have access to influence and participate in AC’s work through indigenous peoples’ organisations that represent their stake in the work of AC and AEC. While connectivity issues are of utmost importance for the Arctic citizens in terms of access to education, telemedicine and participation in the digital economy, the question addressed in this article is of a broader scale. What is Arctic citizens’ agency in the research, collaboration, and political decisions that directly concern their place of inhabitation?

Regarding **invited spaces** (that create opportunities for citizens’ involvement and consultation), there is no such option at the current working format of AC and AEC. Concerning connecti-

²⁵ Charter A. Trends among the Arctic Council Observers, 2017. URL: <http://polarconnection.org/arctic-council-observers-trends/> (accessed 17 July 2020).

²⁶ Arctic Council advances its stewardship role, 2020. URL: <https://arctic-council.org/en/news/arctic-council-advances-its-marine-stewardship-role/> (accessed 10 October 2020).

ty, the only invited space that was identified was initiated by the EU, which it currently does not have observer status in the AC but may observe Council proceedings until the decision on the status is made. In 2017, the EU launched the Arctic stakeholder forum consultation²⁷ to identify key investment priorities in the Arctic and ways to streamline better future EU funding programs for the region. As a result of the consultation process, the report states that stakeholders view as an investment priority “to extend and improve digital infrastructure “²³ [p. 2]. In 2020, the European Commission and the European External Action Service jointly launched a public consultation²⁸ on the way forward for the European Union’s Arctic policy, offering an avenue for citizens’ involvement and participation. No claimed spaces were identified in the Arctic context concerning connectivity issues.

Moving on to **power** component of power cube, **visible power** is represented via AC and AEC work. Both AC and AEC are formal institutions that have norms, rules, and procedures. Likewise, national Arctic strategies represent visible power. **Hidden power** concerning connectivity issues in the Arctic is represented by financial structures and certain powerful players that maintain their influence over the process (e.g., Internet giants like Facebook, Amazon, etc.). Finally, **invisible power** relating to peoples’ attitudes and consciousness, i.e., what people think and how this influences their psychological and ideological boundaries of participation in decision-making. Invisible power can be proxied by enhanced digitalisation of our lives, the privacy of information, digital traces, time spent online *etc.* In comparison, access to connectivity can be viewed as a significant lever that creates opportunities for people from remote areas to work anywhere in the world, which is especially relevant in the time of COVID-19. Simultaneously, the advent of connectivity requires that citizens have digital skills that protect them from invisible powers and dangers that digital lives entail.

The value of power cube exercise lies in the applicability of the concept for any critical matter in the Arctic. For example, it can be done for food security in the Arctic, where main players, agencies, and stakeholders are placed in the power cube depending on their access to power and ability to influence decisions. Power cube is a useful instrument for bringing to light voices and perceptions of different stakeholders’ capacity to exert power. It should also be noted that power cube may have other representations depending on the preparers’ perspectives. Hence power cube framework represents a viable tool to reconcile views of different stakeholders.

Conclusions

The article identified many fora for conducting cooperation and scientific research in the Arctic, which, however, lacks a mechanism for Arctic citizen participation. An example of connec-

²⁷ Summary report of the Arctic stakeholder forum consultation to identify key investment priorities in the Arctic and ways to better streamline future EU funding programmes for the region, 2017. URL: <https://op.europa.eu/en/publication-detail/-/publication/6a1be3f7-f1ca-11e7-9749-01aa75ed71a1/language-en/format-PDF/source-60752173> (accessed 05 December 2019).

²⁸ EU Arctic policy public consultation, 2020. URL: <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12523-EU-Arctic-Policy> (accessed 15 September 2020).

tivity was chosen to have a focused case study of the issue that deeply affects all Arctic citizens. However, the chosen methodology can be applied to any sphere of human activity. This study contributes to the research addressing the need to reform existing-working mechanisms and governance structures of the Arctic institutions [3, Stokke O.S., pp. 13–26; 17, Barry T., Daviðsdóttir B., Einarsson N., Young O.R., p. 102099]. Research by Turnhout and Bommel (2010) suggests that participation creates citizens and “participation as a performative practice emphasises that identities, knowledge, interests, and needs are not represented but shaped, articulated, and constructed in the participation process itself” [19, Turnhout E., Van Bommel S., p. 26]. Hence, it becomes a feasible question to address for the future: whose identities, perspectives, and views are currently not included in Arctic institutions’ work?

The following suggestions can be implemented for opening closed spaces. In AC and AEC’s work, there can be more focus on transparency and citizens’ rights to information disclosure. It can be achieved by greater accountability, starting from the publication of meeting minutes and release of recorded meetings; the research project selection process could benefit from more transparent disclosures. To engage with citizens AC and AEC can, e.g., adopt the EU model of the stakeholder consultation process to inform, for instance, on the needs of future research projects and initiatives. It shall be noted that facilitating citizen participation and breaking institutionalised power dynamics is not easy and shall be not done for the achievement of face value. Still, it should include a feasible, cost-efficient process based on the best practices of intergovernmental organisations works.

Furthermore, creation of the national Arctic strategies could involve elements of stakeholder consultation and citizen engagement process as well, ensuring that the people who live in the Arctic have their voices heard and mechanisms for citizen participation are embedded in the strategies’ design. Procedures and policies that directly affect Arctic citizens’ lives need to include meaningful priorities and improve everyday lives for people that inhabit the Arctic. Returning to this article’s title, connectivity, and the power of connectivity, digital solutions appear to be some of the most efficient ways to have more engagement with the citizens and potentially enhance citizen participation in Arctic institutions’ work. To sum, connectivity in the Arctic becomes even more critical in times of COVID-19 pandemic when people are forced to move their work, education and medical services online. Access to connectivity can be viewed as a lever that creates more equal opportunities for people in the Arctic remote areas. Citizen participation can also be considered as a lever that brings cooperation and research done in the Arctic closer to the people directly impacted by it.

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Arctic Council: Outcome of the First Year of the Icelandic Presidency*

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Annotation. In the article based on the report of the Chairman of the Committee of Senior Officials in the Arctic Council, Einar Gunnarsson «Together on the road to a sustainable Arctic: one year in 2019-2021 of the presidency of Iceland», the first year of Iceland's Arctic Council presidency is reviewed by the Senior Officials Committee. Key priorities for action are identified, which are protecting the Arctic marine environment, combating ocean acidification; sustainable development of the fisheries sector; reducing ocean pollution; combating marine debris; combating climate change and introducing green energy; ensuring the sustainable development of the indigenous community of the Arctic; continuing to strengthen and enhance the role of the Arctic Council in maintaining peace, international cooperation and political stability in the Arctic region. Also, the impact of the coronavirus pandemic on the Icelandic presidency and the development of Arctic cooperation are being considered. Of interest is the analysis of measures taken to counter the pandemic among the small indigenous communities of the North, Siberia and the Russian Far East. Iceland's plans for the second year of its chairmanship of the Arctic Council are indicated. The author also discusses Russian-Icelandic cooperation at the current stage in the economic field and in the sphere of inter-regional relations. It is noted that our countries share a common memory of the joint struggle against fascism, and Russia remembers with gratitude Iceland's contribution to the formation and support of polar convoys.

Keywords: Arctic Council, presidency, Iceland, Russia, environment, climate, small indigenous peoples.

Introduction

The Arctic Council (AC, Council) was formed on September 19, 1996 in Ottawa (Canada) by representatives of eight Arctic states: Denmark, Iceland, Canada, Norway, Russia, USA, Finland and Sweden.

On May 7, 2019, the chairmanship of the Council passed from Helsinki to Reykjavik. Minister of Foreign Affairs of Finland T. Soini handed over the chairmanship of the AC to Minister of Foreign Affairs of Iceland G.T. Thordarson for the next two-year period [1, Zhuravel V.P.]. It should be noted that Iceland held the AC chairmanship for the first time in 2002–2004. Since then the country has been actively engaged in the development of its national Arctic strategy and policy, has prepared a number of reports "Ocean — Iceland's policy" (2005), "North Meets North — Navigation and the Future of the Arctic" (2006), "Iceland at the Extreme North" (2009). Althing formulated 12 key provisions (principles) of the country's Arctic policy in its resolution of March 28, 2011.

While planning and implementing events for its first year of chairmanship in the Council, Iceland focused on protecting the Arctic marine environment, combating ocean acidification, sustainable development of the fishing sector, reducing ocean pollution, combating marine litter,

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combating climate change and introducing green energy, ensuring sustainable development of the indigenous community living in the Arctic, and continuing efforts to strengthen and enhance the role of the Arctic Council.

The theme of the Icelandic chairmanship program in the Arctic Council for 2019–2021 reflects Iceland's commitment to the principle of sustainable development and indicates the need for close cooperation between the states and peoples of the region and beyond through the work of six working groups: Arctic Monitoring and Assessment Programme (AMAP); Conservation of Arctic Flora and Fauna (CAFF); Emergency Prevention, Preparedness and Response (EPPR); Protection of the Arctic Marine environment (PAME); Sustainable Development Working Group (SDWG); Arctic Contaminants Action Program (ACAP).

On June 9, 2020, Einar Gunnarsson, the Chairman of the Committee of Senior Officials of the Arctic Council, published a report that summarizes the results of Iceland's first year of the Council's chairmanship with assessments of the widest range of Arctic issues¹: combating marine litter, reducing ocean pollution, protecting the arctic marine environment, combating ocean acidification.

The first executive meeting of the Committee of Senior Officials of the Arctic Council took place on June, 18–19 in Reykjavik. It was attended by indigenous peoples' organizations, as well as representatives of countries and international organizations with observer status.

The event focused on ways and means of reducing the threat of plastics contamination of the Arctic marine environment. It should be noted that since 2016 the Nordic countries have been conducting annual coastal clean-up activities in May. In 2019, as part of the initiative, more than 19 tons of garbage had been collected on the Icelandic coasts alone. The public organization "Ocean Conservancy" has been active in this direction, which since 1986 has been conducting annual activities for the clean-up marine and ocean territories in more than 150 countries under the general name "International Coastal Cleanup". Approximately 14 million volunteers have already taken part in cleaning up litter from beaches and coastlines.

During the discussion, the participants confirmed the relevance of the issue. According to statistics, more than 80% of marine pollution sources are land-based (coastal), including recreational wastes. It has been found that at least 60% of marine debris is plastic. Approximately 18% of plastic waste comes from the fishing industry [2, Kozlovskiy N.N., Blinovskaya Ya.Yu., p. 159]: foam plastic, plastic bags, disposable dishes, bottles for carbonated drinks, mineral water and juices, as well as fishing nets, polystyrene floats, etc. Plastic waste accumulates faster than any other, due to the growing volumes of its production. This waste forms huge areas of floating islands.

It was noted that the main tasks of combating marine litter will be to clean up Arctic beaches and waterways in all eight Arctic states, to identify sources of litter, to raise public aware-

¹ Together towards a sustainable Arctic: one year into the 2019-2021 Icelandic chairmanship. URL: <https://arctic-council.org/ru/news/one-year-into-the-2019-2021-icelandic-chairmanship/> (accessed 15 April 2019).

ness of the problems caused by marine litter and to encourage people to change their behavior in order to solve this problem [3, Bogdanova E.Yu.].

It was decided that the clean-up activities on the Arctic circumpolar coast will be carried out by the member countries in cooperation with the AC observer states, as well as with local organizations and individuals. During the consultation process, Ocean Conservancy representatives proposed identifying communities in each Arctic region that would be involved in coastal clean-up. They also drew attention to the need to have a sufficient amount of funds and mechanisms for work on the purification of resources and materials. It is noted that the International Coastal Cleanup project is fully suited to the objectives of Iceland's chairmanship of the Arctic Council, and can help to mobilize the public to address the challenges of protecting the Arctic marine environment from plastics contamination in the future.

Scientists have made a significant contribution to the study of microplastics and other pollutants. Studies have found that it is small, less than 5 mm, plastic particles that accumulate in the environment in large quantities, especially in aquatic ecosystems. The oceans today are a kind of repository of plastic mass, which mankind produces in huge quantities every year ².

Unfortunately, marine plastic research in Russia is at the very beginning. Currently, there is a lack of knowledge about its effects on living organisms, including humans. Thus, water samples taken during the expeditions of the Arctic Floating University in 2018 and 2019 ³ showed that the content of microplastics in the Novaya Zemlya area, in the east and in the central part of the Barents Sea, is much higher than in the west, where a lot of enterprises of industrialized European countries are located ⁴. In the autumn of 2019, scientists from the Marine Research Center of Moscow State University named after M.V. Lomonosov surveyed the waters of the White, Pechora, Kara, Laptev and East Siberian seas on the research vessel "Akademik Mstislav Keldysh". During the expedition, floating plastic was discovered in almost all shelf seas of the Russian Arctic. It was noted that the largest Siberian rivers Ob, Yenisei and Lena are likely to be the main sources of plastic pollution in the Arctic. In order to reduce plastic pollution, it is critical to improve the systems of river treatment facilities, as well as to minimize and, if possible, to eliminate production of expendable plastic products ⁵.

Iceland, under its chairmanship in October 2019, with the participation of the Harvard Belfer Center for Science and International Relations, The Polar Institute of the Woodrow Wilson Sci-

² Dno Mirovogo okeana useyano plastikovym musorom [The bottom of the oceans is littered with plastic debris]. URL: <https://esoreiter.ru/news/0115/dno-mirovogo-okeana-useyano-plastikovym-musorom.html> (accessed 17 November 2015).

³ This is a joint long-term project of the Northern Arctic Federal University and the Northern Hydrometeorology and Environmental Monitoring Directorate of Roshydromet.

⁴ Uchenye: Barentsevo more na vostokey zagryazneno mikroplastikom bol'she, chem na zapade [Scientists: the Barents Sea in the east is more polluted with microplastics than in the west]. URL: <https://nauka.tass.ru/nauka/7479791>; Arkticheskiy Universitet provel analiz vody iz Barentseva morya [Arctic University analyzed water from the Barents Sea]. URL: <https://newinform.com/204311-arkticheskii-universitet-provel-analiz-vody-iz-barentseva-morya> (accessed 15 April 2019).

⁵ Uchenye rasskazali, kak zashchitit' rossiyskuyu Arktiku ot mikroplastika [Scientists told how to protect the Russian Arctic from microplastics]. URL: <https://ria.ru/20200117/1563557024.html> (accessed 25 March 2020).

ence Center, held a seminar on policies and actions regarding plastic pollution of the Arctic Ocean

⁶.

In December 2019, Iceland hosted a side event on the acidification of the Arctic Ocean at the annual UN Climate Change Conference. During the event, leading international experts on ocean acidification discussed the chemical, biological and socio-economic impacts of acidification in the north, as well as possible solutions of the problem.

Iceland has been active in promoting innovation and biotechnology in the fisheries sector. Initiatives such as the "Blue Bioeconomy in the Arctic" project have great potential for promoting sustainable development, indicating their reliability in improving the well-being of the region ⁷.

Within the framework of the international conference "Arctic Frontiers", held in January 2020 under the chairmanship of Iceland, a discussion forum and an interactive seminar were held, which made a certain contribution to raising awareness of the "Blue Bioeconomy" [4, Marchenkov M.L.].

In particular, the Working Group on the Protection of the Arctic Marine Environment (PAME) has launched its "Plastic in a Bottle" program, which will allow tracking the movement of marine debris and plastic in Arctic waters and beyond. The capsule, equipped with a GPS transmitter, was launched by the Minister of Environment and Natural Resources of Iceland, Gudmundur Inga Gubbrandsson, from the Icelandic Coast Guard ship Thor in September 2019. In 207 days, the capsule passed more than 7 thousand km and reached the shores of the Tyri Island (Scotland) ⁸.

The small island state has managed to dispose almost entirely of garbage on its territory. The protection of the Arctic marine environment is of key importance to Iceland. Given the importance of fish exports to the economy, Iceland constantly monitors plastic waste in Arctic waters. For example, more than 12,000 microplastic particles per liter of sea ice have been found in the Fram Strait (between eastern Greenland and Svalbard). Iceland expresses concern about excess plastic content in marine waters, which could affect the entire biological chain of flora and fauna in the Arctic ⁹.

It should be noted that the working groups of the Arctic Council have made significant contributions to the expansion of knowledge and understanding of the marine environment. At the end of its chairmanship in May 2021, Iceland plans to submit a comprehensive regional action plan on marine litter and plastics in the Arctic to Arctic Council ministers.

⁶ Together towards a sustainable Arctic: one year into the 2019-2021 Icelandic chairmanship. URL: <https://arctic-council.org/ru/news/one-year-into-the-2019-2021-icelandic-chairmanship/> (accessed 15 April 2019).

⁷ Together towards a sustainable Arctic: one year into the 2019-2021 Icelandic chairmanship. URL: <https://arctic-council.org/ru/news/one-year-into-the-2019-2021-icelandic-chairmanship/> (accessed 15 April 2019).

⁸ Ibid.

⁹ Арктические инициативы Islandii [Iceland's Arctic Initiatives] URL: <https://zen.yandex.ru/media/id/5dc69465c7891f51f5fb5143/arkiticheskie-initsiativy-islandii-5ed61c589934dc5998c067f8> (accessed 13 July 2019).

Sustainable development of the fishing sector

Iceland took an active part in organizing and holding the III International Fisheries Forum and the Fish Industry, Seafood and Technologies Exhibition in St. Petersburg on July 10–11, 2019¹⁰. The event brought together representatives of more than 250 companies from 38 countries of the world in a total of about 6 thousand people. The main event of the fishing industry forum was the plenary session on the theme “Ocean of Opportunities: Nature, Economy, Human”. Industry experts and representatives of official delegations were at the panel sessions “Digitalization as a tool for transforming the fishery industry”, “How to sell fish properly”, “The Arctic and Antarctica: resource potential, prohibition or fishing, elements of cooperation”, “Unlocking the potential of aquaculture in Russia and the world: management, resources, markets”, “The value of the fishing industry: how to assess the efficiency of using a national resource by a business?”, “Fish market economics: fishing, processing, logistics, retail”, “Fishing: social dimension as a factor of territories development”. Iceland presented its national stand at the exhibition.

Climate issues, green energy

Arctic air temperatures continue to rise more than double the global average. Rising temperatures accelerate the melting of snow and ice and have direct and indirect impacts on the interconnected ecosystems of the Arctic, with various economic and social implications for Arctic communities. Studies show that the Arctic climate is especially sensitive to air pollution [5, Matishov G.G., Dzhenyuk S.L., Moiseev D.V.; 6, Morozov A.]. In mid-July 2020, the head of Roshydromet, Igor Shumakov, noted that the decrease in the ice area is the main manifestation of changes in ice conditions in the Arctic. “For the Arctic as a whole, the minimum ice extent was observed in 2007 — 4.19 million square kilometers, in 2012 — 3.35 million square kilometers, in 2019 — 4.1 million square kilometers. For comparison, in 1980 the ice cover reached 7.6 million square kilometers, in 1983 — 7.28 million” emphasized I. Shumakov. He added that the ice cover is getting thinner in the Arctic seas of Russia¹¹.

In order to overcome the negative consequences of climate change in the Arctic, it is necessary to develop strategies aimed at mitigating the effects of climate change, adapting the population to new weather conditions. The Arctic states and their partners should ensure that new economic activities, that became possible due to reduction of sea ice, are carried out on an ongoing basis in order to balance economic growth, social inclusion and environmental protection. This analytical and practical activity during the first year of Iceland's chairmanship was taken into account in the work of six working groups of the Council.

¹⁰ Podvedeny itogi III Mezhdunarodnogo rybopromyshlennogo foruma [The results of the III International Fisheries Forum have been summed up]. URL: <http://fish.gov.ru/press-tsentr/novosti/27678> (accessed 13 July 2019).

¹¹ Rosgidromet otsenil masshtaby tayaniya l'dov v Severnom Ledovitom okeane [Roshydromet has estimated the extent of ice melting in the Arctic Ocean]. URL: <https://ria.ru/20200714/1574311928.html> (accessed 15 July 2020).

During its chairmanship, Iceland pays attention to the further development and application of practical solutions in the field of green energy in the Arctic region, which will allow communities to reduce emissions and improve air quality. Projects that promote knowledge sharing and support small and remote Arctic communities in the transition to sustainable energy will continue in 2019–2021.

Indigenous minorities

The problem of indigenous minorities in the chairmanship of all Arctic states in the Arctic Council has always occupied a special place. Initiatives to improve the well-being of 4 million people who consider the northern region their home are at the heart of the Council's work. The current uncertain situation with the spread of the coronavirus pandemic is especially threatening for the remote Arctic communities.

The Third Executive Meeting of the Committee of Senior Officials of the Arctic Council was devoted to the impact of the coronavirus pandemic on the circumpolar North, the special circumstances and the unique medical, social and economic needs of the Arctic communities, which took place on 24–25 June 2020¹². At this meeting, the Minister of Foreign Affairs of Iceland, Gudlaugurd Urdarson, critically identifying the problems of life of indigenous peoples, noted the importance of continuing the Council's work to solve the problems posed by COVID-19. In his statement, Einar Gunnarsson (Iceland), the Chairman of the Committee of Senior Officials at the Arctic Council, stressed that the lack of necessary infrastructure, remoteness from medical centers, unreliable communications made the inhabitants of the Arctic especially vulnerable during a pandemic. James Stotts, President of the Alaska Inuit Circumpolar Council, noted that Inuit communities in the Arctic have historically suffered devastating human losses due to lack of immunity to disease, exacerbated by a lack of resources and infrastructure, necessary for effective prevention and response. Among the problems that have remained unresolved for decades, he cited overcrowded housing, lack of proper sanitation, drinking water and poor broadband; he suggested that the pandemic would exacerbate these problems, and national efforts would be made to address them. Stefan Skjaldarson, the Chairman of the Arctic Council Sustainable Development Working Group, noted that a lot has been done in recent years to support and improve the health, social, cultural and economic well-being of indigenous peoples and Arctic residents. But the spread of the coronavirus pandemic has shed light on the region's infrastructure deficit. The global health crisis presents a unique opportunity to better understand and support the sustainability of the Arctic region.

It should be noted that the UN High Commissioner for Human Rights Michelle Bachelet, speaking on June 30, 2020 in Geneva at the 44th session of the UN Human Rights Council, positively assessed Russia's efforts to protect indigenous peoples from a pandemic, noting that in the con-

¹² Circumpolar collaboration amidst coronavirus pandemic. URL: <https://arctic-council.org/ru/news/circumpolar-collaboration-amidst-coronavirus-pandemic/> (accessed 15 June 2020).

text of the pandemic, the Russian Federation is using telecommuting technologies to improve medical services for indigenous nomadic populations¹³.

For this meeting, the Association of Indigenous Minorities of the North, Siberia and the Far East of the Russian Federation prepared a report on the experience of countering coronavirus and the restrictive measures taken to reduce the spread of the disease. Thus, in the Yamalo-Nenets Autonomous Okrug, where about 18 thousand Nenets reindeer herders are currently roaming, a system of response, information and assistance to indigenous communities has been built; a system of social payments was organized as well as a delivery of essential products.

Due to the remoteness and inaccessibility of places of indigenous minorities' residence, low social mobility and difficult access to relevant information and public services, there is a threat to the health of individuals and the peoples, whose population often does not exceed several thousand people. It is emphasized that there are additional risk factors for infection and the clinical severity of COVID-19 for people living in the Arctic, since deficiencies in iodine, calcium, zinc and vitamin D are widespread among them, which can negatively affect the course of the disease. Particular attention is paid to the preservation of life and health of the older generation, the elders, who are the bearers and keepers of the national heritage — language and original culture. The most important source of sustainability for indigenous peoples is their access to traditional products that are common for the northern peoples' diet: local fish and meat. It is noted that health and quality of life of the aborigines depend on the ability to keep food habits that have developed over centuries¹⁴. Indigenous people who have lost their attachment to traditional food are more susceptible to pathological disorders of the digestive, respiration, urinary systems, ENT-organs, immune and endocrine systems [7, Zhuravel' V.P.].

In response to the Coronavirus threat, the Federal Agency for Ethnic Affairs sent recommendations to the constituent entities of the Russian Federation in April — May 2020 to analyse the situation among indigenous minorities. They included support measures with a revision of the directions for spending federal subsidies for the development of indigenous peoples through the Agency in 2020. Special attention was paid to the need to ensure stable communication with communities of indigenous (autochthonous) peoples in remote areas, monitor their health status, access public services, provision of products and essential goods. The constituent entities of the Russian Federation formed working groups to organize the relevant work, which made it possible

¹³ V OON pozitivno otsenili usiliya Rossii po zashchite korennykh narodov ot pandemii [The UN praised Russia's efforts to protect indigenous peoples from a pandemic]. URL: <http://www.raipon.info/info/news/4313/> (accessed 15 June 2020).

¹⁴ Severnaya ryba i myaso – eto osnova zdorov'ya korenogo naseleniya. Assotsiatsiya podgotovila materialy dlya vstrechi Starshikh dolzhnostnykh lits Arkticheskogo soveta po koronavirusu [Northern fish and meat are the foundation of the health of the indigenous population. Association prepared materials for the meeting of Senior Arctic Council officials on coronavirus]. URL: <http://www.raipon.info/info/news/4287/> (accessed 15 June 2020).

to avoid massive coronavirus diseases, keeping feeling of stability and atmosphere of quick and managing solution to emerging problems¹⁵.

Currently, the Council's working groups are working on the implementation of 50 initiatives designed specifically to improve the situation of Arctic peoples and communities. The specificity of these projects varies depending on their economic potential, the level of participation of the younger generation, the incorporation of indigenous knowledge and, of course, health problems.

An important role in the development and strengthening of Arctic solidarity of indigenous minorities was played by the 6th Summit of Arctic Indigenous Leaders, which took place on November 13–15, 2019 in the capital of Lapland. The event was attended by official delegations from six indigenous organizations, representatives of the authorities of the Arctic states, representatives of the Arctic Council, members of parliaments of the Arctic countries, representatives of the UN, non-governmental organizations, scientists and experts. The speech of the President of the Association of Indigenous Peoples of the North, Siberia and the Far East of the Russian Federation, Deputy Chairman of the State Duma Committee on Nationalities G.P. Ledkov, was listened to with great attention and interest¹⁶.

Cooperation within the Arctic Council

In connection with the growing interest of the world community in the problems of the Arctic in recent years, the role of the Council has increased significantly, not only in strengthening ties between the Arctic states, permanent participants and working groups, but also in intensifying further cooperation with its observers and interacting organizations.

Thus, in October 2019, a meeting was held under the chairmanship of Iceland with the participation of the Arctic Council and the Arctic Economic Council, which addressed the issues of broadening and strengthening their mutual cooperation.

On November 26, Russian and Icelandic Foreign Ministers Sergei Lavrov and Goodloygur Tor Tordarson signed a joint statement regarding the continuity of the chairmanship of the Arctic Council. Following the meeting, the Russian Foreign Minister noted: "There are no plans to increase the number of members of the Arctic Council; no one has put forward such ideas. Observer status is open to all applicants. We do not see any contraindications against obtaining observer status for countries that are really ready to participate in the work in a non-politicized, pragmatic way, with full respect for the basic decisions taken by the "Arctic Eight". The Icelandic Foreign Minister supported the position of the Russian colleague: "I believe that the balance that now exists among the members of the Arctic Council and the observer countries is already quite stable and

¹⁵ V OON otsenili usiliya Rossiyskoy Federatsii po zashchite korennykh malochislennykh narodov vo vremya pandemii koronavirusnoy infektsii [The UN assessed the efforts of the Russian Federation to protect indigenous peoples during the coronavirus pandemic]. URL: <http://fadn.gov.ru/news/2020/07/03/4091-v-oon-otsenili-usiliya-rossiyskoy-federatsii-po-zaschite-korennyh-malochislennyh-narodov-vo-vremya-pandemii-koronavirusnoy-infektsii> (accessed 15 June 2020).

¹⁶ Lidery korennykh narodov Arktiki sobralis' v Rovaniemi [Arctic indigenous leaders gather in Rovaniemi]. URL: <http://www.raipon.info/info/news/4014/> (accessed 15 June 2020).

good. I agree that there is no reason to expand the membership of the Arctic Council. The system we have now is very successful," underlined Goodloygur Tor Tordarson¹⁷.

Arctic cooperation between Iceland and Russia has a long tradition. Despite the persisting "sanctions" restrictions, the countries were able to reverse the negative trend in trade. The Icelandic-Russian Chamber of Commerce has been set up, with the participation of more than 30 companies from Iceland, and the geography of interregional ties is expanding. The Yamalo-Nenets Autonomous Okrug, Kamchatka Territory, Chukotka, and Murmansk Region interact with Icelandic partners. Important projects are being implemented in the field of innovative technologies, telecommunications and geothermal energy. The involvement of Icelandic companies in the modernization programme of the Russian fishing fleet, the design of modern vessels and the supply of equipment is noted.

Both countries are united by the common memory of the joint struggle against fascism. Russia remembers the contribution of Iceland to the formation and support of polar convoys with gratitude¹⁸. Mutual Russian-Icelandic Arctic cooperation is largely facilitated by the activities of the Russian Ambassador A.V. Vasil'ev in Iceland, who had previously been the Special Assignment Ambassador of the Russian Foreign Ministry to the Arctic Council for a long time.

At the same time, it should be kept in mind that in modern conditions, preparations are underway to reformat the ownership of the Arctic space. There are increasing calls for the internationalization of the Northern Sea Route and the Northwest Passage, and the extension of the Antarctic Treaty to the Arctic is proposed. The Arctic region is not an isolated enclave of international life, living by different rules, unlike the rest of the world community.

According to Yu.F. Lukin [8, Lukin Yu.F., p. 213–214; 9, Fedorov V.P., Zhuravel V.P., Grinyaev S.N., Medvedev D.A.], three options are possible for the transforming the Arctic Council in the short, medium and long term:

- preservation of the previous model of the Arctic Council: to leave everything as it is, without fundamental changes, without interrupting the activities of the Arctic Council in the traditional format, without addressing the still pressing political issues of military security, geopolitics, economics;
- modernization of the Arctic Council in the medium term, taking into account the growing role and influence of observer states, the activities of the Arctic Economic Council, and the expansion of the range of issues discussed;

¹⁷ RF i Islandiya prinyali zayavlenie o preemstvennosti v predsedatel'stve v Arkticheskom sovete [Russian Federation and Iceland adopted a statement of succession in the chairmanship of the Arctic Council]. URL: <https://tass.ru/obschestvo/7201401> (accessed 15 June 2020).

¹⁸ Vystuplenie i otvety na voprosy SMI Ministra inostrannykh del Rossiyskoy Federatsii S.V. Lavrova v khode sovместnoy press-konferentsii s Ministrom inostrannykh del Islandii G.T. Tordarsonom, Moskva, 26 noyabrya 2019 goda [Speech and answers to media questions by the Minister of Foreign Affairs of the Russian Federation S.V. Lavrov during a joint press conference with the Minister of Foreign Affairs of Iceland G.T. Thordarson, Moscow, November 26, 2019]. URL: https://www.mid.ru/web/guest/organizacia-po-zapreseniu-himiceskogo-oruzia/-/asset_publisher/km9HkaXMTium/content/id/3919554 (accessed 15 April 2019).

- transformation of the Arctic Council into a standard international organization of a regional character with the right to adopt regulations that are sources of public international law.

In our opinion, the issue of changing the functionality of the Arctic Council is linked both to objective trends within the organization itself and with processes taking place directly in and around the Arctic region. It is important for Russia to keep the first option, as it is more in line with our national interests. It is important to predict the development of the Russian Arctic in real processes, to see its strengths and weaknesses [10, Zaikov K.S., Kondratov N.A., Kudryashova E.V., Lipina S.A., Chistobaev A.I.].

In 2020, the Russian Federation began preparations for its upcoming chairmanship of the Arctic Council and the Arctic International Forum “Arctic — Territory of Dialogue”, which will take place in 2021 in St. Petersburg, and adopted an important strategic document on the development of the Arctic up to 2035¹⁹.

Conclusion

The results of the first year of the Iceland’s chairmanship show that the Council countries continue to search for a balance between the three main areas of sustainable development: economic growth, social integration and environmental protection.

Einar Gunnarsson, the Chairman of the Committee of Senior Officials in the Arctic Council, noted in his report that “although most of the events are currently being conducted online, Iceland continues to develop cooperation and interaction, thereby maintaining unity between the various elements of the Arctic Council. We have adapted and developed innovative solutions, and the resilience and solidarity that we have shown in the face of extreme circumstances give me reason to believe in the success of our cause to achieve sustainable development in the Arctic. It is in such difficult times that the necessity for close circumpolar cooperation is especially acute”²⁰.

As the analysis shows, Iceland plans to continue monitoring and analyzing climate impacts in the Arctic region in the second year of its chairmanship, which can form the basis for the development of national policies. The results of the work of the expert group on black carbon and methane could lay the foundation for efforts to reduce emissions of pollutants, which will slow down the pace of climate change in the Arctic. Energy security will continue in remote Arctic communities, and the Council will promote the development and implementation of green energy solutions to reduce emissions and improve air quality. Attention will be paid to the discussion of such important issues of the Arctic development as the development of new technologies, the develop-

¹⁹ Ob Osnovakh gosudarstvennoy politiki Rossiyskoy Federatsii v Arktike na period do 2035 goda. Ukaz Prezidenta Rossiyskoy Federatsii ot 5 marta 2020 g. № 164 [On the Fundamentals of State Policy of the Russian Federation in the Arctic for the period up to 2035. Decree of the President of the Russian Federation of March 5, 2020, no. 164]. URL: <http://static.kremlin.ru/media/events/files/ru/f8ZpjhpAaQ0WB1zjywN04OgKil1mAvaM.pdf> (accessed 06 March 2020).

²⁰ Together towards a sustainable Arctic: one year into the 2019-2021 Icelandic chairmanship. URL: <https://arctic-council.org/ru/news/one-year-into-the-2019-2021-icelandic-chairmanship/> (accessed 15 April 2019).

ment of human capital, the economics of the Arctic zone development, resource management and sustainable development.

In the first year of its chairmanship Iceland was just starting its work. Due to the coronavirus pandemic, some of the events were held online, a lot of them were canceled. A symposium on plastics in the Arctic, a large-scale action "Cleaning up the Arctic coastline" and the project "Logistics in the Arctic" are among them. The main forums, sessions and meetings are planned to be held in the second half of 2020 and in spring of 2021. Preparations are under way for an international symposium in Reykjavik on plastic purification techniques for Arctic waters at the end of October 2020.

Iceland's current chairmanship is proceeding with restraint, and there is no reason to accuse Reykjavik of lobbying for China's interests, as it was in 2008–2009. At the same time, militarily and geopolitically, Iceland is largely dependent on the United States. However, the chosen moderate course of the chairmanship does not allow speaking of Washington's excessive influence on Iceland's presidency of the Council. But it should be taken into account that US Vice President M. Pence visited the island state in September 2019. During the visit, an investment of \$ 56 million into the infrastructure of a military base in Keflavik was announced, which will not only create 300 new jobs²¹, but also introduce a new round of the military-political complications in the Arctic region.

Analyzing and evaluating the activities of Iceland's chairmanship of the Arctic Council, it is necessary to support its multi-vector work on investment and development of Arctic tourism. In 2018, 2.2 million tourists visited the country, and in 2019 — almost 2 million people²². The experience of Arctic tourism in Iceland, in our opinion, is advanced and can certainly be borrowed by other countries.

The AC is currently implementing a number of interesting projects and programs under the leadership of Iceland. These include projects to find effective solutions for solid waste management, waste management in small Arctic communities. Scientists are also trying to understand the impact of plastic on bird migration in the Arctic. Iceland intends to make significant adjustments to existing environmental standards in Arctic countries.

According to our estimates, the Republic of Iceland as a whole will be able to implement the declared program, will try to interact with all countries, will not abuse its chairmanship and will not lobby for China's interests on Arctic issues, as was the case in 2008–2014. However, given Iceland's dependence on the United States, Canada and Norway in its Arctic policy, can result in both weakening and exacerbation of current tensions in Russian-American and Russian-European

²¹ SShA rezko aktivizirovalis' v Arktike: M. Pens ob'yavilsya v Islandii [The United States has sharply intensified in the Arctic: M. Pence showed up in Iceland]. URL: <https://aftershock.news/?q=node/786261&full> (accessed 15 December 2019).

²² Arkticheskie initsiativy Islandii [Iceland's Arctic Initiatives]. URL: <https://zen.yandex.ru/media/id/5dc69465c7891f51f5fb5143/arkticheskie-initsiativy-islandii-5ed61c589934dc5998c067f8> (accessed 15 June 2020).

relations. This issue is very important for Russia, since the chairmanship of the Arctic Council will pass to it in 2021.

Cooperation within the AU continues to develop successfully. The Arctic still remains a zone of peace, international cooperation and political stability, despite the emerging environmental risks and military-political threats.

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Contribution of Northern European Universities to the Implementation of Research Policy in the Arctic*

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Abstract. The Arctic region has long been at the center of world politics and economy. One of the reasons for the transformation of the global fringe into a center of attraction for the economic, geo-ecological and geopolitical interests of foreign countries is the Arctic is undergoing dynamic transformations. In the socio-political and scientific research agenda of the Arctic States, there are acute issues of accumulation and exchange of knowledge about changes taking place in the natural and socio-economic environment of a non-standard region from the point of view of management. The Arctic strategies of the Northern European States seek to fill the vacuum about the trends of environmental changes in the Arctic, the impact of natural transformations on the environment, socio-economic development, population security, and the use of natural resources by indigenous peoples. This task is planned to be solved through the development of research activities of universities located in the Far North and in the Arctic zone of Denmark, Norway, Finland and Sweden, as well as Iceland. The article describes the scientific interests of the Northern European States in the Arctic. Using analytical and comparative methods, the goal is achieved — to characterize universities as one of the parts of their scientific and educational space in the Nordic countries. An attempt is made to answer the question: how does educational and research activities contribute to the implementation of state program documents for the development of natural resources in the Arctic and the use of its spaces? The further direction of scientific research may be to compare the educational and research activities of universities in Northern Europe and universities in the Arctic zone of the Russian Federation.

Keywords: *Northern Europe, the Arctic, development strategies, research policy, universities.*

Introduction

In the XXI century, foreign states located both in the Arctic zone (Denmark¹, Iceland, Canada², Norway³, USA⁴, Finland⁵, Sweden⁶), and outside it (China, India, Republic of Korea, Japan, Germany, Great Britain) have developed and updated strategies and programs for the development of national Arctic zones and regions of the Far North.

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¹ Denmark, Greenland and the Faroe Islands: Kingdom of Denmark Strategy for the Arctic 2011–2020. 58 pp.

² Canada's Northern Strategy. Our North, Our Heritage, Our Future. Government of Canada, Ottawa, 2009, 48 pp.

³ The Norwegian Government High North Strategy. Norwegian Ministry of Foreign Affairs, 76 pp. URL: <https://www.regjeringen.no/en/dokumenter/> (accessed 10 May 2020).

⁴ National Strategy for the Arctic Region. May 2013. USA, Washington D.C. 13 pp., United States Coast Guard. Arctic Strategy. May 2013. USA, Washington D.C. 48 pp.

⁵ Finland's Strategy for the Arctic Region. Government resolution on 2013. Prime Minister Office, 2013. URL: <http://www.hs.fi/english/article/Finland> (accessed 10 May 2020).

⁶ Sweden's Strategy for the Arctic region. Government Offices of Sweden. Ministry for Foreign Affairs. Department for Eastern Europe and Central Asia. Arctic Secretariat, Stockholm, Sweden. 2011. 52 pp.

Highlighting similarities in the Arctic strategies, it may be noted that they are based on humanistic principles, which are proposed to be developed using resources of the Arctic zone (regions of the Far North). Foreign countries based their economic activities in the North and the Arctic on the principles of international law. This applies to the issues of delimitation of shelf and island territories, navigation in the Arctic Ocean. At the same time, there are discrepancies in the application of documents. The severity of disputes increases where mineral and biological resources are available and strategic sea routes pass. Countries interested in developing connectivity between the North European and Asia-Pacific regions are seeking to declare the Northern Sea Route (hereinafter — the NSR), the Russian national transport communication in the Arctic, and the Northwest Passage, a significant part of which runs along the coast of Canada, international waters. This is not in the interests of Russia and Canada, respectively.

All strategies proclaim the need to strengthen sovereignty and the role of the Arctic Council in solving the problems of the Arctic region, and emphasize lack of alternatives to this platform for developing a common policy for sustainable development of the Arctic. The Arctic strategies focus not on the Arctic environment conservation, but on the application of advanced science-intensive environmental management standards based on the principles of biodiversity conservation, energy resources usage and alternative energy development which are environmentally safe, consistent with international law. Foreign strategies attach great importance to the prevention of technological accidents in ice-covered areas and indicate the importance of cooperation with indigenous communities in the development of mineral and aquatic biological resources.

Development of science in the North and the Arctic is central point to every Arctic strategy. Priority is given to research in the field of climate change, study of the impact of these processes on ice, ecosystems of the Arctic Ocean and its coast, the use of natural resources by indigenous peoples. The strategies argue for bridging knowledge gaps in natural systems, expanding expeditionary activities, strengthening institutions for transfer of knowledge, competencies and educational technologies, network cooperation, academic and research mobility, and the development of an Arctic Information and Statistical Center (arcticstat.org).

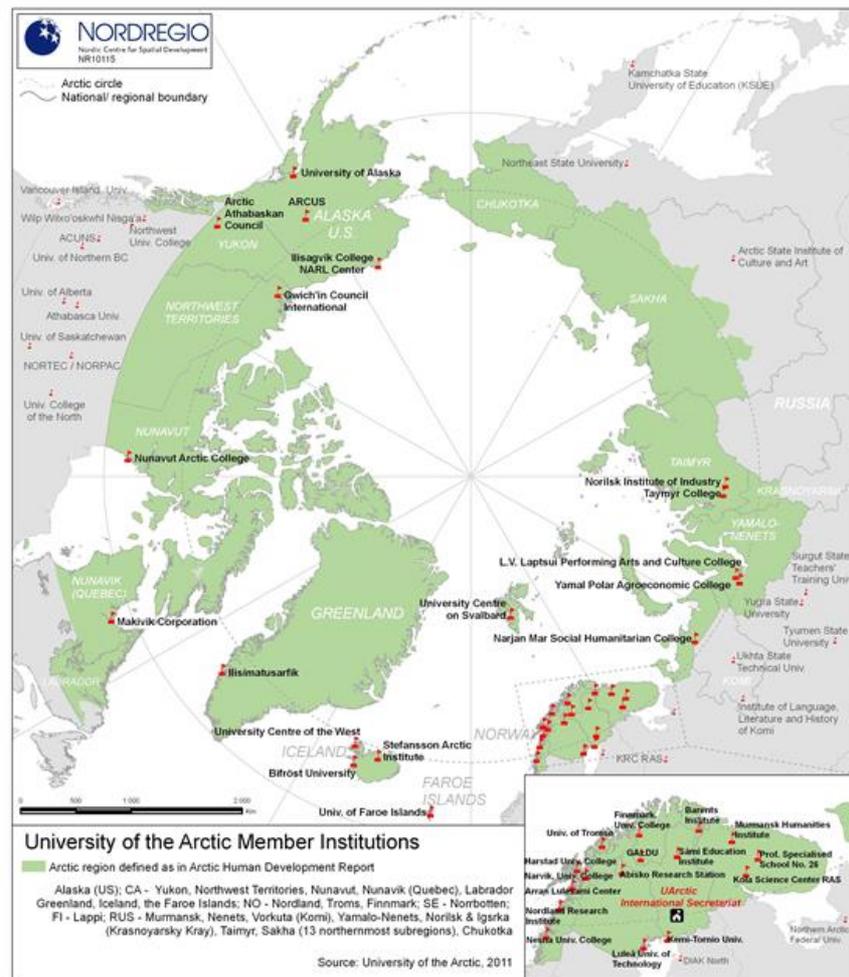


Fig. 1. Arctic universities, 2011 ⁷.

At the same time, as fig. 1 indicates, the number of universities in the Arctic region (in the Far North) differs in each Arctic country. Their maximum number is in the countries of Northern Europe, as well as in the Far North of Russia, especially in the Murmansk region. The Secretariat of the University of the Arctic Network is located in Finland. The least developed scientific and educational space with the participation of universities is formed in the Nenets Autonomous Okrug, the entities of the eastern Russian Arctic, as well as in Greenland and the Far North of Canada, which can be explained by the historical features of the settlement and development of these territories.

⁷ Nordregio. Maps. Research. URL: <https://archive.nordregio.se/en/Nordregio-Research/index.html> (accessed 10 May 2020).

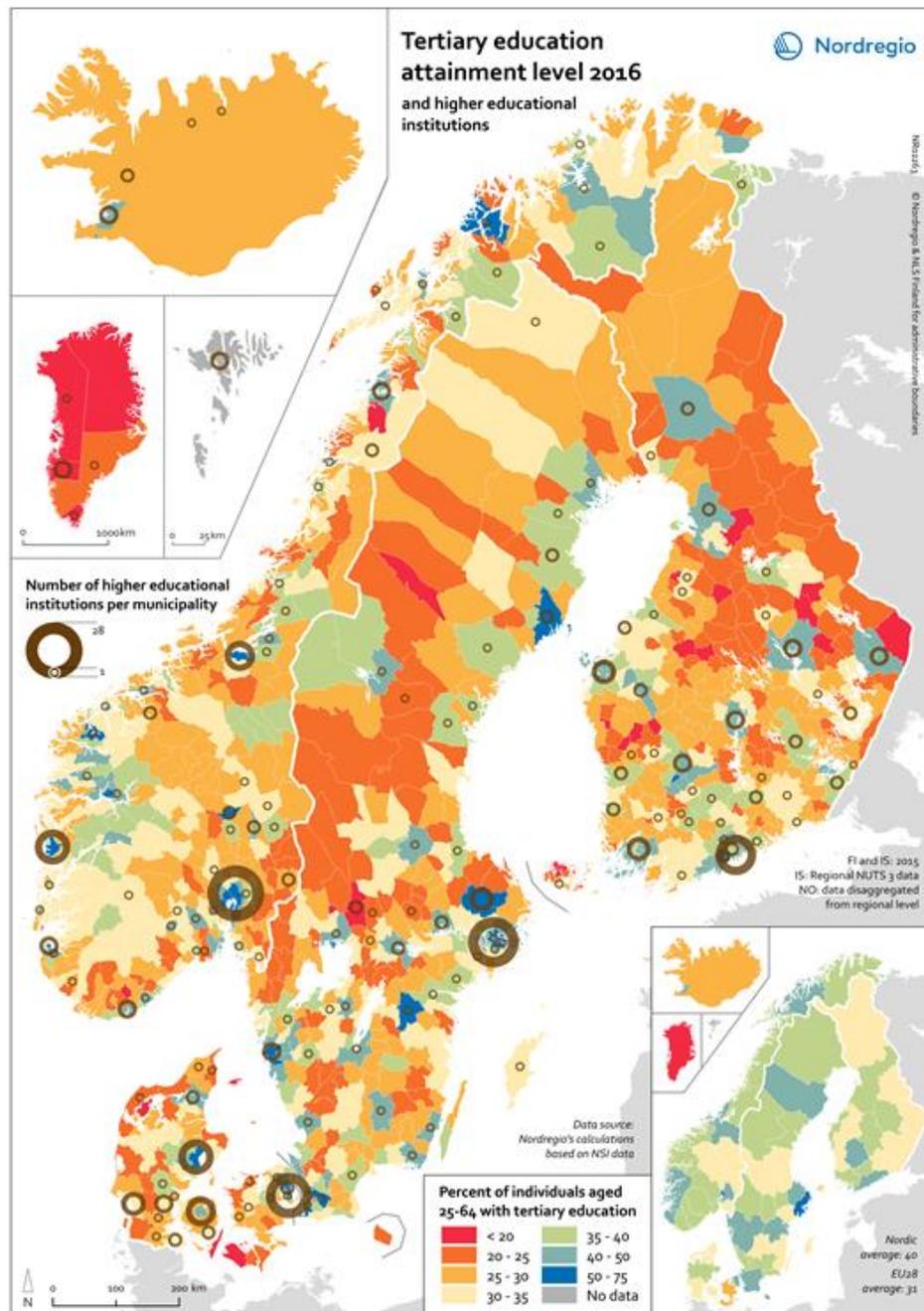


Fig. 2. Number and size of higher education institutions by municipalities in the Nordic countries and the proportion of people with higher education, 2016⁸.

Figure 2 shows that the higher education system in the Far North of Europe is rather undeveloped: universities are located in the central and southern, more comfortable and developed regions of Denmark, Norway, Finland and Sweden. The proportion of people with higher education ranges from 20–25% in municipalities in the High North of Sweden, Finland, Iceland and Greenland and up to 50–75% in the High North of Norway (2016).

⁸ Nordregio. Maps. Research. URL: <https://archive.nordregio.se/en/Nordregio-Research/index.html> (accessed 10 May 2020).

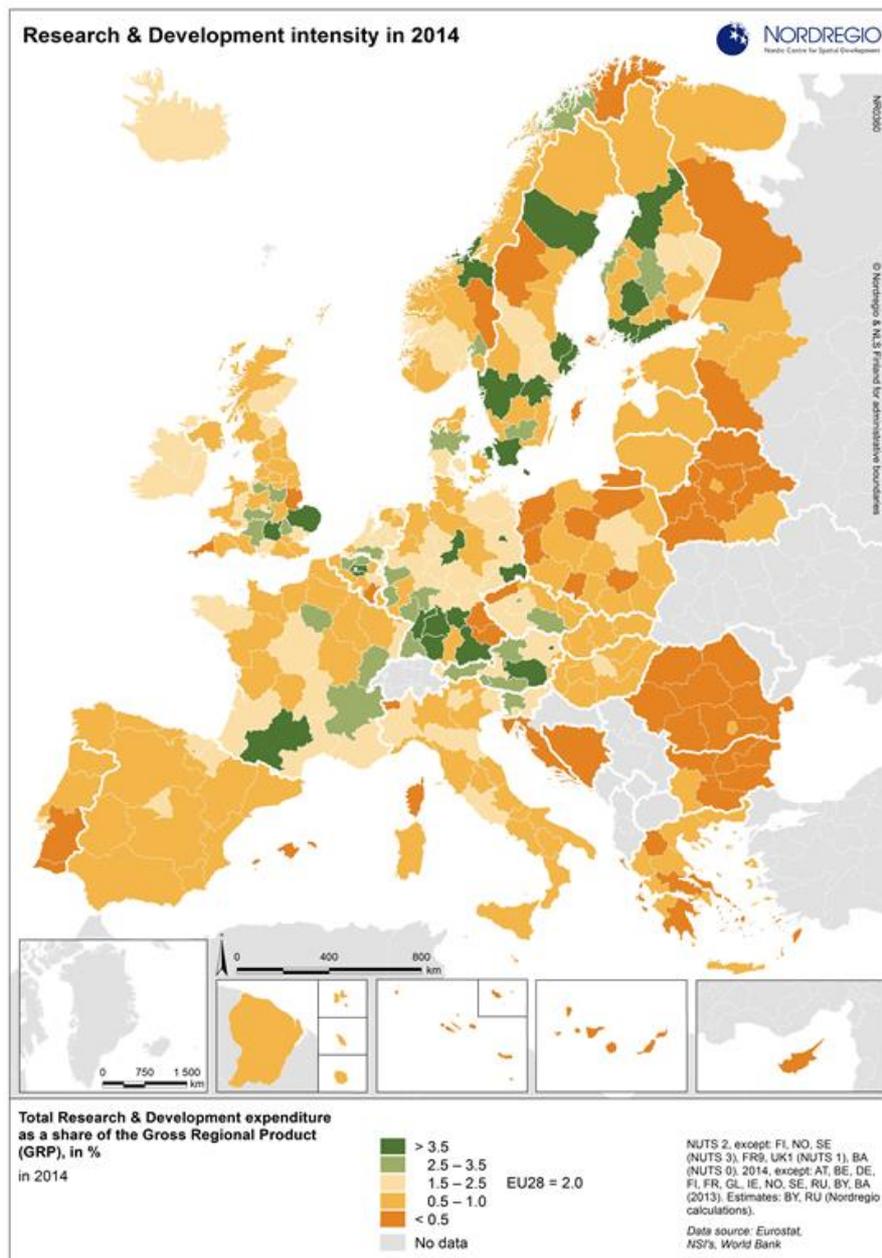


Fig. 3. Share of research and development in GDP of the Nordic countries, 2014 (% of GDP)⁹.

Figure 3 demonstrates the research and development contribution of the Nordic countries to national GDP. On the territories of the Far North of Norway, Finland and Sweden, it varies from 0.5 to 35% and highlights territorial differentiation by entities (counties, provinces, communes), which can be explained by the location of universities

The system of higher education in the northern regions of the studied countries, on the one hand, fits into the national models of higher education; on the other hand, it has specific features. A distinctive feature of the Northern European model of higher education is the predominantly state funding system. The North American model is characterized by minimal interference of government agencies in the development of higher education, a high share of provincial and

⁹ Nordregio. Maps. Research. URL: <https://archive.nordregio.se/en/Nordregio-Research/index.html> (accessed 10 May 2020).

regional responsibility, and a variety of sources of funding for the activities of universities. The state policy of the Russian Federation in development of university education is aimed at increasing the competitiveness of higher education and its integration into the world educational space. Reforming and modernizing of higher education in Russia is based on the principles of preserving and developing a unified educational space, which implies a significant role of federal bodies in determining the quality standards for personnel training, striving to link them with professional industry standards.

Rural and remote communities within the circumpolar world face the challenge of providing opportunities for any — from secondary to postgraduate — education at the location of the student due to geographical barriers and lack of available financial and organizational resources. Considerable experience has been accumulated to overcome such isolation [2].

Analysis of the Russian-language literature revealed an information vacuum on the subject of the article. The 2014 Arctic Human Development Report does not cover this topic comprehensively. M.D. Robards, H.P. Huntigton and others discuss knowledge from a philosophical standpoint, characterize the patterns of “joint production of knowledge” in local communities as a response to global climate change, entailing changes in communications and trade. “Attention to local needs, perspectives and cultures is seen as a prerequisite for facilitating effective adaptation planning or, more broadly, the sustainability of local peoples.” “The area of the 'science-policy interface' goes beyond observing or evaluating changes at different scales and perspectives, and defining conditions conducive to the joint production of practical knowledge. This approach requires the development of response tools that can take into account the dynamic relationships between humans, wildlife and habitats that span different cultures, time frames, and sometimes national boundaries” [3, p. 205]. In the changing geoeological, geopolitical and socio-economic conditions in the Arctic region, S. Petrov, N.L. Mamaeva and others discuss the development of environmental education as a means of ensuring safety, rational use of natural resources and sustainable development of the Arctic. “This is especially important in the Far North with difficult climatic conditions (special geomagnetic background, sharp temperature changes, strong winds, permafrost presence, etc.) and the rapid development of the oil and gas complex (in particular, a high accident rate associated with technical devices complexity, extreme operating conditions, strong environmental influences, flammability and explosiveness of extracted products, human factor)...” [4, p. 366]. M.N. Chechurina and V.E. Sokolenko review Norway’s experience of innovative development. They substantiate the conclusion that the key role in technological progress and innovation is played by universities, science-based companies, scientific and technological clusters. The materials of their research are of interest for a similar analysis of the Russian northern regions development and the national economy competitiveness increasing [5]. The article by A. Husebekk examines the role of universities in regional development on the example of the Arctic University of Norway (UiT). “The mission of the university is to promote Norway's Arctic strategy in education, science and technology.” The author emphasizes the influence of the university on regional

development within the Triple Helix model, the focus of studying the economic, cultural and social development of the Far North through increasing knowledge and human capital, international cooperation in the field of education and science [6]. Misund O.A., Aknes D.W. and others study the role of science and education in Svalbard. Scientists analyze the University Center on Svalbard (UNIS), its organization and development since 1993, links with history and politics (in particular, the Treaty on Svalbard of 1920), scientific, educational and human resources, academic production (graduation of students and scientific products), as well as growth potential. The main motivation for the establishment of the center was the creation of an alternative option for the operation of unprofitable, highly subsidized coal mining industry. It is noted that UNIS currently produces at least 20% of the economic activity in the archipelago [7, 8]. I.V. Rogachev and S.I. Shubin study the role of the universities of Russia and Norway in the Barents Euro-Arctic region, the beginning of cooperation started formally more than 25 years ago, but in fact — several centuries ago thanks to “people's diplomacy” [9]. N.N. Schmidt, T.R. Christiansen and T. Roslin review two decades of collaborative research and environmental monitoring at the remote Zackenberg research facility in high-altitude Greenland. The article shows that “the combination of monitoring ideas with a mechanistic understanding obtained as a result of fundamental research, gave the most complete understanding of the system for the benefit of all and as an example to follow ...” [10, p. 652]. I. Zashihina and M. Postnikova analyze “the social consequences that determine the use of mass media in modern education. The peculiarities of the post-industrial society call for a rethinking of the professional competencies taught in all types of curricula. Students get the opportunity to use a rich assortment of media that are widely used by most teachers today as a source of education...”. The authors point to “the dependence of participants in modern education on their understanding of the mechanism and influence of the media” [11, p. 612].

Features of Denmark's research activities in the Arctic

Denmark published the Arctic Research and Education Strategy in 2016, which sets the framework for the Ministry of Higher Education, the government body responsible for scientific research organization. The organizational and financial potential of ministries, departments and business interested in R&D (in particular, the National Research Fund, the Innovation Fund) is used.

The objectives of Danish scientific research in the Arctic region are the following: development of education and research in Greenland, participation in the coordination of education and research in the Arctic for the rational exploitation of natural resources, dissemination of research results in the Arctic within the framework of international cooperation, positioning Denmark as a partner, supporting the research environment ¹⁰.

¹⁰ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25-26 October 2018, Berlin, Germany, p. 38.

The research topics are derived from the country's strategic interests in the Arctic region: sustainable development of the Arctic and Greenland, study of methods for the search and development of minerals and the extraction of aquatic biological resources, study of sea currents, marine and terrestrial glaciology, paleoclimatology, climate change and the impact of these processes on indigenous communities in Greenland and the Faroe Islands (social and health aspects), monitoring of environmental pollution. Universities that are able to organize and conduct research in the Arctic region include the Universities of Copenhagen, Aarhus, Aalborg and the Technical University of Denmark. They have established interdisciplinary scientific and consulting centers for the environmental and socio-economic development of Greenland and foreign Arctic territories.

The University of Copenhagen was founded in 1479. There are currently about 40 thousand students in 6 faculties: medical, humanitarian, juristic, scientific, social sciences and theological. The university has the Center for Permafrost and the Center for Ice and Climate, which are engaged in research on the geographic and physical effects of permafrost condition and degradation, study of ice cores in Greenland, and also participate in the development of innovative technologies for paleoclimatic and paleoecological reconstructions of the glacial and interglacial periods ¹¹.

The Aarhus University has more than 44 thousand students studying humanities and natural sciences: pedagogical, physical, mathematical, statistical sciences, ecology, environmental management, art, journalism, business, and law ¹². The Aarhus University participates in thematic networks of the University of the Arctic on the study of microplastic pollution in the Arctic Ocean, the study of tundra biodiversity in the context of climate change, social and medical aspects of human well-being, sustainable production of natural products in the North. The university conducts applied research in the field of improving the quality of environmental management and sustainable development, marine ice and icebergs studies (models of underwater robots are being developed).

The Aalborg University's specialization in the UArctic network is sustainable use of natural resources and social responsibility. Approximately 20 thousand students are trained in the fields of tourism, biotechnology, water resources management, environmental quality preservation, energy, technological design, and urban planning in the North ¹³.

The Technical University of Denmark has about 10 thousand students. Its educational programs include aspects of territorial planning, architectural design in the Arctic, environmental studies and protection (including waste management), and mining. Research in the field of infrastructure development, energy efficiency, climate change is carried out at the Center for Arctic Technologies

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¹¹ The University of Copenhagen. URL: <https://www.ku.dk/english/> (accessed 10 May 2020).

¹² The Aarhus University. URL: <https://www.au.dk/> (accessed 10 May 2020).

¹³ The Aalborg University. URL: <https://www.en.aau.dk/> (accessed 10 May 2020).

¹⁴ The Technical University of Denmark. URL: <https://www.dtu.dk/english> (accessed 10 May 2020).

Higher education in the Faroe Islands is represented by the University in Tórshavn¹⁵. It was founded in 2008 as a result of merger of the Faroese School of Education, the Faroese School of Nursing and the University of the Faroe Islands. The university has around 1000 students. Its educational and research specialization is in the fields of local linguistics and literature, oceanography (the study of sea tides and currents)¹⁶. The university specializes in coastal communities, fisheries and aquaculture, northern tourism, folklore and ethnography of the Arctic.

Greenland has a university in Nuuk¹⁷. It was founded in 1987 and has over 200 students. The university has a humanitarian focus and consists of the institutes of education, nursing and medicine, social sciences, economics and journalism, culture, language and history. The Greenland Institute of Natural Resources (GINR) has about 20 students. GINR conducts comprehensive studies of Arctic ecosystems, monitors climate change (a priority) and environmental changes, and advises local authorities on sustainable environmental management. Research is focused on marine ecology, productivity of aquatic biological resources, biogeochemical and ice processes, Arctic medicine, extraction and use of mineral resources. The university's specialization at the University of the Arctic is sustainable development of coastal communities, usage of natural resources and social responsibility, global environmental and economic challenges in the Arctic and Subarctic.

For scientific research purposes, Danish universities use multifunctional ice-class research vessels (Denmark, like other foreign Arctic states, does not have nuclear icebreakers). Research stations in Greenland are of great importance in collecting data on the state of the Arctic ecosystems, climate change trends, the state of the Greenland ice sheet, its permafrost, natural, social and medical aspects of life of the Eskimos: Zakenberg in the northeast, the Disko Island station in the central parts of West Greenland, Vilnum (Nord) in North Greenland, Sermilik near the Sermil Fjord. Danish universities participate in international Arctic research programs. Access to research stations in Greenland for foreign specialists is opened by a project funded by the EU Horizon 2020 program (The EU Framework Program for Research and Innovation) INTERACT, which is a network of 90 bases in Northern Europe, Russia, the USA, Canada, Greenland, Iceland and Faroe Islands¹⁸. The UArctic Denmark finding program (within the UArctic Education north2north program) is used to provide financial and organizational support to young Danish researchers at universities in the Arctic countries and foreign students at universities in Denmark, Greenland and the Faroe Islands¹⁹.

¹⁵University of the Faroe Islands. URL: https://en.wikipedia.org/wiki/University_of_the_Faroe_Islands (accessed 10 May 2020).

¹⁶Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25-26 October 2018, Berlin, Germany, p. 42.

¹⁷University of Greenland. URL: https://www.unipage.net/ru/6563/university_of_greenland (accessed 10 May 2020).

¹⁸EC Horizon 2020. URL: <https://ec.europa.eu/programmes/horizon2020/en> (accessed 10 May 2020).

¹⁹UArctic Denmark finding. URL: <https://education.uarctic.org/mobility/about-north2north/> (accessed 10 May 2020).

Features of Iceland's research activities in the Arctic

The content and tools of Iceland's research activities in the Arctic region are derived from the provisions of the 2011 Parliamentary Resolution on the Arctic and correspond to Iceland's status as an island state, a member of the Arctic Council.

The non-governmental Icelandic Arctic Cooperation Network (IACN) plays the leading role in information support and coordination of research activities of government agencies, scientific and educational institutions and businesses on Arctic issues. Its activities are coordinated by The Icelandic Joint Committee on Arctic Affairs, under the Ministry of the Environment and Natural Resources. Both structures include universities and research institutions. Almost all of them, when compiling research topics, take into account the peculiarities of Iceland's geographic location, give priority attention to marine management issues and the development of alternative energy. Unlike Norway and Sweden, Iceland does not have grant programs to support Arctic research²⁰.

The University of Iceland is the largest university in the country with over 13 thousand students of all levels of education. It consists of the following schools: social sciences, health care, humanitarian, pedagogical, natural sciences and technology. Scientific research is carried out in research centers and field stations²¹. The University of Reykjavik has about 3 thousand students in schools of business, computer science, law, science and technology²². The University of Akureyri is a research and educational center in North Iceland, offering educational programs in the humanitarian sphere: business, sciences, health, as well as scientific services from seven research centers²³. The Arctic topics of the university are represented by the topics of Arctic law, sociological study of the attitude of Icelandic youth to climate change and the formation of values in the industrial and rural areas of the North of the country. The Agricultural University of Iceland was founded in 2005. It consists of the Faculty of Land and Animal Resources, the Faculty of Environmental Sciences; scientific topics are focused around climate change in the Arctic region, the creation of the northern gene bank of agricultural plants and animals²⁴. Bifröst University consists of departments of business, law, social sciences. About 700 students study here²⁵. The University Center of the Westfjords operates in collaboration with other universities and research institutions, specializing in sea and coastal management issues. Hólar University College exists since 2007, the first educational institution in this place was established in the XII century. Aquaculture, marine biology, fisheries management and rural tourism are taught there²⁶. The Institute of Marine Research is one of the leading scientific centers in the country and, taking into account the geographical location and economic specialization of the country, plays a vital role in the scientific potential of

²⁰ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25-26 October 2018, Berlin, Germany, p. 52.

²¹ The University of Iceland. URL: https://english.hi.is/university/study_information (accessed 10 May 2020).

²² The University of Reykjavik. URL: <https://en.ru.is/> (accessed 10 May 2020).

²³ The University of Akureyri. URL: <https://www.unak.is/english> (accessed 10 May 2020).

²⁴ The Agricultural University of Iceland. URL: <https://ru.wikipedia.org/wiki/> (accessed 10 May 2020).

²⁵ Bifröst University. URL: <https://www.bifrost.is/> (accessed 10 May 2020).

²⁶ Hólar University College. URL: <http://www.holar.is/en/english> (accessed 10 May 2020).

Iceland. The institute specializes in the study of the sea and aquatic biological resources, provides information and analytical support for government activities, and provides business services.

Stefansson Arctic Institute is Iceland's leading research institution located in Akureyri under the Ministry of Environment and Natural Resources. This institution takes an interdisciplinary approach to understanding the relationship between human and environment in the circumpolar Arctic. Special attention is paid to the socio-economic research and assessments of the Arctic, human development trends (the Human Development Report 2010–2014), management of marine resources, ecology of agricultural systems, climate change and adaptation to them (incl. in the context of cryosphere degradation). The institute is a basement for functioning of the Arctic Council secretariats (working groups Conservation of the Arctic flora and fauna and Protection of the Arctic marine environment), the Icelandic Arctic Cooperation Network, since 2017 — the secretariat of the International Arctic Scientific Committee ²⁷.

Iceland uses the capabilities of research stations Grimsfjall Glaciological Society, located in the center of the Vatnajökull glacier and intended for geophysical research, including subglacial volcanoes. Litla-Skard Station is a national site (biomonitoring site) for the implementation of an international air pollution monitoring program. The research focuses on precipitation chemistry, climate change and hydrological features of ecosystems. This station is used by the Agricultural University of Iceland. The automated meteorological and hydrological stations of the Icelandic Meteorological Office operate here ²⁸.

Features of Norway's research activities in the Arctic

The Norwegian Strategy for the Development of the Northern Regions was first approved in 2006 and updated in 2017. In order to implement the Strategy, Norway is implementing a scientific and educational policy aimed at achieving sustainable development in the northern regions. Interdisciplinary research is organized for this purpose, aimed at obtaining new knowledge and developing competencies in the field of researching the environment, population and economy of the Far North. A feature of the Norwegian Arctic research policy is its sustainable funding. The priority projects are PETROMAKS (program of research in the field of oil and gas and the development of innovative scientific infrastructure), BARENTS 2020 (program of international interdisciplinary educational and scientific projects on Arctic topics, academic and research mobility with the participation of Russia), programs for development and exchange knowledge about the climate system of the Far North POLARPROG and KLIMAFORSK, support of R&D in the field of maritime activities (in the interests of shipping companies, fishing, aquaculture, industry) MAROFF. The Nansen Legacy project is being implemented in 2018–2023, and is aimed at studying the Arctic Ocean and polar ecosystems in the face of climate change. Institute of Marine Research of the Barents Sea and Ecosystems of the Arctic Ocean in partnership with the Nikolai M. Knipovich Polar

²⁷ Stefansson Arctic Institute. URL: <http://www.svs.is/en/projects/ahdr-and-asi-secretariat> (accessed 10 May 2020).

²⁸ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25–26 October 2018, Berlin, Germany, p. 52.

Research Institute of Marine Fisheries and Oceanography (Murmansk) monitors the reserves of aquatic biological resources and marine ecosystems in the Barents Sea ²⁹.

The Norwegian Polar Research, Research Policy 2014–2023 Strategy defines a list of research areas in the Arctic: international research cooperation (strengthening the role of the Barents Euro-Arctic Council (BEAC) and the Arctic Council in solving the problems of the Arctic), climate change and the impact on environmental management (among indigenous peoples, changes in the hydrometeorological features of the Far North), functioning of polar ecosystems, environmental monitoring in industrial development areas, development of research infrastructure, dissemination of research results ³⁰.

Government agencies, research centers and universities are responsible for the implementation of Norway's R&D strategy. The area of interest of the Fram Center (High North Research Center for Climate and Environment, Research Center for Climate and Environment in the Far North) is the study of climate, ice, sea, the impact of industry and pollution on ecosystems ³¹. The center is subordinated to the Ministry of Nature and Environment and coordinates the activities of organizations involved in Arctic research (Institute of Marine Research, National Coastal Administration, Meteorological Service, Cartographic Service, Geological Survey, Akvaplan Niva Company). Research by the Norwegian Polar Institute covers climatology, glaciology, geophysics, biodiversity. The Institute uses the ice-class ships "Kronprins Haakon" (an Italian-built vessel, commissioned in 2018) and "Helmer Hanssen" (a highly specialized vessel designed for studying marine ecosystems, assessing the reserves of aquatic biological resources), as well as the capabilities of the scientific center on Svalbard. The Norwegian Centre for International Cooperation in Education (SIU) ³² is a subordinate institution of the Norwegian Ministry of Education and Science. SIU administers programs aimed at developing international educational cooperation in the Arctic region, for example, the High North Program. This program supports projects of academic and research mobility, development of joint courses, educational schools between universities in Norway, Russia, Canada, USA, Japan, China, Republic of Korea.

The main educational center and organizer of scientific research in the Far North of Norway is the University of Tromsø — The Arctic University of Norway ³³. More than 16 thousand students study and more than 3.6 thousand employees work here, funding reaches 4 million NOK per year. UiT educational programs and research cover fundamental and applied aspects from international relations, economics, applied mathematics, culture, sports, to polar meteorology, organic and macromolecular chemistry, linguistics, polar medicine, underwater geology of the Arctic Ocean,

²⁹ Norwegian Research Council. URL: <https://www.forskningsradet.no/en/> (accessed 10 May 2020)

³⁰ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25–26 October 2018, Berlin, Germany, p. 62.

³¹ Fram Center. URL: <https://framsenteret.no/> (accessed 10 May 2020).

³² The Norwegian Centre for International Cooperation in Education. URL: <http://siu.no/> (accessed 10 May 2020).

³³ University of Tromsø — The Arctic University of Norway. URL: <https://uit.no/startside> (accessed 10 May 2020).

mining, industrial environmental monitoring, remote sensing of the Earth, the study of climate change, the study of the Sami.

Nord University was established in 2016 on the basis of the Nordland University in Bodø, the capital of the Nordland province³⁴. About 11 thousand students study at the university, about 1.3 thousand people work there. The university provides training in the faculties of business, biological sciences (including in the field of genomics) and aquaculture, health sciences, social sciences, education and art. The University's development strategy identifies the priority areas of research: “blue” and “green” growth, sustainable development, innovation, entrepreneurship and health, welfare and education.

The Sami University College is located in Kautokeino. It has about 270 students and 110 employees. The college includes departments of crafts, reindeer husbandry, natural and social sciences, languages, journalism. The College is one of the leading institutions in Northern Europe for research on the use of natural resources, languages, culture and the rights of indigenous peoples.

On the Svalbard archipelago there is the northernmost scientific and educational University Center in Longyearbyen in Norway and in the world³⁵. The center was founded in 1993 and is the result of collaboration between the universities of Oslo, Bergen, Tromsø and the Norwegian University of Engineering and Natural Sciences. It has about 690 students, at least 50% of them are foreign students. The center is characterized by the application-oriented study of the Arctic in the fields of biology, geology, geophysics. The center is the base for organizing and conducting field work in the archipelago, including international participation. The Center for Arctic Security has been created on the basis of the Center, a master's program and practical safety courses for industry and researchers have been developed.

Features of Finland's research activities in the Arctic

Finland's research policy in the Arctic region, as in neighboring Sweden, is shaped in specific geographic conditions. Despite the fact that both countries do not have direct access to the Arctic Ocean and only a third of their territories are located beyond the Arctic Circle, in 2011–2013 they published Arctic strategies in which both states declared their entire territory Arctic. Finland and Sweden position their activities from an expert perspective, declare their readiness to be involved in projects for the study and development of natural resources, environmental protection, climate studies, environmental management of indigenous peoples, infrastructure development (including navigation in the Arctic Ocean), the economy of the Far North, and share advanced developments with neighbors. Finland and Sweden declare the possibility of producing innovative technology and science-intensive equipment that is ready to operate in the harsh conditions of the Far North and the Arctic (drilling platforms, icebreakers, reinforced ice-class vessels, satellite surveil-

³⁴ Nord University. URL: <https://www.nord.no/en/about/> (accessed 10 May 2020).

³⁵ University Center in Svalbard. URL: <https://www.unis.no/> (accessed 10 May 2020).

lance) and to test advanced research methods demanded in the extreme conditions of the North and the Arctic ³⁶.

In 2016, the National Arctic strategy was modernized. In 2017, an action plan for its implementation in four areas was developed: Arctic country, Arctic competence, sustainable development and rational use of natural resources, international cooperation. The Finnish feature of the Arctic policy is the increased attention to international cooperation in the North. Finland was a founding member of the Arctic Council in 1996, the EU Northern Dimension program (a union of more than 30 universities and research organizations in the fields of environmental protection, health and social development, transport, logistics and culture), BEAR working groups on education, transport and logistics, including the NSR. Rovaniemi hosts the EU Arctic Information Center.

Responsibility for the preparation and implementation of the Arctic research program based on the Arctic strategy is rested on the National Committee for Arctic and Antarctic Research and the Academy of Finland, a government agency subordinate to the Ministry of Education and Culture ³⁷. In order to achieve the best results of research activities, it is envisaged to use public-private partnerships, including participation of Russian enterprises (Team Finland concept) ³⁸. The Finnish Meteorological Institute (FMI) participates in scientific research in the Arctic region, where space exploration is carried out with the support of the North American Aerospace Agency and the European Space Agency. The Satellite Data Collection Center in Sodankylä developed and tested a solar sail, probes for the study of Mars, comet 67P/Churyumov-Gerasimenko in outer space in 2014–2015. The Institute uses the capabilities of the Pallas-Sodankylä field station for observing the atmosphere and the global cryosphere ³⁹.

In order to implement the country's Arctic policy, universities and other organizations in Finland avail of the possibilities of scientific expedition activities using the ship "Aranda", which belongs to the Finnish Environment Institute ⁴⁰. A unique feature of the Finnish experience in the study of sea ice is the ice basin models owned by Aalto University and Finnish private companies. They conduct experimental studies of the design and behavior of ships and marine structures on a model scale, study ice destruction, develop innovative Arctic technologies ⁴¹.

More than 5 thousand students study at the University of Lapland ⁴². In scientific research, the educational institution specializes in environmental studies, geology, the population of the Arctic region, law, geopolitics, ethnography, art, design, as well as the Sami. The Arctic Center with international participation studies the behavior of glaciers, the impact of climate change on eco-

³⁶ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25–26 October 2018, Berlin, Germany, p. 44.

³⁷ Academy of Finland. URL: <https://www.aka.fi/en> (accessed 10 May 2020).

³⁸ Team Finland concept. URL: <https://www.team-finland.fi/en/team-finland-organisations/> (accessed 10 May 2020).

³⁹ Finnish Meteorological Institute. URL: <https://en.ilmatieteenlaitos.fi/> (accessed 11 May 2020).

⁴⁰ Finnish Environment Institute. URL: <https://www.syke.fi/en-US> (accessed 11 May 2020).

⁴¹ Report of the 2nd Arctic Science Ministerial Cooperation in Arctic Science — Challenges and Joint actions. Germany, Berlin, 25–26 October 2018, Bonn. 2018. 116 p.

⁴² University of Lapland. URL: <https://www.ulapland.fi/InEnglish/About-us> (accessed 11 May 2020).

conomic activities, the environment and the population of the Arctic region. The study of the natural resources use by the Sami, aspects of their environmental law is allocated in a separate direction. The UArctic Secretariat is located at the University of Lapland. Scientists work in more than 50 thematic networks: extractive industries, natural resources, law, sustainable development, design, folklore, geopolitics, social responsibility, public health and well-being, tourism, teacher education, management of small and medium-sized enterprises.

Aalto University has about 12 thousand students and more than 4 thousand employees. The university consists of the following schools: business, engineering, chemical engineering, electrical engineering, sciences, art, design and architecture. The university specializes in the study of Arctic ice, snow cover, permafrost, their degradation under the influence of climate change and the impact on infrastructure, prevention of damage to structures⁴³.

The University of Helsinki was founded in 1640; about 40 thousand students study here and 8 thousand employees work in 11 faculties. Key research topics are digital world, aging and health, globalization and sustainable development, life sciences, the human mind in a changing world, materials science. In the Arctic, the university specializes in biology, ecology, climatology, geology, geography and physics research. In 2018, the Institute for Sustainable Technologies was established, which is an inter-faculty unit in the field of sustainable development (including the study of the "Arctic" aspects of this concept). The university cooperates with the Helsinki Institute of Urban and Regional Studies, participates in making programs for territorial development, urban design and urban planning. The university has the Kilpisjärvi Biological Station for field research on biological and ecological topics, as well as the history of the Sami and Lapland. At the Värri Research Station, owned by the Institute for Atmospheric Research, the focus is on ecosystems, as well as atmospheric processes and air pollution in the Arctic.

The University of Oulu is the leading university in Finland. It has 16.5 thousand students and about 3 thousand employees⁴⁴. The university works in eight areas: humanities, education, economics, natural sciences, technology and architecture, healthcare. The scientific strategy of the university includes several sections: sustainable use of natural resources, molecular and ecological basis of health, digitalization, remote study of environmental changes, global changes and their impact on humans. The Arctic research of the university includes the use of natural resources, sustainable technologies for their extraction, atmospheric chemistry, technologies suitable for extreme conditions, Arctic logistics, and public health in the northern regions. The university has scientific centers for the study of the Sami language, folklore and history. The Oulanka Station of the University of Oulu allows year-round studies of the Arctic environment, primarily in the areas of geography, biology, ecology, meteorology and weather forecasting. Most of the research activities are concentrated in the Oulanka National Park. Cooperation within the UArctic is carried out on the following topics: Arctic geology, engineering, natural resources and social responsibility, peda-

⁴³ Aalto University. URL: <https://www.aalto.fi/en/aalto-university> (accessed 11 May 2020).

⁴⁴ University of Oulu. URL: <https://www oulu.fi/university/> (accessed 11 May 2020).

gological sciences, telecommunications and networks, commercialization of science and technology for the needs of the North, health and well-being of the population, indigenous peoples, northern tourism, food security. The University of Turku organizes biological, natural-geographic and environmental science research in the natural and social sciences at the Kevo Subarctic Research Station in Lapland, the northernmost in the EU.

Features of Sweden's research activities in the Arctic

According to the Sweden's Arctic strategy (2011), only a third of the territory is located near and beyond the Arctic Circle: the Norrbotten and Västerbotten regions, which are part of the BEAR.

The content of Sweden's research policy in the Arctic region, in addition to the Arctic strategy, is also formulated in road maps, programs "Swedish National Polar Research Programs: 2014 and beyond", "Priority Projects of Swedish Arctic and Antarctic Research Programs". Priority attention is paid to research in the field of climate change and environmental assessment (such aspects as biogeochemical parameters of the Arctic Ocean, distribution of heavy metals, study of ecosystems, glaciers, geomorphology of the Arctic Ocean bottom)⁴⁵.

The Swedish Polar Research Secretariat is a specialized agency under the Ministry of Education and Science. The Secretariat organizes and supports research expeditions in polar regions and manages research infrastructure (icebreaker Oden, research station Abisko)⁴⁶. The Secretariat works in cooperation with the Swedish Research Council⁴⁷. The Swedish Institute is a government agency that maintains interest in Sweden. Possibilities of information policy, organization of Swedish language courses abroad, as well as academic and research mobility in the Baltic Sea region and in the North of the country are used for this purpose. The main form of project support is grants, scholarships, information promotion in the media⁴⁸. The Swedish Foundation for International Cooperation in Research and Higher Education (STINT)⁴⁹ promotes internationalization as a tool to improve the quality of research and higher education, increase the competitiveness of universities, and enhance the attractiveness of Swedish universities.

One of the demanded tools of the country's research activities, participating in the collection of data on marine ecosystems, biogeochemistry of waters and geomorphology of the seabed of the Arctic Ocean, meteorological conditions of the Far North and the Arctic, is the multifunctional diesel icebreaker Oden, built in 1988, a participant of international expeditions, an important means of demonstrating geopolitical aspirations of Sweden in the Arctic.

Umeå University is the largest educational institution in Västerbotten. It consists of the Faculty of Medicine, the Faculty of Art, the Faculty of Social Sciences, the Faculty of Science and

⁴⁵ Co-operation in the Arctic Science — Challenges and Joint Actions. Report of the 2nd Arctic Science Ministerial, 25-26 October 2018, Berlin, Germany, p. 76.

⁴⁶ Swedish Polar Research Secretariat. URL: <http://www.polar.se/> (accessed 11 May 2020).

⁴⁷ Swedish Research Council. URL: <https://www.vr.se/english.html> (accessed 11 May 2020).

⁴⁸ Swedish Institute. URL: <https://si.se/en/about-si/our-mission/> (accessed 11 May 2020).

⁴⁹ Swedish Foundation STINT. URL: http://www.stint.se/en/stint/about_stint (accessed 11 May 2020).

Technology, the Faculty of Medicine, where 42 international programs are implemented, more than 35 thousand students study, more than 2 thousand employees work. The University's Arctic Research Center conducts scientific research related to the socio-economic and cultural development of the northern regions of Sweden ⁵⁰.

More than 15 thousand students study and about 1.7 thousand people work at the Luleå University of Technology ⁵¹. The university consists of the departments of business administration, engineering technology, electronics, space exploration, social sciences, sustainable development, transport and communications, education, health care, construction, environmental protection, renewable energy, computer science, mathematics. The university is the main one for training highly qualified personnel to work at the Kiruna polar mine, the largest in Europe, where one of the world's highest-quality iron ore deposits is mined.

Norrbotten is home to the Abisko research station, which was founded in 1912 to study the climate ⁵². The station is the venue for the Summer and Winter student scientific and educational schools. There are several laboratories at the station: chemical, geoecology/soil, instrumental and microscopy, isotopic, lake science, bacteriological.

The Tarfala Research Station ⁵³ is operated by Stockholm University, highlighting the fact that it is not only northern universities that are involved in studying climate change and its impact on the environment and the natural resources management. This station has been monitoring climate change since 1910, implementing international training programs for studying and predicting long-term connectivity between climate and weather. The scientific research program includes monitoring the climate impact on the subarctic nature, including the mass balance of glaciers, as well as snow, their hydrology, assessment of the state of permafrost.

Conclusion

Having studied the participation of Northern European universities in the implementation of the research policy of these states in the Arctic region, we can conclude that all states consider the Arctic as a dynamically changing region. Its transformations in the natural and socio-economic environment necessitate organization and conducting of interdisciplinary scientific research. The most comprehensive and thoughtful research activities in the Arctic are presented in Norwegian and Finnish universities. Research topics in all countries of the region are identical and include aspects of natural, socio-political, socio-economic sciences and areas of training: from a priority for all Nordic countries (from natural resources to infrastructure and logistics) development of northern regions, improvement of environmental management, study of shipping in the Arctic Ocean, climate change, analysis and development of innovative approaches to environmental protection,

⁵⁰ Umeå University. URL: <https://www.umu.se/en/> (accessed 11 May 2020).

⁵¹ Luleå University of Technology. URL: <https://www.ltu.se/> (accessed 11 May 2020).

⁵² Abisko research station. URL: <https://polar.se/en/research-in-abisko/> (accessed 11 May 2020).

⁵³ Tarfala research station. URL: <https://www.natgeo.su.se/english/tarfala-research-station> (accessed 11 May 2020).

protection of indigenous peoples, participation in energy and infrastructure (e.g. information and communication technology) projects..

The governments of the northern countries pay special attention to scientific and educational cooperation, supporting academic and research mobility, exchange of knowledge on working in the extreme conditions of the Far North and the Arctic. Effective protection of the population and nature in the Far North, search and updating of knowledge, organization of scientific research are possible within the framework of international cooperation with the participation of the Nordic states. The Nordic countries were at the origin of the Arctic programs of the EU, BEAR and the Arctic Council. Therefore, in the Arctic strategies, they focus on international cooperation with participation of state, business, NCOs, research organizations. Iceland, Finland and Sweden position themselves as experts who have the best practices for living in the Far North, which they are ready to share with their neighbors. The Nordic countries are characterized by a policy of internationalization, attracting the maximum number of participants to study and solve problems in the region, including countries from outside Europe and the Far North, and always with the participation of Russia. The results of scientific activities of the Nordic countries are used to support innovation and technology policies and geopolitical aspirations of the Nordic countries and are at the core of global sustainable development.

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Regional Specifics of Municipal Solid Waste Management in Arctic Regions of the Russian Federation*

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Abstract. The article analyzes the regional specifics of solid municipal waste management in the Arctic zone of the Russian Federation. The relevance of the topic is determined by the need to analyze the regional specifics of solid municipal waste management within the framework of the federal project "Integrated System of Solid Municipal Waste Management", included in the national project "Ecology". First of all, this request will allow us to achieve the most effective management decisions in the field of regulatory regulation and the introduction of mechanisms for economic regulation of MSW management activities, as well as to contribute the creation of an effective management system, and the development of infrastructure for MSW management. The statistical analysis of formation indicators, processing and utilization of MSW waste in the structure by region is presented in this paper. The factors determining the specificity of MSW handling in the Arctic regions are defined. The expert survey made it possible to identify the main problems of implementing the garbage reform in the Arctic in general and in inner regions in particular. The main methods in this study were: semi-formal telephone interviews with representatives of environmental organizations and associations (18 informants), as well as collecting and analysis of statistical indicators of the MSW handling in the Arctic regions.

Keywords: *Arctic zone of the Russian Federation, ecology, municipal solid waste (MSW) management, scheme of territorial waste management, separate waste collection.*

Introduction

The ecological state of the Arctic zone territories of the Russian Federation is increasingly becoming the object of close managerial and research attention. In terms of environmental pollution sources, the main environmental damage to the territories of the Russian Arctic is caused by the activities of industrial enterprises, most of which continue to use aggressive technologies in the production process. In addition to the indicated environmental damage from industrial impact, the problems of waste generated as a result of consumption are becoming more and more acute.

The urgency of the problems of solid municipal waste (MSW) formation and disposal in the Arctic zone of the Russian Federation has not lost its force over the past three decades. The restructuring of the industrial sector, the loss of affordable models of cyclical production and processing of materials have significantly negatively affected the state of the environment in the region. The lack of a waste management system has led to uncontrolled accumulation of wastes at landfills and unauthorized dumps that do not meet environmental requirements. The continuous

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increase in the MSW volume (both in absolute terms and per capita), the complication of waste composition, which includes an increasing number of environmentally hazardous components, have led to the actualization and revision of traditional ways of MSW management at all levels.

At the moment, the issues of MSW management are identified at the highest management level as one of the main environmental problems of the Arctic zone of the Russian Federation¹. Thus, according to the State Report "On the State and Protection of the Environment of the Russian Federation" submitted by the Ministry of Natural Resources and Ecology of the Russian Federation, the Arctic zone of the Russian Federation is recognized as the most sensitive to environmental pollution region of Russia. "The issue of anthropogenic impact on the natural environment in the Arctic zone of the Russian Federation is very acute due to the high vulnerability of geosystems and the low restorability of the region-specific landscapes"².

Despite the recognition of the anthropogenic pressure problem and its consequences for the Arctic territories, the economic significance and potential of the Russian Arctic (primarily in the extractive, processing and transport sectors focused on carbon) are recognized as priority tasks of national policy³, which raise the risks associated with increased amount of waste, including municipal waste.

Taking into account the strategic plans for socio-economic development of regions of the Russian Arctic, the problem of generation of consumption waste in the form of MSW requires a more detailed study: not only in terms of assessment of environmental damage from MSW or analysis of possible utilization options, but also from the point of view of studying the factors that determine the specificity of MSW management in the Russian Arctic.

Theoretical and methodological frame

The theoretical and methodological frame of this article is represented by two levels of work. The first is the general groundworks on the environmental aspects of life of Russian society; the second is the studies of various aspects of MSW management in the Russian Arctic.

The potential for research the ecological paradigm as an element of culture of Russian society was laid in the works of O.N. Yanitsky, L.G. Titarenko [1, 2, 3, 4]. The issues of environmental policy, conflicts and peculiarities of environmental organizations functioning are highlighted in the works of I.A. Khaliy; O.V. Aksenova, N. Levchenko, V.B. Golbrach [5, 6, 7, 8, 9, 10]. The problems of

¹ The report of the head of Rosprirodnadzor V.V. Kirillov at the international forum "The Arctic: Present and Future". URL: <https://rpn.gov.ru/search/?q=%D0%B4%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4> (accessed 01 August 2020).

² State report "On the State and Protection of the Environment of the Russian Federation in 2018". URL: https://www.mnr.gov.ru/docs/o_sostoyanii_i_ob_okhrane_okruzhayushchey_sredy_rossiyskoy_federatsii/gosudarstvennyy_doklad_o_sostoyanii_i_ob_okhrane_okruzhayushchey_sredy_rossiyskoy_federatsii_v_2018/ (accessed 01 August 2020).

³ This proposition is reflected in regulatory documents, such as: "The strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period up to 2020 (approved by the President of the Russian Federation on February 20, 2013)" and Resolution of the Government of the Russian Federation no. 366 of April 21, 2014 "On the State program of the Russian Federation "Social and economic development of the Arctic zone of the Russian Federation for the period up to 2020".

environmental awareness and behavior, in particular in waste management practices, are highlighted in the works of Yu.V. Ermolaeva, O. P. Ermolaeva [11, 12, 13].

With regard to research on the problems of MSW management in the Arctic, it is necessary to note the complexity of their coverage. Thus, the analysis of the statutory regulation of MSW in the Russian Arctic is presented in the works of S.A. Bogolyubov, I.O. Krasnova [14], I.A. Ignat'eva [15], V.A. Makov [16], I.A. Mizin [17]. Issues of handling (management) and features of territorial waste management schemes in the Russian Arctic are discussed in the studies of P.F. Agakhan'yants, A. Yu. Lomtev [18], S.A. Astaf'ev [19, 20], S.O. Kuz'mina, Yu.V. Anishchenko [21], V.A. Mar'ev [22] Yu.I. Sokolov [23]. The impact of MSW on the ecological situation in the Arctic regions is considered by O.V. Grigor'eva, M.O. Ivanets [24], V.I. Grebenets, V.A. Tolmanov, Yu.I. Sokolov [25]. The attitude of the Arctic region inhabitants to environmental threats and their impact on the population health are analyzed in the works of E.S. Klyukina [26, 27].

Despite the existing groundwork, the problem of MSW management requires an integrated approach and in-depth research, including the opinions of local participation agents, which makes it possible to identify the main obstacles to its effective solution, since the "degree" of environmental stress in the studied territories reaches its ultimate value due to different circumstances.

Research methods

This article is carried out within the framework of the RFBR grant and is one of the stages of work solving the problem of researching the opinion of the expert community in the regions of the Russian Arctic with regard to the problem of MSW management. This stage is the precursor to a series of representative surveys that the team of authors is going to conduct during 2020–2021 in the Russian Arctic regions, specifically in the Murmansk and Arkhangelsk regions, the Republic of Karelia and the Nenets Autonomous Okrug.

The main research method was a semi-formalized survey with environmental activists, whose profiles and communities are represented on the VKontakte network⁴ and have a larger (in comparison with other communities within the regions) number of subscribers. The number of interviewed experts was 18 informants (from the Murmansk region, the Arkhangelsk region, the Republic of Karelia, the Republic of Komi, the Republic of Yakutia (Sakha)).

Methods of statistical collection and processing of information were an important part of the work. The main sources were the following: official statistical database of the UISIS; annual reports of regional ministries of the Russian Arctic on the state and protection of the environment; formal inquiries to the Baltic-Arctic Interregional Administration of Rosprirodnadzor, regional schemes of territorial waste management.

⁴ The choice of this network was based on the popularity rating of the website in the Russian-speaking segment of the audience. URL: Global Internet Statistics for 2020 — Digital report on the state of digital technologies in the world and in Russia (web-canape.ru) (accessed 01 August 2020).

Statistical indicators of the formation, processing and utilization of MSW in the structure by regions of the Russian Arctic

According to Federal Law 89-FZ⁵, solid municipal waste is defined as waste generated in residential premises during consumption by individuals, as well as goods that have lost their consumption properties in the process of their use by individuals in residential premises in order to satisfy personal and domestic needs. Solid municipal waste also includes waste generated in the course of the activities of legal entities, individual entrepreneurs and similar in composition to waste generated in residential premises in the process of consumption by individuals.

To understand the scale of the MSW management problem, it is necessary to refer to the statistical indicators; the data are presented in Table 1.

Table 1

Indicators of MSW formation in the structure by regions of the Russian Arctic⁶

Subjects of the Russian Federation	MSW formation 2019, thousand tons	The resident population of the Russian Arctic territories, thousand people	MSW in kg per 1 inhabitant
Murmansk region	277 .4	741 .4	374 .2
Yamalo-Nenets Autonomous Okrug	241 .3	541 .4	445 .7
Arkhangelsk region	102 .8	605 .6	169 .8
Republic of Karelia	45 .5	113 .7	399 .8
Komi Republic	27 .7	74 .7	371 .4
Chukotka Autonomous Okrug	19 .2	19 .2	387 .1
Republic of Sakha (Yakutia)	17 .2	59 .4	289 .2
Krasnoyarsk region	15 .7	216 .9	463 .4
Nenets Autonomous Okrug	15 .6	43 .8	356 .2

The data in Table 1 indicate that the largest volume of MSW formation is in the Murmansk region (32.7%) and the Yamalo-Nenets Autonomous Okrug (28.5%). The smallest volume of MSW formation (up to 5%) is in the Nenets Autonomous Okrug (1.8%), in the Arctic territories of the

⁵ Federal'nyy zakon "Ob otkhodakh proizvodstva i potrebleniya" ot 24.06.1998 N 89-FZ. [Federal Law "On Production and Consumption Wastes" dated 24.06.1998 no. 89-FZ]. URL: http://www.consultant.ru/document/cons_doc_LAW_19109/ (accessed 01 August 2020).

⁶ Data source for the regions of the Russian Arctic — Source: Annual report on the protection and state of the environment in 2019 in the Murmansk, Arkhangelsk regions, the Nenets Autonomous Okrug, the Republic of Karelia, the Yamalo-Nenets Autonomous Okrug, the Komi Republic, Krasnoyarsk Territory and the Republic of Yakutia (Sakha), Chukotka Autonomous Okrug. For a number of regions where reports are not publicly available or regions that include Arctic territories, data were collected on the basis of formal inquiries to the Baltic-Arctic Interregional Administration of Rosprirodnadzor. Resident population — UISIS data. Formation of 1 kg of MSW per 1 inhabitant is calculated by the authors on the grounds of the volume of MSW per year (thousand tons) in the Arctic region or the Arctic territory per total number of residents.

Krasnoyarsk Territory (1.9%), the Republic of Sakha (Yakutia) (2.0%), the Chukotka Autonomous Okrug (2.3%) and the Komi Republic (3.3%). In the context of the average indicator of MSW amount in kg per 1 inhabitant of the Arctic regions, it can be stated that the data do not exceed the mean values for Russia as a whole — 400–500 kg per person per year. It is probably worth mentioning the lowest level of MSW formation in the Arkhangelsk region with the approximate amount of 170 kg per inhabitant per year.

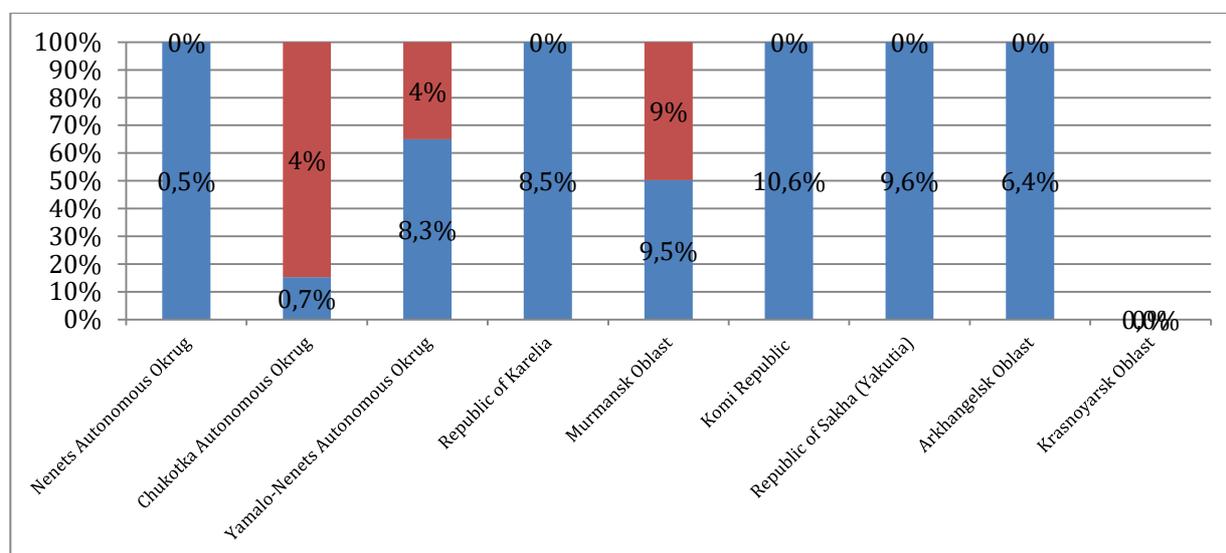


Fig. 1. Indicators of MSW processing and utilization in the structure by regions of the Russian Arctic, 2019 ⁷.

Figure 1 shows data on the processing and utilization of MSW in the structure for the Arctic regions. Concerning the MSW processing, it should be noted that this indicator does not exceed 10.0%. Regarding to the MSW utilization, it is possible to state that it is lacking in most of the northern territories. MSW utilization work is insignificantly carried out in the Murmansk region, where 9.0% of the total waste volume is utilized, in Chukotka and Yamalo-Nenets Autonomous Okrugs with 4.0% each.

A serious problem and one of the administrative tasks in the field of MSW management is the reduction of wastes placement facilities, primarily those formed unauthorizedly or those that have lost compliance with the SanPiN standards. Table 2 provides the current statistical information on the MSW placement facilities in the regions of the Russian Arctic.

Table 2

The number of sanctioned and unauthorized MSW placement facilities in the structure by regions, 2020 ⁸

AZRF region	Number of MSW placement facilities included in the SRWDS ⁹	Number of unauthorized dumps
Republic of Sakha (Yakutia)	260	329

⁷ Annual reports on protection and state of environment by the subjects of the Russian Arctic, 2019.

⁸ Annual reports on protection and state of environment by the subjects of the Russian Arctic, 2019. Official responses to formal inquiries to the Baltic-Arctic Interregional Administration of Rosprirodnadzor.

⁹ State register of waste disposal sites. URL: https://clevereco.ru/groro/respublika-karelija?sort=order_date&page=5 (accessed 01 August 2020).

Yamalo-Nenets Autonomous Okrug	145	350
Murmansk Oblast	78	147
Arkhangelsk Oblast	46	51
Nenets Autonomous Okrug	36	244
Republic of Karelia (Arctic territories)	30	10
Krasnoyarsk Territory (Arctic territories)	18	43
Chukotka Autonomous Okrug	12	44
Komi Republic	11	335

The problem of dumps in the northern regions is urgent for the population due to the fact that the majority of unauthorized landfills are formed within cities and rural settlements. The increase of waste volumes is becoming the subject of active discussion in the regional media, on the social networks profiles and among environmental activists more and more often.

According to the National Atlas of the Arctic, the Murmansk Region and the Republic of Sakha (Yakutia) have the highest total anthropogenic load in recent years; average anthropogenic load is in Arkhangelsk Region, Yamalo-Nenets Autonomous Okrug, Komi Republic and Krasnoyarsk Territory (Taimyr Dolgan-Nenets Okrug); the lowest level is in the Nenets Autonomous Okrug and Chukotka Autonomous Okrug¹⁰.

Factors determining the specifics of MSW management in the regions of the Russian Arctic

The main factors determining the specifics of MSW management in the Russian Arctic are:

Natural and climatic factors. The low average annual temperature, the presence of perennial frozen soils in most areas, the absence of fertile soils in the required volumes, which are recommended to be used for layer-by-layer waste isolation [29, Ulanova Z.A.] require implementation of special approaches to MSW management in the Far North.

Territorial factor. It should be noted that the regions of the Russian Arctic are territories that are difficult to compare in terms of a number of parameters (size of territories, density, remoteness, logistic accessibility). For example, the Arctic territories of the Krasnoyarsk Kray, the Chukotka Autonomous Okrug, the Nenets and Yamalo-Nenets Autonomous Okrug have a less favorable location than the Murmansk, Arkhangelsk regions, the Komi Republic and the Republic of Karelia: due to the lack of roads, the only possible ways to get to remote settlements and other regions — by water or air. Of course, this imposes serious restrictions on the possibility of MSW removing and processing, and what is possible to implement in one part of the Russian Arctic turns out to be difficult to achieve in another. An example is the legislative limitation of the terms of MSW accumulation at storage sites, which are limited to a period of 11 months. It is not possible to meet with these requirements in the Nenets Autonomous Okrug. The administration of the Nenets Autonomous Okrug has sent appeals to the Ministry of Construction, the Ministry of Natural Resources and the Ministry of Transport with an initiative to increase this period up to 36 months in those settlements where the number of residents is less than one and a half thousand and there are no roads.

¹⁰ Natsional'nyy atlas Arktiki [National Atlas of the Arctic]. Moscow, Roskartografiya, 2017. 75 p.

The problem of waste management in remote areas within the Arctic regions is crucial and actively discussed. In accordance with the Federal Law of 24.06.1998 No. 89-FZ¹¹ "On Production and Consumption Waste" as amended in 2014, all regions of the Arctic zone of the Russian Federation have developed territorial waste management schemes (TWMS). Researchers Agakhanyants P.F., Lomteva A.Yu., Primak E.A., Vyucheyskaya D.S., analyzing territorial waste management schemes in the Arctic regions, focus on the problems of MSW management in remote areas [18]. Thus, the MSW transportation and utilization are the most complex cases in the Nenets and Chukotka Autonomous Okrugs, in the Arctic territories of the Krasnoyarsk Kray, the Sakha Republic and the Komi Republic. The intraregional transit of MSW is significantly complicated for these regions; separate decentralized zones of regional operators are being created throughout these territories. In this regard, the questions of profitability and investment attractiveness of such technological zones remain open. The experience of the Chukotka Autonomous Okrug is noteworthy: its territory is divided into technological zones, and each of them is maintained by one of the 24 regional operators.

In TWMS of remoted areas of Murmansk, Arkhangelsk regions and the Arctic territories of the Republic of Karelia, MSW management is also a point of vulnerability. In fact, responsibility for the MSW management in these regions is shifted from the regional operator to the population, who is offered to separate, incinerate and compost waste by their own [18, Agakhanyants P.F. et al., p. 52]. However, there is no specific description of the separate collection system, which certainly creates the prerequisites for unauthorized dumps.

Ecological and economic factor. The main stake in the MSW management practice in all regions of the Russian Arctic is made on waste sorting complexes and further dumping of waste, which causes misunderstanding among the environmental community, since, with all the relevance and managerial attention to the topic, the implementation of the reform does not contribute to the effective collection and sorting of waste.

So, according to the Greenpeace report, which presented data on cities of AZRF with a population of 160 thousand people, access to stationary containers for separate waste (presented in the report) is as follows:

Table 3

*Ranking of cities in terms of the residents' accessibility to separate waste collection, 2018–2019*¹²

Place in the Greenpeace ranking, 2019	AZRF city	Residents' accessibility to separate waste collection in 2019, %	Residents' accessibility to separate waste collection in 2018, %
52	Noyabrsk	41	37
69	Syktyvkar	21	16
78	Severodvinsk	14	34
95	Arkhangelsk	8	34

¹¹ Federal'nyy zakon "Ob otkhodakh proizvodstva i potrebleniya" ot 24.06.1998 N 89-FZ [Federal Law "On Production and Consumption Waste" of June 24, 1998 no. 89-FZ]. URL: http://www.consultant.ru/document/cons_doc_LAW_19109/ (accessed 01 August 2020).

¹² Rating of the availability of separate waste collection in large cities of the Russian Federation. URL: greenpeace.ru/blogs/2020/03/12/rejting-greenpeace-kazhdyj-tretij-zhitel-krupnogo-goroda-rossii-imeet-dostup-k-razdelnomu-sboru/ (accessed 01 August 2020).

148	Murmansk	0	30
152	Norilsk	0	0
163	Yakutsk	0	0

As follows from the table 3, the situation in regional centers in terms of the residents' accessibility to the local separate waste collection is complex and ambiguous. Noyabrsk city, Yamalo-Nenets Autonomous Okrug, has positive dynamics in the rating and takes the highest line of the table. Severodvinsk, Arkhangelsk and Murmansk cities dropped by several positions in the ranking during the year. According to a Greenpeace report, there is no access to separate waste collection in such cities as Norilsk and Yakutsk. But it is worth noting that a drop in the rating and a zero value do not mean a lack of sorting in the regions.

The territorial schemes of all AZRF regions presuppose separate waste collection (SWC) in future, but this task is currently poorly implemented. It is worth mentioning that the SWC experience for large cities has been implemented in all regions of the Russian Arctic. In the Arkhangelsk region, for example, a two-container system of separate waste collection, implemented by AMPK LLC, has been operating for several years in large cities (Arkhangelsk, Novodvinsk, Severodvinsk). The territorial waste management scheme of the Arkhangelsk region contains a target indicator according to which a separate waste collection is planned to be implemented in 10 settlements with the largest population and a high level of infrastructure development. According to environmental experts, this approach to the MSW collection will make it possible to recycle up to 60% of waste, which is recognized as a good indicator, equated to the European experience.

After the commissioning of a waste sorting complex in the Murmansk region in 2019, separate containers for collecting plastic and glass (sold by ORKO-Invest LLC) disappeared from the territory of Murmansk city. Today, separate waste collection in large cities of the region is an exclusive initiative of environmental organizations, associations and a small part of the population.

Separate waste collection is not carried out in the Chukotka Autonomous Okrug. The main reasons for this are the insignificant amount of waste (the population of the ChAO is about 49 thousand people) and the lack of economic practicability, as well as the harsh climatic conditions (the duration of winters is 8–9 months), the inability to deliver wastes to the burial sites due to the lack of roads, the absence of processing plants and the high cost of exporting recyclable materials to other regions. It should be noted that the Chukotka Autonomous Okrug is in the most difficult situation in the Russian Arctic: the situation with landfills for solid municipal waste disposal has reached a critical point in the region, so, according to the report of the Accounts Chamber of the Russian Federation, the landfills will be completely filled in the next 7 years¹³.

¹³ Otchet o rezul'tatakh ekspertno-analiticheskogo meropriyatiya «Monitoring khoda realizatsii meropriyatiy natsional'nogo proekta «Ekologiya», v tom chisle svoevremennosti ikh finansovogo obespecheniya, dostizheniya tseyey i zadach, kontrol'nykh tochek, a takzhe kachestva upravleniya» (s rassmotreniem promezhutochnogo otcheta na zasedanii Kollegii Schetnoy palaty Rossiyskoy Federatsii) [Report on the results of the expert and analytical event "Monitoring of the activities implementation of the national project "Ecology", including the timeliness of their financial support, achievement of goals and objectives, control points, as well as the quality of management" (with consideration of the interim report at a meeting of the Board of the Accounts Chamber of the Russian Federation)]. URL: <https://ach.gov.ru/upload/iblock/697/6974665033576448bae98baa0e9626e4.pdf> (accessed 01 August 2020).

As the informants noted, the declared objectives of the national project “Ecology”, which implicate a progressive approach to waste management and have a goal of reducing unauthorized dumps and maximizing recycling resources, correlate poorly with their implementation. According to experts, the possible volume of secondary resources obtained at waste sorting stations does not exceed 18%¹⁴, which cannot be considered effective. And the subproject “Integrated MSW Management System” does not contain the necessary incentives and measures for the separate collection of waste and its recycling.

Table 4 contains information on the number of organizations involved in the collection, utilization and recycling in the regions of the Russian Arctic.

Table 4

*Organizations collecting, utilizing and processing recyclable materials in the structure of the Russian Arctic regions, 2020*¹⁵

AZRF region	Number of organizations involved in collection and utilization	Number of organizations involved in recycling
Arkhangelsk Oblast	20	1
Komi Republic	18	0
Yamalo-Nenets Autonomous Okrug	15	1
Murmansk Oblast	14	0
Krasnoyarsk Krai (Arctic territories)	13	0
Nenets Autonomous Okrug	8	0
Republic of Sakha (Yakutia)	6	2
Republic of Karelia (Arctic territories)	4	0
Chukotka Autonomous Okrug	-	-

The presented data indicate a weak development of the market for recyclable materials in the territories of the Russian Arctic. Processing plants are located only in three regions of the AZRF (Arkhangelsk Region, Yamalo-Nenets Autonomous Okrug and the Republic of Sakha (Yakutia)).

In order to fully understand the reasons for the inefficiency of the waste reform implementation in the regions of the Russian Arctic, we conducted semi-formalized interviews with representatives of the environmental community of the AZRF regions. Summarizing the data obtained, we received the following opinions of the informants.

1. Territorial waste management schemes. All survey participants are unanimous in their understanding of the discrepancy between the documents and the northern regional specifics. The attitude towards the tasks and the main idea is unambiguously positive, but not towards the methods of the implementation. The most critical respondents were the residents of the Arkhangelsk region, who, in addition to their high level of competence, indicated their own participation in public hearings and the proposals introduction (about 1300). All the respondents consider the existing schemes to be pilot projects that require serious improvements, in particular on the mechanisms of separate waste collection and the problems of remote settlements. The main ob-

¹⁴ The experts called different percentages with the range from 10% to 18% (the maximum mention is used in the text).

¹⁵ Compiled by the authors, based on work with open data of Internet resources.

stacle, according to public opinion, is the adherence of the regional authorities to the formal principle of development and implementation of the document just for *“a tick at the top”*; the measures taken do not contribute to a qualitative solution of the problem of MSW formation and utilization. The main expectation of the informants is a dialogue with decision-makers on the creation of a clear system of MSW management, where optimal conditions are created, legally and financially, for everyone: from a consumer and a regional operator to a processor-producer. Today, most interviewees believe that such conditions do not exist, and that the authorities are not ready for a meaningful dialogue.

2. Waste recycling. The lack of support from the regional authorities is unanimously considered by the informants as the main obstacle to the development of the recycling market. The involvement of the business community in the processing or production of goods from recyclable materials is not possible without public-private partnerships. Support in form of special tax regime or other forms of assistance are identified as key expectations. The second reason is the economic unattractiveness and long-term profitability of projects. Companies engaged in or experienced in the production of goods from recyclable materials see the benefit only in production volumes that can be sold within the region. In this case, the remoteness of the AZRF regions is a factor of economic disadvantage due to logistics costs. It is also worth mentioning that, despite the positive experience of SWC introducing in the cities of the Russian Arctic, this process remains the merit of environmental organizations and the personal (economically unattractive) initiative of individual entrepreneurs. According to the informants, the production of recyclable materials in the Russian Arctic is *“absolutely adventurous”*.

3. Environmental consciousness of population. It is difficult to solve the MSW problems without massive public involvement in the SWC practices. The opinions of informants in this parameter were not unanimous even within the same region. About 60% of the respondents admitted that population was ready to sort wastes and indicated the lack of the necessary infrastructure for SWC, suggesting significant financial support for this process from regional and municipal authorities, which do not have such opportunities. Another part of the expert community was more critical of environmental consciousness and public awareness. First of all, this referred to the reluctance of most people to get involved in waste sorting for a number of reasons: firstly, because of difficulties with the storage and accumulation of a certain type of sortable waste; secondly, the absence or remoteness of necessary infrastructure for separate collection; thirdly, the vulnerability of motivation to sorting waste. So, as an example, the situation with the January holidays in Arkhangelsk was cited, where the local garbage cans were overfilled with consumer waste while the public holidays and, in order not to dump garbage next to those cans, citizens threw unsorted garbage in containers for SWC. Informants from Yakutsk indicated that SWC practices should be introduced gradually and should start little by little, namely *“with batteries and tops”*; based on their own experience, they pointed out that the level of population consciousness in the field of SWC and understanding of waste fractions is still at an extremely low level. The informants also

noted that young people from primary school children up to 35 years old are more involved in SWC processes than senior citizens.

4. Work of regional operators. Regional operators are organizations that are responsible for the entire MSW cycle, including collection, transportation, processing, utilization, decontamination and disposal of wastes in specially designated locations. Regional operator service is paid by the owner of solid municipal waste: the population — flat owners in apartment buildings and owners of private households, legal entities and individual entrepreneurs.

The activities of regional operators in the AZRF regions are not easy. This is especially true for remote regions of the Russian Arctic. As mentioned above, there are 24 regional operators in the Chukotka Autonomous Okrug (10 organizations: 5 are enterprises of housing and utilities infrastructure with organizational and legal form of a municipal enterprise and a municipal unitary enterprise, and 5 are limited liability companies), 4 regional operators in the Republic of Yakutia (Sakha) (3 of them are limited liability companies, 1 is a state unitary enterprise), in the Nenets Autonomous Okrug there are 2 operators (municipal enterprise and municipal unitary enterprise), Arctic territories of the Krasnoyarsk Krai has 2 operators. The activities of regional operators in the above-mentioned territories are complicated by the lack of necessary infrastructure, which contributes to the economic justification of tariffs. Most of the operators are state-owned unitary enterprises. These regions are not very attractive for investors and the choice of regional operators remains a serious problem. For example, a regional operator for the northern zone of the Krasnoyarsk Krai (Turukhansk District) has not yet been chosen.

According to the reform, in order to become a regional operator companies had to go through a tender procedure, the main idea of the document was the competitive nature of the auction, where a decrease in the price of services reduces the tariff for citizens. This plan did not take into account the specifics of work in the Far North, which was economically unattractive for a regional operator. The consequences had the opposite effect: companies with no work experience and dubious reputations entered the market. Informants noted the example of the Arkhangelsk region, where EcoIntegrator company entered into a concession agreement with the regional administration and received a 10-year contract for removal and disposal of waste for a total amount of 28.3 billion rubles due to uncompetitive bidding. This company was established a year before the auction with one employee and an authorized capital of 10 thousand rubles. A similar situation is in the Chukotka Autonomous Okrug with the company RTK LLC: the lack of experience and competition allowed the organization to conclude a contract worth almost 137 million rubles. Karelia and Yakutia (Sakha) also have problems with choosing and work of regional operators.

The economic justification of tariffs by regional operators is also a complex issue for their activities. The highest rates are in the Chukotka Autonomous Okrug: waste transportation is the most expensive there. It should be added that payment discipline in most regions of the Russian Arctic is very high, the leaders are the Murmansk region, the Chukotka Autonomous Okrug, the

Republic of Karelia and Yakutia (Sakha). The average indicator for the Russian Federation is 50%, in the above designated regions (except for the Republic of Yakutia (Sakha)), it exceeds 80%.

All the informants of the study were recruited from the VKontakte social network. As the analysis of the network activity¹⁶ of local environmental organizations has shown, the topic of waste management is one of the most mentioned in the environmental agenda of the regions. Analysis of environmental organizations in all regions of the Russian Arctic has revealed three types of communities or profiles: regional public environmental organizations, initiative groups for MSW collection and territories cleaning up and activists with protest potential. The population network activity in the field of environmental issues is especially gaining strength in recent years, representing a special form of oppositional political participation [10, Gol'braykh V.B.]. For example, the most active protesters are groups of the Arkhangelsk region. This is related to the attempt to build a waste disposal facility at the Shies station, which caused a wave of indignation and resistance from the population of the Arkhangelsk region. There were network groups accumulating protest potential, such as "Pure Urdoma — Reload", "Pure Yarensk", "We are against the landfill in the Lenskiy district", "We are against the landfill on Shies!"

The topic of MSW management is crucial for a number of local associations that carry out educational activities among the population and the business community on the topic of separate waste collection and recycling. Such associations differ from classical environmental NPOs in a number of parameters: firstly, most of them do not have a long history of existence (usually 2–3 years) and they are not affiliated with any large regional or global environmental organizations; secondly, they have project-based nature of activity: most of associations do not have an organizational form, but are volunteer meetings of caring people; thirdly, they have only educational activities for organizing master classes, open lessons, eco-weeks and separate collection of waste and its delivery to recycling enterprises (mostly located in other regions); fourthly, such associations do not initiate dialogues with relevant authorities.

The most popular environmental organizations and associations of the Russian Arctic regions, either specializing or having one of the relevant topics "MSW management", are presented in the table below.

Table 5

Network representation of environmental organizations and associations in the regions of the Russian Arctic
17,18

AZRF region	Organizations and associations specializing only in the MSW problem	Organizations and associations having MSW problem on the agenda
Arkhangelsk Oblast	ECC	Environmental Movement 42

¹⁶ To search for environmental organizations and movements in the regions of the Russian Arctic, the program vk.barkov.net (<https://vk.barkov.net>) was used, which allows to identify thematic pages of groups and personalities, as well as to analyze the content of the wall in social networks.

¹⁷ Compiled by the authors based on the data analysis of the VK network and interviews.

¹⁸ The table does not include regional branches of all-Russian organizations; in this case, the selection was made specifically for local movements.

		Biarmia Green owl Pure North 29 Pomorie is not a dump
Murmansk Oblast	Pure Arctic	Nature and youth "Bellona-Murmansk"
Nenets Autonomous Okrug		Eco-Development Fund of the NAO
Yamalo-Nenets Autonomous Okrug	YANAO project "Future of the Arctic"	Ecology of Yamal
Chukotka Autonomous Okrug		Youth Support Fund
Republic of Sakha (Yakutia)	Separate Collection Yakutsk	Center for work with volunteers of the Republic of Sakha (Yaku- tia)
Arctic territories of the Republic of Kare- lia		Green wave
Komi Republic	Separate waste collection — Komi Re- public ECO_TIME_COMI	Pechora Rescue Committee
Arctic territories of the Krasnoyarsk Kray		Factory of kindness

In our opinion, local associations are most involved in the problem “from the inside” and represent its scale, shortcomings and possible solutions in a more vivid way.

Conclusion

Nevertheless, the conducted research has revealed a certain potential for further immersion in the problem and the necessity of its verification. In particular, it is a representative survey of the population in the field of environmental and economic practices that are implemented in the AZRF regions and possibility of their comparison and more detailed forecasting of volume of MSW formation and utilization. Research hypotheses that require further clarification appeared in the course of communication with informants, for example: whether such indicators as age groups, place of residence (urban (large / small city) / rural area) and the degree of population rootedness correlate with the level of their ecological culture.

The study has several unequivocal conclusions:

- Russian legislation does not fully take into account the climatic and territorial specificities of the AZRF regions in the field of waste management;
- The distance of remote communities and the remoteness of the regions themselves are a major obstacle to the waste management implementation, which reduces significantly the investment attractiveness of the MSW processing and recycling projects;
- Further development of the main idea and tasks of the Federal project “Ecology” is impossible without implementation of special conditions for the business community, ready to develop the recyclable materials market, and introduction of a separate waste collection system;
- There is a necessity of clear regional coordination in matters of substantiation of the best technologies in waste management;

- Serious managerial attention is required by the absence of a system which will make it possible to build a clear MSW management scheme, with maximum interests' observance of the agents influencing the MSW problem in the Russian Arctic;
- The environmental agenda of local activists is the evidence of active work with the public in the field of separate waste collection necessity, but this potential, which is realized exclusively as an initiative "from below", is not seriously supported by the regional authorities, and the stake on waste sorting complexes destroys the potential from the population.

Taking into account the complexity of the waste reform implementation, the Ministry of Natural Resources and Environment of the Russian Federation has developed a "road map" for the introduction of separate waste collection in the territory of the Russian Federation. The document establishes the procedure of tax incentives application to maximize the extraction of secondary resources from waste and their subsequent involvement in economic circulation, contains recommendations for changing building regulations: for example, abandoning garbage disposers in apartment buildings. An important note is the introduction of the "secondary resources" concept into the legislation. At the moment, the document is being negotiated.

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Trust in Ultima Thules: Social Capital and Renewable Energy Development in Iceland and Greenland. Part II*

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Abstract. Iceland — an independent republic — and Greenland — an autonomous country within Denmark — represent two nations with similar geographical, economic, and historical backgrounds. Isolated from the continents, both are significantly affected by an adverse climate, making their economies dependent on trade and import. Nevertheless, despite their similarities, their national energy patterns differ substantially. Specifically, Iceland covers most of its energy mix with local renewables, whereas Greenland meets most of the energy demand with imported hydrocarbons. This paper investigates the reasons for Greenland lagging behind Iceland in terms of developing renewable energy resources. It hypothesises that, apart from the commonly-mentioned geographical, institutional, and cultural factors, the difference in social capital level has significantly contributed to the countries' divergent energy strategies. In this sense, Iceland's higher social capital stock stimulates its renewable power progress, whereas Greenland's lower social capital level hampers it. To examine this hypothesis, the article constructs a 'social capital tripod', which assumes specific geographical, institutional, and cultural factors to be linked to renewable energy development through social capital. The findings demonstrate that Greenland, being dependent on hydrocarbon import, has a significantly lower expected level of social capital than Iceland, which runs mostly on renewables, therefore generally aligning with the research hypothesis.

Keywords: *Iceland, Greenland, renewable energy, social capital, geography, institution, culture.*

Discussion

In spite of the fact that the demonstrated advantages of the 'social capital tripod' could make it a useful tool for analysing current energy strategies and potential future renewable energy prospects, the concept was shown to possess significant limitations. That is why, this part demonstrates an alternative approach, potentially equally capable of explaining Greenland and Iceland's energy situation. Additionally, it identifies further research direction for potential improvement of the 'tripod'.

Alternative explanation: 'Resource curse' and industry specifics.

Although the concept presented above may potentially be utilised for analysing current and predicting future energy trends, alternative theoretical approaches could contribute to understanding the renewable power status quo in Iceland and Greenland. For instance, the 'resource curse' framework suggested by Auty [41, Auty R., p. 1] demonstrates that 'resource-rich countries fail to benefit from a favourable endowment' actually performing 'worse than less well-endowed countries'. Extending this theory Sovacool et al [42, Sovacool B. et al, p 180] assume that 'countries with an abundance of minerals or hydrocarbons can exhibit... deteriorating environmental

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quality'. Adding to this tenet, in her case study of Europe's energy industries, Menegaki [43, Menegaki A] demonstrates that the 'resource curse' is not associated with renewable energy sources, while the relationship between the development of extractive industries and inhibited economic growth still remains strong. Thus, in the opinion of Mansson [44, Mansson, p. 1], 'resource curse'-prone countries are less likely to develop renewable energy, as 'renewable resources... are more difficult to control', and nations rich in minerals and hydrocarbons are more likely to be affected by rent-seeking and authoritarianism.

Although authoritarianism is not characteristic of Denmark, according to Paldam [45, Paldam M.], rent-seeking is a unique feature of the Greenlandic model, which owes primarily to the annual financial grant from Denmark and extractive industry. Thus, the country is succumbing to the 'resource curse', as mineral mining and oil production are encouraged, even assumed by the Naalakkersuisut to form the basis of the nation's future economy¹. In this respect, production industries are currently not prioritised². Since, according to Liu and Ang [46, Liu N. and Ang B.], in most cases extractive sectors are significantly less energy-intensive than production ones, focusing on minerals and oil does not give Greenland sufficient incentive to develop its energy industry. Combined with the 'resource curse', this hampers impetus for renewable energy progress. Graphical illustration of these tenets could be accomplished through identification of current renewable energy projects and representation of mineral exploration and exploitation areas (see Fig. 10).

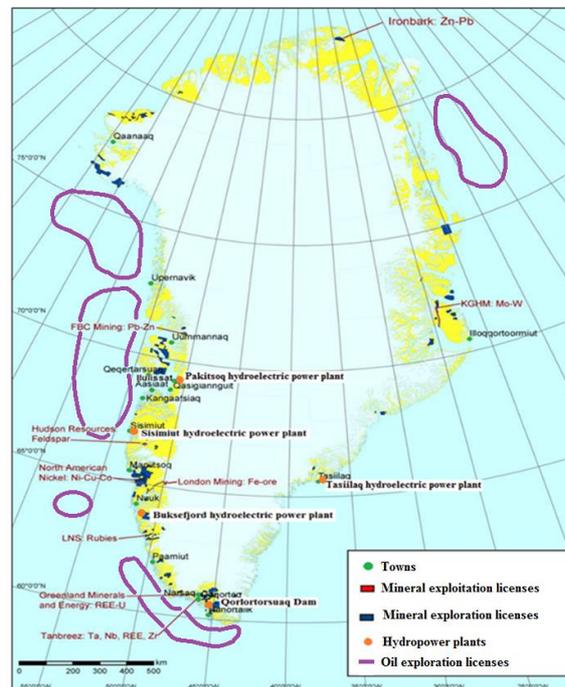


Fig. 10. Mineral exploration and exploitation licences and hydroelectric power plants in Greenland³.

¹ IIED. Energy and minerals in Greenland. URL: <http://pubs.iied.org/pdfs/16561IIED.pdf> (accessed 19 January 2020).

² Naalakkersuisut. Economy and industry in Greenland. URL: <http://naalakkersuisut.gl/en/About-government-of-greenland/About-Greenland/Economy-and-Industry-in-Greenland> (accessed 19 January 2020).

³ Author's adaptation from GEUS. Greenland geological data. URL: <http://data.geus.dk/map2/geogreen/#Z=5&N=7778710&E=980648> (accessed: 21 February 2020) and Mortensen B.O.G. Exploiting hydropower in Green-

As shown, only three of five currently existing hydroelectric power plants are located close to oil/mineral exploration areas (Buksefjord, Sisimiut, and Qorlortorsuaq). This is likely to signify that their purpose is to provide electricity to local settlements rather than exploration industries⁴. Although they cover Greenland's biggest towns, about 20,000 people in the country still lack stable renewable electricity supplies and most of the electricity for all sectors of Greenland's economy (fishing and mining) is thus produced from imported fossil fuels⁵.

In contrast to Greenland, according to Kristjansdottir [1, Kristjansdottir H.], Iceland has no significant extractive industrial prospects. Alternatively, in the opinion of the author, modernisation of the country after WWII by means of building the aluminium production industry created additional need for stable energy supplies. Since aluminium smelting is extremely energy-intensive, these industry development plans could be viewed as some of the greatest instigators for the large-scale utilisation of Icelandic hydropower potential⁶. Indeed, in 2015, about 65 percent of the total electricity produced in the country was consumed by currently-operating smelters⁷. In this respect, Kárahnjúkar and Andakílsárvirkjun hydropower plants could be mentioned as built specifically in the vicinity of the Fjarðaál and Grundartangi aluminium smelting plants for the consequent energy supplies⁸. Here, according to Kristjansdottir [1, Kristjansdottir H.], the Kárahnjúkar power plant appears the country's biggest energy-production project, located closest to its nation's biggest industrial energy consumer — the Fjarðaál aluminium smelter.

As seen, large-scale renewable energy production in Iceland was greatly associated with industrial modernisation and shift towards aluminium smelting. As a result, in 2015 the country covered 87 percent of its total energy demand with locally-produced green electricity and heat, leaving only 13 percent to imported petrol and diesel for transportation purposes⁹. In this sense, absence of any extractive activities with the accompanying success of developing renewable energy sources in Iceland greatly contrasts with mineral-exploiting Greenland importing most of its energy, providing significant support to the 'resource curse' theory.

On the other hand, mineral and hydrocarbon endowments — i.e. the core of the 'resource curse' theory — are assumed by Auty [41, Auty R.] to be an integral part of any nation's geographical conditions, leading to greater probability of resource-rich countries to experience this problem. Orihuela [47, Orihuela J.], in turn, mentions weak governmental institutions among factors contributing to the adverse effect of favourable geographical conditions. Following the argument of Al

land: Climate, security of supply, environmental risks and energy-intensive industries. *The Yearbook of Polar Law*, 2015, 6 (1), pp. 36-62.

⁴ Bawa H. Clean sustainable energy for Greenland. *Circle*, 2015, 3 (1), pp. 22-23.

⁵ *ibid.*

⁶ Witherall R. From fish to aluminium: Iceland turns attention to energy intensive industries. *Aluminium Today*, 1998, vol. 10, iss. 5, pp. 1-32.

⁷ *ibid.*

⁸ Skulason J.B. & Hayter R. Industrial location as a bargain: Iceland and the aluminium multinationals 1962-1992. *Human Geography*, 1998, 80 (1), pp. 29-48.

⁹ Orkustofnun. Power intensive industries. URL: <http://www.nea.is/hydro-power/power-intensive-industries/> (accessed 23 March 2020).

Sabah [48, Al Sabah M.], cultural factors (e.g. management traditions, innovation responsiveness, etc.) are also assumed to be capable of either impeding the ‘resource curse’ or facilitating it. Since each of the cited authors mentions a particular component of the ‘social capital tripod’, the concept of the ‘resource curse’ can potentially be integrated into it, either augmenting the understanding of the influence of separate components of the framework, or forming the ‘social capital quadripod’ (with the main ‘industry type’ becoming the fourth component). Fully-fledged development of this concept, however, needs further research.

Potential improvement: Interdependency of components

Although the current paper represents the ‘social capital tripod’ as indirectly integrating geographical, institutional, and cultural factors through the concept of social capital, these components may also be directly linked to each other. In this case, the ‘social capital tripod’ could be graphically represented as follows (see Fig. 11):

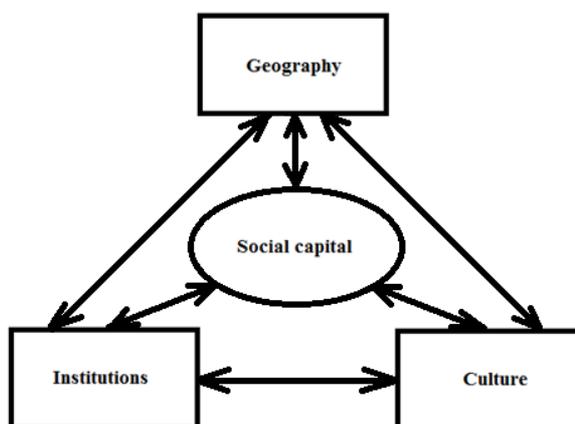


Fig. 11. ‘Social capital tripod’: Direct links between the components.

Here, in addition to the secondary links (arrows leading to social capital), there are direct bonds between the components (arrows connecting institutions with culture and geography). Alongside hypothetical assumptions of the existence of these ties, there is some evidence in the literature supporting that supposition.

In the opinion of Hart [2, Hart G.], ‘geography has a major role to play in developing... political economy, culture and power’. Sachs [8, Sachs J., p. 148] adds to this, arguing that geographical conditions and climate are associated with culture, as ‘geography... affects the profitability of various kinds of economic activities’. In this sense, in the opinion of the author, some types of culture developed mainly due to a specific form of subsistence economy that was most effective in those geographical conditions. With respect to climatically extreme Greenland, in the opinion of Caufield [49, Caufield R.], whale and seal hunting were the main activities that helped the Inuit to survive for 4000 years. In contrast to this, according to Grad [50, Grad I.], the milder climate of subarctic Iceland with less intense ice coverage allowed the Norse settlers to replicate the sheep farming

economies of Norway, etc. Thus, as shown, geography and culture being connected to each other affect long-term economic development.

When it comes to the energy development, the geography-culture link could also be used to illustrate the non-renewable preferences of Greenland and the renewable ones of Iceland. In particular, according to Sachs [8, Sachs J., p. 150], geography and culture 'shape the flow of technology'. In this respect, according to Caufield [49, Caufield R.], with the introduction of motor-boats for whaling and fishing in the 1920s, this type of transport has become dominant in Greenland's economy, gas oil being the most popular fuel. In the opinion of Buijs [51, Buijs C.], as no significant technological advances have been made regarding marine and land vehicles for Arctic conditions, Greenland's situation will most likely not change, as boats and snowmobiles propelled by hydrocarbons appear most reliable. In contrast, according to Discoll et al [52, Discoll P. et al, p. 637], Iceland's current industrial and energy specifics possess significant 'possibilities for a shift towards a more sustainable mobility paradigm'. In the opinion of the authors, this owes primarily to the country's more favourable geographical conditions and greater share of land transport, potentially facilitating replacing combustion cars with electric ones.

Similarly, such researchers as e.g. Castells [cited in 2, Hart G., p. 816] connect culture to institutions, assuming that 'cultures manifest themselves fundamentally through their embeddedness in institutions'. In this respect, organizations and institutions usually reflect a nation's cultural specifics. However, in the opinion of Gad [3, Gad U.], Greenlandic institutions were established by the colonial Danish power, irrespective of local culture. According to Orvik [53, Orvik N., p. 67], the Inuit therefore regard implementation of the western institutional model as a menace, threatening their 'endeavour to preserve their own values and culture'. Thus, following the researcher's argument, the country's modernisation, orchestrated by the central Danish government, did not reflect the cultural aspirations of most Greenlanders. In contrast, Icelandic institutions of classical western type were introduced by Icelanders themselves; thus, all socio-economic modernisation had the overall consent of the majority of Icelanders¹⁰.

Such conditions hampered Greenland's renewable energy development, also potentially relating to the dichotomy between the traditional Inuit culture and modern institutions established by the Danish colonial power¹¹. Here, the authors assume renewable energy to be part of the general modernisation policy, negatively perceived by the Inuit population. On the other hand, Iceland's large-scale renewable development plan initiated by the country's government was welcomed by its citizens interested in getting greater economic and financial opportunities, as the institutions responsible for the change consulted the local population, obtaining consent¹². Thus,

¹⁰ Witherall R. From fish to aluminium: Iceland turns attention to energy intensive industries. *Aluminium Today*, 1998, vol. 10, iss. 5, pp. 1-32.

¹¹ Langgård K., Pedersen K. Modernization and heritage: How to combine the two in Inuit societies, Nuuk, Atuagkat, 2013.

¹² Skulason J.B., Hayter R. Industrial location as a bargain: Iceland and the aluminium multinationals 1962-1992. *Human Geography*, 1998, 80 (1), pp. 29-48.

the interconnection of culture and institutions can either go in line or conflict with each other, ultimately influencing renewable energy development.

Finally, similarly to illustrating the direct connection of culture to institutions and geography, scholars find a link between the last two factors. In particular, Engerman et al [54, Engerman S., p. 87] while studying geography, institutions, and subsequent development of South and North America, assume that natural factor endowments of the former, and agricultural production opportunities of the latter, fostered the establishment and evolution of two specific types of institutions in these regions: 'extractive and inclusive'. Specifically, following the authors' argument, mineral exploitation in South America created greater opportunities for the 'extractive institutions with power in the hands of a small elite' not interested in production-related economic progress [ibid, p. 96]. Alternatively, vast territories suitable for farming in North America created preconditions for inclusive institutions because of fewer opportunities for elitist rule, as profit-generation was available to a greater number of people. In this respect, Acemoglu and Robinson [7, Acemoglu D. and Robinson J., p. 89] mention that such institutions 'foster economic activity', creating a platform for further modernisation, whereas extractive ones hamper it.

Such a comparison of the geographical features and subsequent institutional development of South and North America could potentially be projected to Greenland and Iceland. Indeed, with challenging climatic conditions and the territory suitable for neither agriculture, nor significant production of goods, Greenland's institutions appear to be close to the ones of extractive type: according to Goldbach [55, Goldbach I.], low general education level concentrates power in the hands of a small elite, linking national prosperity to mining and oil production. In contrast, Iceland's geographical conditions allowing for both agriculture and large-scale industrial activities are augmented by the inclusive institutions — i.e. a government focusing on large-scale industrial and energy development plans including strategic environmental assessment and incorporating citizens' opinions¹³. Additionally, Iceland's government constantly stimulates an already high level of education by building additional regional universities¹⁴. Thus, insignificant renewable energy development in Greenland, and an extensive renewable energy development in Iceland, could potentially be linked with their extractive and inclusive types of institutions, owing to their geographical specifics.

In summary, in addition to being linked to each other through social capital, the core parts of the 'social capital tripod', as shown above, could presumably have direct links to each other. Although this may significantly augment the concept suggested by this paper, further research still needs to be conducted into this relationship. Additionally, alternative theories explaining the status quo in Iceland and Greenland could reveal significant limitations of the represented framework.

¹³Thorhallsdottir T. Strategic planning at the national level: Evaluating and ranking energy projects by environmental impact. *Environmental Impact Assessment Review*, 2007, 27 (6), p. 576.

¹⁴Bjarnason T., Edvardsson I. University pathways of urban and rural migration in Iceland. *Journal of Rural Studies*, 2017, 54 (1), pp. 244-254.

Thus, both the nature of the relationship between the components and the overall concept need additional research.

Further limitations

Though this article did not intend to provide statistical evidence to highlight the direct relationship between social capital and renewable energy development in the two jurisdictions, further exploration of this assumed link from this perspective is needed to give the hypothesis a sound quantitative proof. In this connection, the predominantly qualitative nature of the paper represents the main shortcoming of this study. That is why the next step in developing research on this topic would be the application of econometric (statistical) analysis that could support this body of knowledge with a more vivid and reliable set of evidence.

Apart from applying non-quantitative approach towards the investigation of social capital's impact on the progress of renewables, the paper uses 'conventional' (i.e. western-borne) conceptualisation of the phenomenon of social capital. This, in its turn, could pose significant limitations on the results of the investigation and thus needs further and more detailed exploration. In particular, while mentioning some of the most prominent studies on the topic developed by Bordieu, Coleman, Lin, Portes, Putnam, etc., the article did not apply alternative views on the phenomenon of social capital. In particular, in contrast to the most popular approaches tying social capital mostly to networks, relationships, social structures and trust, such researchers as e.g. Ready [56, Ready E., p. 3] have quite an unconventional view looking at social capital through the prism of 'resource flow'. Here, in the context of indigenous population, food sharing could be viewed 'as a form of social capital that provides access to resources in a network' [ibid].

Though Ready [ibid] focused primarily on the indigenous population of the North American Arctic and its harvesting culture, similar assumptions about the importance of food sharing for the indigenous communities in other geographical regions were made by other scholars. For instance, while exploring the traditional settlements of Greenland's Upernavik district, Hendriksen and Jørgensen referred to the 'old tradition of "meat gifts"' [57, Hendriksen K. and Jørgensen U., p. 137]. According to the authors, in those indigenous communities 'if someone catches a whale, walrus, or polar bear, it is shared in the smaller settlement according to traditional rules for distribution, and if someone cannot hunt due to illness, age or mental state, the rest of the settlement makes sure that the family has fresh seal or other meat' [ibid]. Hence, following the argument of Ready, paying specific attention to the food sharing practices in such traditional communities could potentially indicate that the level of social capital present in them is high. This, in its turn, could challenge the findings of the current article that demonstrates low overall level of social capital in Greenland.

At the same time, since Hendriksen and Jørgensen's paper (unlike the one of Ready) is qualitative by its nature [ibid], proving the significance of the 'food sharing' argument in Greenland could further benefit from quantitative support just like the current article. In addition, the

limited geographic scope of the authors' research — i.e. focus on one Greenlandic district — may question whether the social capital level in Upernavik could reflect the one in the whole country. Nevertheless, exploring the concept of social capital from the perspectives of 'resource flows', 'food sharing' and other alternative approaches towards social capital is likely to bring new insights to the argument posed by this piece of research. In this sense, the specific attention that this paper gives to the 'conventional' social capital conceptualisations should be viewed as its significant limitation.

Conclusion

This study explored the reasons behind Iceland and Greenland's divergent renewable energy patterns. Taking into consideration the countries' significant geographical, historical, and economic similarities, the research aimed to find out why the latter is currently not promoting renewable power implementation as actively as the former. To do so, the paper focused on the three main theoretical concepts, attributing the energy development difference between these nations to geographical, institutional, or cultural factors. However, despite providing important insights into potential contributors to the energy pattern disparity, the traditional geography, institution, and culture paradigms were demonstrated to be unable to completely pinpoint the exact reason for Greenland lagging behind Iceland. This research thus hypothesised that low social capital hampered renewable energy development in Greenland, whereas high social capital fostered that of Iceland.

To support this hypothesis with sound arguments, one of the research objectives was to estimate social capital stock in both countries. For this purpose, it argued in favour of creating a 'social capital tripod', linking each of the three frameworks to this notion and demonstrating positive association of social capital with renewable energy development described in the previous research. As the notion of social capital appears to be broadly interpreted, another objective was to identify its components and create a comprehensive definition for use in this paper. This was done through extraction of the key social capital features (trust, reciprocity, social structures, relations, and networks) mentioned in the six most cited academic definitions of social capital and their subsequent integration.

Similarly, the six specific geographical, institutional, and cultural features were revealed to directly impact social capital level: population growth rate, distance and discontinuity/connectivity between settlements (for geography); homicide and suicide rate (for institutions); alcohol consumption rate and nomadic/semi-nomadic traits (for culture). By binding these six social capital proxies to its five components, the research constructed the 'social capital matrix' that was implemented for assessment of the estimated social capital level in Iceland and Greenland in 1999–2009, considered one of the most significant decades for Nordic renewable energy progress.

Having analysed qualitative and quantitative geographical, institutional, and social factors in Greenland and Iceland through the 'matrix', the research reached its objective of measuring the

proxy indicators' level in each country. Specifically, in the researched period, most of the Greenlandic features — i.e. high discontinuity and low connectivity, high number of suicides and alcohol consumption, and strong nomadic traits — had 'significantly negative' impacts on social capital, with the remaining — low population growth and high homicide rate — being 'moderately negative'. In contrast, four out of six Icelandic features were associated with 'moderately positive' effect (high population growth, no nomadic traits, low homicide and suicide rates), with only two being 'significantly positive' (low distance/discontinuity and moderate alcohol consumption).

Since none of the indicators in Iceland was paralleled with negative social capital, and none of the Greenlandic factors related to the positive one, analysis of their status in each country revealed that the expected overall Icelandic social capital level is 'moderately' high, while that of Greenland is 'significantly' low. The identified difference in the two countries' social capital stock generally *aligns* with the research *hypothesis*. Hence, the research *aim* of exploring the reason for the countries' dichotomy has been approached. Indeed, Iceland's advanced renewable energy development could be paralleled with its higher level of social capital, whereas Greenland's lack of renewable power enthusiasm could owe to the revealed low level of social capital.

Although the findings parallel the diverging levels of social capital with similarly diverging renewable energy patterns, due to its non-calculative nature, the suggested 'tripod' concept does not demonstrate statistical proof that other potential variables did not contribute to the countries' current renewable energy state. In this sense, further improvement would include integration of correlation and causality analyses, as well as elaboration of a specific social capital index for exact measurement of its level. On the other hand, its relative simplicity, not requiring problematic primary data collection, could turn the 'tripod' into a helpful mechanism for decision-making and analysis. Hence, by evaluating geographical, institutional, and cultural features of countries and regions, one can possibly predict the probability of success, or explain the reasons behind the failure of renewable energy development in high-potential regions.

In parallel with the promotion of the social capital concept as an explanation of the Greenlandic paradox, the paper mentions the 'resource curse' theory as an alternative approach, potentially capable of illustrating the cause of this disparity from a different view. Then, explaining unwillingness to develop renewable energy through the presence of significant mineral deposits, the research connects it to the buildout of non-energy-intensive extractive industries. In contrast, active renewable energy development is paralleled with the boost of power-intensive aluminium production. Although these arguments seem reasonable, the research shows that the 'resource curse' concept can potentially be integrated into the 'social capital tripod', either through strengthening the already-existent components, or by adding an additional one in a form of 'industry specifics', so that the 'social capital quadripod' is formed.

Next, apart from additional exploration of potential incorporation of the 'resource curse' theory into the 'tripod' structure, the study suggested steps for further theoretical improvement of the existing model. Specifically, alongside the indirect connection of the geographical, institu-

tional, and cultural factors to each other by means of social capital, the paper provided some evidence of literature supporting the idea of their direct links. Although establishment of such bonds between the proxy indicators needs further research, the potential new version of the concept will not undermine their connections to its social capital core.

Finally, having recognised the non-quantitative nature of the article among the key traits limiting the reliability of its argument, the paper welcomes further exploration of this topic with statistical methods. In addition, though this piece of research viewed the social capital phenomenon solely through the prism of its most popular conceptualisations, less conventional theories attributing this notion in indigenous communities to 'food sharing' and 'resource flows' were recognized as important elements of the theory that were not addressed. In this connection, introduction of such new and 'less conventional' approaches towards social capital would additionally augment this body of knowledge.

In summary, alongside providing insights into the causes of renewable energy development failure within the circumstances favourable for its progress, by integrating geographical, institutional, and social factors into one system, the paper demonstrates the tri-partite essence of sustainability that connects social, environmental, and economic pillars. In this sense, having illustrated the variety of effects that specific proxy indicators have on social capital and, consequently, on renewable energy and sustainability, the research provides additional evidence of the multifaceted nature of sustainable development. Most importantly, the paper illustrates social capital as a significant prerequisite for the success of renewable energy development.

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Branding of the Arctic Tourism Destinations in Russia*

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Abstract. The study deals with the issues of tourism destinations branding, as well as tourism multidimensionality and tourism destination identity in the Russian Arctic. The factors determining the promotion and branding of tourist destinations in the Russian Arctic are considered in correlation with the fundamental principles of sustainability in Arctic tourism. The relationship between state policy and socio-economic development of the Arctic regions of Russia is considered, in particular, in the aspects of Arctic tourism development. Dialectical, logical, theoretical and empirical methods were conducted for this research. The article defines the conditions for increasing the competitiveness of the domestic tourism product in the Arctic, lists tourism facilities, territories and tourism products that are of the most expressed interest to Russian and foreign tourists. The factors affecting the competitiveness of the tourism product in the Russian Arctic are identified. The article presents the components of the tourist destinations image in the Russian Arctic, which may become the basis for the formation of a strategy for branding tourism in the Arctic regions. The conclusion is drawn about the need for an umbrella brand creation for the Russian Arctic. The necessity of creating conditions for the professional implementation of tourist personnel in the Arctic regions of Russia and the influx of labour resources from urbanised and oversaturated territories to the Arctic with the aim of the integrated development of tourism is substantiated.

Keywords: *the Russian Arctic, Arctic tourism, tourism destination branding, sustainable tourism development.*

Introduction

The intensive expansion of the Arctic market over the past decades is based on both the consumer demand factor for an exclusive tourism product and the dominant geopolitical factor of the strategic presence in the Arctic and the impact on its further development. Most of the national and regional tourism offices in the Arctic (VisitNorway, Inspired by Iceland, Discovering Finland, etc.) have formed strategies for promoting Arctic national, regional and local brands of tourist destinations. They are actively promoting them in the domestic, international, Russian markets, successfully attracting Russians as loyal tourists.

When studying the development and branding of Arctic tourism, it is necessary to take into account the fact that the Arctic is a very vulnerable region, where even a small number of tourists can cause irreparable harm to the environment. At the same time, the positioning of the state innovation policy of priority sectors of the economy in strategically significant regions, which the Arctic region undoubtedly belongs to, through the tourism destinations branding is considered by scientists as a tool for spatial planning and strategic communication with the foreign public [1, Van Assche K., 2, Oliveira E.]; the geocultural brand of the Arctic territory is its strategic asset [3, Zamyatin D.N.].

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Tourism branding is the subject of works of UNWTO, the European Tourism Commission, the World Tourism and Travel Council, foreign researchers, including S. Anholt, S. Murdy, N. Morgan, S. Pike, S. Warren, G. Ashward, and others, as well as A.Yu. Alexandrova, M.A. Zhukova, A.B. Kosolapov, V.N. Sharafutdinov, and other Russian scientists [4, Timoshenko D.S.]. However, the problem of integrated tourism branding in the Russian Arctic remains poorly researched and requires special attention.

This study provides a comparative analysis of the factors determining the development and branding of tourist destinations in the Russian Arctic in the context of the current state policy of the Russian Federation, in correlation with the principles of sustainability. With the help of empirical methods, a list of strategic objects of tourist attractions has been drawn up for inclusion in the branding strategy.

The role of tourist destination branding in current conditions

The trend of recent years is the intensive development of sustainable tourism. This development is ecological, focused on conservation and creation. The society of tourist products consumers transforms into a society of connoisseurs and custodians of exceptional tourist resources. The culture and philosophy of tourist consumption becomes part of the tourist destinations image, forms the prestige of a tourist region («tourism destination» is the destination place of a tourist, playing a major role in the decision-making process for the trip¹. It can be a place, a city, a region, a state, a country. Author's note). In 2020, the world community faced dramatic changes in the business processes of the tourism industry and in the promotion of tourist destinations. In the context of a pandemic, closure of borders, travel restrictions, each tourist destination was forced to conduct a certain kind of reaction, prepare for a completely new stage of development, and rethink the philosophy and strategies of its tourist brands. This forced rethinking allowed Russia to pay special attention to the development of tourist regions, including the Arctic.

Currently, the development of innovative, effective and at the same time easy-to-implement technologies for tourism branding is an important area of intensive development. Identification and interpretation of tourist identity, formation of the territory image, promotion through the developed branding strategy, integration into the national tourist brand are inextricably linked to the processes of complex social, cultural and economic development, technological progress, innovative achievements, environmental safety, business activity, favorable investment climate, human capital potential. [5, Kirichenko Yu.Yu., Timoshenko D.S.] All the above-mentioned factors of tourism development should also be taken into account in planning and forecasting the development of tourist destinations, as well as in the design of tourist and recreational complexes (TRC) in order to determine the anthropogenic impact and prevent excessive anthropogenic pressure. That would make it possible to forecast possible development scenarios, to identify target

¹ UNWTO. Glossary of Tourism Terms. Destination (main destination of a trip): The main destination of a tourism trip is defined as the place visited that is central to the decision to take the trip. URL: <https://www.unwto.org/glossary-tourism-terms> (accessed 15 July 2020).

and niche markets, as well as to bring a high-quality and competitive tourism product to the market.

The development of tourism is also impossible without creating the necessary conditions for building a system of operational and successful communication, which includes all participants in the production, promotion, sale and consumption of tourism products, as well as stakeholders from tourism-related industries. Thus, UNWTO responded quickly to the evolving 2019-nCoV pandemic and the declaration of WHO state of emergency on 31 January 2020². The World Tourism Organisation recommended restricting travel and movement, especially to the centers of an acute epidemiological situation. In March 2020, UNWTO expected a decrease in tourist arrivals of at least 20-30% in 2020, which means a decrease in international tourism revenues (exports) by \$300–450 billion. The World Tourism Organisation claims that, given past market trends, COVID-19 will cause damage to the tourism industry equivalent to five–seven years of tourism market operation³. In March, the decline was 55%. In June 2020, UNWTO informs that the widespread travel restrictions resulted in a 97% drop in international tourist arrivals in April 2020, which was supposed to be one of the peak periods of the year due to the Easter holidays. Between January and April 2020, the number of foreign tourists decreased by 44%, resulting in a loss of about US \$195 billion in international tourism⁴.

The uncertainty of the economic situation, the lack of the possibility of carrying out short-term and medium-term planning, the blurring of the sales depth, the crisis in financial relations and mutual payments among the subjects of the tourism market, hospitality, aviation, etc. make adjustments to the forecasts of tourist arrivals. According to the author's preliminary estimates, at least 60%–75% reduction in the total number of tourist arrivals in 2020 compared to 2019 should be expected. Stabilisation in the tourism market is impossible without transformation, search for new forms of sales, distribution channels, revision of branding strategies. The expected active competition for the consumer may affect the socio-economic development of tourist destinations and force a rethinking of the pricing policy for a tourism product. At the same time, innovative branding will play a key role in attracting tourists and communicating messages to potential markets.

Undoubtedly, the crisis situation in the tourism and hospitality market, aviation, tourism-related industries and the global economy in general, caused by 2019-nCoV, influenced the development of Arctic tourism in Russia and the dynamics of tourist arrivals in the Arctic regions of the country. Tourism, as a connecting thread of the economy, diplomacy, cross-cultural relations be-

² World Health Organization 2020 Novel Coronavirus (2019-nCoV) Situation Report 11. URL: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200131-sitrep-11-ncov.pdf?sfvrsn=de7c0f7_4 (accessed 15 July 2020).

³ UNWTO. International tourist arrivals could fall by 20-30% in 2020. 26 March 2020. URL: <https://www.unwto.org/news/international-tourism-arrivals-could-fall-in-2020> (accessed 01 July 2020).

⁴ UNWTO New data shows impact of covid-19 on tourism as unwto calls for responsible restart of the sector. 22 June 2020. URL: <https://www.unwto.org/news/new-data-shows-impact-of-covid-19-on-tourism> (accessed 01 July 2020).

tween countries and regions, has suffered from the pandemic more than other areas, but now it can become a catalyst for the recovery of communities and regions.

Tourism development in the Russian Arctic. Sustainability principles and public policy

The tendencies of a sustainable tourism development in the last two decades have become a characteristic of many tourist destinations, which is caused by the global trend of sustainability, distinctive for a modern intensive economy with socially responsible management. The Arctic Council, BEAC, UNWTO, the European Tourism Commission, leading Arctic universities, including Russian, etc., are actively involved in researching the development of Arctic tourism in the context of sustainability. The 1993 Kirkenes Declaration reflects the concept of sustainable development of the Barents cooperation.

There is no doubt that tourism in the Arctic as an integrated system of economic, socio-cultural relationships should simultaneously serve the purposes of supporting the local economy and local population, recreation, humanistic and intellectual education, as well as protecting, preserving and renewing biodiversity and natural resources, involved in tourism. The benefits obtained from tourism should be distributed rationally, ensuring the socio-economic sustainability and ecological compatibility of the tourism business in the Russian Arctic.

The Russian leadership has always considered the Arctic as a strategically important object of its presence and future development. Currently, the intensification of development, image formation and branding of Russian Arctic tourism largely depends on the practical implementation of the Fundamentals of State Policy of the Russian Federation in the Arctic Zone up to 2035, the adoption of the final draft of the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security up to 2035, and at the same time from supporting and stimulating business processes and entrepreneurial initiatives, social support (the possible expansion of the “Far Eastern hectare” program to the Far North of Russia) in the context of sustainable tourism development by the state. National scientific and political interest in the Arctic, initiated by speeches of the country's top leadership on a regular basis, media coverage of events related to the presence in the Arctic region, contribute to attract the attention of the public and foreign players in the geopolitical arena to the expansion of the Russian presence in the Arctic; it is a reliable basis for broadcasting these provisions through the communication messages of the national, arctic and tourist branding of Russia.

The basic principles of sustainable development of the AZRF are transmitted by the Security Council of the Russian Federation, including the course of joint events at the international level through the Arctic Council (AC). For example, the Security Council of the Russian Federation has repeatedly held international thematic forums, conferences, high-level meetings, during which issues related to the development of tourism and recreation potential of the Russian Arctic regions and the development of tourism infrastructure have been discussed as well as research, personnel, transport, information and logistics support. The importance of ensuring the safety of

tourists and the indigenous peoples of the North is emphasised, the problems of ensuring a stable communication, organizing medical care, including cases of emergency situations, are discussed:

- “Northern Sea Route — to Strategic Stability and Equitable Partnership in the Arctic” — a conference on board of atomic icebreaker “Yamal” along the NSR route in August 2011;
- Conference “Security and Cooperation in the Arctic: New Frontiers” in April 2012, Murmansk with visits to the FJL archipelago and a visit to the border office “Nagurskoe” of the FSS of Russia. (Fig. 1);
- Conference “Ensuring technogenic and environmental safety in the Arctic: solutions” in April 2013 Route: border outpost “Nagurskoe”, ice base “Barneo”, North Pole, Salekhard, village Yar-Sale, Aksarka;
- Meeting of representatives of the AC member states, AC observer countries and the scientific community in August 2014 in Nar’yan-Mar and a number of other events that are actively covered by federal channels and in foreign media.



Fig. 1. Official delegation of the International Meeting of High Representatives of the AC member states. Border office “Nagurskoe”, the FJL archipelago, Russia. 11.04.2012⁵.

The meetings of representatives of the AC member states are aimed at enhancing practical cooperation between states to ensure the comprehensive safety of human life in the Arctic. They demonstrate the closeness of national approaches to development and preservation of the Arctic, their focus on enhancing multifaceted cooperation in the region, their help to strengthen mutual trust and contribute to the formation of a positive image of Russia, including Arctic tourism development. At the same time, the AC is a platform for positioning Russia as an Arctic power, and AC meetings on the territory of the Russian northern regions undoubtedly allows demonstrating the level and potential of the Russian presence in the Arctic.

In the course of the meetings, special attention is paid to the revival of navigation along the NSR and ensuring international transit traffic. Discussions include the issues of building new icebreakers, modernising existing ones, creating new and updating existing ports, strengthening the

⁵ Source: Press Service of the Security Council of the Russian Federation.

search and rescue system in Arctic waters, emergency medicine, improving navigation and communication systems, including auroral zone during magnetic storms.

In the context of intensive development of tourism in the Arctic regions of Russia, the issues of sustainable, safe and environment-oriented tourism are discussed, the routes of which pass through the places of residence and traditional economic activities of the indigenous peoples of the North. One of the important issues is the conduct of tourist and recreational activities in specially protected natural areas (SPNA) of the Russian Arctic, as well as the assessment and forecast of possible risks from the mass development of tourism. The Arctic today is a territory of low political tension and successful development of multilateral international cooperation [6, Grinyaev S.N., Zhuravel V.P.]. In these circumstances, international activities development aimed at enhancing international cooperation in tourism and mutual tourist exchanges with northern tourist destinations, as well as promoting the potential of Arctic tourism in the domestic tourist market, remain relevant. The NSR development, the simplification of tourist logistics and visa formalities, the development of tourist infrastructure, the solution of personnel shortage in tourism in the Arctic regions, environmental issues, security, as well as the provision of search and rescue operations are the factors that determine medium and long-term branding of tourism in the Russian Arctic.

The above-mentioned issues and challenges cannot and should not be solved only by the tourist business community and public associations, without state participation. This is primarily due to the peculiarities of the geopolitical situation development in the AZRF, which is changing as a result of the intensification of world international relations.

Development of tourism in the Russian Arctic. Tourism potential

Organised tourism in the Russian Arctic is not mass scale. Arctic tourism is a niche and expensive tourism product. At the same time, it is technically and organisationally complex. A comparative analysis of the market for offers of Arctic tourism makes it possible to conclude that the number of tour operator companies that conduct the entire cycle of production, promotion and sale of a tourist product in the Arctic regions of Russia is small. The Arctic tourist industry is characterised by a complexity of the tourist offer, compound logistics and a high level of security and protection of tourists themselves, biodiversity and ecosystems involved in the production and sale of a tourist product, as well as strategic facilities and the state borders. All of these things should be reflected in the branding of tourist destinations in the Russian Arctic [7, Timosheko D.S.].

One of the successful examples of branding technology and promotion of tourism and recreational potential is the participation of the Arctic regions of Russia in the All-Russian competition for the creation of tourism and recreation clusters and the development of ecotourism in Russia (16.06–15.11.2020), organised by ANCO "ASI". Sixty-eight constituent entities of the Russian Fed-

eration participated in the competition, 231 specially protected areas were presented within the framework of projects, 63 of which are federal, and 168 are regional ⁶.

The northern regions took an active part in the competition project. Yamalo-Nenets Autonomous Okrug introduced the project "Natural Park "Polyarno-Uralskiy"; NAO presented the projects "Natural Monument "Pym-Va-Shor" and "Integrated Natural Park of Regional Significance "Northern Ti-Man". The Murmansk region has applied for support of the TRC uniting the Khibiny National Park, the Polar-Alpine Botanical Garden-Institute named after N. A. Avrorin, "Astrophylites of Mount Eveslogchorr", "Eutrophic bog of the southern Khibinya", "Yuxporrlak", "Cryptogram gorge", "Aikuayvenchorr gorge", as well as to support the state integrated nature reserve "Kaita". Arkhangelsk Region presented a project of the "Golubino" Park TRC. Krasnoyarsk Territory announced the project "TRC "Arctic. Putorana Plateau", etc. Republic of Sakha (Yakutia) presented "Tourist cluster "Lena", Chukotka Autonomous Okrug — the "Arctic Riviera" TRC, which combines the Vostochnyy SPNR (Uelenskie hot springs), the Lorinskie SPNR (Kukunskie hot springs) and the Klyuchevoy (Senyavinskie thermal mineral springs). The Komi Republic presented the "Virgin Komi Forests" TRC, which included the "Yugyd Va" National Park and the "Pechora-Ilych" State Biosphere Reserve. The purpose of the competition is to identify territories for the development of ecotourism, create a TRC within the framework of the integrated development of protected areas and stimulate the development of small and medium-sized businesses. It is obvious that such targeted work carried out by the regions to identify, form and promote TRC will contribute to the growth of employment and local population incomes, the development of vacant or underutilized territories, the environmental protection of SPNR resources, environmental and tourism education, as well as development of communication and interaction at various levels of government, business and local residents. As a result of active work with the target audience, the regions have been able to reach out to broad sectors of population that were not previously informed about the tourist and recreational potential, including the Russian North.

In addition to the abovementioned, it should be noted that despite the absence of a unified strategy of branding and development of Arctic tourism in Russia, the national park "Russian Arctic", which is one of the most famous brands of the AZRF abroad, was visited by more than 6.5 thousand people from 70 countries for the period 2011–2018, while 1079 tourist arrivals were recorded in the tourist season of 2018 ⁷. In the anniversary year for "Russian Arctic", in 2019, the number of Russian visitors was on top for the first time in ten years of the park's existence. In 2019 the park was visited 1306 times, of which 262 were committed by Russians [8, Sevastyanov D.V.]. These figures indicate a high tourist interest in visiting facilities of the Russian North.

The high role of the indigenous peoples in the branding of tourism destinations in the North and the formation of the tourism identity of the Arctic territories is not in doubt. Currently,

⁶ All-Russian competition for the creation of tourism and recreation clusters and the development of ecotourism in Russia. URL: <https://priroda.life/> (accessed 28 July 2020).

⁷ National Park "Russian Arctic". Statistics. URL: <http://www.rus-arc.ru/ru/Tourism/Statistics> (accessed 27 July 2020).

41 ethnic groups are represented in the 28 northern regions of the country (about 270 thousand representatives of the small indigenous peoples of the North). UNWTO emphasizes that indigenous peoples should be the decision makers⁸ and beneficiaries of tourism development⁹, that affects them in one way or another. It is obvious that tourism organised in the territories of the indigenous peoples of the North and connected to the traditions, culture and life of the indigenous peoples, should bring them benefits. The development of this type of tourism is possible only in the conditions of interaction and the development of a reliable partnership of indigenous peoples of the North, government at different levels, tourist regions, as well as business sector of the tourism industry, related supporting spheres and industries, investors, and civil society. In addition, research institutes should also cooperate with all the listed stakeholders in order to be able to conduct research on the basis of valid data, that will be used in the future to develop tourism, to determine the so-called “points of attraction” of Arctic tourism, to analyse seasonality of tourist demand, anthropogenic pressure on tourist destinations and individual objects of tourist interest, to plan and to forecast tourist arrivals and tourism development in the short-term and long-term perspectives.

The most attractive objects of tourist interest that should be included in the branding of the AZRF are:

- Arctic Lights;
- crossing the Polar Circle;
- Franz Josef Land archipelago;
- passage along the Northern Sea Route;
- North Pole;
- nuclear icebreaker fleet, cruises on “Rosatomflot” ships;
- National Park “Russian Arctic”;
- “Barneo” — Ice Base ASPOL named after A.V. Orlov;
- observation of arctic birds, polar bears, whales, walruses, deer, arctic flora;
- Barentsburg settlement and Piramida settlement at Svalbard;
- “Arctic Floating University” of NArFU named after M.V. Lomonosov and other projects of Arctic universities;
- events, competitions, expeditions of the Russian Geographical Society and other associations;
- route “Silver Necklace of Russia”;
- Arctic regional and local cuisine;
- shamanism;

⁸ UNWTO Recommendations on Sustainable Development of Indigenous Tourism. URL: <https://www.e-unwto.org/doi/pdf/10.18111/9789284421299> (accessed 26 July 2020).

⁹ UNWTO Regional Conference on Sustainable Development through Tourism. URL: <https://www.e-unwto.org/doi/pdf/10.18111/9789284421312> (accessed 26 July 2020).

- folklore;
- ethnographic expeditions, etc.

We believe that the highest development potential and solution to the issue of competitiveness of the domestic tourist product in the Arctic can be found in the promotion of combined tourism, which combines the most promising types of tourism in the Russian North: industrial, business, MICE, sports, ecotourism, photo tourism; extreme (racing, skydiving, ATV trips, helicopter flights, hot air balloon flights, ice diving, snowkiting, etc.), eventful, cultural, historical, archaeological, ethnographic with indigenous people's sites visiting, educational, ornithological, cruise tourism, reindeer running and racing, dog sledging; licensed fishing; military-patriotic tourism, passes along the routes of reindeer transport echelons; acquaintance with traditions and folk crafts, trips to reindeer breeders' camps, scientific expedition tourism, etc. [7, Timoshenko D.S.]. Tourists are attracted by thematic tours (Soviet heritage, gastronomy, musical culture, berry picking, etc.), snow and ice installations, national holidays of the peoples of the North. The listed objects should be combined into the umbrella tourism brand "Russian Arctic", promoted and positioned in the global and local tourism market in accordance with the principles of sustainability and provisions set out in the Fundamentals and Strategy-2035.

Features of the Russian Arctic tourist destinations branding

Exogenous factors of the economy, along with socio-economic and industrial sectors, affect the definition of a tourist destination identity, the formation of the region image and the choice of a scenario for further branding of tourism.

The Arctic region is perceived as a territory of exceptional resources, unique biodiversity. The Arctic image includes extreme conditions for survival and coexistence with various ecosystems in an uncontrollable environment. The Arctic has an image of a territory of challenge, overcoming, influence, struggle, a territory of natural resources, historical and cultural heritage of Russia and the whole world. A large number of monuments of world importance, outstanding objects of history, archaeology and architecture are presented in the AZRF. The evidence of the historical past of the Arctic inspires potential tourists to make their first trip to the Arctic and empower those who have already visited it to further exploration of the Russian Arctic regions. The image of the Russian Arctic can be described as cold, wild, ferocious, attractive, sedate, silent, rich, pure, rigorous. The identity of the AZRF tourist destinations is determined by both natural objects and the traditions of the peoples inhabiting them, cultural elements, originality, fishing, local cuisine, artistic presentation of the Arctic in rituals, folklore, folk costume, holidays, construction and decoration of houses and traditional dwellings of northerners. Traditional games, entertainment, everyday life, as well as elements of shamanism are of great interest to Russian and foreign tourists. The rich tourism resources of the AZRF are conducive to deep research and exploration of the country's northern territories. The branding of tourist destinations in the Arctic should reflect vast op-

opportunities for meeting the needs of potential visitors in active, environmental, cultural, educational, ethnographic, industrial, business, scientific, educational, sports and extreme tourism.

A number of federal decisions for the NSR development up to 2035 were adopted in 2019. It inspires with hope that improvement of infrastructure, increase in the volume of freight traffic and development of the Arctic territories will be made [9, Zhuravel V.P.]. At the same time, the possibilities of increasing the number of tourist cruises in the seas of the Arctic Ocean along the NSR route are obvious [10, Federov V.P., Zhuravel V.P., Grinyaev S.N., Medvedev D.A.]. The image of the NSR can also become an integral element of the tourist identity of the Arctic regions of Russia.

The branding of Russia's Arctic tourism should correlate with the comprehensive and integrated development of the Russian Arctic. The problem of the lack of professional and highly specialised personnel involved in organised and legal Arctic tourism can be solved by creating conditions for the professional implementation of tourist personnel and the influx of labor resources from urbanised and oversaturated territories [8, Timoshenko D.S.]. The promotion of interregional temporary labor migration can also partially solve the problem of providing professional personnel for the tourism industry in the northern regions.

Tourism branding technologies in the Russian Arctic should correspond to the Fundamentals, the Strategy-2035 and follow the general vector of intensive development of the national economy. From the standpoint of ensuring the effective implementation of the branding strategy for the Russian Arctic tourism destinations, it is necessary to integrate interregional, regional and local brands of the North into a concerted strategy for promoting Arctic tourist destinations in Russia and beyond — the national tourism brand. In this case, the identity of Russia's Arctic tourism destinations will be embedded into the brand and information realm of the country in all its diversity and attractiveness.

Conclusion

When conducting marketing research and branding of tourist destinations in the Arctic, it is necessary to take into account the conditions of the harsh Arctic climate while planning, organising and implementing tourist routes. A well-developed algorithm of crisis communication in tourism, ensuring routes safety should be reflected in the branding strategy of tourist destinations in the Russian North. Well-functioning communication, work with tourists during a state of emergency and minimisation of its consequences are the key to sustainable and stable development of a tourist destination in the future [11, Koehl D.].

Practical solutions to the territorial and environmental problems of the Arctic can be provided using the experience (but not the mechanical transfer of it) and knowledge accumulated in key sectors of the northern economy in different countries [12, Zaikov K.S., Kondratov N.A., Kudryashova E.V., Lipina S.A., Chistobaev A.I.]. The concept of competitive brand identity of the territory of S. Anholt [13] can also be applied in branding and promotion of the Russian Arctic.

Branding of tourist destinations, processes of forming a system of socially responsible tourism business, popularization of the national idea through tourism, formation of the Arctic consciousness of Russian citizens and its projection on the culture of tourist consumption formation should reflect the principles of sustainable development of tourism in the Russian Arctic.

Effective tourism branding of the Russian Arctic cannot be carried out without the participation of tourism professionals — highly specialised tourism personnel who are competent in both branding and specific development of the Russian Arctic. Taking into account the personnel shortage in the tourism sector of the Russian Arctic, it is necessary to introduce innovative vocational training technologies, the primary purpose of which will be to transfer the most valuable and relevant knowledge to future specialists at the time of their graduation from the university [14, Timoshenko D.S.].

Tourism can give a powerful boost to the development of the Russian North, depressed territories, as well as the SPNR system, including significant private investments. Integration of vacant natural and tourist-recreational potential into the regional economy will create favourable conditions for further socio-economic development. However, it should be emphasised that the development, promotion and branding of tourist destinations in the Russian Arctic is impossible without an integrated and systematic approach. These measures have a perspective only in the context of a comprehensive understanding of the multidimensionality of the tourist space of the Russian North, the national, cultural and biological diversity of the northern latitudes of Russia. State policy in the Arctic creates favorable conditions for the development and maintenance of national tourism. Tourism should meet the interests of the indigenous peoples of the North and protect their welfare. At the same time, the increasing “excess tourism” should not be allowed. In this case, both price policy and active education through the formation of a culture of consumption in tourism, education of Russians’ ecological and Arctic consciousness can become the regulator.

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Verkhoyansk Secondary School — the Oldest School in the Far North: The Beginning of a Long Journey*

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Annotation. In this article, the author shares the results of his research on the history of the city of Verkhoyansk — one of the oldest cities in the Far North of Russia. The city was founded by the Russian Cossack Postnik Ivanov in 1638. The school, which was opened two and a half centuries later, has its own history, as interesting as the city itself: it reflects almost all the events that took place in such a distant time in the Arctic coast of the Arctic, in Yakutia, in Russia. Despite the fact that the city is one of the smallest for its population, however, the founders of the school, its teachers and alumni were involved in many historical events, facts that made the fame and pride of place, has contributed to the development of their region, their country. Today we will get acquainted with the earliest period — the time of the Foundation and creation of the school as one of the main points of enlightenment of the vast territory lying to the North of the Verkhoyansk ridges. As it turned out, despite the long-standing interest in this place on the part of domestic and foreign historians, sociologists, and ethnographers, this period still remains a blank spot in history: we still do not know many participants in these events, there is no reliable data about some facts. The author has to be content with fragmentary information, give his own interpretation and explanation.

Keywords: *Verkhoyansk, Verkhoyansk secondary school named after M.L. Novgorodov, education, political exile, education, school education, Yakutia.*

On January 1, 2021 one of the oldest educational institutions in the Far North — Verkhoyansk secondary school named after M.L. Novgorodov — celebrates its 150th anniversary. We hope that this date will be celebrated throughout Yakutia as one of the most significant dates in the history of the region. It reflects, as a mirror, the whole history of not only this once forgotten Russian suburb, very precisely named a “prison without bars”, but also the whole dramatic life of the Russian province. It has passed lots of trials: it was covered by the winds of reforms and hopes of the 19th century, it was carried away by the whirlwinds of revolutionary changes at the beginning of the last century, it shared the dramatic fate of the Russian schools development of the Soviet period with the whole country. The history of the country, the development of educational system of Russia: pre-revolutionary, Soviet and post-Soviet, can be studied through the biography of the school.

When we, together with the teachers and the headmaster of the school — Margarita Nikolaevna Yumshanova — began to study the chronicle of the school, it turned out that the period that takes place in pre-revolutionary time was the least studied. This is in spite of the fact that the scientific, historical and ethnographic study of the Verkhoyansk District is not lacking in attention of historians and travelers, geographers and ethnographers, folklorists and Slavists, scientists of

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other specialties. They actively visited these places, explored the territory through the length and breadth, vividly described the surrounding nature, life and worldview of the local inhabitants.

But we can find only a few lines in their travel notes regarding the presence of an educational institution here, and just some critical notes in the Russian press of the late 19th century about teachers and pupils.

There are several objective reasons for this. First of all, this is due to the fact that from the very beginning of the school establishment, and in the first decades of its existence, the educational process was directly related to the names of the country's most educated people who were in exile in Verkhoyansk — former university students, nobles, commoners, public figures and scientists. They played a major role in organizing an educational institution on the outskirts of the empire. This was not a secret for the local population and the authorities, but it could become compromising evidence both for the “inmates” themselves and for the officials who were strictly monitoring their life there, in a “prison without bars”. By the way, this term has nothing in common with either the projects of the Frenchman Pierre Botton, or with the current Western penitentiary system reform projects. The Yakut exile received this name due to the impossibility of escaping from these places: severe frosts in winter, the lack of roads in summer did not give any chance for the escapees to survive. In addition, many local residents — inhabitants of camps, reindeer sites — were very law-abiding, so that the escapees had to bypass all their paths.

Another reason for maintaining the silence about the pre-revolutionary period of the Russian education development may be the impossibility to discuss the educational achievements of the tsarist era in the Soviet period as only post-revolutionary successes had to be praised. The reticence was selective, but since almost all the first public schools were parochial, they were not widely discussed. Therefore, we have to be content with only fragmentary data and information when speaking about the first years of education spreading on this ground. The main sources of our research will be scientific, historical and ethnographic works of different years, memoirs, notes of contemporaries and archival documents.

Verkhoyansk is one of the most famous and therefore one of the most investigated cities in both Yakutia and the entire North of the Russian Federation. One of the most comprehensive studies of Verkhoyansk is the work of a political exile from Tobolsk province, Ivan Aleksandrovich Khudyakov, who came from a wealthy merchant family with a very difficult fate. After graduating from the Ishim district school, he entered the Faculty of History and Philosophy of Kazan University in 1858, where he first got acquainted with revolutionary ideas [1, Khudyakov I.A., p. 35]. It is believed that in order to study Slavistics better, he transferred to the Moscow University, where the subject was at a higher level of teaching. However, in 1861 he was expelled from the University because of his failure to appear for exams. However, he received a certificate with the right of teaching.

After that he went to St. Petersburg, where in 1863-1864 he was getting closer to N.A. Ishutin, a member of the secret organization “Land and Liberty”, which had been dispersed by that

time, and in August 1865 he went abroad and established contact with A.I. Herzen and N.A. Ogarev. Later Khudyakov recalled that the organization members "mostly abandoned all the joys of life and devoted themselves to the cause of national liberation" [1, Khudyakov I.A., p. 103]. On returning home, he continued his anti-state activities and became one of the active leaders of the Ishutin's organization "Hell".

On September 24, 1866, in the case of assassination attempt of D.V. Karakozov against Emperor Alexander III, Ivan Aleksandrovich was sentenced by the Supreme Criminal Court "as not incriminated in knowledge of the intentions of Karakozov, but incriminated in knowledge of the existence and goals of a secret society." It is not entirely clear whether his personal guilt has been proven, but the indictment specifically states that he is a man of "extreme socialist conviction, an enemy of the existing order, requiring the transformation of the state in its fundamentals" [2, Assassination attempt of Karakozov, p. 37]. Khudyakov was shorn of all rights and was sent to an eternal settlement in Siberia.

I.A. Khudyakov arrived in Verkhoyansk on April 7, 1867, and spent 7 years there. He was settled in the yurt of a large Yakut family, and he started studying the Yakut language, life and daily routine of the local population. He had the kindest relations with a very educated and inquisitive merchant S.V. Gorokhov, who helped Khudyakov financially in his ethnographic and folklore studies.

Semen Vasil'evich Gorokhov, the only second-guild merchant in Verkhoyansk, was one of the few people in the Yakutsk region who knew the north of Yakutia well, he was often approached by members of scientific and cartographic expeditions. Semen Vasil'evich was born in 1819 in a bourgeois family and received a good home education and, as contemporaries point out, "got his knowledge of grammar and mathematics quite well". He was one of the most intellectual and erudite Yakuts of that time, among the few he became a second-guild merchant, an active participant in public life. Besides, he financed a hospital in Verkhoyansk — the first medical institution in the Arctic, established in 1817.

Later I.A. Khudyakov became a mentor and teacher of S.V. Gorokhov's son — Nikita, assisting him in rationalizing the circle of reading and self-education, broadening his horizons, and later in learning the methods of local history, ethnography, and preconceptual studies. Most likely, N.S. Gorokhov received his first knowledge of the methodology of pedagogy and the arrangement of educational institutions with help of Khudyakov.

We can call these people, I.A. Khudyakov and N.S. Gorokhov, the pioneers of the education system in Verkhoyansk and the founders of the school in 1871. However, it is well known that the first requests to open an educational institution were submitted by residents of the Verkhoyansk district long before that date. We have a copy of the petition dated back to 1825. The document was found in the Yakutsk archive: a letter from the priest Aleksey Ivanovich Sleptsov to the

Verkhoyansk district police officer Petr Petrovich Mikhalev about the necessity of school opening¹.

But that year was one of the most dramatic periods in Russian history: the sudden death of Emperor Alexander I and, thus, the end of the “Alexander’s days...” also marked the end of enlightened absolutism and liberal reforms in Russia. The performance of the Decembrists on Senate Square predetermined the reactionary rule of Nicholas I with his rigorous government.

Verkhoyansk was far from these events in the capital of the Empire, but one can predict the result of the petition for school opening: surprisingly, but the events easily fell on the same plane and developed in the same direction. A report of the Verkhoyansk foreign council dated November 10, 1825, addressed to the Verkhoyansk district police officer, said: “... at the current congress, the patrimonial elders ... by agreement, or because of their own delusion ... completely refused to establish a school” [3, Verkhoyansk school, p. 6]. Thus, the petition of the Verkhoyansk priest was abandoned.

Having received this report, the district police officer sent an official letter dated December 27, 1825, addressed to the “Archpriest Aleksiy Ioannovich”, forwarding the report of the council and expressing the hope that “before long” the patrimonial elders would understand the benefits of this matter, noting that it was necessary to conduct explanatory work, “to teach them to be in other assumptions”. Internal censor, allegiance and conservative mentality of local elders became the reason for the refusal to organize the school at that time.

In this regard, the message in the newspaper “Socialist Yakutia” dated August 30, 1932 looks curious and somewhat paradoxical, because of the article “General education and school building in the Verkhoyansk region” by inspector D. Kychkin, which states: “The first school in the region was founded in 1859 (I-grade parish) ... “². Nobody knows whether it was a mistake of the author or whether he really knew that district churches classrooms operated in the city unofficially long before the official opening of the Verkhoyansk school. But we know from the history of the city and the stories of old residents that even before the school opened in 1871, children were taught to read and write at home, and the townspeople understood the importance and value of education, especially in wealthy families.

It should be noted that at that time there were quite a large number of educated people in Verkhoyansk, their number increased with the arrival of new exiles, starting from the first half of the 19th century. They did not consider it shameful to teach local children, and wealthy townspeople willingly send their children to study. This was a significant contribution to the financial

¹ Kurchatova T.T. Pervaya perepis' v Yakutskoy oblasti. Ekho stolitsy. 19 marta 2017. № 30 (2761) [The First Census in the Yakutsk Region. Echo of the Capital. 19 March 2017. No. 30 (2761)]. URL: <https://www.exoykt.ru/articles/02/608/17955/> (accessed 13 August 2020).

² Kychkin D. Vseobuch i shkol'noe stroitel'stvo v Verkhoyanskom rayone [General Education and School Construction in the Verkhoyansk Region]. Sotsialisticheskaya Yakutiya [Socialist Yakutia], 1932, 198(3108), p. 1. URL: <https://e.nlrs.ru/open/22292> (accessed 13 August 2020).

stability of the exiles. All this happened not without the local authorities' awareness, but at least with their silent agreement.

Only after the enthronement of the greatest reformer in Russian history, Emperor Alexander II, infamously known as "Liberator", it became possible to open an educational institution in a remote village, which was Verkhoyansk at that time. "On January 1, 1871, after the liturgy and prayer service, the Verkhoyansk school was opened in a convenient building of Semen Gorokhov. Four boys entered it. One of them is Yakut, and three others are Russian, the last ones have already received their initial home education"³.

The first teacher was a Cossack, Pentecostal of the Yakut Cossack regiment, Efim Popov. The curator and tireless devotee of enlightenment among the local population was S.V. Gorokhov, who donated an outbuilding of his house, consisting of four rooms, for the educational institution. This was the beginning of school education development in the vast polar territory.

In the second half of the 19th century, the Verkhoyansk district was the largest of all the districts of the Yakutsk region, as it occupied more than one third of its entire territory. The administrative center of the district was Verkhoyansk. There was a district administration, headed by a police officer, who was appointed by the governor-general of Eastern Siberia. The police department and the Cossack team were the executive body. Verkhoyansk, perhaps, did not resemble an administrative center: the pathetic view of the town always shocked visitors. According to the census of 1897, there were 59 households with 356 people in Verkhoyansk, 177 were males and 179 were females; in 1911 it had 450 inhabitants. According to the same census, the Yakutsk region occupied one of the last places in literacy among all provinces and regions of the empire: only 11090 educated persons were identified, that is only 4.11% of the whole population⁴.

Thus, it can be said that the school opening turned out to be the most significant event of the Verkhoyansk region of that time, which then included Abyy, Allaikha, Moma, Ust'-Yana, Sakkyryr, the foothills of the Verkhoyansk ridge.

The contribution of political exiles to the opening of the school is undoubted, but the desire of educated people from the local population to spread education in this vast territory is also important. The contribution of local officials is also well-known: at the urgent request of I.A. Khudyakov, the police officer of the Verkhoyansk district V.V. Ivaschenko wrote a report to the Yakut governor about the possibility of opening a parish school in Verkhoyansk. In particular, the police officer wrote that "the population of the district gladly expressed their consent... donated 1064 rubles 80 kopecks for the opening of the parish school"⁵.

Subsequently, in the period from 1871 to 1875, similar schools began to be widely opened in the Yakutsk region; they operated in 12 uluses, financed mainly by the local population. School in-

³ CSA YaASSR. F. 24, invt. 1, file 1625, sh. 1.

⁴ Kurchatova T.T. Pervaya perepis' v Yakutskoy oblasti. Ekho stolitsy. 19 marta 2017. № 30 (2761) [The First Census in the Yakutsk Region. Echo of the Capital. 19 March 2017. No. 30 (2761)]. URL: <https://www.exoykt.ru/articles/02/608/17955/> (accessed 13 August 2020).

⁵ CSA YaASSR. F. 24, invt. 1, file 1625, sh. 12.

spector of the Yakutsk region V. Popov wrote to the Imperial Minister of Public Education about Yakut's desire for education: "I consider it my duty to note the strong desire of the Yakuts to get not only primary education, but also secondary and higher education. It is only a thirst for knowledge and a desire to come to the light that can explain the fact that Yakut children run to rural schools for 5-6 miles even in trembling 40-degree frosts" ⁶.

The Gorokhovs also helped Khudyakov in his personal requests and affairs, including provisioning of paper and pens that were in short supply at that time. Apparently, at the request of Ivan Aleksandrovich, Semen Gorokhov made a trip to the naslegs of the Verkhoyansk ulus in 1868 and collected a huge amount of information about folk customs, myths, beliefs and folklore of the Verkhoyansk Yakuts, which were requested by the Russian Geographical Society. As P.S. Troev writes in his book "I. Khudyakov in Verkhoyansk exile", it was S. Gorokhov who provided invaluable assistance to the scientist in collecting materials that formed the basis for the fundamental work of I.A. Khudyakov "A Brief Description of the Verkhoyansk District".

In the whole story, the first attempt to organize a school looks very vivid, but doubtful, in which, as it becomes clear, Ivan Khudyakov saw the most reliable way to accelerate the enlightenment of people. As it is known, the scientist persuaded the police officer Ivashchenko to arrange a school upon his arrival into the city. However, in the worst traditions of the Russian bureaucracy of that time, Ivashchenko saw only a new source of financial income for himself. He easily "persuaded" the townspeople to donate money for this task (a considerable amount of 1000 rubles in silver was collected), which was made off by the police officer.

The political exile understood that the cause of public education can be undertaken honestly and unselfishly only by a representative of the people themselves. To this purpose he began to teach Nikita, S.V. Gorokhov's son, who, as he wrote, "has already been an educated and inquisitive young man". "His instructions on what books to buy were important to me, and I began to subscribe books on his advice, since my father did not refuse me money. I read under the guidance of Khudyakov, often discussed books with him, and this was Khudyakov's teaching of me," said Nikita Gorokhov afterwards [3, Verkhoyanskaya, p. 139].

On the advice of I.A. Khudyakov, the Gorokhovs subscribed the magazine "Children's reading" to Verkhoyansk in 1867 and a year later — the magazine "Family and School", then the magazines "Public School" and "Teacher". All this turned out to be the scientific, theoretical and practical basis for the beginning of educational and methodical work in the Verkhoyansk school.

It should be said that, despite the parish name of the Verkhoyansk one-grade school, it was originally a secular educational institution. The parish school at the Blagoveshchenskaya Church would not be open for another 21 years. At that time, the parish school taught, of course, both the Law of God and the foundations of the Christian doctrine, which was obligatory. More attention was paid to reading, writing and arithmetic; in addition to these subjects, geometry, geography, history, the beginnings of physics and natural history were taught. At the same time, meteorologi-

⁶ RSHA FE. F. 733, invt. 186, file 2115, sh. 24.

cal observations began in Verkhoyansk, which would glorify the city as the coldest place in the Northern Hemisphere. So both of these events — the school opening and the finding of the world's cold pole — are events of the same order.

It is also known that I. Khudyakov was the first who started meteorological observations, realizing the importance of this matter in the conditions of this harsh region. He constantly transmitted reports with meteorological observations through the Verkhoyansk District Police Department. The report of the Verkhoyansk District Police Department to the Yakut civil governor about the Khudyakov's presentation of meteorological observations table, which were sent to the Imperial Geographical Society in St. Petersburg, is known ⁷. He compiled them on behalf of the Chukotka expedition of Baron G.L. Maydel. This expedition was organized at the beginning of 1868 by the East Siberian Governor-General M.S. Korsakov, the Siberian Department of the Imperial Russian Geographical Society and the St. Petersburg Academy of Sciences. Its goal was to strengthen the influence of Russia on the eastern borders and the final acceptance of Russian citizenship by the Chukchi ⁸.

Baron G.L. Maydel thanked Khudyakov and left him 2 thermometers, and subsequently donated a watch and money to continue the meteorological observations. However, the report of the executor and treasurer of the Yakutsk regional police department, centurion E. Zhirkov to the Verkhoyansk district police officer, said that only "English-made watches" and a note from the baron himself were delivered ⁹.

As the famous researcher of the history of this region, professor, doctor of historical sciences P. Kazaryan wrote, "After Khudyakov, Semen Gorokhov was engaged in meteorological observations. From November 13, 1871 to March 27, 1872, he conducted observations". [4, The city of Verkhoyansk, p. 17]. Schoolchildren were undoubtedly involved in these observations. As a member of A. Chekanovskiy's expedition Sigizmund Venglovskiy, who visited Verkhoyansk in 1875, noted in his diary, "Nikita set up a small observatory, diligently conducted his observations for several years." He described the merchant himself as follows: "Gorokhov ... is an enlightened, rather erudite person, a patriot of Yakutia, who passionately loves his native land. ... He helped us in organizing a new column of vehicles for further transportation of the collections. We also owe him a lot of practical instructions regarding travelling in winter time." [5, Mostakhov S.E., p. 408].

Nikita Semenovich had an extensive library, which mainly consisted of popular science books on earth sciences. He did a lot of meteorology, set up an observatory, kept results of his observations in a special diary, recorded legends, stories, fairy tales of his native people. "He sent his works to the Geographical Society in Irkutsk." [6, Kazaryan P.L., p. 87]. Unfortunately, these materials are not known to a wide scientific community, although there is information that N. Gorokhov

⁷ NA RS (Ya). F. И-12, invt. 1, file 1672, sh. 84-84-06.

⁸ Kazaev A.V. Predislovie. Chukotskaya ekspeditsiya Gergarda Lyudvigovicha Maydelya (1868-1870) [Foreword. Chukotka Expedition of Gergard L. Maydel (1868-1870)]. NA RS (Ya), 2014. 29 p. URL: http://archivesakha.ru/?page_id=8500 (accessed 13 August 2020).

⁹ NA RS (Ya). F. И-25, invt. 1, file 156, sh. 4-4-06.

was in active correspondence with the Academy of Sciences, in particular, with academician L.I. Shrenk.

Initially, the first teacher of the school, Efim Popov, was helped from July 1872 by the priest of the local church Orlov. However, it soon became clear that he could not cope with the duties assigned to him, and I. Khudyakov was ill and could not participate in the school affairs. But in the same year, Nikita Gorokhov returned from the Olekminsk gold mines, and invited Ivan Bratchikov, a Pentecostal who has a teaching practice, from Yakutsk. In 1874, in two years after his father's death, the governor approved N. Gorokhov as an honorary curator of the Verkhoyansk parish school, and after that things went much better. He immediately organized a boarding house at the school, realizing that an increase in the students' number at the expense of visitors will definitely require a search for place of their residence. His petition from January 7, 1874 to the Verkhoyansk police officer A.S. Antipin says: "Sincerely sympathizing to the cause of public education and wishing to help the government as much as possible in spreading literacy and the Russian language among the Yakuts, I humbly ask, your honor, to accept a school house opposite the house of the medicinal student Klimovskiy from me. I donate this house with all the barns and outbuildings to the eternal possession of the school. In order to spend as little of the school capital as possible, I undertake to deliver textbooks for students within 3 years"¹⁰. For a better arrangement of the educational process, Gorokhov ordered student desks and benches according to figures and drawings published in the journal "Public School" in 1870.

As a result of our research, we got the opportunity to learn new facts from the history of the opening and the first years of the existence of the Verkhoyansk secondary school. It had a significant impact on the further development of education in the Arctic zone of Yakutia and became an outpost of education in the Far North. The social structure and cultural enlightenment of the people is directly related to the history of increasing the desire of people to study and the dissemination of the science fundamentals among the local population. It gives us the opportunity to look back at the past of our republic from different point of view — without ideological or political implications. At the same time, spirituality is inextricably linked to the state policy, economic structure and economic development of society. An analysis of the pre-revolutionary period of the formation and functioning of the educational system makes it possible to represent the problems of modern reforming and modernization of this most important sphere of the state more clearly.

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