New Perspectives on Northern Economies

Research Article

Creating a More Prosperous Northern Economy: Development Insights from Northern Finland

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Abstract: This essay examines economic development and commercial innovation in Northern Finland as the country and region endeavour to capitalize on the opportunities and challenges associated with economic transitions in the Circumpolar North. A variety of economic strategies have been undertaken in the region. These have included marketing winter and Santa Claus for the tourism sector, developing cold-weather technologies, bioeconomy initiatives, and a vibrant high-technology sector, and promoting Sámi nature-based occupations. Collectively, these initiatives have created impressive developments in the region. While regional successes reveal much about Finland, they also hold considerable value for researchers and policy-makers in other areas of the Circumpolar North whose leaders, like those in Northern Finland, seek to overcome the challenges presented by their small populations, limited access to capital, distances from capital cities and metropolitan centres, and their long histories of resource dependency. This essay proposes that Northern Finland's economic successes could offer ideas for other regions in the Circumpolar North.

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Créer une économie nordique plus prospère : Perspectives sur le développement dans le Nord de la Finlande

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Résumé: Cet essai examine le développement économique et l'innovation commerciale dans le Nord de la Finlande, alors que ce pays et cette région cherchent à tirer parti des occasions et défis liés aux transitions économiques dans le Nord circumpolaire. Une variété de stratégies économiques ont été mises en place dans la région, incluant la promotion touristique de l'hiver et du Père Noël, le développement de technologies adaptées aux climats froids, des initiatives en bioéconomie, un secteur dynamique de haute technologie, ainsi que la valorisation des métiers Sámi liés à la nature. Ensemble, ces initiatives ont donné lieu à des développements remarquables dans la région. Si les réussites régionales en disent long sur la Finlande, ils revêtent également une grande importance pour les chercheurs et les décideurs politiques d'autres régions du Nord circumpolaire, dont les dirigeants, à l'instar de ceux du Nord de la Finlande, cherchent à surmonter les défis liés à la petite taille de leur population, à l'accès limité aux capitaux, aux grandes distances qui les séparent des capitales politiques et des centres métropolitains, ainsi qu'à leur longue histoire de dépendance aux ressources. Cet essai propose que les réussites économiques du Nord de la Finlande pourraient inspirer d'autres régions du Nord circumpolaire.

1. Introduction

Governments and communities across the world are focused on how best to expand economic activity thereby ensuring a steady supply of high-paying jobs, tax revenue, and future development opportunities. A key segment of twenty-first century economic development is rooted in the commercialization of science, technology, and innovation and the pursuit of "new economy" opportunities (Schwab & Davis, 2018; Smith, 2010). Economic success based on science, technology, and commercial innovation in the Circumpolar World has been concentrated primarily in the northern regions of Finland, Sweden, and Norway (Coates & Holroyd, 2020; Larsen & Petrov, 2020; Larsen & Fondahl, 2015). The rest of the Circumpolar World lags well behind, save for isolated centres of natural resource extraction. Advantages like milder weather and larger and less scattered populations distinguish the Nordic North from Alaska, northern and Arctic Canada, and much of the Russian Far North. However, there are enough similarities between the northern Nordic countries and the rest of the Circumpolar World—remoteness and cold, dark, long winters—that an exploration of the economic initiatives undertaken in Northern Finland is a worthwhile exercise. It is quite clear that the region offers important lessons for the management and acceleration of northern economies from the intersection of resource extraction, technological innovation, and post-secondary based commercialization. This essay examines those efforts at economic development and commercial innovation in Northern Finland and proposes that the region's economic successes could offer ideas for other areas of the Circumpolar North.

The focus of governments in the North, as it is elsewhere in the world, is primarily on urban areas; with rural regions and small towns in the Circumpolar North experiencing out-migration and economic marginalization comparable to rural areas globally, but with the spectre of rapid climate change also hanging over the region. The Nordic North stands apart economically from the Canadian North, Greenland, and much of Alaska; it is economically vibrant in terms of diversity of commercial activity, national investments in infrastructure, creative responses to circumpolar and global economic realities, and northern-centred business activities. Economic development, moreover, has expanded beyond the historic reliance on natural resource development, with greater attention to secondary processing, technical services, large-scale tourism, and technology-based enterprises.

An earlier study looked closely at the economic activities taking place across northern Sweden. In this region, innovations have ranged from a winter car-testing hub centred in Arjeplog, to the commercialization of space research in Kiruna,

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Indigenous cultural tourism in Jokkmokk, and server farms and data centres in Luleå that make good use of cool weather and ready access to electricity (Coates & Holroyd, 2021). Sweden differs significantly from Northern Finland, particularly because of the dominance of the Kiruna iron ore mine (and the recent discovery of rare-earth elements deposits), and the prominence of the economically strong Swedish communities from Haparanda and Lulea, to Skelleftea and Umea along the southern edge of the northern Swedish coast.[1]

Northern Finland is not without its economic challenges. Rural areas and smaller centres, particularly close to the Norwegian border, do not share equally in the region's general prosperity (Kauppila, 2011). Sámi communities, while more economically stable than Indigenous settlements in many other parts of the Circumpolar World, are more seasonal and less prosperous than the urban areas in northern Finland. The Sámi population is recovering from generations of efforts at cultural domination and assimilation by the people and government of Finland. Sámi communities are endeavouring to protect their reindeer herding economy and to expand craft businesses and culturally-based tourism. Language revitalization efforts have expanded dramatically and Sámi political re-empowerment, including the Sámi Parliament (*Sámediggi*) in Inari continues to make promising strides (Spangen et al., 2015; Müller-Wille, 1979). The Sámi in Finland do not have the same legal and political rights as Indigenous Peoples in northern Canada and Alaska (as recognized by respective governments), and the Sámi carry the primary burdens from the assimilationist and discriminatory policies of the past, while benefiting directly and indirectly from the high level of government investments and general economic development in the region. The Sámi have turned to international tribunals to get attention to their land and resource rights. The United Nations Committee on Economic, Social and Cultural Rights (UNCESCR) ruled on the Sámi claim that Finland had violated their rights to land, resources, and culture, arguing that the national government had failed to consult with and accommodate Indigenous interests. The UNCESCR decision provided a boost to Indigenous asperations, but the practical impact of the United Nations' decision remains untested in Finland (United Nations, 2024).

This essay first discusses the variety of economic strategies undertaken in Northern Finland—including the marketing of winter and Santa Claus, cold weather technologies, Sámi nature-based occupations, the bioeconomy, and high technology—and describes the impressive developments in the region. Following up on extensive policy research and writing on northern Nordic economic innovation and earlier research trips to Northern Finland, the author made a focused research trip in the spring of 2024, meeting community economic development officers and business leaders, visiting commercial establishments, and assessing the general effectiveness of economic policies in the region.[2] Follow-up correspondence with northern contacts, combined with further policy and other research, expanded the portrait of regional development. This essay explores the interesting economic development lessons that can be drawn from this look at the Nordic North, and presents comparisons that could help inform northern economic development in Canada.

2. Northern Economic Development

The Nordic North is, in general, more prosperous than the North American North; the region does not have the extremely poor communities that exist in northern Canada and Alaska, nor does it lack roads and other infrastructure as does most of northern North America. The Arctic Council Secretariat regularly produces statistical profiles of regional northern economies. These studies reveal that in the Nordic North per capita incomes and Gross Regional Products (GRP) are higher than national averages in most northern regions (Glomsrød et al., 2021). The regional numbers lack specificity, however. Most northern communities, as Jennifer Schmidt et al. point out, have a single base industry: the military in Alaska; tourism in many locations; high technology in the case of Oulu, Luleå, and Tromsø. In the absence of such an economic engine, government employment and spending serve as the economic foundation, as is particularly the case in the Canadian territorial North and Greenland, and most remote Indigenous communities (Schmidt et al., 2015, p. 1). While most northern regions have incomes above national norms, the data masks structural inequalities between populations, with government employees and resource workers at the top of the scale. High GRP numbers, often reflecting a single mine, forestry operation, or energy extraction site, also hide the comparative underperformance of the private sector and the seasonality of many parts of the northern economies.

The Nordic countries have been seizing opportunities. In the case of Norway, long-term, thoughtful management of the massive hydrocarbon resources off its coast propelled Norway to a future of well-financed prosperity. Northern Sweden and Northern Finland, in comparison, historically had resource economies based on small-scale agriculture, forestry, mining, and hydroelectricity, much like the Canadian Subarctic. Analysts of economic development in the Circumpolar World have pointed out that, in most of the region, the formal economy tends to be largely focused on resource development (Larsen & Huskey, 2015). Fish, lumber, natural gas, minerals, and precious metals are harvested and sold around the world. This is supplemented, in a declining manner, by an informal economy based on traditional and small-scale work, including Indigenous and non-Indigenous fishing and hunting, production, and sales. For many northern centres, government transfers are a third, but often the most reliable and increasingly dominant, economic pillar. The public sector provides a significant number of

services and jobs to local residents (Huskey et al., 2015). As a base upon which to build future economic opportunities, however, a resource-based economy can be unsteady. The sale of resources, particularly if value-added activity is minimal, can be subject to rapid and sometimes dramatic changes in prices. Overdependence on government finances and employment often stifles innovation.

National governments with territories in the Circumpolar World have prioritized economic development, at least in theory, for decades. The main objective of these efforts has varied but includes the desire to solidify sovereignty in the North, improve access to natural resources, and raise the standard of living for local peoples, particularly the Indigenous populations. Much of the region's postwar growth was rooted in the northern resource boom—an investment explosion in mining, forestry, oil and gas, and hydroelectricity that reached throughout the Circumpolar World—and this, combined with government investment, established the roots of the modern North (Coates & Powell, 1989). Many northern regions grew rapidly from the 1950s through the 1970s, based largely on the marginalization of Indigenous Peoples and the arrival of a largely transient non-Indigenous workforce. Since that time, despite the fact that the northern regions and their national governments made concerted and often expensive efforts to build economic opportunity in circumpolar areas, technological innovation, globalization, and automation created economic shifts that left parts of the North behind.

The new economic realities of the twenty-first century prioritize knowledge work, technological innovation, and digital media. Northern governments and community organizations want to create stable economic conditions and jobs, improve opportunities for their residents, especially Indigenous Peoples, and find sectors with economic potential, but this has not been easy. Economic stability for much of the Circumpolar World remains elusive as reflected by the fluctuations in global demand and prices for commodities. A global surge in Indigenous-led entrepreneurship and, in North America, modern treaty settlements and agreements with resource firms, have helped build a commercial presence for Indigenous people, although community-level progress remains mixed.

Overall, technology has brought as many challenges as benefits. It has reduced employment in resource development and taken away service jobs in the retail, finance, and government sectors. The need for venture capital, highly qualified employees, and expensive research facilities has left the advantage clearly with the larger metropolitan centres although some individual entrepreneurs and businesses flourish in rural and remote areas.

Much of the Circumpolar World—although not the Nordic North—is economically stagnant, if not declining, as many young people move south, e-commerce undercuts local businesses, and the challenge to obtain risk capital, attract professional and scientific staff, and grow companies all continue to make building an economy difficult. Much of Russia, northern Canada, and Alaska have not yet adapted to current economic realities and the knowledge economy. Making that adaptation is a formidable challenge with uncertain results and high failure costs. It is in this context that my research and that done with Ken Coates, which previously has included a variety of studies across the Circumpolar World, drew us to northern Finland where the importance of economic diversification—both making traditional sectors stronger and more sustainable, and creating new industries—has been a high priority for some time. Northern Finland showcases what an innovative, regional economy can look like, with industries ranging from sustainable mining, hydro, forestry, and the traditional livelihoods of the Sámi, to bioeconomy, information technology, health technology, tourism, and new energy.

3. Northern Finland

Finnish Lapland and the provinces of Kainuu and Northern Ostrobothnia make up Northern Finland. This is about half of the land area of Finland, but the region is sparsely populated with a population of about 665,000 people, or 12% of the country's total population (Statistics Finland, 2024). One-third of Northern Finland's inhabitants live in the city of Oulu, another 63,000 live in Rovaniemi. The rest are scattered in smaller communities throughout the 150,000 square kilometres of the region. As described below, historically the natural resources of Northern Finland—minerals, timber, and hydroelectricity—contributed significantly to Finland's nation-wide industrialization and helped maintain a high level of regional prosperity throughout the twentieth century.[3]

A majority of Finland's mining operations are in or near Lapland. This includes the major Kolari iron mine; the Kittilä gold mine (the largest gold mine in Europe); the Kevitsa multi-ore property (nickel and copper concentrates along with cobalt, platinum, palladium, and gold); the Kemi chrome mine; the Lampivaara amethyst mine; and SMA Mineral's Kalkkimaa mine (limestone and calcium carbonate).

Forestry and the forest industry are also of considerable economic importance to Northern Finland, accounting for 12% of the region's GDP (Morales & Sariego-Kluge, 2021, p. 57). About one-quarter of Finland's commercial forests are in Lapland. However, Lapland's forests are subject to more restrictions than those in other parts of Finland in order to preserve old growth forest and to protect reindeer husbandry. According to Finland's Reindeer Management Act, reindeer husbandry "is based on the free access of semi-domesticated reindeer (Rangifer tarandus) to pastures irrespective of land ownership," meaning whether the land is privately or publicly owned (Minna et al, 2020). Nonetheless, forestry—lumber as well as pulp and paper—remains

an important part of Northern Finland's economy. Half a dozen private and family-run companies (Pölkky Oy, Kuhmo Oy, FM Timber, Junnikkala, Keitele Group, and Vaara Group) have sawmills and/or wood processing and production companies across Northern Finland. These companies export their products around the world (Wood from Finland, n.d.). Lapland itself has "two pulp mills, two paper mills, four sawmills, over 100 small-sized enterprises dedicated to timber and two mega-biorefineries investment plans in process" (Morales & Sariego-Kluge, 2021, p. 57).

Pulp and paper has been a significant economic sector in Northern Finland for decades. In 2021, however, Stora Enso, a major Finnish pulp and paper manufacturer, announced the closure of its pulp and paper mill in Kemi (the northernmost paper mill in the world) due to declining global demand for paper. The previous year, the company had converted a pulp and paper mill in Oulu into a packaging production site (Bronder, 2021). On the positive side, that same year Metsä Fiber announced plans to build a bioproduct mill in Kemi. The Kemi bioproducts mill (pulp and other bioproducts, including bio-based electrical energy), a €2.02 million (euros) investment (CAD $3.15 million) , opened in 2023. The new mill employs 250 people on site "and 2,500 people through its direct value chain in Finland" (Metsä Fiber, n.d.). In 2021, around the same time as the Kemi bioproducts mill was announced, so were Vataset Teollisuus Oy's plans to build the Kemijärvi Biorefinery, specializing in processing biomass, in Kemijärvi (approximately 200 kilometres northeast of Kemi). Located just north of the former site of a Stora Enso pulp mill that had operated from 1965 to 2008, the biorefinery is expected to employ about 200 workers directly and another thousand people indirectly. Both the Kemi bioproducts mill and the Kemijärvi biorefinery are designed to operate as circular economies, meaning that all the input raw materials are used to create various bioproducts and/or bioenergy. The creation of a biopark in the area of the Kemijärvi biorefinery is underway. The aim is to attract businesses that can create synergies in the use of biomaterials and energy and create a larger circular economy (Kemijarvi Biopark, n.d.; Aho, 2007).

These initiatives connect with Lapland's strategic focus on a "forest-based bioeconomy." According to Morales and Sariego-Kluge, who have been investigating Lapland's green policies:

> The strategy targets the forestry industry, small-scale food production, energy, and rural micro- and small and medium-sized enterprises (SMEs) linked to the tourist, forestry or steel sectors. The aim is to boost an industrial modernization that cares for the fragile arctic environment (e.g., finding alternatives [sic] uses for waste and wood residuals), and to expand the economic exploitation of the forests beyond large forestry industries, hence breaking the pattern of declining economies in rural communities. (Morales & Sariego-Kluge, 2021, p. 58)

The third natural resource sector that has contributed to Finland's economy is hydropower. Almost 20% of Finland's electricity production comes from hydropower and much of that comes from the north of the country. Six of the top ten operating hydropower plants in Finland are in the north of the country (Power Technology, 2024). Kemijoki Oy produces one-third of Finland's hydropower and sixteen of its twenty plants are in the Kemijoki area in the north. Pohjolan Voima, one of the other large producers of hydropower, owns or co-owns twelve power plants and ten of those are in the north. The Fortum energy company has eleven hydropower plants along the Oulujoki river system. (The Oulujoki River is about 100 kilometres, beginning in Oulujärvi Lake and flowing into the Bothnian Bay at the city of Oulu). Suomen Voima, a power generating company, has announced plans to construct as many as three pumped storage hydropower plants in Kemijärvi. Pumped Storage Hydropower (PSH) enables utility-scale energy storage for approximately eight hours.

Over the past forty years, and most specifically the last two decades, Lapland and the rest of Northern Finland attempted to build on their natural resource base and attract or develop new sectors of their economies. Finland has worked to capitalize on its resource potential, adding processing and related commercial activities and seeking to create circular economies. It is not an accident that Arctic cities like Oulu and Rovaniemi have been able to develop Information and Communication Technology (ICT), tourism, Arctic design, and health technology industries (discussed below)—the country and region have been thinking about and planning northern economic growth. The 2015 report *A Strategic Vision for the North: Finland's Prospects for Economic Growth in the Arctic Region,* commissioned from Finland's former Prime Minister Paavo Lipponen by the Confederation of Finnish Industries EK and a variety of other industry associations, stated that,

> investments worth about EUR 140 billion are planned in the Barents region alone. Finland now has a window of opportunity to ensure that we will get our share of northern economic growth. Now that the 'Arctic hype' has evaporated, it is possible to assess business opportunities in northern regions more realistically, and the potential is substantial. Finland will have a wide range of opportunities in the sectors of industry, energy, cleantech, logistics, infraconstruction, as well as tourism and other services. The Arctic growth opportunity may, however, slip through our fingers unless the state and the business sector can together determine the key

> goals of our northern policy. It is equally important to commit ourselves to the action plan that determines the responsible actors, contributors, and follow-up. (Lipponen, 2015, p. 5)

The section of this report that focuses on business opportunities in different sectors includes a range of recommendations. One of the first calls for initiating "a sector analysis to promote business activities in northern areas together with the business sectors and enterprises. It must be examined what can be done together and which common issues strengthen the interest and competitiveness of businesses" (Lipponen, 2015, p. 30). Other recommendations include prioritizing Nordic energy cooperation, capitalizing on Finland's expertise with cold in the clothing sector, developing major public–private partnerships related to sustainable development, and improving northern infrastructure (roads, flight connections, and data cables).

The country also launched a series of "smart specialization" initiatives across the country, designed to capitalize on regional strengths and to promote local engagement in the global economy. For Eastern and Northern Finland, the government's plan, part of a general European Union strategy, called for a region-centred economic plan:

> The sustainable refining of natural resources and conditions is one of the backbones of ENF [Eastern and Northern Finland] economy, both now and in the future. The significance of natural resources in the Nordic areas has been emphasized in the EU in the past few years. At the same time, the region's unique nature attracts tourists from around the world. Whether we are looking at production activities or the development of services, increasing the value added is the common denominator and the general foundation for the creation of sustainable operating methods. This perception is highlighted in the smart specialisation strategies of the ENF regions. The regions have invested in the development of a versatile economic structure, and at the same time searched for distinct smart specialisation choices to boost the regional competitiveness. (ENFIT, 2025)

There is a concerted effort to make the Finnish economy sustainable, which is more appropriately understood as being more sustainable and longer lasting in the resource sector and more economically diverse in general (Marjamaa & Makeela, 2022; Marjamaa et al., 2021).

In *Finland's Strategy for the Arctic Region 2021*, from the Ministry of Economic Affairs and Employment, one of the four priorities is Arctic expertise and livelihoods with an emphasis on sustainable development. The Ministry summarizes this priority area:

> The strategy emphasizes the importance of diversifying the Arctic economy and increasing the value added of products and services. Activity that complies with sustainable development is a cross-cutting principle concerning business in the Arctic region. This supports the development of a favourable market for innovation and lays the foundation for the region's long-term economic development. A market favourable to new solutions attracts innovative companies and creates an interesting market for Finnish companies with high-level expertise.
>
> Finland possesses a great deal of competence in the cold sector and long practical experience in operating in Arctic conditions. The maritime industry, tourism, circular economy and bioeconomy, health technology, construction, sustainable mining, environmental and energy technologies, fishing industry and the traditional livelihoods of the Sámi have strong links with economic activities in the Arctic region. (Ministry of Economic Affairs and Employment of Finland, n.d.)

Finland has had a strong vision for its north, which has helped to make its plans become a reality. Northern resource companies are focusing increasingly on circular economies and bioenergy.

However, much of the impetus for innovation and creative development does not come from broad national policies, but rather through economically engaged local and regional authorities. An examination of the economic strategies in three of northern Finland's larger centres—Rovaniemi, Inari, and Oulu—demonstrates the significance of local initiatives and investments.

3.1 Rovaniemi

Rovaniemi is a city of 65,000 people (and 12,450 reindeer!) very close to the Arctic Circle. It is the administrative and cultural centre of Finnish Lapland. Rovaniemi hosts 10,000 students, some of whom come from outside Finland to study at the University of Lapland or the Lapland University of Applied Sciences. The scorched-earth policy during the German withdrawal at the end of the Second World War caused extensive damage throughout Lapland, particularly in Rovaniemi. Over 90% of the city was destroyed at that time. Alvar Aalto,

Finland's most famous architect, designed the reconstruction plans for the city. His design—the Reindeer Antler Plan—outlines a reindeer (i.e., the reindeer antlers, head and back) within the design of the city streets. The city may light up this outline in the future so that passengers arriving by plane will be able to see the reindeer (T. Rintala-Gardin, personal communication, May 23, 2004).

In June 1950, Eleanor Roosevelt, Franklin D. Roosevelt's wife, visited Rovaniemi to witness the city's rebuilding efforts. As she wanted to see the Arctic Circle, a small hut was built for her visit eight kilometres from the city. This cabin, which still stands, was the beginning of what would become Santa Claus Village (T. Rintala-Gardin, personal communication, May 23, 2004). Today, Santa Claus Village is one of Finland's best-known tourist attractions and welcomes 500,000 visitors annually. While meeting Santa Claus is the highlight, there are numerous activities on offer at the Village, including riding in reindeer-drawn sleighs, playing with Siberian huskies, meeting Mrs. Claus in the Christmas Cottage, visiting Snowman World, sending postcards from the Arctic Circle, and attending the Elf's Hat Academy. There are also numerous shops, restaurants, and cafes as well as on-site accommodation (1,000 beds as of 2024) including cottages, glass igloos, and a snow hotel.

Santa Claus has been part of Rovaniemi's tourism story for decades. One of the oldest photographs at Santa Claus Village is of the Shah of Iran from the Shah's 1970 visit to Rovaniemi. The first tourism groups came to Rovaniemi to see Santa Claus Village in 1980; the first Concorde flight from the United Kingdom arrived in 1982.[4] A joint marketing group made up of municipal employees and local entrepreneurs began even earlier. *Visit Rovaniemi* (Rovaniemi Tourism and Marketing Ltd.) is a non-profit tourism public–private partnership owned 51% by the city of Rovaniemi and 49% by approximately 230 travel-related companies in the area. It was established in 2007 as the tourism board for Rovaniemi and region. *Visit Rovaniemi* promotes Rovaniemi as a tourist destination domestically and internationally, strengthens Rovaniemi's brand as the official hometown of Santa Claus and the Arctic capital of Lapland, provides tourist information, and works with the media. Sanna Kärkkäinen, CEO of *Visit Rovaniemi*, noted that the organization began making a real push to emphasize Christmas and Santa Claus from about 2010; by 2016, the city had won an international tourism award for its successful marketing work (S. Kärkkäinen, personal communication, May 22, 2024). The desire to see the northern lights is another major reason people visit Finnish Lapland. The northern lights are visible 150 nights a year, between August and April. Lack of pollution—according to the World Health Organization (WHO) in 2018, Lapland had the cleanest air in the world—helps with ensuring the visibility of the northern lights, which can be seen even from the centre of Rovaniemi.

The number of visitors to Rovaniemi and the amount of money those tourists spend in the area has continued to increase (except during the COVID-19 pandemic). During the 2024 winter season, over 700,000 people visited the city. Projections call for that number to be over one million by 2030. Almost three-quarters of the visitors are international, with over 70% from Europe and 20% from Asia. There are currently twenty-four direct daily flights to Rovaniemi from cities across the United Kingdom and Europe (and one Turkish Airways flight from Istanbul). Turkish Air is also launching a direct flight from Beijing in 2025 and expanding connections to the Middle East. Flights from other European and international destinations can connect in Helsinki where flights to Rovaniemi run every half hour throughout the winter (S. Kärkkäinen, personal communication, May 22, 2024).

In the five years before the pandemic (i.e., 2014–2019), China had been the largest source of visitors to Rovaniemi. A photo of Chinese President Xi Jinping and Santa Claus when Xi was vice president created an explosion of interest in Santa's hometown among Chinese travellers. As of 2024, the number of Chinese travellers has not yet picked up to pre-pandemic levels. In 2024, the main source countries for visitors to Rovaniemi were Spain, Italy, France, Germany, the United Kingdom, Singapore, Israel, Ireland, the United States, Australia, and China. Tourism brought in over €400 million ($625 million) in local economic activity in 2023 (S. Kärkkäinen, personal communication, May 22, 2024).

An increase in flight options and local activities have resulted in tourists staying in the area longer. Many people are staying for a full week and much of the accommodation is booked a year in advance. Much of that accommodation—about 40%—has been in AirB&B apartments. Innovative accommodation options like the Arctic Treehouse Hotel or snow and ice hotels are also available. There are 130 locally owned tourism companies in the Rovaniemi region offering opportunities to see the northern lights (by bus, snowmobile, or snowshoe), and participate in activities such as dog sledding, snowmobiling, skiing, visiting reindeer, ice fishing, and winter hiking. Other tourism spin-offs that bring economic benefits to the Rovaniemi region include restaurants and locally made souvenirs and handicrafts for purchase (e.g., reindeer pelts, knives, leather goods). Norwegians even come to Rovaniemi to buy cars, which are less expensive than in Norway (S. Kärkkäinen, personal communication, May 22, 2024).

While winter tourism has been the region's focus for the past fifteen years, there is a growing desire to develop the summer tourism market. Increasing summer temperatures in much of the world could make northern Finland's cooler summer climate very attractive for even more tourists from southern Europe, China, and the Middle East. *Visit Rovaniemi* has recently decided to focus 75% of its marketing budget on the summer season. Tourists visit to experience the

midnight sun, explore nature, relax in a floating sauna on the river, or golf across the Arctic Circle. Within the city itself, there are numerous attractions, including Arktikum (Lapland's provincial science centre and regional museum with a focus on northern nature, culture, and history), the Science Centre Pilke with its focus on northern forests, and the Korundi House of Culture.

Although not traditional tourism, Finland has hosted numerous security meetings in Rovaniemi since joining NATO in April 2023. In fact, the city is now in desperate need of more conference facilities (S. Kärkkäinen, personal communication, May 22, 2024).

Outside of tourism, which is responsible for between 12% and 19% of Rovaniemi's GDP, other industries include the traditional public sector and the nearby military base (Lapland Air Wing, which expanded its operations following Russia's invasion of Ukraine), and services related to mining, which are supplied to the rest of Lapland and to northern Sweden. Rovaniemi and the surrounding area do not have a lot of surplus energy, so it cannot exploit energy-intensive industries. Forest processing is also not done near Rovaniemi, but further south in Kemi (T. Rintala-Gardin, personal communication, May 23, 2004).

Rovaniemi has moved into new innovative industries. The city has proclaimed itself the Arctic Design Capital and hosts Arctic Design Week each March, bringing together design experts and companies from many countries. During the week, there are meetings and seminars along with numerous events including fashion shows and design boutiques. Arctic design businesses producing products such as handicrafts, jewelry, home decor items, accessories, leather, and fur garments have flourished. The Faculty of Art and Design at the University of Lapland in Rovaniemi fosters and teaches new artists. One of the successful design companies from the area is Lappset, a family-owned company for 50 years, which manufactures innovative playground structures and outdoor exercise equipment for children and seniors (T. Rintala-Gardin, personal communication, May 23, 2004).

Rovaniemi-based companies focused on cold and winter technologies are also emerging. The most well-known is BRP Finland (Bombardier Recreational Products), which started as a subsidiary of the Canada-based Bombardier, and manufactures engines for various motorized outdoor recreational vehicles such as boats, all-terrain vehicles, and snowmobiles.

For a small northern community, Rovaniemi has done an impressive job of capitalizing on local and regional opportunities and producing a diverse, employment-rich economy. The region supports a blend of traditional and new-economy activity, which attracts students and workers and draws international attention to what used to be a remote, forestry-dependent economy. What stands apart for Rovaniemi is the degree to which the primary driving force comes from the local private sector without reliance on either heavy government subsidies or resource-based investments.

3.2 Inari

Even smaller communities in Northern Finland have made impressive innovations. The Sámi area of Finland is made up of the Lappi Reindeer-Herding District near Vuotso, and the municipalities of Inari, Enontekiö, and Utsjoki (the only Finnish municipality in which Sámi are the majority). However, over 50% of the 10,000 Finnish Sámi live outside the Sámi area of Finland (Sámi Museum and Nature Centre Siida, 2024).

The village of Inari has a population of approximately 600; the village is in a district of the same name, which has a population of 7,000 and just under one-third of this population are Sámi. Located in the village of Inari is the Sámi Education Institute (SAKK), *Sámi oahpahusguovddáš*, which started as a home-schooling institution and, in the 1970s, transformed into a Sámi folk school. Today SAKK is an upper-secondary school that also offers vocational training for adults. Its purpose is to sustain and support the development of Sámi languages and cultures, and promote nature-based occupations (e.g., reindeer husbandry and wilderness tour guiding) and employment. There are courses and programs offered in person and by distance. All programs are free and also open to non-Sámi students. Approximately 100 students study full-time and in person, and 1,000 students are enrolled in online courses. About one-fifth of the students come to SAKK upon completion of Grade 9; the other 80% enrol as adults (S. King, personal communication, May 25, 2024; Sámi Education Institute, n.d.).

The Institute offers intensive Sámi languages and culture immersion programs in each of the three Sámi languages: Skolt, Inari, and Northern Sámi. This program is taught in person and students live on-site in dormitories. Sámi languages and culture immersion has attracted a great deal of interest and the program has a lengthy waiting list, making it one of the more successful Indigenous language programs in the Circumpolar World (S. King, personal communication, May 25, 2024; Sámi Education Institute, n.d.).

As mentioned, SAKK offers certifications in nature-based occupations. Reindeer husbandry now requires certification, which is offered at the Institute. The professional reindeer husbandry qualification combines vocational qualification training with practical training. In the "Reindeer Husbandry Entrepreneurship" program, students learn how to care year-round for their reindeer herd and about the licensing, legislation, and compensation systems

involved in being the sole proprietor of a reindeer herding business. A "Specialized Upper-Level Vocational Qualification in Reindeer Husbandry" builds on what was learned in the entrepreneurship program and covers the changes and challenges facing the reindeer herding industry. The program also gives students an opportunity to meet and exchange ideas with reindeer herders from other parts of the Nordic North. In the "Vocational Qualifications in the Arts and Crafts Industry: Sámi Handicrafts" program, students learn about manufacturing traditional Sámi soft handicrafts using fabric, leather, and fur, or hard handicrafts using gemstones, bone, wood, and gemstones. More advanced programs in Sámi handicrafts are also available (S. King, personal communication, May 25, 2024; Sámi Education Institute, n.d.).

Students can also earn qualifications in fields as diverse as restaurant catering, media education, business administration, practical nursing, and tourism. A priority in all these programs is training people to work in the North. The Sámi Education Institute is important for developing and promoting Sámi languages, cultures, and nature-based employment, and ensuring these continue to flourish. The Institute brings the additional benefit of economic development through employment at the Institute to teach students in person and online. The annual influx of students who move to Inari to study and live, thereby supporting other businesses in the area, also has a significant economic impact. SAKK is actively engaged in national and international projects with the University of Lapland and the University of Oulu and with Indigenous people from across the Arctic (S. King, personal communication, May 25, 2024; Sámi Education Institute n.d.).

Inari is a vibrant and diverse small town, home to the Sámi Parliament of Finland and the impressive Sámi Cultural Centre Sajos and the Sámi Museum Nature Centre Siida, themselves important tourist attractions. The community has capitalized on Sámi resilience and determination to become a centre for Indigenous revitalization. With culture, education, and traditional industries as a centrepiece, Inari is more innovative than most circumpolar communities of comparable size.

3.3 ProAgria and Bioeconomy Initiatives

Inari is far from the only example in Northern Finland of a commitment to the revitalization and persistence of rural regions. ProAgria is a Finnish rural advisory organization with expertise in agriculture and business. Privately owned by farmers (although 10% of the organization's budget comes from the government), ProAgria offers farmers access to specialists and a variety of services to improve the profitability and productivity of their businesses. These services include business and financial management, livestock and plant productivity, rural entrepreneurship, bioeconomy, water systems, and climate solutions. Close to 85% of Finland's farmers use ProAgria services. One of ProAgria's eight regional centres is in Oulu, which looks after northern Finland. There are eighty staff in northern Finland out of a national total of 650 (V. Nuolioja, personal communication, May 28, 2004).

ProAgria receives funding from the European Union for a variety of rural economic development projects. One of these in Northern Finland was the European Union funded COOPID project—COOPeration of bioeconomy clusters for bio-based knowledge transfer via Innovative Dissemination techniques in the primary production sector—which ran from January 2021 to June 2023 and brought together primary producers from ten European countries to discuss bioeconomy business models. The Finnish partners were ProAgria Oulu and the Oulu Women's Advisory Organization (ProAgria, n.d.). The objective was to foster innovative biobased business models in the primary production sector. The participating countries chose a regional bioeconomy cluster and a successful bio-based business model. Finland chose Valio, a cooperative that collects milk from 4,300 dairy farmers and aims to do so in a completely carbon neutral way by 2035, as its success story (V. Nuolioja, personal communication, May 28, 2004).

Before COOPID, ProAgria implemented the Oulu Region Bioeconomy Leader Tour (2016–2019). Connected to this bioeconomy tour, the Oulu office hosted over 100 events. These were promoted to everyone in the region interested in bioeconomy, to discuss the opportunities for new bio-based businesses. Over 2,000 people participated. Numerous companies received business advice. As a result of this project, fifty-five small rural bioeconomy businesses were started, including two new biorefineries for biogas and bio-based products (V. Nuolioja, interview, May 28, 2004). Intense localization remains the focal point of the initiative:

> The whole project was built to promote the sustainable use of local resources. Promoting local products, made with local raw materials and processed using local renewable energy and local collaboration models were the key building blocks of the project's approach. (European Network for Rural Development, n.d.)

The success of the Oulu Region Bioeconomy Leader Tour brought international attention to the region and led to the region's participation in the COOPID project. This kind of cooperative initiative, connected to national and international educators and business developers, is another indication of the unique forces and concerted regional and national effort that sustains northern Finland's innovation economy.

3.4 Oulu

The best-known element in northern Finland's economic renaissance is the city of Oulu. Located 100 kilometres south of the Arctic Circle, Oulu is the third largest of the most northern cities in the world, outside of Russia, with a population over 100,000. (Unless otherwise noted, this section is drawn from an interview with, and materials supplied from, Juha Ala-Mursula, Executive Director of Business Oulu, May 29, 2024.) In 2024, Oulu was home to 215,000 people and it is growing by 3,000 inhabitants annually, making it Finland's fastest growing region. It is the biggest city in the Nordic North and often markets itself as the "capital of northern Scandinavia" (a status that Tromsø, Norway, also claims). In the centuries after its founding in 1605, the city was known for its production of tar, which was very important in the shipbuilding industry. Once the need for tar declined, the city rebuilt itself with a focus on technology and innovation, developing industries such as pharmaceuticals, chemicals, steel, wood processing, and paper.

In 1958, the University of Oulu was founded. Oulu is an excellent example of university-driven economic development.[4] Like Luleå in Sweden and Tromsø in Norway, the university influenced regional development and underpinned a strong commitment to developing an innovation system (Hintsala et al., 2017, p. 7). The University of Oulu gradually became a leader in information technology and computer sciences. Oulu-based tech companies emerged, many with an international reach. Between 2010 and 2016, increased competition and changes in the market caused by the rapid decline of communications pioneer Nokia saw the region lose thousands of jobs.[5] In their article on *Arctic Innovation Hubs*, three Finnish researchers discuss how, early on, it was clear that:

> rearrangement of the local economy was going to be led by emerging technology start-ups. To support this development, both universities (University of Oulu and the Oulu University of Applied Sciences), and the business development organization of the city of Oulu (BusinessOulu) joined forces … Researchers, teachers, and business advisers worked together with companies to build business models and commercialization plans for new technological innovations. These co-creation activities were aimed at increasing the number of knowledge intensive companies and also accelerating the growth of the start-ups. (Hintsala et al., 2017, p. 9)

As a result, the city's ICT ecosystem transformed itself and thousands of new jobs were created. These jobs were in existing local companies, Oulu-based new and rapidly growing companies (many started by former Nokia employees), and in outside firms (both Finnish and global) that established research and development units in Oulu to tap into the local talent. Oulu has remained an important research and development site for Nokia. Nokia Bell Labs and Mobile Networks R&D are located within the Oulu factory. The research into radio research, development, and manufacturing that takes place in Oulu has earned the city the appellation "home of radio." Nokia built a new company campus in Oulu, slated to open in 2025.

Oulu is home to high-technology companies that directly employ approximately 20,000 people (in 2024). There are hundreds of companies in ICT and nanotechnology, wellness, and life sciences, and over 1,500 firms in green and smart industries. Oulu now spends more per capita on research and development (5.3% of its GDP, less than 10% of which is public funding) than any other city in Finland. (And Finland itself spends about 3% of its GDP on research and development, making it one of the largest per capita R&D spenders.) Together, the University of Oulu and the Oulu University of Applied Sciences have 25,000 students from all over Finland and around the world, providing an excellent economic boost to the regional economy and a steady stream of skilled workers for local firms.

BusinessOulu is tasked with making Oulu a strong and vibrant city by attracting business, students, and immigrants. Owned by the city, BusinessOulu offers unemployment services and helps companies from start-up to internationalization, including missions to overseas markets. It offers business coaching and funding services for both companies and investors (€60 million is dispersed annually; $94 million). There are three start-up funds run by a private investor company. Polar Bear Pitching is one of Business Oulu's many creative initiatives. At this annual winter event, company representatives make their pitch for investment while standing outside in a hole in the ice. This encourages speedy and concise presentations!

BusinessOulu serves 2,400 companies and sets some significant annual targets, including a net increase of 2,000 new jobs, and the attraction of €300 million ($468 million) worth of private investments excluding housing, a €150 million ($234 million) increase in exports, and €50 million ($78 million) in equity investment to start-up companies. Oulu has a strong industrial base in sectors including chemicals, paper, steel, forestry, and energy. Even in these more traditional sectors, according to BusinessOulu, this is a leading region in the world at utilizing ICT and digitalization to create a resource-efficient circular economy.

As mentioned, the city also has several thousand high-technology companies. These companies (and many start-ups) receive support through Oulu Innovation Alliance, a consortium of Oulu companies and organizations that work in research, development, and innovation, and partner to help each other and improve the innovation ecosystem. Oulu also boasts numerous testing labs like the PrintoCent innovation centre (printed intelligence and optical measurement innovation),

OuluHealth (hospital, health, and well-being product commercialization test bed), 6G Test Centre (5G and 6G wireless communications research and testing), Fab Lab Oulu (digital manufacturing workshop), and Hilla Runway marketing (brings innovations to market within a year). Tekes, the Finnish Funding Agency for Technology and Innovation, first supported a research and development project in printed intelligence in the late 1990s. This was followed by the first Printo project, which launched in 2002; by 2015, Oulu had an ecosystem of forty companies in the printed intelligence field. Oulu is a leader in 5G wireless technologies and is home for hundreds of companies making wireless core products. The 6G Test Centre offers leading 5G and 6G testing environments for dual use (defence and non-military) advanced wireless communications.

Oulu is not resting on its laurels but is continuing to expand and innovate into other sectors. For example, the Port of Oulu is being expanded, and investors are sought for the new Oulu Port Green Transition Industrial Area, which will focus on sustainable industries such as clean energy. Gasgrid Finland and Nordion Energi have plans to build cross-border hydrogen pipelines in the Bothnian Bay region (the Nordic Hydrogen Route), opening the hydrogen market. This should help attract hydrogen-related investments into this new development. The nearby Nuottasaari industrial park hosts Stora Enso's factories, which produce biogenic C02, and the chemicals company Nouryon among other industrial companies.

Oulu has made a determined effort to build a livable city with opportunities for sports and the arts. Oulu has been named a European Capital of Culture for 2026.[6] It is the most northerly city with a full-sized symphony orchestra and supports a film industry, sports facilities, and arts and theatres. In 1996, Oulu launched the Air Guitar World Championships, which now take place annually and attract competitors from across the globe.

More than anything, Oulu demonstrates that a northern or circumpolar city can compete at the highest economic and commercial level. The city has not allowed its northern location and distance from the southern capital to be an excuse for economic marginalization and decline. Where other northern centres rely on the military (Anchorage and Fairbanks), government (Whitehorse, Yellowknife, Iqaluit, and Nuuk), or national universities (Tromsø and Luleå) as an economic foundation, Oulu's success is founded on private sector investment, entrepreneurship, and an impressive academic–business alliance.

4. Lessons from Northern Finland and its Nordic Neighbours

Interesting economic development lessons and comparisons can be drawn from this look at Northern Finland and previous research into northern Sweden**.** First, the Nordic North demonstrates that northern regions need not be limited to economies based on government spending and subsidies, and prolonged resource dependency. Finnish Lapland has a GDP growing faster than the rest of the country. In contrast, areas like Greenland, much of northern Canada (outside the territorial capitals), and non-metropolitan Alaska have experienced stagnation, if not economic decline, and are struggling to find a place in the twenty-first century economy.

A tentative, but potentially important, conclusion arises from this work: being northern does not automatically mean economic marginality, resource dependency, and comparative poverty. This commentary, earlier work on northern Sweden (Coates & Holroyd, 2021), and a great deal of comparative work on the Circumpolar World (Larsen & Fondahl, 2015), argue for a more comprehensive understanding of northern economic development. Much of the scholarship has, for years, focused on a deficit model, implying (save for comparatively short-term major resource developments) that circumpolar regions cannot experience levels of sustained economic prosperity comparable to that often experienced in southern and metropolitan regions.

The Circumpolar World has economic options. As seen above, Northern Finland embraces winter and its northern location, rather than using these as excuses for a failure to be economically competitive. Large signs from the University of Oulu greet visitors arriving at the Oulu airport, saying "Welcome to the new latitude" and "Science with #arcticattitude" and "People with #arcticattitude." Oulu hosts its Polar Bear Pitch initiative, Rovaniemi bills itself as the "official hometown of Santa Claus," and the Sámi Education Institute promotes nature-based occupations. Many businesses focus on winter tourism, cold and winter technologies, or Arctic-based design. Currently, Lapland is capitalizing on intense international interest in northern lights and Santa Claus. Northern Sweden likewise welcomes winter. It is home to the world's first ice hotel, the Aurora Sky Station (a chairlift takes visitors to watch the northern lights from the top of a mountain), winter car testing, server farms and data centres cooled by winter air, and the Polar Explorer Icebreaker cruise and swim in the icy Arctic Ocean (Coates and Holroyd, 2021).

Finland is also making efforts to broaden the tourism sector to include cool summer tourism designed, as southern areas heat up, to attract people fleeing major cities in summertime for a Subarctic respite. As mentioned, *Visit Rovaniemi* is now devoting three-quarters of its marketing budget for the summer season.

Tourism in northern locations with cooler summer temperatures has enormous economic potential. The rest of the Circumpolar World should pay attention to Finland's efforts.

The Far North, in Finland as around the Circumpolar World, is entering uncertain times (Corell, 2006; Hanna et al., 2021). Northern Finland illustrates that with the right leadership and vision, post-secondary institutions in northern locations can make an enormous difference to long-term regional development. The wide-ranging impacts of the University of Oulu, primarily in attracting talent and applied research and business development, illustrate the potential benefits arising from national investment in northern post-secondary education—and, equally, of a university that refused to be confined by its location and geography but instead remained committed to fulfilling its international ambitions. The University of Oulu's leadership in information technology and computer science contributed to the development of the city's high-technology sector.

The Nordic North is not immune from global and regional economic forces. Transitions in the forestry sector, particularly in pulp and paper, had marked effects on several communities. The region, though, has taken these changes and adjusted to focus on a sustainable use of resources and "closed loop" systems so that biological resources are used, and products created, in a sustainable circular system. This focus can be seen in both forestry and agriculture. In addition, the urban areas in northern Finland have successfully invested in "new" economy sectors. Oulu is building an economy around a combination of information and communications technology, nanotechnology, the life and health sciences, and other emerging high-tech fields.

In the fast-changing economic realities of the twenty-first century, it has become increasingly evident that the reliance on traditional resource extraction will not be sufficient to sustain, let alone enhance, the prosperity of northern regions. Northern economic revitalization and long-term success require a combination of entrepreneurship, a supportive and experimental business culture, sound government policy, appropriate and competitive infrastructure (which increasingly prioritizes energy and internet connectivity), access to capital, and a willingness to look to the future for opportunities and commercial ideas. Much of the Circumpolar World lacks many of these characteristics, and the Nordic North stands out well ahead of most other areas of the region.

Northern Finland's record of innovation and collective action—marked by an impressive revitalization and stabilization of Sámi culture and traditional industries, globally-competitive commercialization of science and technology, innovative approaches to traditional northern resource sectors, and an expanding commitment to tourism's "experience economy"—holds a great deal of inspiration and solid lessons for northern regions seeking to convert Subarctic disadvantages into advantages that will allow them to push their way into national and international markets.

The key insights from Northern Finland are quite straightforward—although not all are readily transferable to the rest of the Circumpolar North:

- Northern regions, to be truly competitive, must benefit from substantial and sustained investment from southern governments, particularly in regional infrastructure (building to national norms) and the development of national-class institutions, like the universities in Oulu and Rovaniemi.
- Subarctic areas should build on the strengths and realities of the North, including the dominance of winter, darkness, and remoteness, rather than ignoring the significance of climate and geography.
- Economic realism requires careful attention to potential major threats. In Northern Finland, Russian militarization is producing short-term economic opportunity while raising the spectre of severe downstream dangers. The larger, more systemic and unpredictable risks of climate change loom over the entire Circumpolar World, with unknown implications for the future of the northern economy.
- Regional aspirations must match the potential of the region. At times, northern promoters exaggerate the wealth and opportunity in the area and establish unrealistic expectations. At other times, they underestimate the possibilities and sell themselves short economically. Northern pride and potential are the key foundations for long-term economic stability and growth.
- Indigenous Peoples and communities must be included in plans for regional growth and development. The Sámi in Northern Finland, while small in number and living largely in small towns and northern rural areas, have engaged with planning and business development and have been supported by the general prosperity of the region. Northern Finland's emphasis on Sámi cultural revitalization and Sámi-based tourism has been particularly important.
- Northern Finland demonstrates the importance of engaging with the potential and the disruptions of the new economy. Many northern areas assume that high technology is the preserve of southern areas and not readily available for northern communities. Rapid technological change is transforming the global economy. The North must be part of the global new economy.

- Circumpolar regions should follow Northern Finland's recognition of the long-term global appeal of the Far North, which is a major economic resource attracting tourists, investment, and international attention—all representing substantial potential for long-term growth.
- While the establishment of national-quality infrastructure brings major quality of life improvements to rural areas and small towns, the primary economic opportunities lie in medium-sized and larger cities. Major investments in Oulu and Rovaniemi had ripple effects on the rest of the region, which improved commercial and professional services, motivated northern people to stay in the North, and generally raised their aspirations.

Finland's economic achievements reflect how politicians, entrepreneurs, investors, institutions, and communities have been committed and have found innovative approaches to the challenges of building and transforming economies in the modern North. While regional successes reveal much about Finnish approaches, they hold considerable value for researchers and policy-makers in other regions of the Circumpolar World whose leaders, like those in Northern Finland, seek to overcome the challenges presented by their small populations, limited access to capital, distances from capital cities and metropolitan centres, and their long histories of resource dependency. More than most other areas of the Circumpolar World, Northern Finland has elevated itself above its geographical limitations, embraced winter, and sought connections to the broader global economy. More than most of the Circumpolar World, Northern Finland has converted liabilities into advantages and refused to accept the defeatist narrative that has long constrained northern economic development.

Notes

1. The best source to explore these economic patterns is Larsen & Fondahl, 2015; see also Larsen et al., 2010 and Smith, 2011.
2. During a visit to northern Finland in May 2024, interviews were conducted with the following individuals: Sanna Kärkkäinen, CEO, Visit Rovaniemi, May 22, 2024; Tuula Rintala-Gardin, Director, International Relations, Business Rovaniemi, May 23, 2024; Suvi King, Sámi Education Institute, May 25, 2024; Vesa Nuolioja, CEO, Proagria, and numerous Proagria staff, May 28, 2024; Juha Ala-Mursula, Executive Director, Business Oulu, May 29, 2024. Individuals were interviewed in their professional capacities and understood that their information would be used in the preparation of this study. We agreed, further, that no one would be quoted directly without permission.
3. For more information on the history of Northern Finland's demographic transitions and economic development see Ingold, 1973; Lahteenmake, 2006; Sotarauta et al., 2023; Arter, 2001; Ala-Karvia, 2018; Heleniak & Glassen, 2020; Malmberg, 2010.
4. According to Finland's Reindeer Management Act, reindeer husbandry "is based on the free access of semi-domesticated reindeer, *Rangifer tarandus*, to pastures irrespective of land ownership," meaning whether the land is privately or publicly owned (Minna et al., 2020).
5. For background on the development and challenges of tourism in Northern Finland, see: Jarkko, 2003; Tuulentie & Mettaiimem, 2007; Grenier, 2007; Halpern, 2008; Popescu & Corbos, 2010; Tervo-Kankare et al., 2013; Mäkitie et al., 2013; Rusko et al., 2013, Rahman, 2014; Tommasini & Zhou, 2016; Tervo-Kankare & Saarinen, 2020; Bohn & Hall, 2022.
6. For discussions on the University of Oulu's importance to regional development, see Lajunen et al., 1999; Niinikoski et al., 2017; Pinheiro, 2014.
7. For information about Oulu's economic transformation, see Donnelly & Hyry, 2004; Salo, 2014; Hyry, 2004; Simonen et al., 2016.

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