Supplement to working paper

Overview of the socio-economic considerations relevant to the transportation and logistic system in Northern Norway

Counties of Nordland, Troms and Finnmark

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1 Demographic

The area of study has 482 513 inhabitants as for 01/January 2021 (SSB, 2022a), the population growth in this area is overall negative in the period 2018 to 2021, Nordland had 1907 population negative change in the period 2018 to 2021, while Troms and Finnmark missed 1575 inhabitants in the same period (SSB, 2022a). The latest BIN report also concludes that even in the latest decade the population growth is lower than the national average (Olsen et al., 2022). For the year 2021, considering gender distribution, 50,9% correspond to male and 49,1% female. In terms of age groups, data from 2021 shows a slightly tendence towards older population groups is present with 18, 1% belonging to the age range 0-16, 30,4% to the range 17-40, 38,2% to the range 41-70 and 13,2% older than 71. The median age for the year 2021 was 43 in Nordland and 41 in Troms and Finnmark (SSB, 2022b). The projections of population growth are also the lowest at national level in Norway with Norland projected a negative decrease of 1,6% by 2050, and Troms and Finnmark only projected to grow 3,2% in the same period (SSB, 2022a). In synthesis the figures show that diminishing trend of people in the working age as key prognosis.

The two counties in the area of study had the lowest share in densely populated areas with 71,7% (Nordland) and 73,7% (Troms and Finnmark), only Innlandet had lowest rate (SSB, 2022c). Urban settlements have however good growth projects in the area in the cumulative period of 2007-2016, with the cities of Bodø and Tromsø, and the towns of Alta, Nesseby and Hammerfest all exceeding a growth of 10% (Middleton et al., 2018). A key pattern in the region is that urban areas gain population while rural areas with dispersed population get smaller in terms of population (Olsen et al., 2022).

In general, northern Norway creates less employment in the public and services sector in comparison to the whole of the country, however, in industry job creation is higher (Olsen et al., 2022). Data from 2020, indicates that 242 210 persons had employment in Northern Norway counties in eight industry categories (SIC2007): 30% in (code 45-82) trade etc., transport, communications, financial intermediation, estate, business activities, 24,5% in Human health and social work activities (codes 86-88), 18,4% in industrial activities (codes 05-43), 5% worked in agriculture, forestry and fishing (codes 01-03) (SSB, 2022d). Unemployment in the area of study was 0,4% in 2020 and the household disposable income as defined by Eurostat was 39735 in Troms and Finnmark, and 38833 in Nordland, the highest in northern Scandinavia (Olsen et al., 2022).

To sum up, the population density is low, which also brings challenges to the large investments needed to create large port terminals just serving local urban centers in Northern Norway. This has implications in the presence in the transportation infrastructure distribution as

further discussed in point 4.3. Employment generated by activities that require transportation system is an important share of all persons employed, and also indicates the high diversity of economic activities.

2 Environmental

The area of study falls into the Arctic definition of AMAP (1998), with most of its territory above the Arctic circle (66°32'N). However, only a small portion of the three counties' area falls above the tree line limit, and within the sub-Arctic, an area which includes boreal forests and Arctic tundra, while also contains sporadic permafrost (AMAP, 1998). Characteristics about sunlight distribution and temperature distribution. These climatological characteristics have clear consequences for road and sea transport. In concrete, the harsh weather, frequent snow covered roads, blizzards,.. dark conditions half of the year have consequences on traffic safety as well as the presence of large animals besides the roads (reindeer, moose, etc…).

This position gives the region special characteristics with special ecological zones at the intersection of altitude, wind and precipitation but also expected to be susceptible to global warming effects leading to higher temperatures, fires and effects towards ecological diversity (AMAP, 2021). The ecological characteristics is also reflected into the land and coastal uses which shows a total of 18957 km^2 of total protective purposes (national parks, nature reserve, landscape protected areas and marine protected areas) in the area of study, Nordland has 251 protected areas and Troms and Finnmark has 208 (SSB, 2022e).

The coastline and waters adjacent to the coast is subject to multiple uses which includes built up area (1%), agriculture land (1,5%), forest (27%), open firm ground (47%), wetlands (5%). Bare rock, gravel (11,5%), permanent snows or glaciers (1,0%) and inland waters (6%) (SSB, 2022f). One key characteristic is the fjord distribution along the coast which provides good protection for open sea waters and wind e.g. Kirkenes port (Gunnarsson et al., 2019).

The area of study is within Arctic and sub-Arctic climatic conditions that have a direct impact on the planning and investments of transportation infrastructure adapted to snow, blizzards and darkness. The topography characterized by an irregular coastline, fjords, large rivers and mountains has also implications on the road expansion possibilities, thus the presence of mountains passes, tunnels and dependence of maritime connections for many isolated urban agglomerations along the coastline of the counties. The ecological value of the nature in the region is also translated in several protected areas which at the same time limited large infrastructure transportation projects.

3 Infrastructural

Existing transportation infrastructure comprises road, air and sea facilities. The existing road network is built following topographic restrictions which limits its utility during the winter month due to climate conditions. However, the road infrastructure is key for industries and the supply of urban centres. The road network is also critical connection for transborder trade with Finland and Sweden, providing potential for intermodal connections also through the existing railway connection to the port of Narvik (WSP Finland and Korkia Consulting, 2020). In 2021 the area counted with 3115 km national roads, and 99 tunnels on county roads, 43,7 % is the proportion of km of county roads with poor or very poor stage of coverage in relation to all county roads (SSB, 2022g, 2022h). The infrastructure also represents public investments, for instance in 2021, the gross operating expenses for transport in NOK per capita was 12 093 in Nordland and 12 710 in Troms and Finnmark. The transport services in both counties also indicated 35 271 and 64 176

number of travels per 1000 inhabitants in Nordland and Troms and Finnmark respectively (SSB, 2022h).

The airport network represented by 25 airports operated by Avinor (Samferdselsdepartementet, 2019), while SSB indicates that 28 airports including freight transportation transported 2490 tons in the 2nd quarter of 2022, being the airports in Tromsø, Bodø, Alta and Hammerfest topping the cargo tonnage (SSB, 2022i).

In terms of sea transport the infrastructure comprises ports, passenger transport and SAR services. In 2021, Nordland had 21 ferry connections while Troms and Finnmark had 22 (SSB, 2022h). Data from 2021 shows that the capacity of utilization for boats routes was 13,5% in the area, while the average travel distance of boat routes was 45 km in Nordland and 80,9 km in Troms and Finnmark. A total of 634 048 passengers used the boat routes in 2021 (SSB, 2022j). A large number of ports are located in the area of study, which represents multiple commercial activities ranging from recreation, fishing and aquaculture, oil and gas, bulk or container. In terms of cargo volume the ten main seaports include the ports of Narvik, Hammerfest, Mo i Rana, Kirkenes, Brønnøy, Helgeland, Tromsø, Bodø and Harstad. Nine smaller seaports include Sortland, Alta, Nesna, Myre, Stø, Alsvåg and Øksnes, Hadsel (Stokmarknes), Bergneset, Båtsfjord, Honningsvåg and district of Salten (Sørfold) (Eurostat, 2022).

The key ports in terms of variety of services and intermodal solutions are Kirkenes, Tromsø, Bodø, Narvik and Hammerfest. The port of Kirkenes in Finnmark lays close to the border with Russia offering year around ice-free and deep water quays in protected locations, it hosts the largest indoor dry-dock service (Kimek) north of Trondheim. It handles iron ore, passengers, fish and general cargo. The port of Tromsø, is an important cruise and fishing port and a logistics based in the high North. The port offers key support infrastructure including cold storage and support base for the oil and gas industry, including repair and maintenance services. The port of Bodø owns ca. 70000 outdoor storage space, it has in addition a railway connection, cargo terminal, warehousing and a ferry terminal. The railway connects to the Norwegian railway network as this is the northernmost terminal while the port also host the Joint Rescue coordination Centre in Northern Norway (Gunnarsson et al., 2019). The port of Narvik is well known for its bulk (iron ore) shipping terminal connecting with the railway to the Swedish mines of Kiruna and Kaunisvaara. The railway connection offers further access to Southern Scandinavia and Central Europe (Gunnarsson et al., 2019). Finally, the port of Hammerfest becomes a critical hub in Northern Norway and has a good connection by the national road 94 (Gunnarsson et al., 2019).

The railway network is present in Nordland through the Sweden to Norway (Luleå-Kiruna-Narvik) for the transport of iron ore, fish and passengers. While the port of Bodø is connected to the BaneNord national network in Norway as the northernmost terminal. Investments projects for extension of railway infrastructure is considered without realization in the past including the extension of the railway from Fauske to Troms or the Finnish Arctic Railway corridor to Kirkenes (WSP Finland and Korkia Consulting, 2020).

4 Industrial

During the period 2015 to 2018, industries with sustained growth in the area are all linked to extractive activities and natural resource exploitation, including aquaculture, forestry and fishing, followed by IT and communication (Middleton et al., 2019). As result of this demand in extractive industry, Northern Norway represents a supplier offshore base for the oil and gas industry in the Barents and Norwegian sea, with a number of ports generating employments in ship repair and

maintenance (as presented in section 3). Similarly, onshore, iron ore and steel production mining activities require port and railway solutions as highlighted in three ports (Narvik, Mo i Rana, Kirkenes) (Gunnarsson et al., 2019).

One industry that stands out is aquaculture as the combination of natural environmental conditions, link to know-how and access to market. As result the aquaculture industry represents a case where innovation links to international market knowledge (Middleton et al., 2018). A number of industry clusters are present in Northern Norway including NCE Aquaculture, Biotechnorth, Smart construction (Middleton et al., 2018). In 2022, the Energy Nord Cluster expanded its activities to link the traditional oil and gas industry with new emerging branches as hydrogen and ammonia. Similarly, older mining facilities have evolved and innovate to attract new business activities, with the case of Mo Industrial Park (Middleton et al., 2018), which has attracted a diversified set of industries into the facilities focused on the development of environmentally friendly solutions, including a new Freyr battery manufacturing plant in its vicinity. Power-intensive industries such as battery production and data centers thus gain importance as industries of the future which can link with R&D development needs (Middleton et al., 2019).

The area of study underwent important changes in term of the industrial activities and generated jobs. A shift from mining, manufacturing, agriculture forestry and fishing towards service-oriented activities (health and social work, hospitality, IT, real estate, construction) (Middleton et al., 2018). Digitalization and automation in the economy is one of the reasons for this evolution, but should be considered as a potential area of future development, as hitherto Northern Scandinavia has been supplier of raw materials (Middleton et al., 2018). However, more recently the region faces challenges to establish and keep highly educated R&D oriented jobs (Olsen et al., 2022). Other example of non-industry jobs, is service and in concrete the tourism sector, in 2020 the area had 4826 establishments (hotels, camping sites, hostels), and 358 260 available beds (SSB, 2022k), as the tourism sector also requires the supply of interrelated services such as catering, restaurant and recreation generated 36973 jobs in 2020 (SSB, 2022d). Cruise shipping represented 344 ship calls in Northern Norway in 2017 with Lofoten, Tromsø and Hånningsvåg/ Nordkapp had largest number of calls. As result of this market increase, the coast liner Hurtigruten continued to develop cooperation packages with local suppliers centered on experience and culture development.

To sum up, the industrial activity is varied and pose challenges for existing infrastructure particularly road capacity and conditions. The intermodal solutions are at large extent present in mining projects (Narvik, Mo I Rana, Kirkenes). The maritime supply industry is relevant in the oil and gas projects in the Barents Sea with current increased demand for LNG production in the Melkøya facility (BEATA, 2019). Ship yard repair in easter Finnmark and service facilities for fishing fleet, facing some challenges due to international context. Intermodal solutions important in the processing of fish (freezing and packaging supply chain), however road transport is still important in this regard, with some possible challenges posed by cargo transport by sea in the current maritime transportation provider.

5 Political

Two government instruments are relevant to the transportation system in northern Norway. The National Transport Plan (NTP) sets the governmental goals priorities and investment in long term every four years. The sixth plan covers the period 2022-2033 and was approved in March 2021 (Norwegian Ministry of Transport, 2020). The next NTP for the period 2025-2036 is planned for approval in Spring 2024, but the consultation process with all actors is taking place currently.

In the maritime sector, the action plan for green shipping sets the goals, investments and prioritized programs to reduce emissions from domestic and fishing vessels by half by 2030 (Norwegian government, 2019).

The NTP's 2022-2033 overall vision is "An efficient, environmental friendly and safe transport system in 2050" (Norwegian Ministry of Transport, 2020). The current plan differs from previous ones by introducing the principle of portfolio management and continuous optimization vis-à-vis previous practice of predefining projects to fund as state in the plan. The idea is State agencies propose the order of prioritized projects during the NTP's twelve year period rather than setting a priority order beforehand. In Northern Norway, the Ministry of Transport commissioned the National Road Administration (Statens vegvesen) to lead the Concept Selection Investigation in Northern Norway (KVU). KVU will identify the intermodal solutions for goods and people that in a cost-effective way bring socio-economical gains to the three counties in Northern Norway with sustainability considerations at the center (Statens vegvesen, 2022).

The financial framework for infrastructure in all the country is 1200 billion Norwegian krone (NOK), with more than half reserved for national roads and 33 billion NOK for maritime infrastructure, and 3 billion for technological development and R&D. The transportation system in Northern Norway receives a special mention in the NTP, considering it as an important element for regional development and to enhance the productivity of local industries. NTP sees the transportation system in Northern Norway as basis for sustainable growth and connect the resource output to the benefit of all of Norway, explicitly stating upgrade and development of the road network in Northern Norway. The budget allocation in the NTP include airport upgrades in Bodø and Mo i Rana (Nordland), as well as railway freight transport improvement between Bodø and Trondheim. Similarly the road corridor between Bodø-Narvik-Tromsø and Kirkenes will mean new projects starting for road expansion while coastal areas will benefit of improvements in the port infrastructure and accessibility (Røst, Værøy, Andenes, Årviksand, Kjøllefjord and Vardø).

Along the investment requirements, environmental protection is at the core of the transportation system vision. The NTP in concrete requires that any transportation infrastructure development shall avoid protection areas, avoid crossing water courses or ecological sensitive locations for flora and fauna. Similarly emergency preparedness to avoid pollution shall be enhanced as part of the transportation system (Norwegian government, 2019). Maritime transportation is prioritized in terms of environmental targets, as the government has also set clear policy goals for the maritime strategy, with the aim to reduce the emissions from domestic shipping and fishing vessels by half by 2030 the green shipping strategy sets policy instruments to achieve this goal (Norwegian government, 2019). The plan prioritizes intermodal solutions with emphasis on increased cargo transport by sea, which requires collaboration across logistic suppliers, cargo owners and shippers. Incentives for the shift from road to sea transport exists in the form of eco-bonus to railway and maritime companies (WSP Finland and Korkia Consulting, 2020).

Environmental technology and R&D investments are critical in achieving the targets in zero and low emission maritime transportation. R&D investments include the ENOVA program which has allocated more than NOK 1,6 billion to projects to develop vessels green technologies including hydrogen, battery technology and port infrastructure development. The Research Council of Norway provides funding for pilot projects in collaboration with the private sectors through different programs (MAROFF;Pilot-T, innovation clusters). A number of maritime innovation clusters focus on developing port and on board cleaning solutions (NCE Maritime Cleantech, the Ocean Hyway Cluster or CGE Blue Maritime) (Norwegian government, 2019).

Digitalization and integration of technological developments is seen as an incremental step to improve safety and operations. Data generated by transportation activities is expected to improve transportation planning and investments (Norwegian Ministry of Transport, 2020). Examples of ongoing environmental upgrades in the shipping fleet include the electrification of the ferry fleet in short routes, implementation of environmental requirements in public procurement tenders. In 2021, the coastal steamer covering Bergen to Kirkenes was awarded under the requirements to install LNG as propulsion among other environmental friendly technologies. Hydrogen technology is also mentioned as part of solutions for high speed vessels in schedule routes. Ports are therefore vital in this green shipping plan, as they are expected to supply onshore power and bunkering facilities to the low and zero fuel solutions (hydrogen, biogas, biofuels) (Norwegian government, 2019).

6 Cultural

Northern Norway is the home territory of Sámi people, which culture and traditions are protected by national legislation (Norwegian Constitution, Section 108 and Sámi Act) and the ILO Convention (The UN Indigenous and Tribal Peoples Convention, 1989, No. 169) (Norwegian Government, 2022). The regulatory framework thus gives the Sámi people large autonomy in regards to decisions pertaining land use in the territory, thus their institutions are involved in consultation process for transportation planning, large infrastructure development projects such as railway and intermodal transportation plans, as well as possibility to use land for expansion of renewable energy production or energy infrastructure.

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