Potential of Örebro area to funnel flows between the northernmost BSR territories and the ScanMed Corridor

TENTacle, Region Örebro County, WP 5.3, Activity 5.3.3

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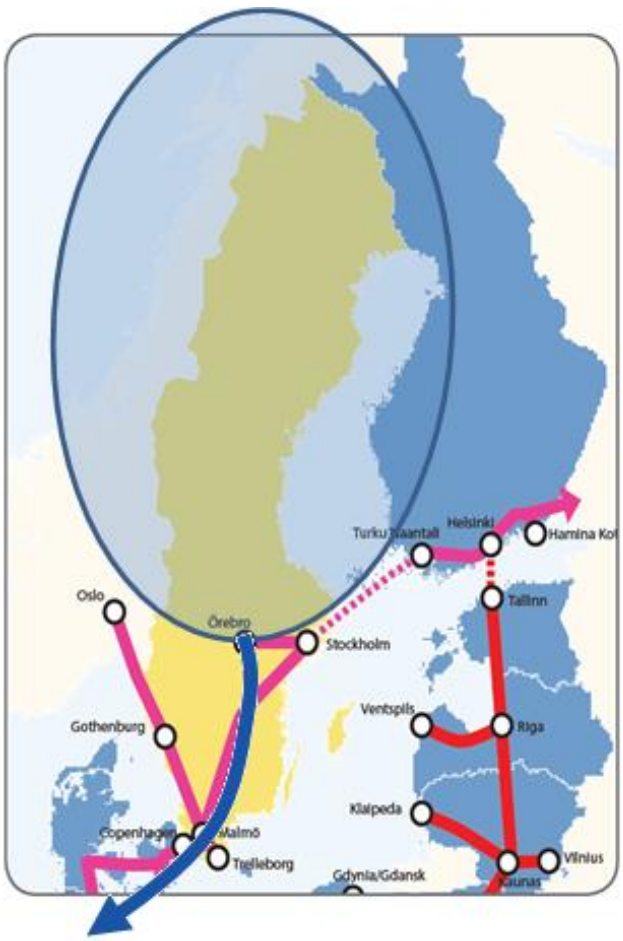

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Abbreviations

BSR	Baltic Sea Region
BSRP	Baltic Sea Region Programme 2014-2020
CNC	Core network corridors
TEN-T	Trans-European transport network
ScanMed corridor	Scandinavian-Mediterranean Corridor
WP	Work package
EU	European Union
ERTMS	European Rail Traffic Management System
JIT	Just-In-Time

Executive Summary

The TEN-T core network corridors (CNC) is a new instrument of the EU transport policy, aimed to improve mobility, intermodality and interoperability on the major transport axes across Europe. The Baltic Sea Region (BSR) is intersected by three core network corridors being Scan-Med, North Sea-Baltic and Baltic-Adriatic. The TENTacle project aims towards improved stakeholder capacity to reap benefits of the core network corridors implementation for the prosperity, sustainable growth and territorial cohesion in the BSR.

The over-all purpose of the task 5.3 in TENTacle is to analyse how to functionally extend the CNCs to the northernmost BSR areas through:

- improved cooperation between stakeholders
- guidance with practical solutions

The main objective of this report is to analyse the potential of the Örebro area to funnel flows between the northernmost BSR territories (Norway/Sweden) and the Scan-Med Corridor.

The report concludes that Örebro fills the criteria to function as an intermodal hub. Its transport infrastructure is part of the ScanMed corridor, which connects southern with northern Europe to Örebro, and then flows eastwards towards Stockholm and Helsinki. Moreover, almost all volumes going to and from the northern part of Sweden, Norway, and Stockholm on rail pass through the Örebro region. This is why Hallsberg/Örebro should and does work as a transit hub for many transports going further north.

Today there are several existing railway freight connections between the northern regions of Sweden and Norway and the Stockholm Mälar Region. There are, in general, imbalances of the freight flows in Sweden, which are mainly caused by disparities between the base industry and consumer goods flows, and the difference in the transport needs of these two markets. Large volumes from the base industry go in a southwards direction, and generally the filling ratio in these system train solutions is higher southbound than northbound. Examples of successful solutions where both base industry as well as consumer goods are well balanced are the NRE and ARE container shuttles. With a transport time of just over one day, they transport fish from Narvik in northern Norway to the Alnabru intermodal terminal in Southern Norway (passing through Hallsberg). On the way back, the shuttles are filled with consumer goods.

An interview study of private actors regarding modal shift opportunities was performed. Out of the 280 transport flows identified in this market survey, 50 transport flows were related to the northern parts of the BSR. Out of these 50 transports flows about 60 TEUs/week (towards the north) and 7 TEUs/week (towards the south) were evaluated to have potential to shift from road to rail. 60 TEUs/week transit through Örebro region to the northernmost parts and 64 TEUs/week in transit through Örebro region to southern parts, these TEUs are also transported by truck and evaluated to have potential to shift from road to rail. Better use of the unutilized capacity in the existing rail

solutions to transport these flows northwards may therefore lead to a win-win situation: the companies that today transport goods to the north by road could use a more sustainable and environmental friendly rail solution, while the ones already operating on rail probably would get a better price because of a higher filling ratio.

However, there are several obstacles to achieve this. One challenge is that system trains are mostly dedicated to only one client or goods owner and are fixed to the client's operations. Having a restricted time schedule and destination, they are less flexible than an intermodal train, which would be the best solution for the northwards flows. There are however opportunities to finding a "good match" - a customer having similar destination and timetable. For central warehouses, for example, the time schedule is a crucial aspect. The goods often need to be at their new destination within 12 hours (although to destinations around Skellefteå and further north some additional hours are acceptable, sometimes even one day extra is acceptable); the customer should be able to put an order in the afternoon and expect the delivery at the morning after. A large part of these companies with consumer goods cannot gather enough volumes to have their own dedicated system trains. This means that in order for them to shift to rail, their goods need to be coordinated with other companies with similar interests.

Another obstacle consists of the technical incompatibilities regarding the types of good loading units and wagons that are used to load different types of goods. For example, today most system trains use wagon types that are not suitable for intermodal transport. Moreover, consumer goods are more suitable for intermodal transport as the goods owner don't normally have a direct connection to rail, and therefore need to use an intermodal terminal.

During the interview study competition from other modes is the main issue for goods owners not to use rail; 64% of the interviewees said this is because of the lower costs of road transport compared to rail. It is difficult to pinpoint the reason why (and if) railway is more expensive, as it differs from case to case. Reliability is also mentioned as a big challenge, as well as difficulty for finding the right freight channels.

Several companies said they put a lot of effort in trying to move there transports to rail but in the end it was not possible because of prices and timetables. More and more companies are aiming towards getting more environmental friendly and a part of this is shifting from road to rail. This shows that there is a demand for sustainable and competitive transport that is not satisfied at the present and that there is a potential for a modal shift from road to rail.

1. Introduction

1.1 Background

The European Union has shaped a trans-European transport network (TEN-T). The TEN-T Regulation is mainly based on the Europe 2020 Strategy and the commission's White Paper entitled "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system". The network would contribute to the attainment such as smooth functioning of an internal market and the strengthening of economic, social and territorial cohesion.

Their specific objectives also include allowing the seamless, safe and sustainable mobility of persons and goods, ensuring accessibility and connectivity for all regions of the Union, and contributing to further economic growth and competitiveness in a global perspective. Those specific objectives should be achieved by establishing interconnections and interoperability between national transport networks in a resource-efficient and sustainable way. For example, rail interoperability could be enhanced by innovative solutions aimed at improving compatibility between systems, such as on-board equipment and multi-gauge rail tracks.

The core network corridors (CNC) are defined as the main long-distance flows in the CNC and aim to improve cross-border connections. A CNC should cross at least two national borders and include at least three modes of transport. Figure 1, below, show the geographic range of the Scandinavian-Mediterraean Corridor, reaching from Italy in the south to Scandinavia in the north.

Figure 1 ScanMed Corridor road and rail

1.1.1 TENTacle

The TEN-T core network corridors (CNC) is a new instrument of the EU transport policy, aimed to improve mobility, intermodality and interoperability on the major transport axes across Europe. The Baltic Sea Region (BSR) is intersected by three core network corridors being Scan-Med, North Sea-Baltic and Baltic-Adriatic.

A broad range of stakeholders are expected to be involved in a joint action to remove physical, technical, operational and administrative bottlenecks along these corridors by the year 2030.

Implementation of the three core network corridors has a large but untapped potential to stimulate positive effects in the BSR beyond the pure transport sector and beyond the immediate geographical areas they cross.

Opening it up for a broader group of stakeholders and a wider geographical area requires tackling major capacity challenges. These are, for example, related with a low awareness and deficient understanding of how the CNC implementation can help improve accessibility and connectivity challenges in specific territories. And this is what TENTacle will foster in the coming years. By working across the borders and sectors the project will:

Improve stakeholder capacity to reap benefits of the core network corridors implementation for the prosperity, sustainable growth and territorial cohesion in the BSR.

In practise, this means that by the end of 2019:

- All territories in the BSR can profit from the CNC, irrespective of the geographical location;
- The involved public authorities and market players are able to deliver effective growth and prosperity policies and strategies, and work out effective logistics solutions complementing the CNC investments;
- European Coordinators leading the CNC implementation receive an organised project-based support in mobilising stakeholders both in and outside the specific corridors to a joint work;
- Transport authorities around the Baltic Sea are aware of the two policy coordination instruments of CNCs and the EUSBSR, and are able to use the synergy gains in routine planning, management and implementation processes;
- Other European macroregions are inspired by the BSR way how to reap benefits of the core network corridors for the purpose of prosperity, growth and cohesion.[1]

1.1.2 Task 5.3

Task 5.3 combines two detected CNC implementation challenges in the BSR: (1) a geographical limitation to the Örebro-Stockholm-Helsinki line and consequently lack of schemes how to functionally extend the CNCs to the northernmost BSR areas; and (2) low uptake of the CNC policy tool among the business players due to problems with streamlining CNC implementation with supply chain management approaches (cf. WP5 aim). This is further explained below.

[1] *TENTacle nutshell paper*

In the latter context, the conducted dialogue with the manufacturing and transport/logistics companies and networks in the BSR (e.g. at the European Conference on "Shaping the Future of Core Network Corridors – Improved Dialogue for Smart and Sustainable Transports", Malmö, Sweden, 6.05.2015) helped realise that business players do not see or adequately appraise the substantial added value of the CNC for their market strategies, although access to CNC hubs is of vital importance in developing and maintaining supply chains. This requires a better understanding by the public authorities how the supply chains are organised and how (and if) to facilitate the cooperation between such companies in order to streamline motivations and aims of different sets of players. At the same time, a better understanding is needed among private actors regarding how the long term public policies may be developed and implemented based on short term business sector strategies.

For that purpose, Task 5.3 will focus on the Örebro area as one of key gateways for supply chains between the ScanMed Corridor and the northernmost BSR areas (northern Sweden and northern Norway). Following up on the work initiated in the BGLC project (although in a different context), it will map company behaviour and logistics practices of key business players involved in managing north-south-bound supply chains transiting Örebro area. The task will investigate the modal choice and analyse modal shift opportunities (e.g. by looking at possible lead times and price indications), in an attempt to integrate companies' perspectives.

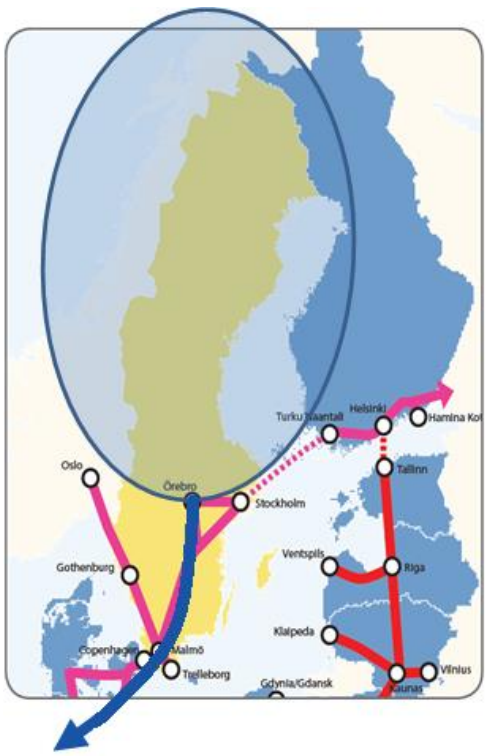

Figure 2 Task 5.3 coverage, the Stockholm Mälar Region towards northern parts of BSR areas

1.2 Purpose

The over-all purpose of the task 5.3 in TENTacle is to analyse how to functionally extend the CNCs to the northernmost BSR areas through:

- improved cooperation between stakeholders
- guidance with practical solutions

The main objective of this report is to analyse the potential of Örebro area to funnel flows between the northernmost BSR territories (Norway/Sweden) and the Scan-Med Corridor. This includes:

- identification of company behaviour and logistics practices of key business players (manufacturing, transport and logistics) involved in supply chain management between the northernmost BSR areas and the Scan-Med Corridor (drawing e.g. on reports by the Bothnian Green Logistics Corridor project)
- Investigation of the modal choice in the management of north-southbound supply chains via the Örebro hub area (with a Scan-Med Corridor entry/exit function) and to analyse opportunities to integrate perspectives of the manufacturing, transport and logistics companies
- Analysis of modal shift opportunities

This report explains this process and the results of the analysis.

1.3 Scope

The market study covers a selection of companies that are located and/or active within the Örebro region and north of Region Örebro County and their current flows. The interviewed stakeholders have been selected based on findings from the exploratory study as well as by a list of contacts provided by the Business Region Örebro. There was no particular selection process, as intention was rather to interview as many stakeholders as possible within the given timeframe, and no stakeholder was ever denied involvement in the study. This was in order to non-discriminatorily identify business partners that could be interested in running the developed multimodal services. As the market study includes only the current situation, it does not take into account future scenarios and/or possible changes in the market at a company level.

The geographical scope is such that only companies with supply chain activities between the Stockholm Mälar Region north of the ScanMed corridor, to the northernmost parts of Sweden and Norway is represented. See Figure 2 for an illustrated geographical scope.

1.4 Methodology

1.4.1 Work process

The work performed for task 5.3 can be divided into three main parts, namely data collection, mapping & evaluation and analysis, as illustrated in Figure 3.

The focus of the work was not only to analyse the potential of Örebro Region as a hub for northern flows and to gain knowledge about freight flows, but also preparation for next stage on how to actually produce a practical solution and to gain understanding in how a cooperation strategy may be formed. It was discovered that both numeric data and a deeper understanding of company behavior were needed in order to achieve this.

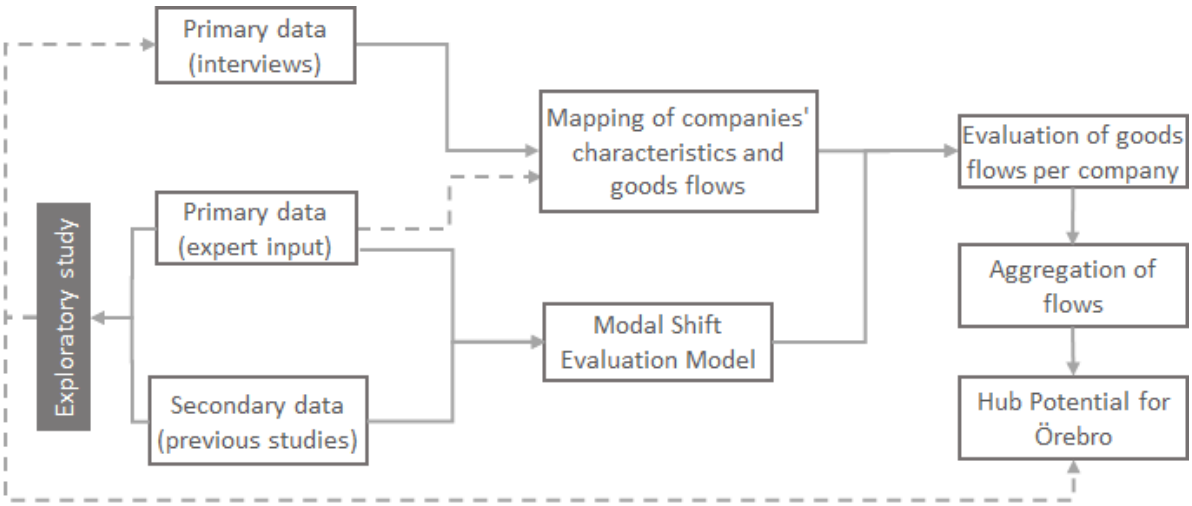

Figure 3 Work process

To illuminate the essential part of the task, an exploratory study was made in an initiative stage, this to gain wide knowledge and a solid foundation for what would need to be investigated and identified in the market study. The exploratory study provided a wider knowledge about the freight flows to/from the Örebro region, analysis of Örebro as a hub for freight flows to/from the northernmost parts of the Baltic Sea Regions (BSR) and the opportunity for a modal shift, from road to rail. Inputs for the exploratory study include secondary sources (industry reports, public reports, industry magazines, etc.) as well as recommendations and information provided by people working in the business (such as persons from the Swedish Transport Administration, private companies, regions, municipalities and other organizations and projects).

Primary qualitative and quantitative data was obtained through interviews with actors performing transport intensive activities that concern the Örebro region and northern Sweden/Norway. Most of the qualitative and quantitative data from interviews were used for the mapping of goods flows. These data are specific to each interviewed company and include details such as:

- Transport relation (origin and destination)
- Volumes (given in different units depending on each company's available data)
- Current transport mode

- Lead time
- Willingness to shift to rail transport, including the underlying reasons and possible obstacles

The former also helped to gain a deeper understanding in how market players act and what challenges they see for a modal shift to rail, and to initiate a discussion process. See chapter 1.4.2 to know more about the data collection process.

The market study was performed with the help of a modal shift evaluation model, which was developed as a tool to provide concrete yet anonymized results of company-specific goods flows that are feasible to be transported by rail. The model consists of several criteria, which are used to evaluate the feasibility for each flow to be transported by rail. The criteria and general structure of the model was developed with base on expert input as well as secondary sources.

The data included in the mapping of companies' goods flows were complemented with assumptions whenever direct data were not available or incomplete, and/or whenever conversion between different units was needed. The complete input was then evaluated using the model. The direct results consist of evaluations for company-specific flows (including direction, type of goods, volume, etc.) which must be aggregated. This is because the information gained from the market surveys and interviews might be highly sensitive from a business point of view. Therefore, all results will be presented on an aggregated level. In the case that a particular supply chain is pointed out, its identifying characteristics have been removed or anonymized.

Based on the results from the market study and the information obtained from interviews, discussions are carried out with stakeholders in order at a later stage suggest a practical solution and a cooperation strategy.

1.4.2 Data collection

Primary qualitative data were collected through semi-structured interviews and observations. In order to first gain an understanding of the process, dialogs with experts (as mentioned above) within the defined area were made. Secondary data were used when collecting basic information about Region Örebro County's strategy and aims as well as when collecting information about already existing transport solutions, data about transports in and through the Örebro region, statistics on transport modes, etc.

The semi-structured interviews were performed either face-to-face or over the phone, preferable at the location of the interviewee, to get a deeper knowledge and understanding through observation of their transport possibilities and difficulties. Due to distance and timeframe, this was not always possible.

The semi-structured interviews were conducted according to the questions in Appendices. The group of interviewees includes the companies' Logistic Managers, Transport Managers, Warehouse Managers, CEO or similar personnel with knowledge of the company's transport patterns. The questions were not sent out in advance but a prior phone call was made to describe the purpose and aim of the interview.

The interviewed stakeholders have been selected based on findings from the exploratory study as well as by a list of contacts provided by the Business Region Örebro. They consist of business players (manufacturing, transport and logistics) involved in supply chain management between the Stockholm Mälar Region and the Scan-Med Corridor. There was no particular selection process, as intention was rather to interview as many stakeholders as possible within the given timeframe, and no stakeholder was ever denied involvement in the study. This was in order to non-discriminatorily identify business partners that could be interested in running the developed multimodal services.

Some of the interviews and meetings with stakeholders were used not only for data collection, but also as part of the ongoing discussion process for the development of a market ready multimodal solution.

Some data regarding freight volumes to/from Örebro region were already available from secondary sources. However, these data were mostly collected statistically and do not reflect reality at the level requested. Therefore, the collection of primary data from stakeholders, which is the basis for the freight flow mapping, was needed as a foundation to evaluate opportunities for modal shift with help of the evaluation model. The model's results, together with the discussion process, will then help develop a practical solution.

1.5 Delimitations

Goods flows that nowadays are transported by sea have not been included in the evaluation. This is because a need for modal shift to rail has not been perceived because maritime transport is sufficiently environmentally effective.

As the market study includes only the current situation, it does not take into account future scenarios and/or possible changes in the market at a company level.

The assumptions provided by industry experts in order to complete the missing data for the mapping might cause deviations between the calculated results and reality. These assumptions include the conversion of goods flows units (e.g. wagons, trains, load units, etc.) and the filling out of missing data during the mapping of flows.

In the market study, not all of the goods flows which concern the Orebro region could be included. The extent of the information collected depended on the companies' willingness and possibility to share their figures, the project's timeframe, as well as the available data. This means that the mapping of goods flows could be described rather as a "sample" of all the goods flows. It would not be feasible in terms of time and resources to include all goods flows.

The mapping of data flows includes mainly high-volume flows, e.g. industries with large transport volumes (manufacturing, raw material transport, etc.) Therefore, the collected data for transport activities of consumer goods is not as comprehensive. This is because flows of consumer goods are much more spread out among many different actors and their operations normally present more variation.

The information gained from the market surveys and interviews was aggregated and anonymized, as it might be highly sensitive from a business point of view.

2. Explorative study

2.1 Hub characteristics

The potential for a region as a relevant intermodal hub depends on several factors that can be divided depending on their time scope and geographical extent. On the one hand are macroscopic long-term factors, which are related to the regional features such as economic activities and geographical location. On the other hand are short-term specific factors, which relate to the characteristics of the transport infrastructure and the logistic facilities located in the region.

An evaluation methodology for logistics nodes in Sweden was previously developed by WSP Group[2], based on the characteristics and criteria that are defined in the Swedish Transportation Administration (Trafikverket) report *Importance of the term 'Central Terminals'*. In this method, the term Characteristics is used to refer to long-term factors related to geographical, demographic, and infrastructural and market conditions that are generally difficult for both terminal owners and government agencies to modify. Characteristics therefore constitute of fundamental prerequisites, they are site-borne and hardly modifiable through investments. On the other hand, the term Criteria is used in the method to refer to all goods volumes and flows related to the region, as well as to the quality of its transport connections. They are more linked to the immediate conditions and internal operations of each existing and planned terminal within the region. Only some of the Criteria can be applied to planned terminals.

Characteristics and criteria have been assigned a weight according to their importance in the context of goods transport as well as their possibility to be influenced by the different actors from a system perspective. As such, characteristics have generally a higher importance than criteria, as they are related to higher geographic, economic and social conditions that cannot be managed or modified with the same ease as Criteria.

The evaluated characteristics include:

1) The amount of goods owners with large volumes located in the region have
2) Connections to the most important goods corridors
3) Relative location in relation to large consumption areas
4) Connection to the strategic long-distance transport network, as defined by national and European transport policies.

[2] WSP Group (2011). *Centrala terminaler –Utvärdering av befintliga och planerade kombi-terminaler i Sverige.*

2.2 Existing transportation connections

2.2.1 Green Cargo

Green Cargo's network covers Sweden and destinations in Norway. The company offers different kind of solutions; Single wagonload- system, block train, intermodal, direct route, international freight and freight-handling services. Their "single wagonload"-system make it possible to access almost 300 locations in Sweden. Together with partners they connect Sweden with Europe. The green dots on the figure below show all destinations and the yellow dots show the intermodal terminals.

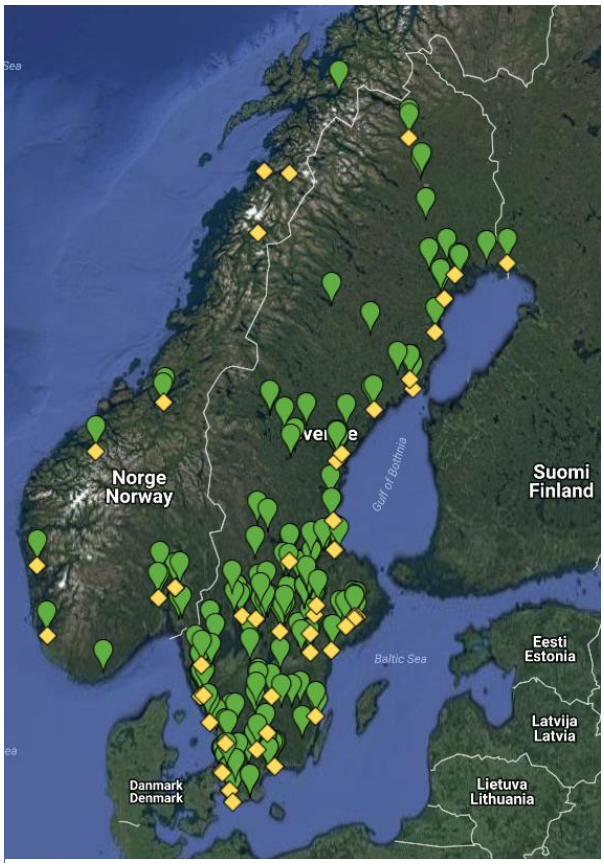

Figure 4 Green Cargo; Single wagon load system (green dots) and intermodal terminals (yellow dots)

Source:https://www.google.com/maps/d/viewer?mid=1Nk55BlYyyvXFDIwH73LsgmYs5qQ&ll=58.748387766270646%2C23.343189

Green Cargo uses multiple intermodal terminals in the northernmost parts of Sweden. Following show the intermodal terminals in the north and what kind of handling they offer;

- Kiruna (swap bodies/containers and trailers handling)
- Haparanda (swap bodies/containers)
- Luleå (swap bodies/containers and trailers)
- Piteå (swap bodies/containers and trailers)

- Skellefteå port (swap bodies/containers)
- Umeå (swap bodies/containers and trailers), Umeå port combi (swap bodies/containers and trailers), Örnsköldsvik Arnäsvall (swap bodies/containers and trailers)
- Sundsvall (swap bodies/containers and trailers) Söråker/Sundsvall (swap bodies/containers), Sandarne (swap bodies/containers)
- Fredrikskans/Gävle (swap bodies/containers and trailers)
- Borlänge (swap bodies/containers and trailers).

The intermodal terminal they use in northernmost parts of Norway are;

- Bodo
- Fauske (swap bodies/containers and trailers handling)
- Mo i Rana (swap bodies/containers and trailers), Trondheim (swap bodies/containers and trailers).

In Region Örebro county, Green Cargo uses the intermodal terminal in Hallsberg (swap bodies/containers and trailers handling). On the way down to south of Sweden Green Cargo trains usually pass Ånge in the north and Hallsberg in Örebro region.

NTR, Green Cargo's subsidiary, manages cross-border transports, e.g the international direct-lines. With departure from Skåne, via the Swedish network, these lines are operated together with partners.

2.2.2 Scandfibre Logistics

Scandfibre Logistics is a transport and logistics company, specialized in rail transports for the Scandinavian paper- and wood industry. Their rail-based logistics system is called Rail17 which focus on transports from terminal and ports in Sweden to the rest of Europe. Scandfibre logistics partners are:

- Green Cargo: run the Swedish volumes to and from the paper manufacturing units.
- Rail Cargo Logistics: Runs full trains to Italy.
- DB Cargo: Transports from Malmö to Germany, Benelux, France, Austria/Switzerland and Eastern Europe.
- Hector rail: Full trains within Sweden

On the way back to Sweden, from Europe, wagons are reloaded with goods from e.g. Coca Cola, Zeta, ICA, IKEA, Kakeldax, Dagab. Scandfibre Logistics head office is located in Örebro.

Figure 5 Scandfibre network

Source: http://scandfibre.se/?page_id=208

2.2.3 HUPAC

With Shuttle Net, one of the largest networks in terms of route density and traffic frequency, Hupac connects the main economic areas of Europe from Sweden to Southern Italy, from Belgium to

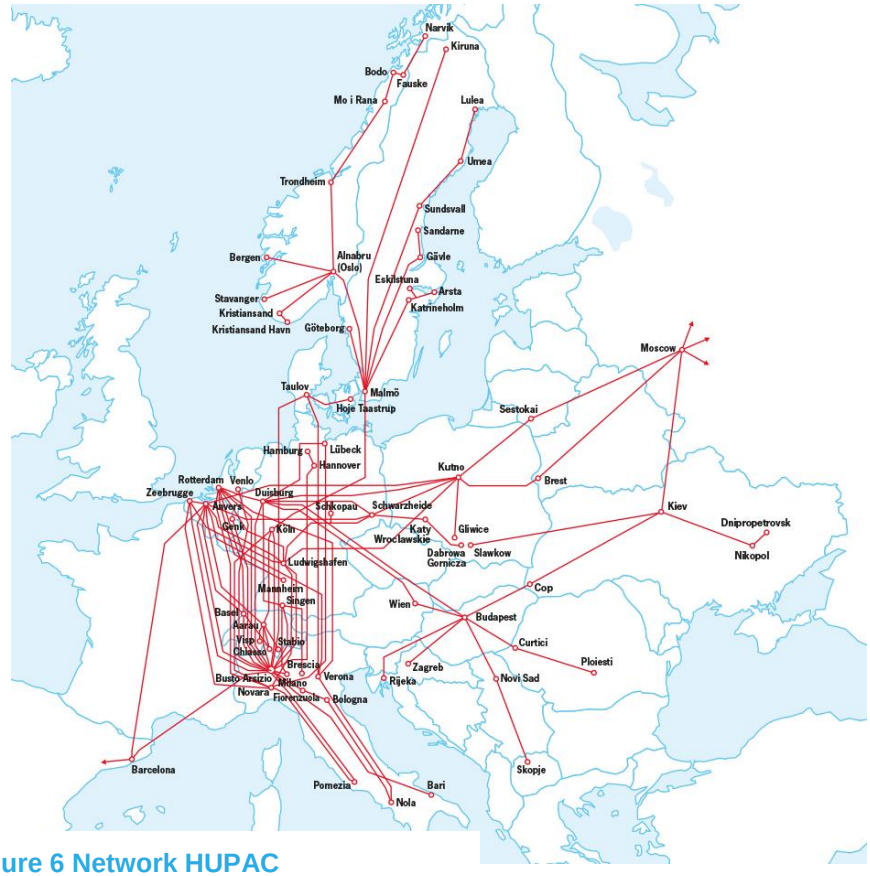

Figure 6 Network HUPAC

Source: http://www.hupac.ch/index.php?node=290&lng=2&rif=85f6ac53eb

Russia, from the Netherlands to Hungary. In case of longer journeys, an intermediate transfer takes place. At so-called Gateway terminals the loading units are transferred from one train to another. In this way they reach secondary economic areas, thus benefiting from the advantages of an extensive intermodal network.

Every day, some 110 Hupac trains with their own rail wagons are on the move, transporting containers, swap bodies and semitrailers. Combined road/rail transport system integrates different transport carriers into a single transport chain, thus combining the advantages of each. Around 140 suppliers operate in this sector.

2.2.4 Kombiverkehr

Kombiverkehr is a logistics service provider that develops, organises and markets a Europe-wide network for rail-road combined transport. Its services are aimed at freight forwarders and transport companies. In 2016 the company shifted 985 424 truck consignments– 1,97 million TEU – from road to rail.

As seen in the network chart below, Kombiverkehr have their own transports in central Europe (mainly Germany) and from Malmö they operate with partner (today Green Cargo) to reach destinations within Sweden.

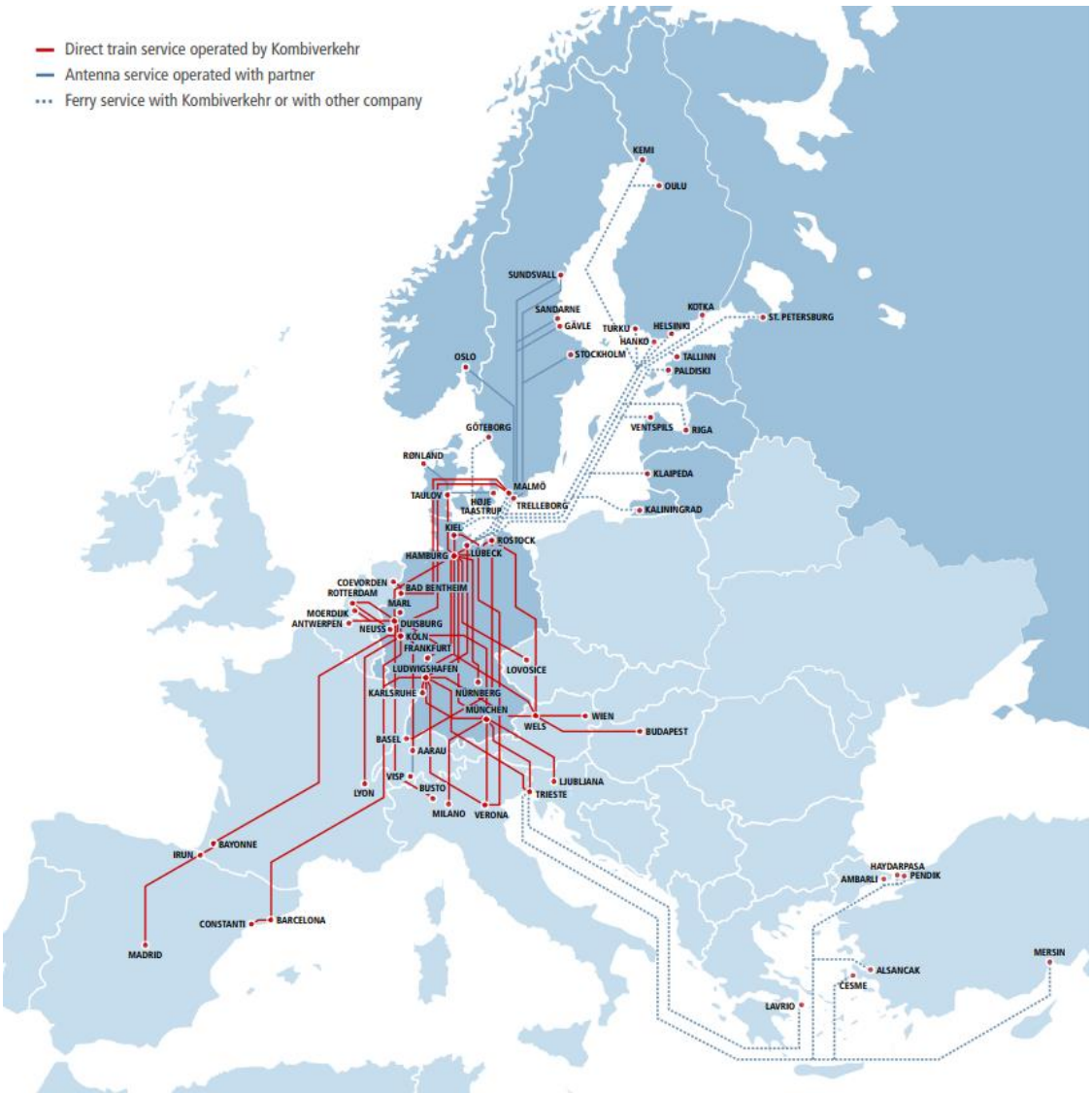

Figure 7 Network Kombiverkehr

Source: https://www.kombiverkehr.de/en/transport/#netzwerk

2.2.5 Samskip Van Dieren

Samskip Van Dieren offer pan-European, combined transport services via shortsea, road, rail and inland waterway routes. Multimodal, high frequency services are offered from Germany, France, Netherlands, Belgium, Luxembourg, Italy Greece, Spain, Portugal, the United Kingdom, Ireland, Scandinavia, the Baltic States, Russia, Turkey and destinations in Central and Eastern Europe.

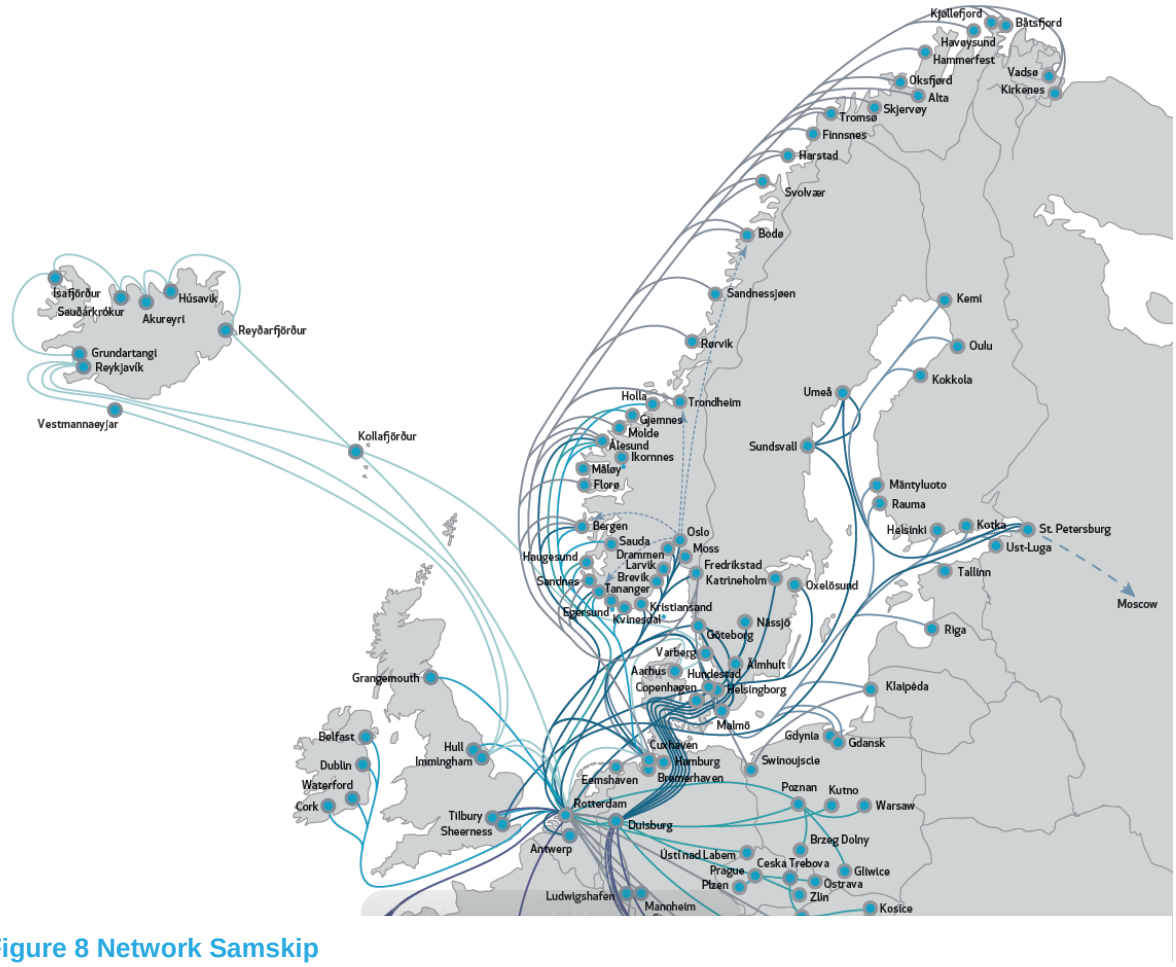

Figure 8 Network Samskip

Source: http://www.samskipmultimodal.com/media/business-portal/171122_Temperature_Controlled_Solutions_LR.pdf

Samskip offers shortsea services between Bremerhaven and Hamburg to Norway, Sweden, Finland, Russia, the Baltic States, Poland and Central Asia (e.g., Georgia, Azerbaijan, Kazakhstan, Turkmenistan, Tadzjikistan, Uzbekistan and Kyrgyzstan). In addition, they offer shortsea services from Rotterdam to Russia via Sweden.

For Sweden and Norway the shortsea services from Rotterdam and Hamburg/Bremerhaven to the north is to following destinations;

ORGIN	DESINATION	FREQUENCY	TRANSIT TIME (DOOR-DOOR)
ROTTEDAM	SUNDSVALL	2/WEEK	7-9 DAYS
ROTTEDAM	UMEÅ	2/WEEK	7-9 DAYS
ROTTEDAM	GJEMNES	1/WEEK	8 DAYS
ROTTEDAM	MALOY	1/WEEK	7 DAYS
HAMBURG/BREMER HAVEN	MALOY	1/WEEK	7 DAYS

Table 1 Shortsea services Rotterdam and Hamburg/Bremerhaven to Norway and Sweden

For longer sailings to the northernmost parts of Norway they have the sailing Rotterdam-Hammerfest and Hammerfest-Rotterdam and following destinations during the route are available:

ORIGIN	DESTINATION	TRANSIT TIME
AALESUND	ROTTERDAM	4 DAYS
MOLDE	ROTTERDAM	4 DAYS
TRONDHEIM	ROTTERDAM	4 DAYS
BODO	ROTTERDAM	6 DAYS
SVOLVAER	ROTTERDAM	6 DAYS
HARSTAD	ROTTERDAM	6 DAYS
TROMSÖ	ROTTERDAM	7 DAYS
HAMMERFEST	ROTTERDAM	8 DAYS

Table 2 Sailings from Rotterdam to northern Norway

For railservices, Samskip offer connections from Duisburg. Hector rail operate these intermodal trains. See in below table, this is a back and forward service.

ORIGIN	DESTINATION	FREQUENCY	TRANSIT TIME (TERMINAL-TERMINAL)
DUISBURG	HELSINGBORG	6/WEEK	1 DAY
HELSINGBORG	DUISBURG	6/WEEK	1 DAY
DUISBURG	GÖTEBORG	6/WEEK	1 DAY
GÖTEBORG	DUISBURG	6/WEEK	1 DAY
DUISBURG	NÄSSJÖ	5/WEEK	1 DAY
NÄSSJÖ	DUISBURG	5/WEEK	1 DAY
DUISBURG	KATRINEHOLM	6/WEEK	1 DAY
KATRINEHOLM	DUISBURG	6/WEEK	1 DAY
DUISBURG	ÄLMHULT	5/WEEK	1 DAY
ÄLMHULT	DUISBURG	5/WEEK	1 DAY
DUISBURG	MALMÖ	6/WEEK	1 DAY
MALMÖ	DUISBURG	6/WEEK	1 DAY

Table 3 Railservices from Duisberg to Sweden

The terminal in Duisburg has connections to multiple terminals in Europe and Asia. For example to Turkey: four block trains per week linking their rail terminal in Duisburg to the Port of Trieste (IT) for on-connection to ships operating between Trieste and Istanbul as well as into Izmir. As seen in the table no connections by rail to northern most parts of the BSR areas are available.

Samskip Van Dierens northernmost terminals are Umeå and Sundsvall in Sweden and Gjemnes, Ålesund and Målöy in Norway. See below figure for all terminal locations in northern Europe.

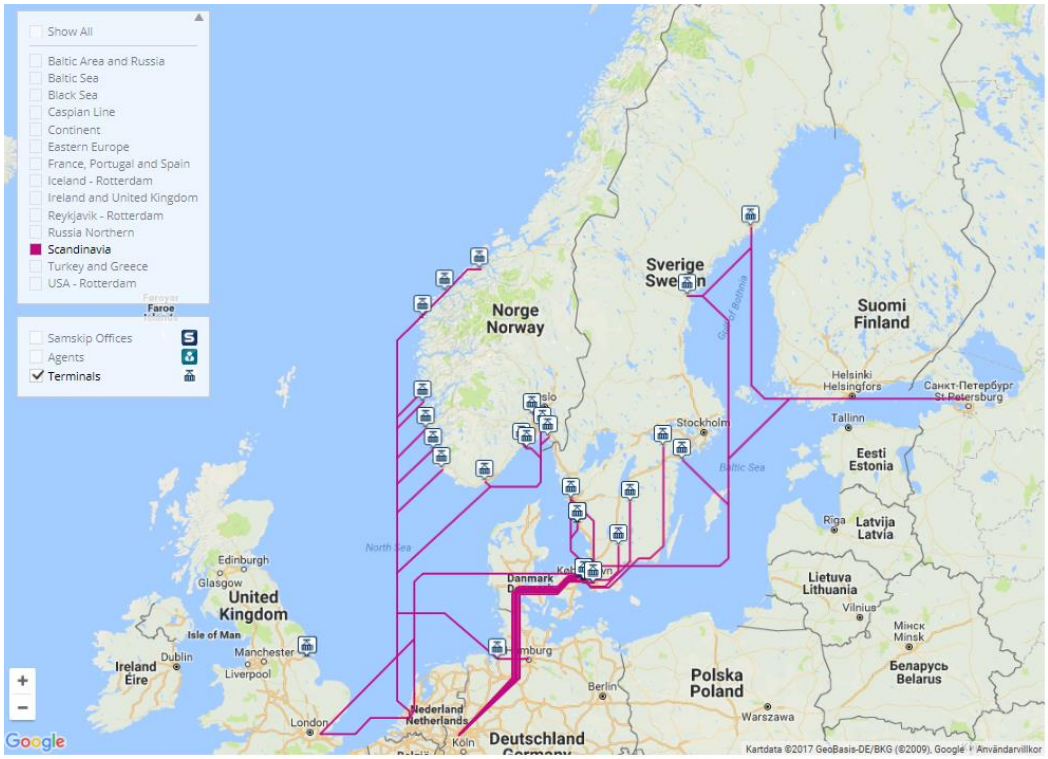

Figure 9 Samskip terminals in Norway and Sweden

Source: http://www.samskipmultimodal.com/whatwedo/multimodal-network/

2.2.6 SCT

SCT offers domestic services from Örebro, Eskilstuna, Göteborg, Helsingborg, Jönköping, Malmö, Stockholm and Åhus. They run 4 railway connections to and from Skandia port, this in collaboration with Hector Rail and Tågfrakt AB;

- Göteborg - Örebro/Hallsberg
- Göteborg - Eskilstuna
- Göteborg - Jönköping och Göteborg - Gävle

SCT owns about 120 traction units that have 400 container chassis and operates 21 SIMA lifts daily, which means they are one of Europe's largest operators in this area. Through this SCT can provide with expertise and capacity for container transport.

2.2.7 RealRail

RealRail have domestic services within Sweden and 2016 they transported about 70 000 TEU. There connections are the following:

TERMINAL	DESINATION	FREQUENCY	DEPARTURE	TIME	DELIVERY	TIME 2
HELSINGBORG	LULEÅ	5/WEEK	M-F	19:00	TU-F/SU	19:00 /9:00
LULEÅ	HELSINGBORG	5/WEEK	M-F	18:30	T-F/SA	18:30/18:15
HELSINGBORG	UMEÅ	5/WEEK	M-F	19:00	TU-F/SU	14:45/9:00
UMEÅ	HELSINGBORG	5/WEEK	M-F	19:00	TU-F/SA	18:30/18:15
NÄSSJÖ	LULEÅ	5/WEEK	M-F	22:00	TU-F/SU	19:00/9:00
LULEÅ	NÄSSJÖ	5/WEEK	M-F	18:30	TU-F/SU	14:30/10:00
NÄSSJÖ	UMEÅ	5/WEEK	M-F	22:00	TU-F/SU	14:45/9:00
UMEÅ	NÄSSJÖ	5/WEEK	M-F	19:00	TU-F/SU	14:30/10:00
GÖTEBORG	LULEÅ	5/WEEK	M-F	19:30	TU-F/SU	17:30/9:00
LULEÅ	GÖTEBORG	5/WEEK	M-F	15:45	TU-F/SA	13:20/12:30
GÖTEBORG	UMEÅ	5/WEEK	M-F	19:30	TU-F/SU	11:00/9:00
UMEÅ	GÖTEBORG	5/WEEK	M-F	19:00	TU-F/SA	13:00/10:30
GÖTEBORG	SUNDSVALL	5/WEEK	M-F	19:15	TU-F, M	6:00
SUNDSVALL	GÖTEBORG	5/WEEK	M-F	17:35	TU-F/SA	6:00/10:00
JÖNKÖPING	SUNDSVALL	5/WEEK	M-F	19:30	TU-F,M	6:00
SUNDSVALL	JÖNKÖPING	5/WEEK	M-F	17:35	TU-F,M	6:00

Table 4 Timetable RealRail

ReailRail is a part of the Sandahlsbolagen AB that is terminal operator at the terminals of Luleå combi, Umeå combi and Sundsvall combi. All train that runs west of Hallsberg passes through Hallsberg, but not the shunting yard.

2.2.8 CargoNet

Cargonet is Norway's largest rail freight carrier and have a network covering Norway and some destinations in Sweden. The company offers combined transports (regular transports between the major cities in southern Norway and to/from northern Norway) and system transports.[3]

Figure 10 Network CargoNet

Source: http://www.cargonet.no/om_cargonet/virksomheten/

ARE, Arctic Rail Express, is a shuttle moving to and from Oslo and Narvik operated by CargoNet. Northwards the train transports groceries and consumer goods and on the way back to the south it contains of fish and seafood. Today 20 trains run between Oslo and Narvik and carries about 400.000 tons. The line is 1950 kilometres resulting in ARE is Europe's longest direct railway shuttle.[4]

[3] http://www.cargonet.no/om_cargonet/virksomheten/
[4] http://www.narvikhavn.no/knutepunkt-narvik/logistikk-knutepunkt/jernbane/cargonet-are-togene.aspx

TERMINAL	DESTINATION	FREQUENCY	DEPARTURE	TIME	DELIVERY	TIME 2
ALNABRU	NARVIK*	4/WEEK	M-TH, F	17:45	TU-TH/SA	22:30
ALNABRU	NARVIK	6/WEEK	M-F, SA	19:45, 10:45	W-SU, SU	00:30, 19:00
NARVIK	ALNABRU*	4/WEEK	TU-TH, SA	21:30	TH-F, SA, M	05:00, 04:00, 05:00
NARVIK	ALNABRU	6/WEEK	M-F, SU	23:30	TU-SA, SU	05:20, 07:00

Table 5 Timetable ARE

Source:http://www.cargonet.no/contentassets/6c986605755e4bb683dc7c73fb6db198/170410-timetable-2017-from-24.4.pdf Processed by Region Örebro County

*Passes through Kirunavaara for coupling and decoupling of wagons

As seen in the table the connection between Narvik and Alnabru has a frequency of 10/week and takes about 29 hours (loading deadline to the time to start unloading). It passes through Hallsberg, not for coupling and decoupling of wagons.

2.2.9 Green carrier

Greencarrier Freight Services offers railway transports from China to the Baltics. From their hub in Suzhou, they offer weekly departures, both full container load (FCL) and less than container load (LCL), to Warsaw with only 14 days transit time. Green carrier's latest expansion, called Green Smart Transport Solutions, which previous included intermodal solutions from Turkey to Northern Europe, as well as Short Sea in Europe with focus on the Baltics. Their new solution offers a railway solution via Hamburg from China to Hallsberg. From Hallsberg it is delivered by truck to customers.

2.2.10 DB cargo NRE

NRE, North Rail Express, is DB Schenker's shuttle with daily departures to and from Oslo and Narvik. Similar to the ARE the NRE it carries groceries and consumer goods northwards and fish/seafood southwards. It carries 25.000 container each year (2013) and has a capacity of 40 TEU which means about 520 meters and a weight of 1000 tons. Of these there are 5 semivans and 5 container wagons. The train runs 5 round trips/week.

It stops in Kirunavaara where several salmon containers from Troms and Finnmark will be hauled on. The train passes through Hallsberg on the way back to Alnabru. In Alnabru, the final destination for the train is where the train gets split up. Some goods are repacked to either by plane go to East or the US, or by truck or train to the continent.[5]

Figure 11 The North Rail Express

Source: http://www.narvikhavn.no/media/18376/nre.jpg

[5] http://www.narvikhavn.no/knutepunkt-narvik/logistikk-knutepunkt/jernbane/db-schenker-north-rail-express-nre.aspx

2.3 Region Örebro County

Intelligent Logistics, an independent business magazine focusing on freight transports and logistics, annually releases a list of Sweden's best logistic nodes. The geographical and demographic position, i.e proximity to the largest number of consumers, along with quality and sustainability in the region's overall infrastructure, are the most important factors for receiving a high ranking. Because of the significant growth in logistic areas, the Örebro region has been placed first in 2018 together with Business Region Gothenburg. This is the first time the Örebro region was placed first, they have been placed second the last years. Gothenburg has been placed first for several years, one of the top reasons for this ranking is because the largest import/export port in the Nordic region is located here.[6]

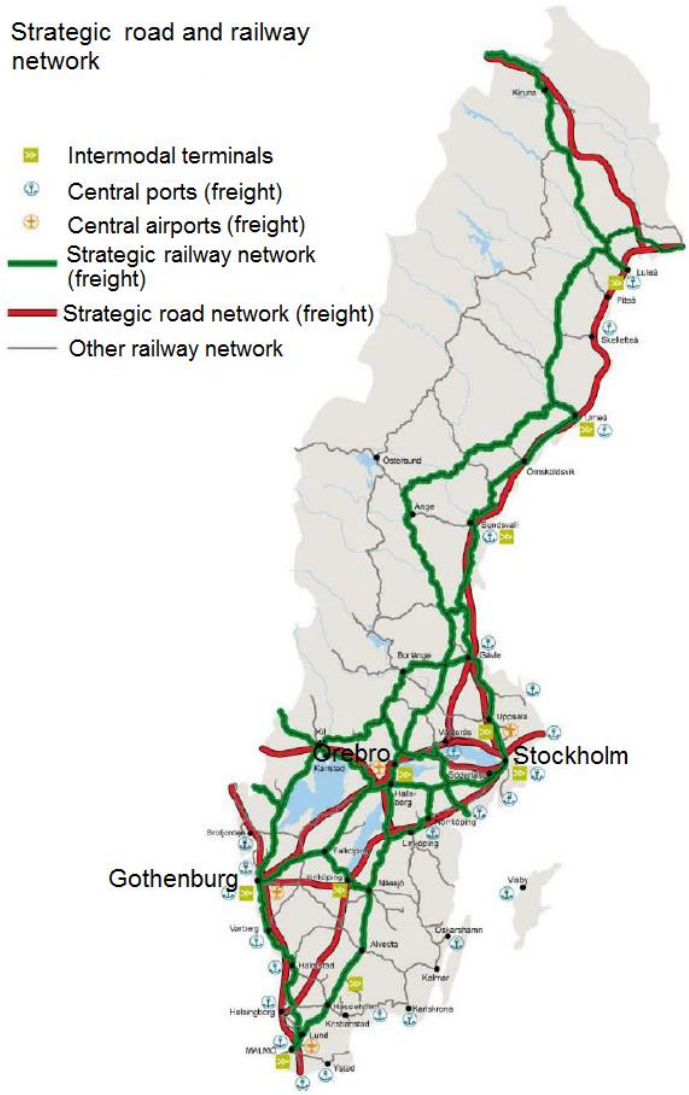

Figure 12 Road and railway network for freight in Sweden

Source: Godstransporter Östra Mellan Sverige 2010-2050
Processed by Region Örebro County

[6] *Intelligent Logistik* http://intelligentlogistik.com/logistiklagen/*(2017-12-28)*

The Örebro region is a hub for transports in north-south and east-west directions. Highways E18, E20 and highway 50 all converge in the region, as well as several of Sweden's busiest railway lines. In Hallsberg is the biggest marshalling yard of Scandinavia located.[7][8] The rail-road intermodal terminal in Hallsberg is identified as a strategical node in the national transport infrastructure plan, he Swedish Transport Administration's strategical document over infrastructure development.[9] Almost all freight transports from the northern parts of Sweden pass through Örebro and Hallsberg on the way to the southern and western parts of the country. The airport located in Örebro is the fourth largest freight airport in Sweden.[10] Hallsberg terminal is one of Sweden's most important intermodal terminals. It is also a dry port to Gothenburg. The terminals located in Frövi and Örebro are multimodal terminals. The Hallsberg terminal, located just next to the marshalling yard has several departures and arrivals each week to Gothenburg and Malmö.

Figure 12 shows the strategic road and railway network in Sweden. This is based on the TEN-T network with some additions according to Swedish Transport Administration's "Kapacitetsutredning" [Capacity investigation] from 2012.

Technology-, trade- and whole sale companies together with raw- and process industry are the primary businesses in Region Örebro County, and they are all very much depending on effective transport solutions.[11] Some of the important manufacturing industries located in the region include Atlas Copco, BillerudKorsnäs, Orica, BAE Systems, Meritor and Suzuki Garphyttan etc.[12] The development of the pricing for metal has made it possible to assume a realistic future in mining operation in Bergslagen. If this will be the case; it will result in a need for increase capacity requirements for part on the railway network.[13]

Another characteristic of Örebro region is all the warehouses located in the region, primarily focused to the city of Örebro and its vicinity.[14] The table below shows some of the new establishments made within the past years as well as establishments expected in the near future.

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[7] *Utvecklingsstrategi för Örebroregionen, https://www.regionorebrolan.se/Files-sv/%c3%96rebro%20l%c3%a4ns%20landsting/Regional%20utveckling/Rapporter%20och%20publikationer/Regional%20utveckling/RUS_medportratt_40sid_webb.pdf (2017-12-28)*

[8] *Länsplan för regional transportinfrastruktur – Örebro län 2014-2025, https://www.regionorebrolan.se/Files-sv/%c3%96rebro%20l%c3%a4ns%20landsting/Regional%20utveckling/Trafik%20och%20samh%c3%a4llsplanering%20(ny)/RF%c3%96_Ltp2014_2025.pdf?epslanguage=sv (2017-12-28)*

[9] *Länsplan för regional transportinfrastruktur – Örebro län 2014-2025, https://www.regionorebrolan.se/Files-sv/%c3%96rebro%20l%c3%a4ns%20landsting/Regional%20utveckling/Trafik%20och%20samh%c3%a4llsplanering%20(ny)/RF%c3%96_Ltp2014_2025.pdf?epslanguage=sv (2017-12-28)*

[10] *Regional Översiktlig Planering, https://www.regionorebrolan.se/PageFiles/1204663/Regional_%c3%b6versiktlig_planering_R%c3%96P.pdf?epslanguage=sv (2017-12-28)*

[11] *Regional Översiktlig Planering, https://www.regionorebrolan.se/PageFiles/1204663/Regional_%c3%b6versiktlig_planering_R%c3%96P.pdf?epslanguage=sv (2017-12-28)*

[12] *Business Region Örebro, http://businessregionorebro.se/download/18.218bcd6158dc01af182ba92/1481636306663/L%C3%A4ge%20att%20v%C3%A4xa%20tillsammans.pdf (2017-12-28)*

[13] *Regional Översiktlig Planering, https://www.regionorebrolan.se/PageFiles/1204663/Regional_%c3%b6versiktlig_planering_R%c3%96P.pdf?epslanguage=sv (2017-12-28)*

[14] *Godsflöden i Östra Mellansverige, Örebro län. Maj 2013.*

COMPANY	TYPE OF WAREHOUSE	SIZE [M2]	DISTRIBUTION AREA	YEAR
POSTNORD	MAIL-TERMINAL	25 000	CENTRAL SWEDEN	2013
XXL	CENTRAL WAREHOUSE	43 000	SWEDEN, NORWAY, FINLAND, OTHER PARTS OF THE NORDIC	2013, 2015
ELON ELKEDJAN LOGISTICS	CENTRAL WAREHOUSE	55 000	THE NORDIC, BALTIC	2004, 2008, 2015
PAC PRODUCTION	CENTRAL WAREHOUSE	20 000	SWEDEN	2016
ELEKTROSKANDIA	CENTRAL WAREHOUSE	45 000	SWEDEN	2017
POSTNORD	PACKAGE TERMINAL	25 000	SWEDEN	2018
LIDL	CENTRAL WAREHOUSE	45 000	SWEDEN	2018

Table 6 New establishments within the Örebroregion

Source:http://businessregionorebro.se/download/18.218bcd6158dc01af182ba92/1481636306663/L%C3%A4ge%20att%20v%C3%A4xa%20tillsammans.pdf

The main product groups transported within the Örebro region are ”soil, stone, gravel and sand”, ”logs” (in tons) and ”foodstuff and animal feed” (in SEK). The main imported product groups to Örebro region are ”logs” (in tons), ”foodstuff and animal feed” (in SEK) and major exported are ”logs” (in tons), ”food and animal feed” (in SEK). For transit transports the main products are “unprocessed- or semi-finished products from iron or metal” (in both tons and SEK).[15] Figure 13 shows the volume of which is transit, import and export.

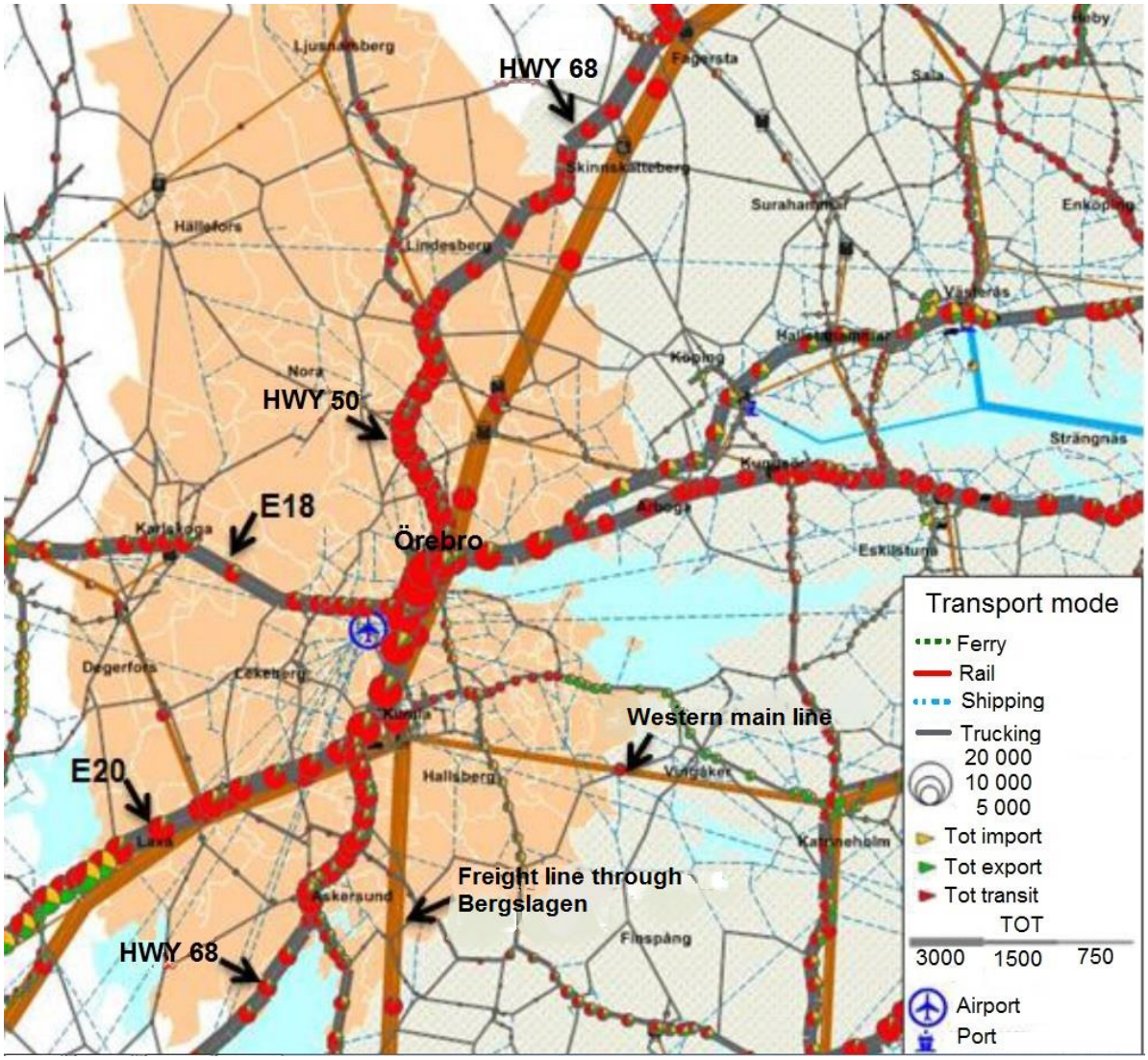

Figure 13 Import, export and transit transport volumes within the Örebro region, for different modes of transport*

Source: Godsflöden i Östra Mellansverige , Örebro County. May 2013.

* *The number of circles have nothing to do with the transport volume. There are more circles on the road network than rail network due to the fact that the road network is divided into several links and there is one circle per link. Also, the color distribution of the circles seen applies for the county where the link is located, i.e. the color distribution may change at the border crossing.*

To develop the Örebro region towards a sustainable direction, Region Örebro County runs a project called "The Green Logistics Region". This study within this project shows that about 32 000 ktons of freight was transported to/from/through Örebro region 2016. A significant part of this, about 24 000 ktons, is transported on rail. In accordance with the indicators presented in this project, Region Örebro County is the "greenest" (most environmental friendly) logistics region in Sweden, measured in emissions of carbon dioxide. The high ranking of Örebro County is due to the high amount of rail utilised in the region. See the table below (air freights not included as the volumes were considered negligible).[16]

REGION	EMISSIONS PER TON-KM
ÖREBRO COUNTY	0.04 KG CO2-EKV-/TON KM
JÖNKÖPING COUNTY	0.09 KG CO2-EKV-/TON KM
ÖSTERGÖTLAND	0.11 KG CO2-EKV-/TON KM
VÄSTMANLAND	0.07 KG CO2-EKV-/TON KM

Table 7 Emissions per tonnes-km, 2014

Source: Mikusinska, Martyna and Bodian, Robert. Analys av transportindiaktorer, Örebro vatten och miljö. Sweco for Region Örebro County. 2017-03-26

[16] *Analys indikatorer gröna logistikregionen*

The Örebroregion, has large volume of transit traffic, seen in Figure 13. This is significant for the region. The figure shows the freight transport for railway, road, sea and ferry in eastern/central Sweden. The thicknesses of the flows describe the size of the transporters measured in tonnes / year.

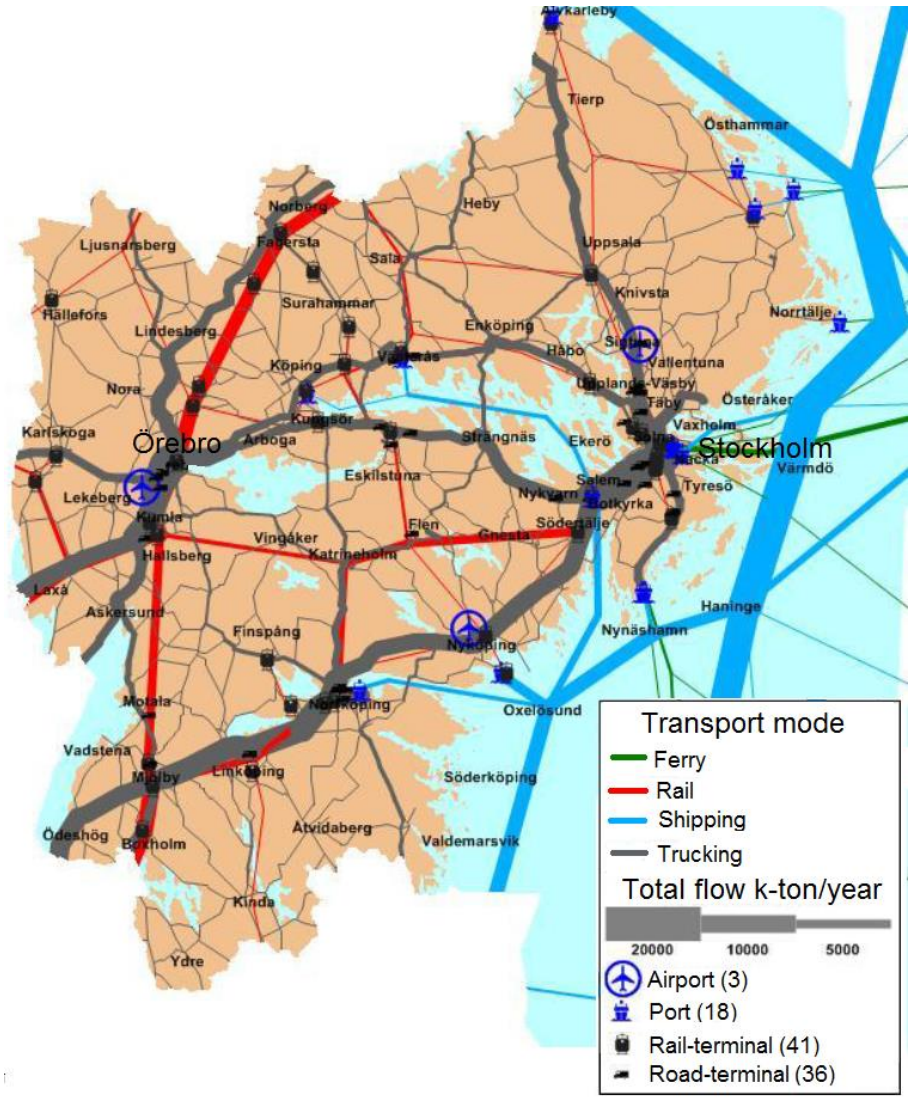

Figure 14 Freight transports in the Stockholm Mälar Region

Source: Projektet ”Godsflöden i Östra Mellansverige”, Örebro län. Maj 2013.

2.4 The Örebro Region and northern BSR areas

A major part of EU production of raw material (e.g iron ore and other products from wood) comes from northern Europe. For EU to reap full benefit from the significant nature resources in the Barents region, it is essential to have functional infrastructure to be able to have efficient transports. The transport system needs to link the region to the European continent and the rest of the world. If this is not done efficient it may hamper the development of the European industry. [17]

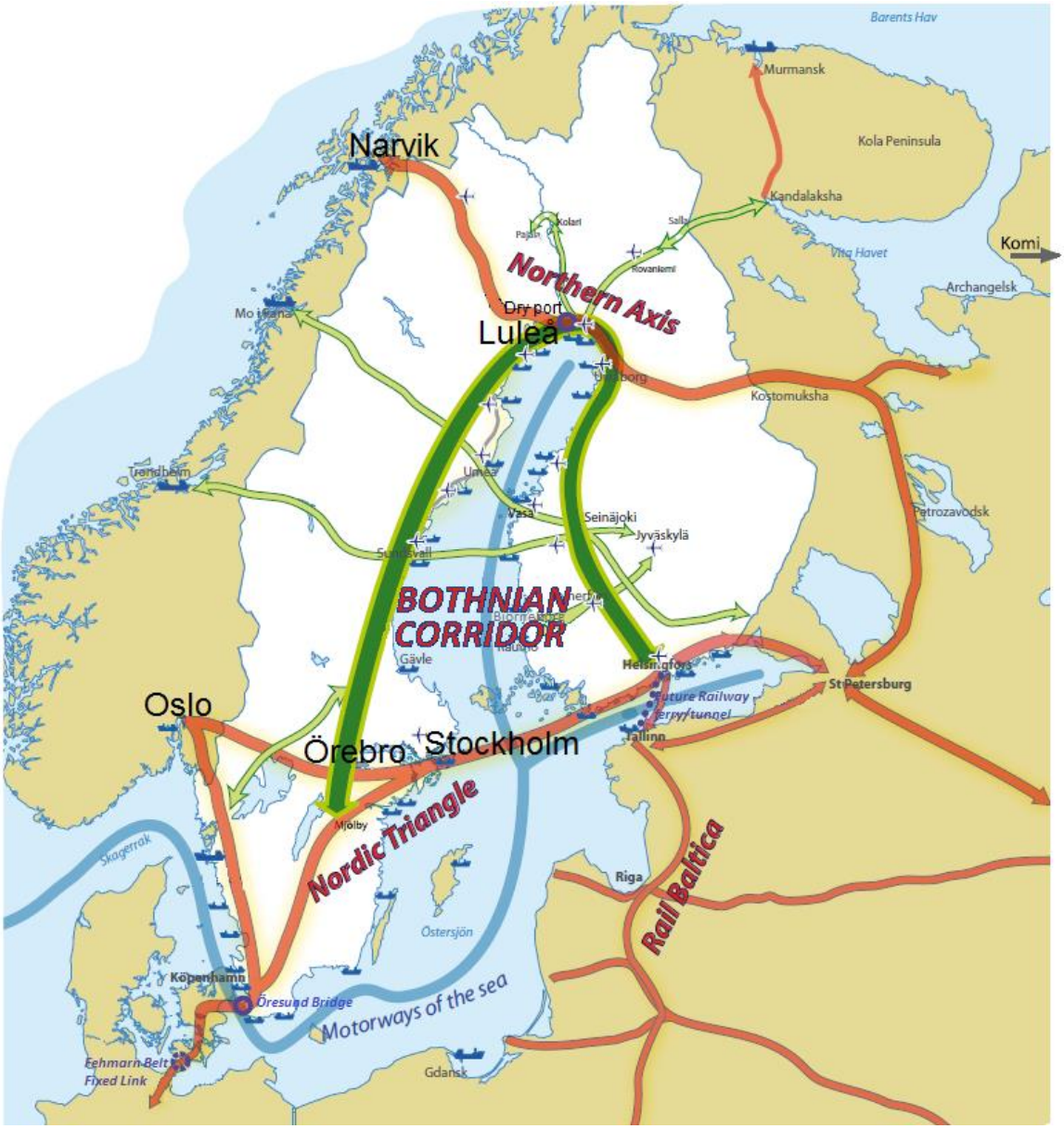

Figure 15 Nordic Triangle, Northern Axis and Bothnian Corridor

Source: Report. Råvaror och transporter i norra Europa. ÅF Infrastrukturplan AB, Processed by Region Örebro County

[17] *Lundberg, Stellan et al. Rapport. Råvaror och transporter i norra Europa. ÅF Infrastrukturplan AB together with Bothnian corridor and EU. Travelsjö, 31 August 2010.*

The Nordic Triangle and the Northern Axis are connected via the Bothnian Corridor. Bothnian corridor, reaches Sweden and Finland, links the east-west and the north-south transnational axes in Sweden, Finland, Norway and Russia. The corridor is a part of the European Union's TEN-T Core Network, it is a strategic important transnational link with great freight flows.

The Bothnian corridor project is a collaboration between all regions in the north of Sweden and the Region Örebro County. The corridors strength comes from its support from local and regional stakeholders and its function as a cross border connection linking south to north, west to east.

The collaborations shared objective is "all the way 2030" – in accordance to the TEN-T regulation – and better communications and transport solutions through broader dialogue and participation from all parts of society when developing the corridor and the use of the corridor. The collaboration will continue to work for a practical solution at national level to include the Bothnian corridor to the ScanMed corridor TEN-T Core Network Corridor. [18] Infrastructure Minister Tomas Eneroth announced, in February 2018, that Sweden has submitted a request to the European Commission to extend the Scandinavian-Mediterranean (ScanMed) Corridor to northern Sweden (to Haparanda and along the Ore line) and along the section Örebro-Oslo.[19]

The geographical scope of this report is the area of northern Baltic Sea Region, which in this study, refers to the northern parts of Sweden and Norway and its connections to the Stockholm Mälar Region. A big part of the business in northern Sweden is base industry, such as mining, metallurgy, mechanical industry, forest based industries (wood, paper, pulp), hydroelectric and specialized services. The businesses in northern Norway are characterized of gas and oil extraction, hydroelectric, fish, and also iron, aluminum and chemical industries. Inefficient infrastructure may lead to difficulties to connect stakeholders to different markets, within the region as well as at border crossings.

Central challenges for northern Europe are to develop functional and efficient transports and to link existing national separated transports systems. The gradual transition to a more environmental and sustainable transport system will require an increasing of freight transportation on rail. The capacity must to be improved and better intermodal solutions need to be developed.[20]

[18] *Botniska korridoren, http://bothniancorridor.com/en/bothnian-corridor/*
[19] *Sveriges Televistion AB, https://www.svt.se/nyheter/lokalt/vasternorrland/regeringens-besked-eu-miljarder-till-jarnvag-i-norrland*
[20] *Lundberg, Stellan et al. Rapport. Råvaror och transporter i norra Europa. ÅF Infrastrukturplan AB together with Bothnian corridor and EU. Travelsjö, 31 August 2010.*

2.5 Imbalances in freight flows

In Sweden, a large portion of the goods production occur in areas with a low density of population. In this respect, the northern parts of the country stand out, as production units for the base industry (forestry, mining and steel) mainly are located there. The consumption of goods, on the other hand, is generally concentrated to areas with high population density, mainly in the central and southern parts of Sweden. The consequence of this is imbalances in transport demand. Furthermore, this results in imbalances based on the need for customized transport solutions, as industrial goods are to a higher degree transported on rail compared to consumer goods. The dominating mode of transportation for consumer goods is by truck.

Relatively big portions of the base industry's transports are carried out with train solutions – both wagonloads and system train solutions. Generally, the location of the production site as well as the source of the raw material governs the route of the transport. This means that there are big freight volumes from the counties of Norrbotten, Västerbotten and Västernorrland (located in Northern Sweden) with destinations in Västra Götaland, Skåne (located in South-Western and Southern Sweden) or the European continent. Thus, trains generally depart from areas with a lot of production and with low population density, which means that the possibilities for return loads are small. Furthermore, train transport solutions often use wagons and/or transport units specifically adapted for the produced goods (in this case southbound). This means that not all types of goods can be loaded for return transport (northbound).

Regarding intermodal rail transports, the increased containerization has meant that the variety of different goods being able to be transported by rail has increased. This theoretically provides good opportunities for the operator to balance the transport flows, for example regarding northbound vs southbound and consumer goods vs produced goods/raw materials. However, in many cases there are technical incompatibilities that hinder the possibility for different types of goods to use the same train solution in the short term.

2.6 Infrastructure

As mention in chapter 3.1 some of Sweden's main roads and railway passes through Örebro region. For a more technical report about the railway standard regarding the possible extension of ScanMed corridor between Örebro/Stockholm and Haparanda/Narvik, please read "Railway Standard-Possible extension of ScanMed Corridor from the Stockholm Mälar Region to the northernmost areas of the Baltic Sea Region" written by Region Örebro county for TENTacle.

The compliance analysis with respect to the distinctive rail objectives is showing the following, in particular:

- The standard track gauge is supplied on all corridor lines.
- Most lines are electrified with the exception on the line between Kilafors-Söderhamn V, 1,7%, which is currently closed but about to be electrified until December 2018.
- Axle load below the standard parameter (<22.5 t) on the same line as mentioned above, the stretch between Kilafors and Söderhamn V will open again in December 2018 and when finished it will allow an axle load of 25,0 t.
- Maximal operating speed is above 100 km/h in about 75% of the network. The Ofoten line in Norway does not fulfil this requirement. Regarding Sweden, a big part of the speed limitations are located along the Iron Ore line (about 45% of the restrictions in Sweden).
- All networks allow a train length of 700 m or more regarding specific braking and/or operating conditions. With breaking operating conditions/break group G it is possible to have trains up to 880 m in Sweden and 850 m in Norway. However, there are plenty of restrictions because of timetabling and operational challenges. Train length in general is below the standard of 630 m.
- ERTMS is implemented in 24,2 % of the possible extension of ScanMed corridor to the northermost parts. The Norwegian part (Ofotenbanen) is scheduled to be finished 2022 and the Swedish Malmbanan (Iron Ore line) by 2025. The plan is that by 2035 all main lines in Sweden will have ERTMS.

Future investment plans regarding the railway infrastructure mentioned in Sweden's National Plan 2018-2029 (in selection) that will affect Region Örebro County's hub potential are:

- Double track development on the network "freight line through Bergslagen":
  - Freight line Dunsjön-Jakobshyttan
  - Freight line Hallsberg-Åsbro
  - Freight line Jakobshyttan-Degerön
  - Freight line Hallsberg-Degerön.
- Development of Frövi shunting yard
- Frövi-Ludvika, measures for ore transports
- Ställdalen-Kil, remote blocking, meeting stations, speed adjustment, power supply, track change and increasing of maximum axle load up to 25 tonnes.

2.7 Terminal

As mentioned in chapter 2.3 the Hallsberg terminal is one of Sweden's most important intermodal terminals. The terminals located in Frövi and Örebro are multimodal terminals. Hallsberg terminal, located just next to the shunting yard has several departures and arrivals each week. GoA 3.2 in Scandria®2Act explains more in detailed what services is offered at these terminals. Also this Scandria®2Act report explains timetable for existing solutions from the Stockholm Mälar Region further down to Central Europe. Some conclusion from this table is that the intermodal transports are only offered from a limited number of locations in Sweden. This combined with the existing solutions, presented in chapter 0 in this report, show that by rail from northern part of Sweden it is only Green Cargo that offers solutions down to central Europe. An example of a terminal in the Stockholm Mälar Region that has intermodal connection to Central Europe is Eskilstuna. Eskilstuna has several departures every week by e.g TX Logistik. Eskilstuna Logistik och Etablering describe what they think is the main reasons why they made it possible with rail connection to central Europe;

- The geographic location. To be close to market and volumes.
- The surrounding. If the road-rail terminal is the only one in the area the ”better” for good connections and high filling ratio
- Good access to the terminal; electrified and functional infrastructure
- Active sales and marketing work in cooperation between the terminal and municipality

3. Market analysis

Örebro region is a hub for transports in north-south and east-west directions. A majority of the goods from the northern most BSR areas passes through here on the way to the south. To analyze the potential of Örebro area to funnel flows between the northernmost BSR territories (Northern parts of Norway and Sweden) and the ScanMed Corridor, a few parameters have been considered. One part describes the more solid characteristics like infrastructure and location. Thus, the focus towards the private actors and the market study have slighter "softer" characteristics been discussed, such as;

- Freight volumes
- Modal choice
- Services; connections, warehouses, terminals etc
- Lead time
- Prices
- Possibilities and challenges for a smooth, environmental friendly and effective flow between the Örebro area and the northernmost BSR areas
- Etc.

3.1 Identified freight flows

A total of 280 different goods flows were collected through the market study. These flows range from domestic to intercontinental in scope and from fully loaded trains each week to a couple of pallets each month.

All flows have been converted to the same time unit, and are expressed as TEU per week. The largest flows, when the information is given in amount of trains, are converted to TEU through the assumption of 80 TEU per train.

The arrows (in Figure 16) to/from the north indicate flows to and from northern Sweden only, i.e. they do not include flows towards northern Finland and Norway, as such supply chains were not found during interviews. The arrows to/from the northwest indicate the direction towards Oslo and Norway in general. The arrows to/from the southwest indicate the import/export flows, mostly towards Western Europe, via the port of Gothenburg and ports in the Southeastern part of Sweden with Roro, as well as via the Öresund link. The arrows to the Southeast represent flows to/from eastern Europe, which are assumed to be transported mostly via Roro ferry.

Figure 16 show identified flows originating in the Örebro region (left), terminating in the Örebro region (middle) and moving through the Örebro Region (right). Northwards direction indicates northern Sweden and northern Norway. Northwest indicates Norway. Southwest indicates the port of Gothenburg and ports in the Southern part of Sweden, as well as the Öresund link and western/central Europe. Southeast indicates the direction towards eastern Europe.

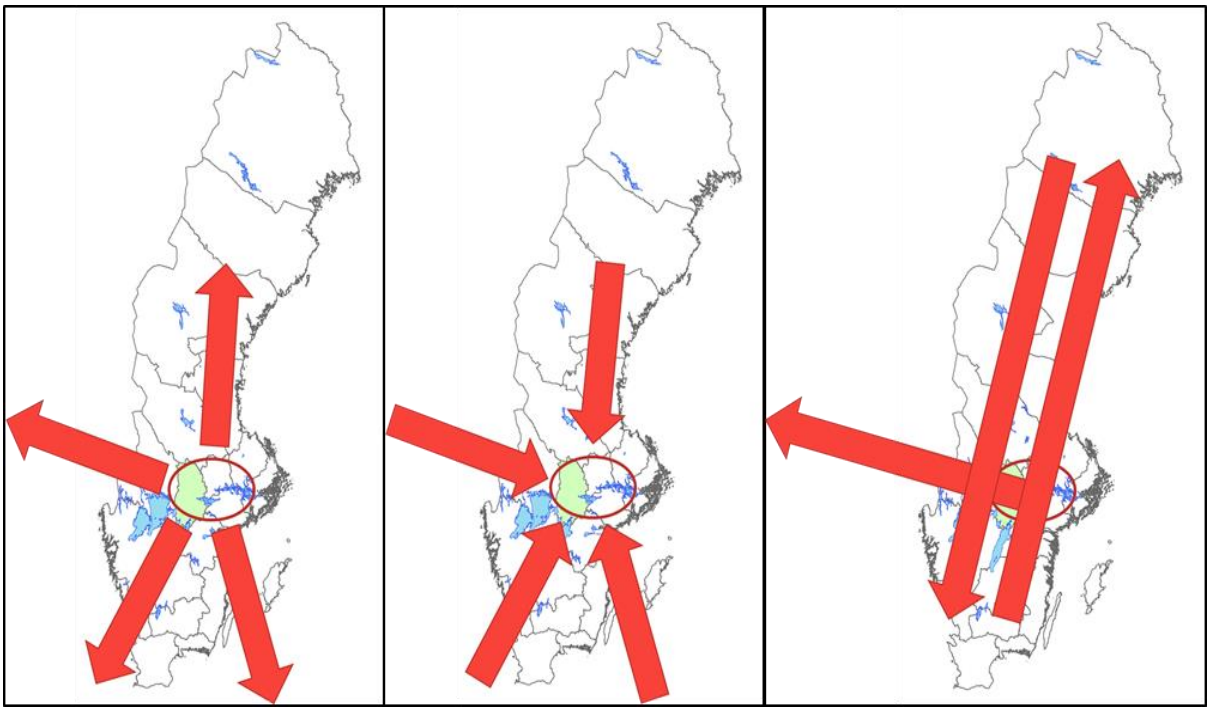

Figure 16 Flows from the market study

3.2 Evaluation model

The choice of freight mode for a specific transport buyer is a function of a number of parameters, such as:

- Commodity
- Freight volumes
- Transport distance
- Frequency
- Reliability and predictability
- Redundancy / backup transport solutions
- Infrastructure quality
- Environmental impact
- Etc.

Regarding intermodal transports, comprising a transport chain including two or more modes of transportation such as sea, train and truck haulage, some of the above factors differ compared to pure truck or sea transports. Furthermore, there are distances within which truck transport is the most suitable option, whereas there are other, generally longer transport intervals in which rail or sea transport is the more logical option.

In this study, an overall assessment of the likelihood for a specific cargo flow to be transported by or transferred to rail freight has been evaluated based on a group of parameters, as specified below. Each parameter comprises a number of criteria/sub-parameters, which is described in the following chapters. The parameters are:

1. Commodity
2. Transport distance and infrastructure requisites
3. Order flexibility and reliability
4. Competition from other modes of transport
5. Company intention

3.2.1 Commodity

Different commodities are more or less suited for railway transport. For instance, goods with a longer life span may be more suitable than the goods with a short. For example timber can be stacked for days/weeks before sent away while milk or fish needs faster handling. This does not mean food is not suitable for railway but the lead time is of greater importance. Furthermore, some commodities are fragile and the handling can be problematic in transshipment. Some commodities are not suitable for railway transport due to the loading profile, whereas others are well suited to be loaded directly onto a train wagon or onto a pallet suitable for train transports.

Another parameter that varies between commodities is the typical size of a shipment. Shipments below 10 tonnes for instance are traditionally transported by truck, whereas shipments above 50 tonnes per day may be more likely to be transported on railway. Generally, the larger the shipment size is, the more suitable it is to transport it via railway. However, if sea transport is a viable option

it generally is the preferable option, given that the shipment sizes are large enough and that the longer lead time is acceptable. To determine which transport (road, rail or sea) is most likely to be chosen for a specific shipment is a bit problematic, as railway transport in some cases can be a viable option even for smaller shipment sizes. This can be the case when an intermodal commuter train is already running in a specific transport relation, where the transport buyer can add wagons or buy container positions for their goods.

In summary – parameters regarding *commodity* that determine whether railway transport is a viable option:

- Is the commodity suitable for railway transport (i.e. life span, sensitivity, etc.)?
- Shipment size
- Loading profile (and suitable pallets)

3.2.2 Transport distance and infrastructure requirements

Railway as a transport mode generally has difficulty in competing with truck transports at distances of less than 100-200 km. On longer distances railway may be a viable option, but it is of course dependent on a number of other factors. Sea transports is typically the logical choice at long distances, where the goods volumes are high and where there are suitable ports available at both sending and receiving end. Regarding sea transports, the connections between the ports and inland terminals need to be secured in order for the transport to be carried out efficiently.

The total transport time (from point A to point B) is often a crucial factor when deciding transport mode. This can, however, vary depending on commodity – some goods have to reach the customer quickly, while a longer transport time might be acceptable for other types of goods.

For railway transport to be a viable option, the infrastructure in form of the actual tracks have to be of a certain standard and the track capacity utilization needs to allow reasonable freight transport times. In the case of intermodal trains however, well-functioning intermodal terminals are also needed enabling efficient loading and unloading to/from trucks for the first and last mile haulage. These intermodal terminals have to be located in such a way that the distances for the first and last mile haulages are minimized. It is difficult to determine what the acceptable maximum distances for these transports are, but they should probably not exceed 50-100 km (at each end).

Also affecting the overall competitiveness for intermodal rail transports is the number of transhipments needed to reach from point A to point B. A transport chain including too much transhipment (from one train to another) will be expensive and, perhaps above all, too time consuming. In transport relations that require a lot of transhipments, railway may therefore not be a competitive alternative compared to truck transport.

In summary – parameters regarding *transport distance and infrastructure requisites* that determine whether railway transport is a viable option:

- Rail haulage distance
- First and last mile haulage distance

- Total transport time
- Infrastructure and terminal quality
- Number of transshipments needed

3.2.3 Order flexibility and reliability

For different commodities, there are different requirements for how fast the goods have to reach the customer. For some, the goods need to be delivered within one or a couple of days, whereas a longer lead-time (from order to delivery) is acceptable for others. The former is traditionally not suited for railway transports, as the lead-time is almost exclusively longer than for truck transports.

Low variations in shipment size and frequency are generally regarded to be favorable when considering railway transport. In addition, a constant rather than temporary flow of goods is viewed as advantageous. As the procedure for booking a railway transport often is considered more complex than booking a truck transport, predictability in this regard is seen as a big advantage. However, modern day intermodal commuter trains (run by a railway operator such as Hector Rail and booked by a forwarding agents such as DB Schenker) probably means that the procedure for booking single wagons or pallets on a train is regarded as easier.

Considering order flexibility and reliability in relation to railway transports, the recipient's ability to store goods is an important factor. If the company's business allows the use of a reserve stock, it is less sensitive for variations in delivery precision. On the other hand, a company that uses just in time deliveries are far more sensitive to variations, and in this case railway transports may not be a suitable option. It cannot be overlooked that railway transports to a greater extent than truck transports suffer from delays. This is mostly due to a lack of redundancy in the transport network.

In summary – parameters regarding *order flexibility and reliability* that determine whether railway transport is a viable option:

- Lead time (from order to delivery)
- Variations in shipment size
- Variations in shipment frequency
- Predictability – temporary or constant flow of goods
- Requirements on delivery precision (reliability)

3.2.4 Competition from other modes of transport

Although it has to some extent been addressed within the framework of the other parameters (as described above), competition from other modes of transport is a particularly important factor when considering whether railway transport is a preferable option. In this regard, proximity to ports and intermodal terminals are important factors. If the goods being transported are of high volume and if there are ports in close proximity at both the sending and receiving end, railway transports will have a hard time competing with sea transports. Similarly, if the distance is too short railway as a mode of transport will have a hard time competing with truck transports. The railway's ability to compete with other modes of transport above all comes down to transport time and costs.

Another factor (also mentioned above) is how difficult the booking procedure is perceived between the different modes. The procedure for booking a railway transport is generally considered more

complex than the procedure for booking a truck transport. The differences (in complexity) between booking a railway transport compared to a sea transport however should be similar.

In summary – parameters regarding *competition from other modes of transport* that determine whether railway transport is a viable option:

- Transport cost (in relation to other modes of transport)
- Transport time (in relation to other modes of transport)
- Other modes of transport available, i.e. proximity to ports, intermodal terminals, etc.
- How easy it is to book a transport (in relation to other modes of transport)

3.2.5 Company intention

Although it is hard to determine/evaluate, a company's intentions in regards to railway transports can be a decisive factor for whether it will be realized or not. Some companies, for example, have a high environmental profile, and it can be seen as more probable that these will choose to use railway in favor of truck transports. In addition, some companies have (within the framework of this study) stated that they intend to, or want to use railway transports to a greater extent – in general – or in a certain transport relation specifically.

In summary – parameters regarding *company intention* that determine whether railway transport is a viable option:

- Attitude on environmental impact
- Attitude towards rail transport

3.2.6 Overall assessment

The overall assessment was carried out by investigating the information for all the goods flows from the interviews and evaluating them according to the different parameters described above.

For each goods flow the parameters above have been evaluated and given a grade on a scale from "minus" to "zero" to "plus", with two additional categories "deal breaker" and "additional info required", according to the following:

- Minus – indicates that, for the investigated flow, the parameter opposes railway transport.
- Zero – indicates that, for the investigated flow, the parameter neither supports nor opposes railway transport.
- Plus – indicates that, for the investigated flow, the parameter supports railway transport.

And the two additional categories are:

- Dealbreaker (the red box in Figure 17)– indicates that, for the investigated flow, the parameter is such a strong contraindication against railway transport that it is practically impossible to overcome it and the investigated flow is thereby written off from further assessment.
- Additional info required (the grey question mark box in Figure 17) – indicates that, for the investigated flow, the parameter cannot be assessed without additional information.

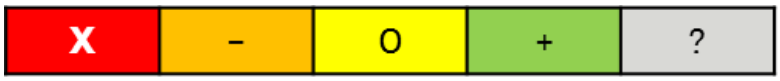

Figure 17 The five different "grades" possible for each parameter

This evaluation yielded three groups of flows:

- Excluded – flows with at least one deal breaker. Discarded from further investigation
- Info needed – flows that could not be fully assessed due to lack of information. If possible more information was sought out to complete the assessment but in the cases where this course of action was not possible the flows where treated as the ones in the Excluded-group.
- Included – flows with a score for all parameters. These were further analyzed in the next step of the assessment.

3.2.7 Aggregating the grades for each flow

In order to make a complete assessment of the feasibility of each flow being transported by rail, at least in part, an aggregated score was constructed based on the minus-zero-plus-scale used above for each parameter. The base score was calculated by converting the scale-values to numerical values in the following manner:

- Minus = -1 points
- Zero = 0 points
- Plus = 1 point

It was judged that not all the parameters were equally impactful in a flow's suitability of being transported by rail and a weighted sum was therefore used as a means of compensating for this fact. In deciding what weight to give each flow, how easy and quick the parameter is to change from a negative score to a positive and how impactful the parameter is on the total suitability. The weights were set to the following, from least to most impactful:

- Company intention – this parameter was given the weight of 1 since it was considered the least impactful. The reasoning being that if all the other parameters indicates that the flow is highly suited for railway transport but the company is averse to rail freight for whatever reasons; it is possible to present rational and well-founded arguments that might change this attitude within a relatively speedy time frame.
- Order flexibility and reliability – this parameter was given the weight of 2 since this is something that might change over time and with the aid of modern logistics software and other information technologies might still be possible to move in a direction that is more suited for railway transport even if the status quo is not particularly well matched with such a setup.
- Competition from other modes of transport – this parameter was given the weight of 2 since it is possible, even in a highly competitive environment, to find enough advantages with a rail setup to make it a viable option, but the level of competition strongly dictates how close to optimum rail freight conditions the other parameters needs to be.
- Transport distance and infrastructure requisites – this parameter was given the weight of 4 since some of the factors in this parameter are impossible to affect and others require costly and/or time consuming investments to change, while the parameter as a whole is something that can really make or break a rail transport setup. It is, for example, more or less

impossible to change the distance between two places, and not very likely that a company will change location or deliverer/customer to be able to use rail. Also if the length by rail would require the construction of new tracks, which may not even, be possible.

- Commodity – this parameter was given the weight of 4 since part of the factors taken into consideration in this parameter needs to be kept unaltered to even be considered the same flow and other aspects can be rife with technical obstacles that needs to be overcome to allow a change. For instance, the commodity itself will not change and its susceptibility to railway transport might only be affected by switching to another type of transport unit or other technical solution that can be difficult to integrate with existing production facilities and methods. Aspects such as shipment size, on the other hand, might be possible to alter within a reasonable time frame.

After each parameter (for each flow) was given a numerical score, these were all summed up to yield a single score for each flow, with 13 being the maximum. The scores were collected into the categories red, yellow and green depending on their total score in alignment with this description:

- Red – total score less than one third of max. This category was considered unlikely candidates for railway transport.
- Yellow – total score between one third and two thirds of max. This category was considered somewhat likely candidates for railway transport.
- Green – total score greater than two thirds of max. This category was considered likely candidates for railway transport.

Based on the analysis from this report, one should be able to recommend practical connection(s) that would be relevant for extending an operational/geographical range of the core network corridor by strenghtening Örebro region as a hub.

3.3 Modal shift opportunities

Out of the 280 flows from the market survey 50 were related to Norrland. 5 of these were transport flows within the Norrland region and 45 were flows crossing the border to other regions.

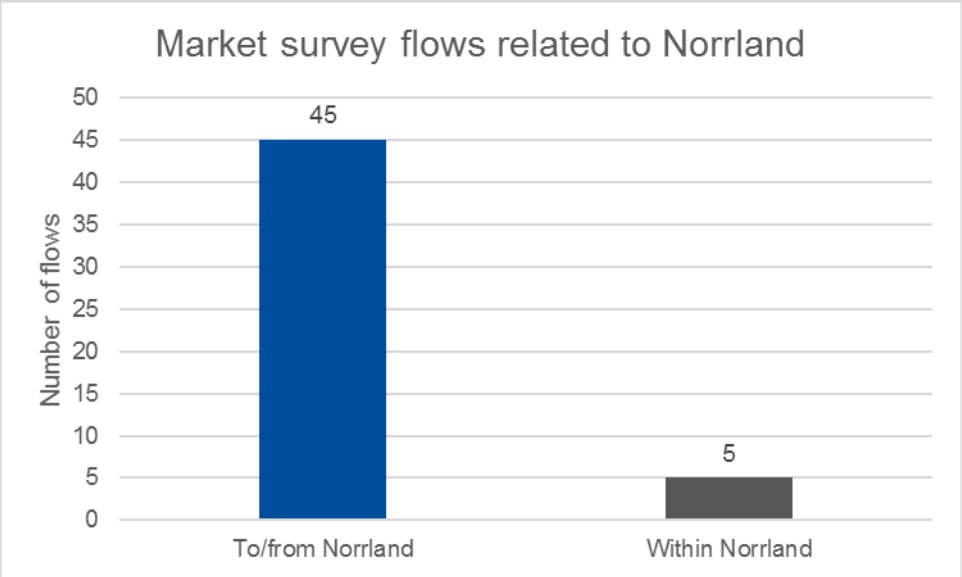

Figure 18 Flows either originating or terminating in Norrland (left) and flows within the Norrland region (right)

Removing the intra-Norrland flows and making a first classification of the remaining ones yielded the following result:

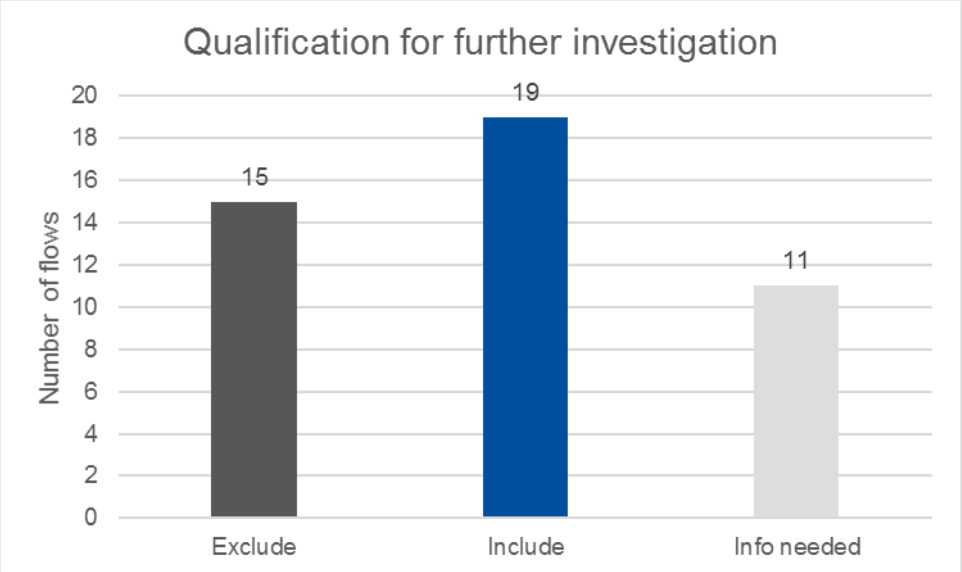

Figure 19 Flows with at least one "dealbreaker" in a category (left), flows suited for detailed examiniation (middle) and flows lacking critical information (right)

A total of 19 flows are suitable for a detailed investigation using the method above and 15 are eliminated due to Dealbreakers. The specific Dealbreakers causing the elimination can be viewed below. Worth noting is also that as soon as a flow got one Dealbreaker it was excluded from further investigation, meaning that each flow might have grounds for exclusion in several categories but only one is presented in the figure above.

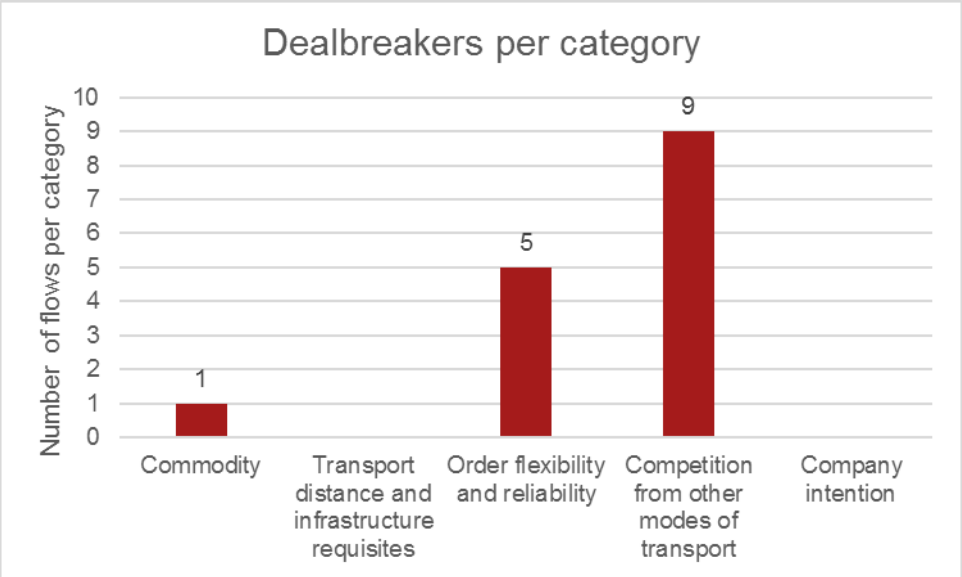

Figure 20 The number of instances were specific Dealbreaker was the cause of elimination

From the figure above, we note that the two dominant reasons for exclusion are "Order flexibility and reliability" and "Competition from other modes of transport". Especially the later one will be a point of interest when comparing scoring among the included flows.

That "Competition from other modes of transport" is the dominant exclusion criterion speaks to the fact that a lot of the heavy bulk goods originating in Norrland is shipped by sea and, when it comes to smaller sized shipments, that road transport is a strong competitor even at these distances.

If we examine the 19 Included flows (from Figure 19), focusing on only the flows originating or terminating in Norrland and removing all of the flows already transported by rail, we get the result of 14 remaining flows, see Figure 21 below.

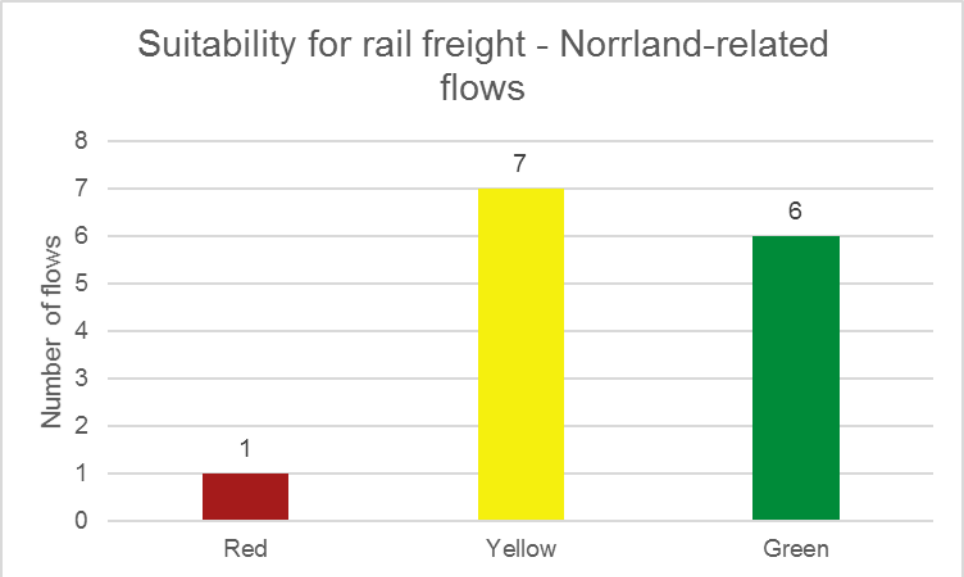

Figure 21 Suitability for rail freight

Red is for less likely to be shifted from road to rail, yellow is for somewhat likely and green is likely be shifted from road to rail. Please see chapter 3.2.7 for further description of each color. Comparing the number of flows classified as Green and Yellow, we find that they are about even. This result speaks to the point that many of the potential flows to/from Norrland are already transported by rail, about 25% of the flows identified in this study was already on rail, this is probably due to the distances involved, and that the ones not already shifted to rail are of a lower suitability. Breaking down the 14 flows by grade per category we get the result below.

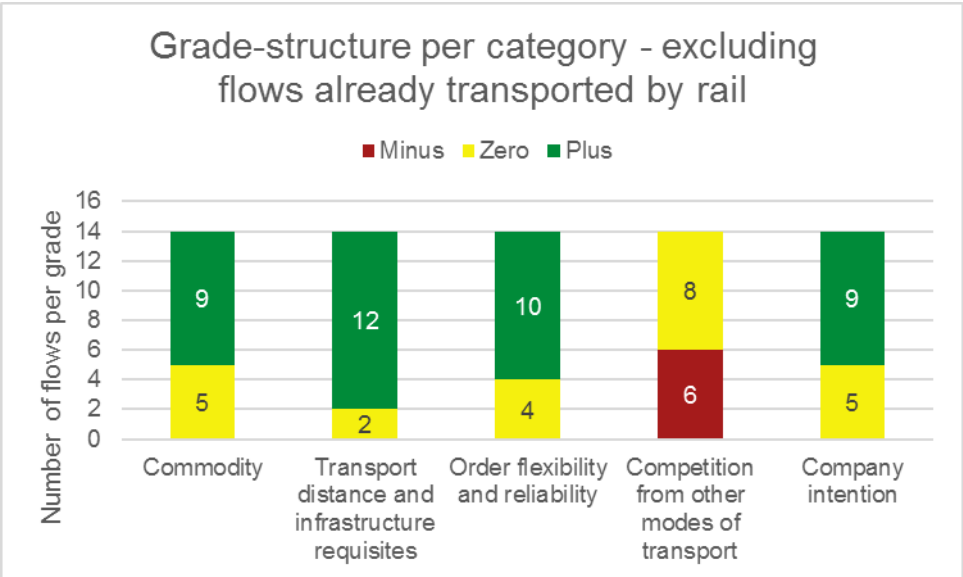

Figure 22 The count of a specific grade occurring in each category

Here we see a similar result as in the Dealbreaker case; the investigated flows are worst off when comparing rail freight to other modes of transport, with the other categories being more or less positive.

Taking the included 14 flows (see Figure 21) and showing the flows in the number of TEU/week,we get the figure below. The figure 22 show the road flows only.

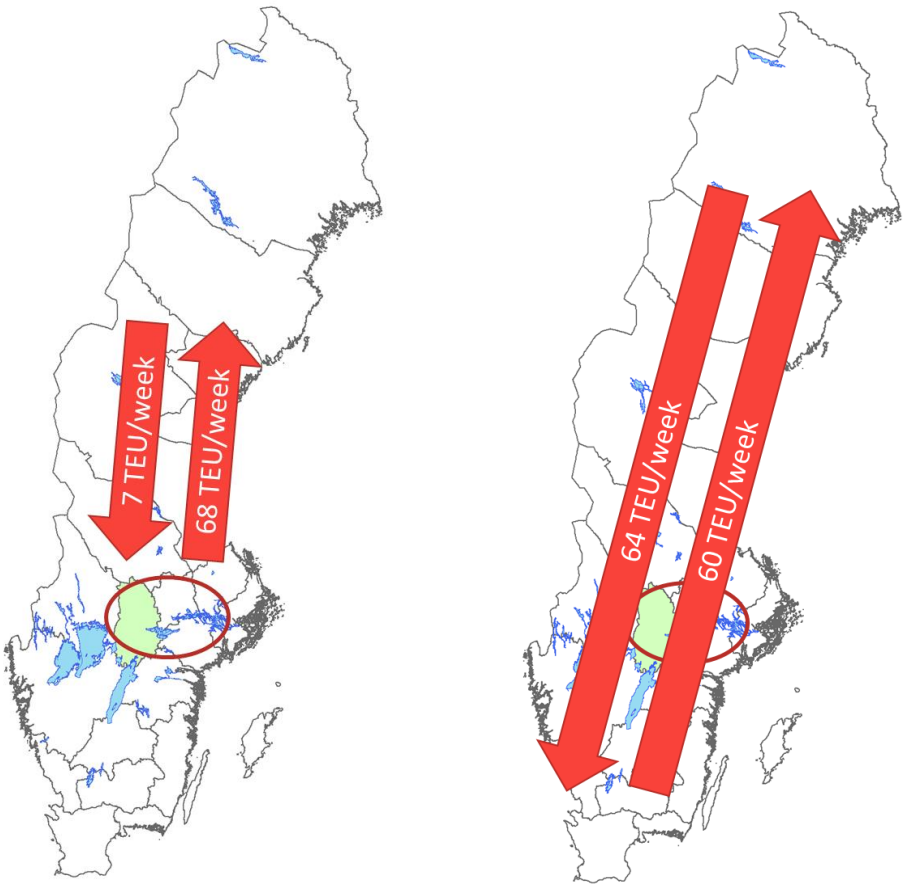

Figure 23 Flows with origin/destination in Norrland, only non-rail flows. Flows with start/stop in the Örebro region (left) and passing through the Örebro region (right)

From these figures, we get an inversion of the expected imbalance and notes that in this special case the Örebro region is more important as a distribution node than as an origin/recipient. From this study it is clear that the flows between Örebro region and Norrland is very small for a potential train operator, and the results regarding the imbalances also have a negative effect on the potential for a modal shift. The potential for a modal shift becomes better if looking at the left map in Figure 23, with transit flows. Due to this and for future work in this task 5.3 in TENTacle, for the formation of an extend operational/geographical range of the CNC, the recommendation is that it is needed to observe and analyze transit flows through Örebro and if looking in the possibilities of a shuttle it should go Denmark-Örebro-Norrland and back.

3.4 Challenges

At the semi-structured interviews, the freight owners were asked why some (or all) of their goods don't go by rail, as well as what they see as main challenges when it comes to railway. This was done through open questions in which the interviewees were able to answer freely, i.e. without being given a limited number of alternatives to choose from. However, there were several recurrent factors among the answers, which were shared by several freight owners. These "challenges" have been clustered into five groups, based on the criteria used in the modal shift evaluation model. Figure 24 through Figure 29 depicts these interview results. It can easily be seen that the challenges the freight owners mentioned are in line with the criteria. About 50 freight owners have been interviewed, both from the Stockholm Mälar Region (about 40) and from the northern Sweden (about 10). For interviewees who mentioned more than one challenge, the additional challenges are also accounted for in the pie charts below with the category "other".

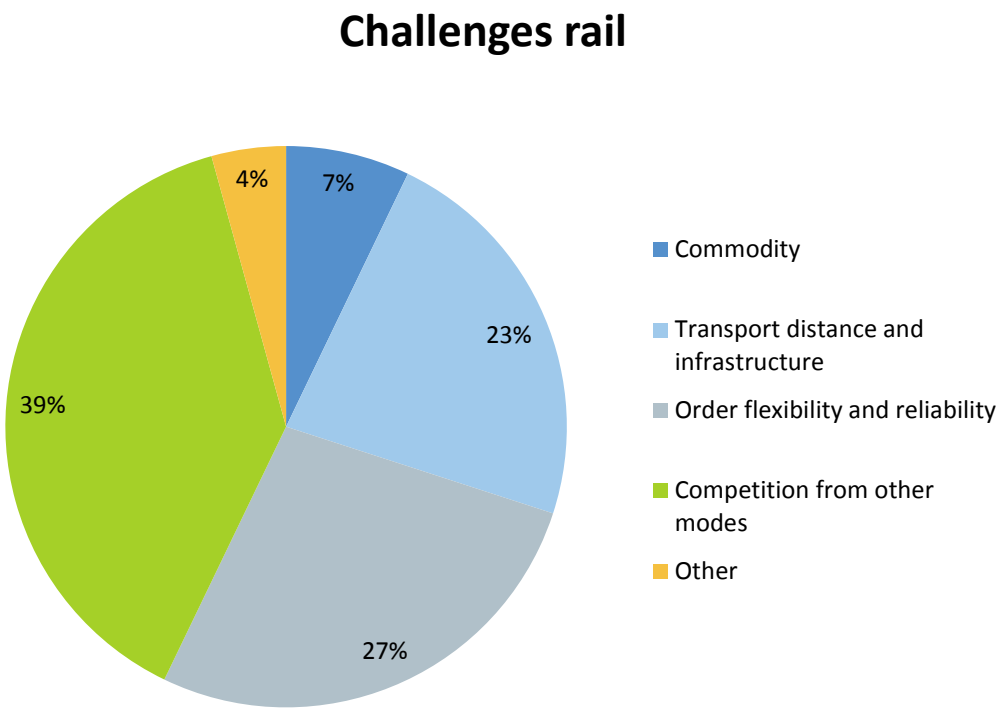

Figure 24 The 72 challenges mentioned from different freight owners, grouped in four clusters. Percentages relate to the number of different challenges grouped in each respective cluster.

The total number of challenges mentioned is 72. 28 of these were in the category "competition of other modes". In order to understand what the different criteria refer to, the pie charts below give further details about the different reasons why interviewees have chosen road instead of rail. The

group "other" was freight owners expressing they were not in control of deciding such a thing as the decision was someone else's.

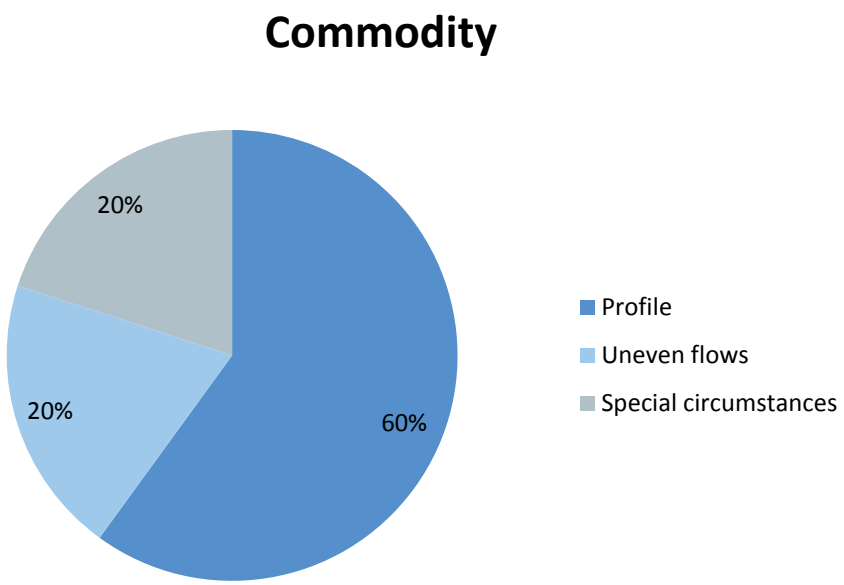

Figure 25 Share of respondents mentioning each individual challenge in the category *Commodity*

The largest share of respondents who mentioned a challenge related to the commodity was due to the profile of their goods. In these cases, they were uncertain or certain that their products were too high for the rail standard. Meanwhile, the challenge of *uneven flows* occurs mostly in freight owners working more project-based, while *special circumstances* includes mostly those cases where companies have special or classified flows, for example frozen goods.

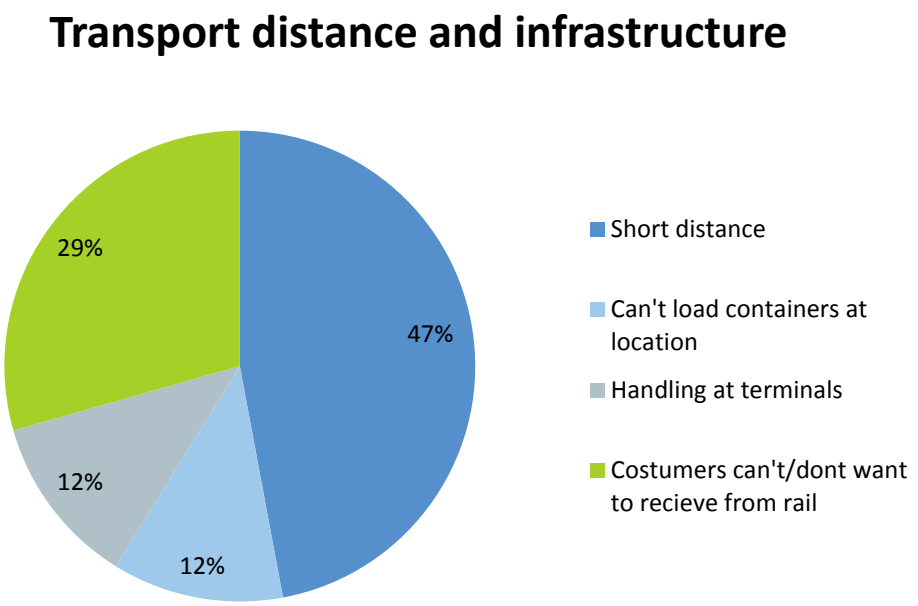

Figure 26 Share of respondents mentioning each individual challenge in the category *Transport distance and infrastructure*

Within the criterion of transport distance, almost 50% said that they did not use rail transport because of short distances to customers or from suppliers. A quarter told us that their customers do not want or are not able to receive goods from rail. The last two groups are *handling at terminals*—where companies expressed dissatisfaction with how the goods were handled at terminals when they have tried using rail—and *could not load containers* due to lacking the right infrastructure at/near the facility.

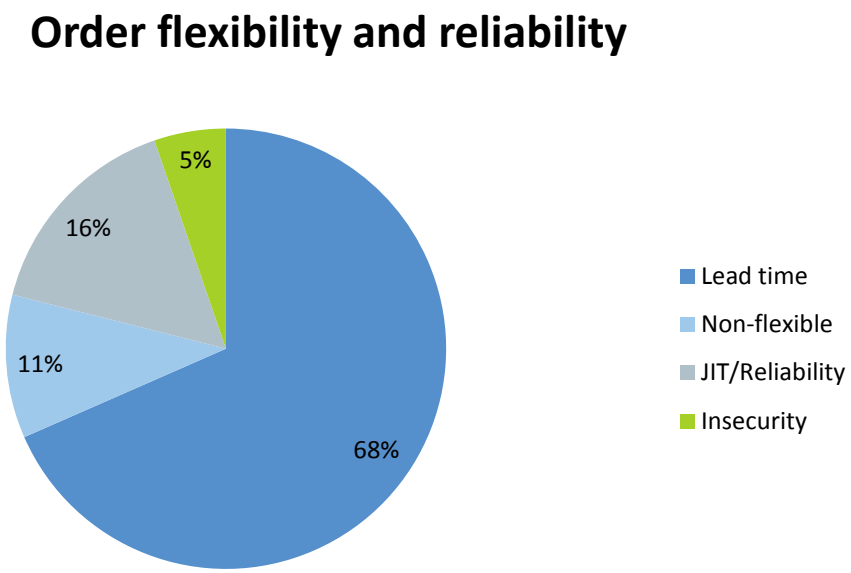

Figure 27 Share of respondents mentioning each individual challenge in the category *Order flexibility and reliability*

Challenges of order flexibility and reliability were almost 30% of all responses, and therefore seemed to be one of the major challenges of shifting from road to rail. Within this category, almost 70% of respondents think that lead time was the biggest challenge. This was followed by companies mentioning that JIT is something they require and the delivery precision is very important. 11% mentions that the lack of flexibility would create problems, for example during campaign times or changes in orders. One company mentions that they are very insecure and didn't really trust railway companies.

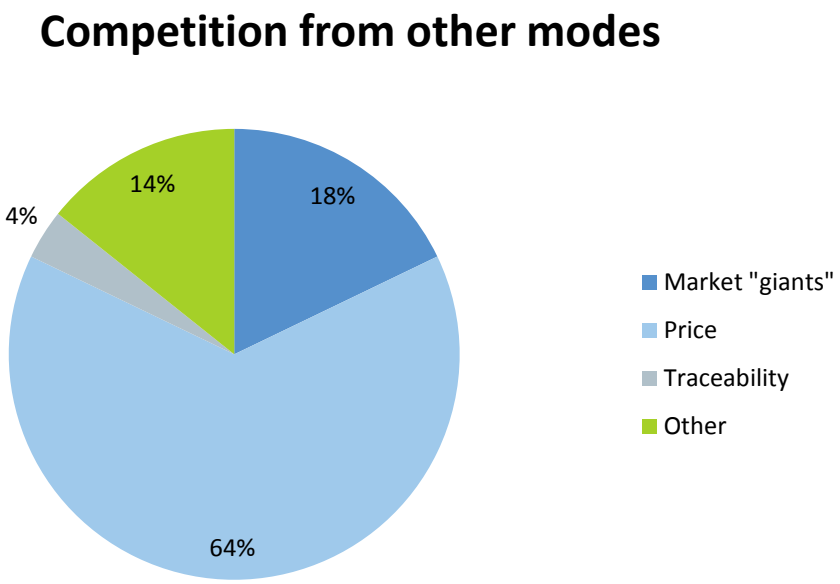

Figure 28 Share of respondents mentioning each individual challenge in the category *Competition from other modes*

The main obstacle for using rail instead of road that was mentioned during the interviews was *competition from other modes*. The absolute largest factor there was price, which we chose to divide into different sub-parts as there was a difference why the price was the major challenge. Five companies (18%) reported that they had problems with the "big giants" on the market (i.e. the largest rail operators). They explained that when they tried to get more information about a possible train shuttle, they did not get the help they needed as they are considered too small to be important customers.

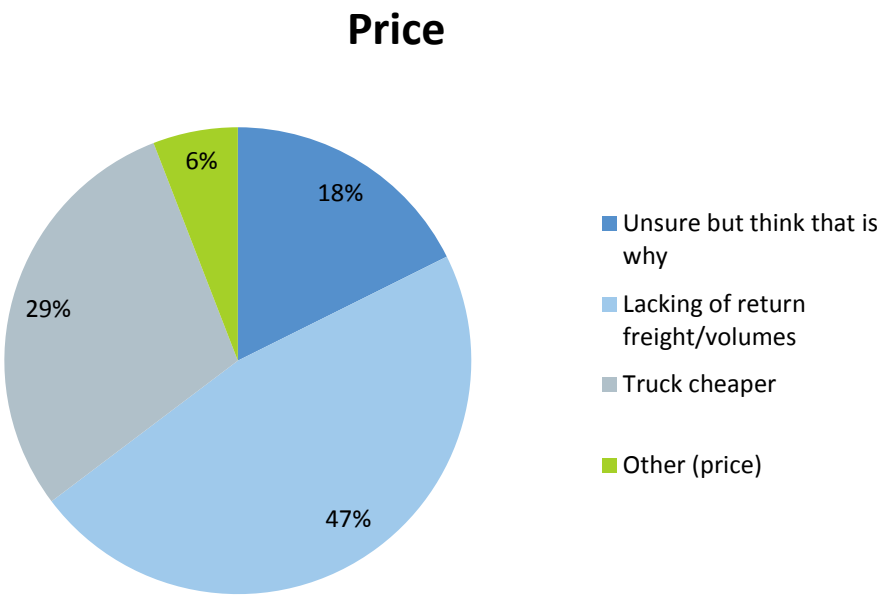

Figure 29 Share of respondents mentioning each individual challenge in the category *Price*

Within the *Price* criterion, four sub-groups were created. The largest of these with almost half of the reasons was *lacking return freight* and *small volumes*. Thus, due to small volumes or that freight owners have no return flow, they considered it being too expensive to use railway. Almost 30% mentioned that lorries are cheaper to the destinations they require. The subgroup *Other (price)* contains the freight owners who replied that they were unsure, but mentioned that they thought that price was the reason.

3.5 Hub evaluation

Based on the characteristics for a hub (chapter 2.1), the market study and explorative study is to be evaluated. Again the characteristics are as following;

1) The amount of goods owners with large volumes located in the region
2) Connections to the most important goods corridors
3) Relative location in relation to large consumption areas
4) Connection to the strategic long-distance transport network, as defined by national and European transport policies.

Characteristic 1. The largest private workplaces in Örebro belong to transport intensive industry sectors such as parts manufacturing and logistic/transport services. These include Atlas Copco, Rock Drills AB, Suzuki Garphyttan, Meritor, E.ON and DHL in Örebro. Moreover, large companies such as Axfood Närlivs, DHL, Würth, Elektroskandia and Elon have warehouses in this region. Future establishments such as Lidl and PostNord are planned and will be finished in 2018. The market study shows that there is some potential for transition of goods to a rail.

Characteristic 2 and 4. Region Örebro County is part of the TEN-T ScanMed corridor as well as the Priority Project Nordic Triangle, which include important goods corridors connecting the Nordic countries among themselves and with Continental Europe. The region is located at a crossroads between the North-South and East-West European goods corridors.

The European roads E18, E20 as well as the national highway 50/Bergslagsdiagonalen traverse the region. Some of the highest trafficked rail lines in Sweden, such as Västra stambanan (Western Main Line), Mälarbanan, and Godsstråket genom Bergslagen also go through the region.

The project Bothnian corridor is a collaboration between Region Örebro County and 19 partners from the northern most parts of Sweden working for an extension of ScanMed corridor. The benefits of being part of a TEN-T network component such as the ScanMed corridor include the eligibility for receiving CEF funding, the European instrument created to finance projects in the TEN-T network. This would be very beneficial for improving the rail infrastructure in the Northern parts of Sweden. The project has the plan to build a new railway line between Umeå and Luleå, which would lead to increased capacity on the line and higher standard. Moreover, it would connect the Scanmed corridor to the northern axis.

Green Cargo with their single wagon load system reaches all of over the northern parts of Sweden and Norway and it is possible to transport by rail from these terminals to Hallsberg and further south. Realrail have daily shuttles between Umeå and Luleå to terminals in southern Sweden, passing through Hallsberg but without any services. SFL have block trains, operated by Green Cargo or Hector Rail, in the northern most parts of Sweden and multimodal solutions from these terminals to central Europe. Samskip offer shortsea and long sea solutions to the northernmost parts. Cargonet together with DB Schenker have the NRE and ARE shuttle working perfect between Alnabru and Narvik passing through Örebro/Hallsberg.

In the Swedish National Infrastructure Plan the double track development on the network ”freight line through Bergslagen” is mentioned. This means there will be an improvement in connection between the most important goods corridor and the northern parts of Sweden.

Hallsberg is the largest marshalling yard in Scandinavia. Hallsberg has a terminal which is one of Swedens most important intermodal terminals. The terminals located in Frövi and Örebro are multimodal terminals. It is essential with good terminal connections to provide the freight owners with the right solutions.

Characteristic 3. The largest advantage of the Örebro region as a logistic node stems from its advantageous location in relation to large consumption areas. Statistics Sweden (SCB, 2007) calculated that Hallsberg municipality is Sweden's geographical middle point. The region of Örebro is located in the middle between the largest Nordic demographic centres such as Oslo, Stockholm and Gothenburg.

Though, the north of Sweden and Norway has a different structure and a great imbalance in freight flow. This due to a major base industry located in the northern parts of the BSR area. Base industry's transports are mainly carried out with block train solutions. Regarding intermodal rail transports, the increased level of containerization has meant that the variety of different goods transported has increased. This theoretically provides good opportunities for the operator to balance the transport flows.

4. Discussion and conclusion

As described in chapter 2.2, there are several existing railway solutions between the northern parts of Sweden and Norway and the Stockholm Mälar Region. Real Rail has railway shuttles (direct trains, for example between Umeå and Göteborg), Green Cargo has a single wagon load system (their system covers all over Sweden and northern Norway), while Scandfibre Logistics transports paper from the manufacturing units in the northern parts of Sweden (they are partners with Hector Rail and Green Cargo and transports in conventional wagons).

Examples of successful solutions were both base industry as well as consumer goods are well balanced are the NRE and ARE container shuttles. With a transport time of just over one day, they transport fish from Narvik in northern Norway to the Alnabru intermodal terminal in Southern Norway (passing through Hallsberg). On the way back, they are all filled with consumer goods. Nowadays, large part of the volumes from Alnabru are transported by truck to central Europe as well as Poland and Eastern Europe. If these trains would use Hallsberg as a node, the goods could be grouped with other flows from Orebro region in trains, according to their destination. This would make it easier to achieve the critical volumes for rail and lower the need to use road for the long haul.

Chapter 2.5 describes the imbalances of freight flows in Sweden, which are mostly caused by disparities between the base industry and consumer goods flows, and the difference in the transport needs of these two markets. It is explained that large volumes from the base industry go in a Southwards direction, and thus the filling ratio in these system train solutions is higher southbound than northbound. On the other hand, in the market study it was identified that more than 60 TEUs/week are nowadays transported to Northern Sweden by truck from the Örebro region, while only 7 TEUs/week are transported the opposite way. Using the unutilized capacity in the existing rail solutions to transport these flows northwards could therefore lead to a win-win situation: the companies that today transport goods to the North by road could use a cheaper and more sustainable rail solution, while the ones already operating on rail could get a better price.

However, there are several obstacles to achieve this. One challenge is that system trains are mostly dedicated to only one client or goods owner and are fixed to the client's operations. Having a restricted time schedule and destination, they are less flexible than an intermodal train, which would be the best solution for the northwards flows. There are however opportunities to finding a "good match" - a customer having similar destination and timetable. For central warehouses, for example, the time schedule is a crucial aspect. The goods often need to be at their new destination within 12 hours (although to destinations around Skellefteå and further north some additional hours are acceptable); the costumer should be able to put an order in the afternoon and expect the delivery at the morning after. A large part of these companies with consumer goods cannot gather enough volumes to have their own dedicated system trains. This means that in order for them to shift to rail, their goods need to be coordinated with other companies with similar interests.

Another obstacle consists of the technical incompatibilities regarding the types of good loading units and wagons (as described in chapter 2.5) that are used to load different types of goods. For example, today most system trains use wagon types that are not suitable for intermodal transport. Moreover, consumer goods are more suitable for intermodal transport as the goods owner don't normally have a direct connection to rail, and therefore need to use an intermodal terminal.

As determined in chapter 3.5, Örebro fills the criteria to be a good intermodal hub. Its transport infrastructure is part of the ScanMed corridor, which connects southerns with northern Europe until Örebro, and then flows eastwards towards Stockholm and Helsinki. Moreover, almost all volumes going to and from northern part of Sweden, Norway, and Stockholm on rail pass through the Örebro region. This is why Hallsberg/Örebro should and does work as a transit hub for many transports going further north.

Due to the large number of passenger trains going to and from Stockholm every day, transit freight transports through Stockholm should be avoided in order to unburden its infrastructure. In this sense, Örebro could be used instead as it has the right infrastructure and location. With Stockholm and Helsinki to the east, and Oslo to the west the Örebro region is an important hub in west-eastern direction as well. Transports going this direction could potentially merge in the region and transports collectively south or north. To make this work it is crucial that the timing between the different shuttles and road transport is optimal.

Region Örebro County is a partner of the project *Bothnian Corridor* together with the northernmost Swedish regions (see section 3.5). Said project is currently working in creating an extension of the ScanMed to northern Sweden and northern Norway. If this corridor would be declared as a part of the TEN-T core network, more funding sources would be available. When Infrastructure Minister Tomas Eneroth announced that Sweden has submitted a request to the European Commission to extend the Scandinavian-Mediterranean (ScanMed) Corridor to northern Sweden (to Haparanda and including the Ore line) this was a big step forward in achieving this.

This could potentially lead to a better function of the infrastructure, i.e double tracks, higher tonnage, longer meeting stations etc. Better access to the ScanMed corridor is essential for the private sector in both Northern Sweden and Northern Norway. This is not only a prerequisite for competitive transport solutions; it is also of greatest importance to the industries in Central Europe as it could lower their base product prices. Moreover, the ScanMed Corridor can only be used to its full potential if the connections to other corridors are of good quality.

As mentioned in chapter 3.4, competition from other modes is the main issue for goods owners not to use rail; 64% of the interviewees said this is because of the lower costs of road transport compared to rail. It is difficult to pinpoint the reason why (and if) railway is more expensive, as it differs from case to case. Reliability is also mentioned as a big challenge, as well as difficulty for finding the right freight channels. The second is related to the possibility that the large rail operators

do not give priority to clients with small volumes, and therefore do not tend to provide the necessary information and guidance for shifting to rail.

Because of the interview study and the overall perspective, Region Örebro has managed to coordinate B2B meetings that have resulted in companies creating new business opportunities, cooperations and new knowledge about railway systems. Some companies said they put a lot of effort in trying to move there transports to rail but in the end it was not possible because of prices and timetables. More and more companies are aiming towards getting more environmental friendly and a part of this is shifting from road to rail. This demonstrates that there is a demand for sustainable and competitive transport that is not satisfied at the present.

Appendices

Appendix 1 – Questionnaire 66

Appendix 1 – Questionnaire

Transport questionnaire

1. View upon actors in the region

1. Do you cooperate with other companies in the Region of Örebro or elsewhere?

1.1.1.If yes, which companies are those and what does the cooperation look like?

2. Transport system

2. 2.1Do you use road, rail or sea for you transports?

2.1.1 If road, why?

2.1.2 If rail, why?

2.1.3 If sea, why?

2.1.4 If only use of road, what would need to happen for you to choose rail/sea?

2.1.5 What problems do you see with rail?

2.2 Where do you see problems in the transport system in the Region of Örebro?

2.2.1 Which actions would you propose?

2.3 Which roads are most important to your enterprise?

2.4 Which railroads are most important to your enterprise?

2.5 Do you use the airport? How?

3. Enterprise information

3.1 What kind of services do you offer in the Region of Örebro?

3.1.1 Transports

3.1.2 Warehousing

3.1.3 Manufacturing

3.1.4 Other?

3.2 At which other locations in Sweden and in the Region of Örebro are you present?

3.3 Do you undertake or arrange international transport?

3.4 Are you participating in any transport projects?

4. Enterprise transports

3.1 What kind of transports do you have?

3.2 What parts of the logistics chain do you handle inhouse, which outhouse?

3.2.1 How long are your contracts with your customers and your service providers?

3.3 How important is green transport to you?

3.3.1 What does your company do in order to have sustainable transports?

3.3.2 Do you have any environmental requirements from your transport?

3.4 Do you have own trucks or wagons?

3.5 Do you require special trucks or containers for certain transport?

3.6 What are currently the greatest challenges for your transports (low prices, no demand, bad road conditions)?

3.7 How do you think your transports will develop?

3.8 Which decisions concerning transport can you make here? Which are done somewhere else?

3.9 Do you benefit of being close to the network corners (the Scanmed corridor or/and the Bothnian corridor)?

4.9.1 Is Scanmed or Bothnian corridor important to you? Why Scanmed/Bothnian?

5. Interest for innovations

a. Present what we are working with

i. Road to rail

ii. Intermodal

iii. Shuttles with new intermodal techniques

b. Which areas of innovation would your company be interested in?

c. Do you think it is important to improve the “hard” part as the infrastructure or the “soft” parts as in the logistic systems?

d. How do you (som en del I private sector) want to be involved in Corridor management?

6. Flow of goods

6.1 How many goods do you get delivered per month?

6.1.1 Type of cargo

6.1.2 Tons

6.1.3 Cubic meters

6.1.4 Number of trucks (incl. size)

6.1.5 Number of wagons

6.2 Are the routes/sources stable?

6.3 Is there a scheme behind the deliveries?

6.4 Do you use intermodal transport?

6.4.1 Which routes?

6.4.2 Under which circumstances would it be an option?

- 6.4.3 What are from your perspective the greatest hinders?

6.5 Where do the goods come from?

- 6.5.1 Countries
  - 6.5.1.1 Where are they entering Sweden?
  - 6.5.1.2 On which mode of transport are they entering Sweden?
- 6.5.2 Swedish Regions
  - 6.5.2.1 Where are they entering the Region of Örebro?
  - 6.5.2.2 On which mode of transport are they entering the Region of Örebro?
- 6.5.3 How great is your company's influence concerning a change of routes?
- 6.5.4 Under which circumstances would you switch to another route?
- 6.5.5 Under which circumstances would you switch to another mode of transport?

6.6 How many goods do you send out per month?

- 6.6.1 Type of cargo
- 6.6.2 Tons
- 6.6.3 Cubic meters
- 6.6.4 Number of trucks (incl. size)
- 6.6.5 Number of wagons

6.7 Are the routes/destinations stable?

6.8 Is there a scheme behind the deliveries?

6.9 Are your goods time-sensitive?

6.10 Do you use intermodal transport?

- 6.10.1 Which routes?
- 6.10.2 Would you like to use intermodal transport?

6.11 Where do you send the goods?

- 6.11.1 Countries
  - 6.11.1.1 Where are they leaving Sweden?
  - 6.11.1.2 On which mode of transport are they leaving Sweden?
- 6.11.2 Swedish Regions
  - 6.11.2.1 Where are they leaving the Region of Örebro?
  - 6.11.2.2 On which mode of transport are they leaving the Region of Örebro?
- 6.11.3 How great is your company's influence concerning a change of routes?
- 6.11.4 Under which circumstances would you switch to another route?

6.11.5 Under which circumstances would you switch to another mode of transport?

6.12 Where do you see challenges for your company in the future concerning transport?

7. Quick ones

7.1 Do you have any freight transports to Örebro/Stockholm region or the northern part of Sweden?

7.2 If yes, rail/road/sea?

7.2.1 What volume?

7.3 If no, are you interested in having transports to Örebro/Stockholm region or the northern parts of Sweden?

7.4 Do you recive any freight from region of Örebro/Stockholm or northern Sweden?

7.4.1 If yes, rail/road/sea?

7.4.2 What volume?