Assessing offers and preconditions for multimodal freight transport in the Scandria®2Act partner regions: Summary report

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Output 3.2

Assessing offers and preconditions for multimodal freight transport in the Scandria®2Act partner regions:

Summary report

Interreg Baltic Sea Region Project #R032 "Sustainable and Multimodal Transport Actions in the Scandinavian-Adriatic Corridor"

Work Package	WP3 - Multimodal Transport
Activity	A 3.2 - Assessing offers and preconditions for multimodal freight transport in the Scandria®2Act partner regions
Responsible Partners	PP18 - Technical University of Denmark PP11 - Region Örebro County PP6 - University of Turku PP19 - Copenhagen Business School
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1	28.02.2019	Draft	04.03.2019	Draft
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Output Description (Application Form)

The output of activity A3.2 is a report summarizing actions taken and results achieved. It consists of four main chapters, one for each activity:

1. Existing multimodal freight offers in the Scandria®2Act partner regions
2. The role of Ro-Ro shipping in a stricter regulatory environment
3. Shipper needs in relation to multimodal freight transport services
4. Business models for multimodal services

The report provides a comprehensive overview of relevant multimodal services provided in the Scandria®Corridor. The report is intended for use mainly by project partners creating a framework and common ground for defining / refining the scope of activities in the subsequent activity A3.3. However, the results can also be used by regional, national and European transport planning authorities, multimodal service providers, forwarders and shippers, knowledge institutions and industry organisations. The chapter on Ro-Ro shipping is targeted multimodal freight service providers, who are considering including a sea transport in their supply chain.

The results of the investigation of shipper needs will complement the supply side multimodal offers with the demand side requirements. As such, shippers are vital as stakeholders involved in transport logistics, including those participating in the multilevel governance dialogue of WP4.

In terms of multimodal business models, the report evaluates multimodal collaborations by providing a scale of engagement from arm's length collaboration to close strategic partnership. This tool is coined the "Multimodal Collaboration Framework". All the collaborations described in this report are positioned on the scale of the Framework. Cost/benefits estimates are presented for different collaborative types. In Phase II, relational transaction costs are added to each collaborative type presenting further details on the 'cost of engagement' and thereby guiding the decision making process. The Multimodal Collaboration Framework targets transportation providers and B2B customers, including municipalities, regions and others.

Output Schedule

Source	Deadline / Milestone					
	31.10.16	30.04.17	31.10.17	30.04.18	31.10.18	30.04.19
Planned according to work plan					X	
Expected						X

Quality Criteria

- The **aim of this output** is to present the results of Group of Activities 3.2, which focuses on assessing offers and preconditions for multimodal freight transport in the Scandria®2Act partner regions.
- The **geographical scope** of the report is identical to that of the Scandria®2Act project, i.e. the northern part of the ScanMed TEN-T core network corridor consisting of Germany, Denmark, Sweden, Norway and Finland.
- In general, the **target group** consists of all stakeholders in freight transport operations: shippers and forwarders, multimodal service providers, regional, national and European transport planning authorities, knowledge institutions and industry organisations. Project partners in Group of Activities 3.3 are also among the targeted recipients.
- The **intended use** of the report is the provision of assistance in the design and implementation of integrated multimodal freight transport operations. The shipper needs of A3.2-3 aim to set the priorities that are necessary for expanding the existing network and range of services identified in A3.2-1. The collaboration relationships of A3.2-4 provide insights on possibilities businesses and other institutions have in creating synergies and economies of scale, while the role of policy makers in forming the business framework is shown by A3.2-2.

1 Introduction

This is the executive summary of the work performed and the results achieved under Group of Activities (GoA) 3.2 of the Scandria®2Act project. Scandria®2Act is an initiative of regions located along the Scandria® corridor, i.e. the Baltic Sea stretch of the Scandinavian-Mediterranean core network corridor. It aims at increased connectivity and competitiveness while reducing the negative implications of transport operations.

Aiming at removing physical, technical, operational and administrative bottlenecks along the major transport axes across Europe, the core network corridors (CNCs) were introduced in 2013 as an instrument for the coordinated implementation of the EU transport infrastructure policy. A major challenge in organising transport along the CNCs is the negative environmental impact caused by emissions mainly of road transport and the limited capacity of transport infrastructure in highly utilised corridor sections.

The Scandinavian-Mediterranean (ScanMed) is one of the two CNCs that surround the Baltic Sea Region (BSR) - the North Sea-Baltic (NSB) being the other one. The transport market study of the ScanMed corridor identified a number of bottlenecks in the transport network and confirmed rising transport volumes between the corridor regions. This puts high pressure to develop cross-sectoral and cross-level solutions that minimise environmental impact of transport and optimise capacity utilisation. This is the challenge that Scandria®2Act addresses and to which Group of Activities 3.2 contributes.

To meet its objective, Scandria®2Act has adopted a 3-tier approach addressing:

- the deployment of clean fuels,
- the deployment of multimodal transport services and
- the establishment of a multilevel governance mechanism, the Scandria®Alliance.

The promotion of multimodal transport of both passengers and freight along the Scandria® corridor is the subject of the project's WP3. More specifically, the package aims to:

- improve knowledge about transport flows in the corridor as a prerequisite for increasing capacity of regional stakeholders to adopt relevant policies,
- facilitate multimodal transport services that are capable of shifting freight volumes from road to other, less burdening transport modes and
- strengthen existing services in passenger transport by providing relevant information about international public transport services to customers.

Against this background, GoA 3.2 aims at identifying the current offers of multimodal freight services in the region, and investigating the necessary preconditions for enabling their advancement. The group consists of four distinct activities:

A3.2-1: Map the current services offered to/from the partner regions,

A3.2-2: Assess the stability of the Ro-Ro offers in the region in view of the recent regulations restricting the sulphur content of marine fuels,

A3.2-3: Investigate the shipper needs in relation to multimodal freight transport services and

A3.2-4: Identify appropriate business models for multimodal services along the corridor.

The GoA 3.2 was undertaken by four project partners, namely: Region Örebro County (PP11) that worked on Activity A3.2-1; the Technical University of Denmark (PP18) that was involved in Activities A3.2-2 and A3.2-3; the University of Turku (PP6) that participated in Activity A3.2-2; and the Copenhagen Business School (PP19) that undertook Activity A3.2-4.

Due to the volume of the reports produced by each of these activities, it was decided to keep them as separate documents, complemented by an executive summary that briefly presents their main findings

and conclusions. This is the purpose of the present report. The following four headings correspond to the respective activities of the 3.2 Group. The detailed supporting documents can be found in the project's website (https://www.scandria-corridor.eu/index.php/en/scandria-2act/downloads).

A final heading has been added after the Project Partner Meeting of 5 March in Brussels to incorporate the views expressed during the meeting and to suggest a few directions for further work in support of the multimodal transport cause.

2 Existing multimodal freight offers in the Scandria®2Act partner regions

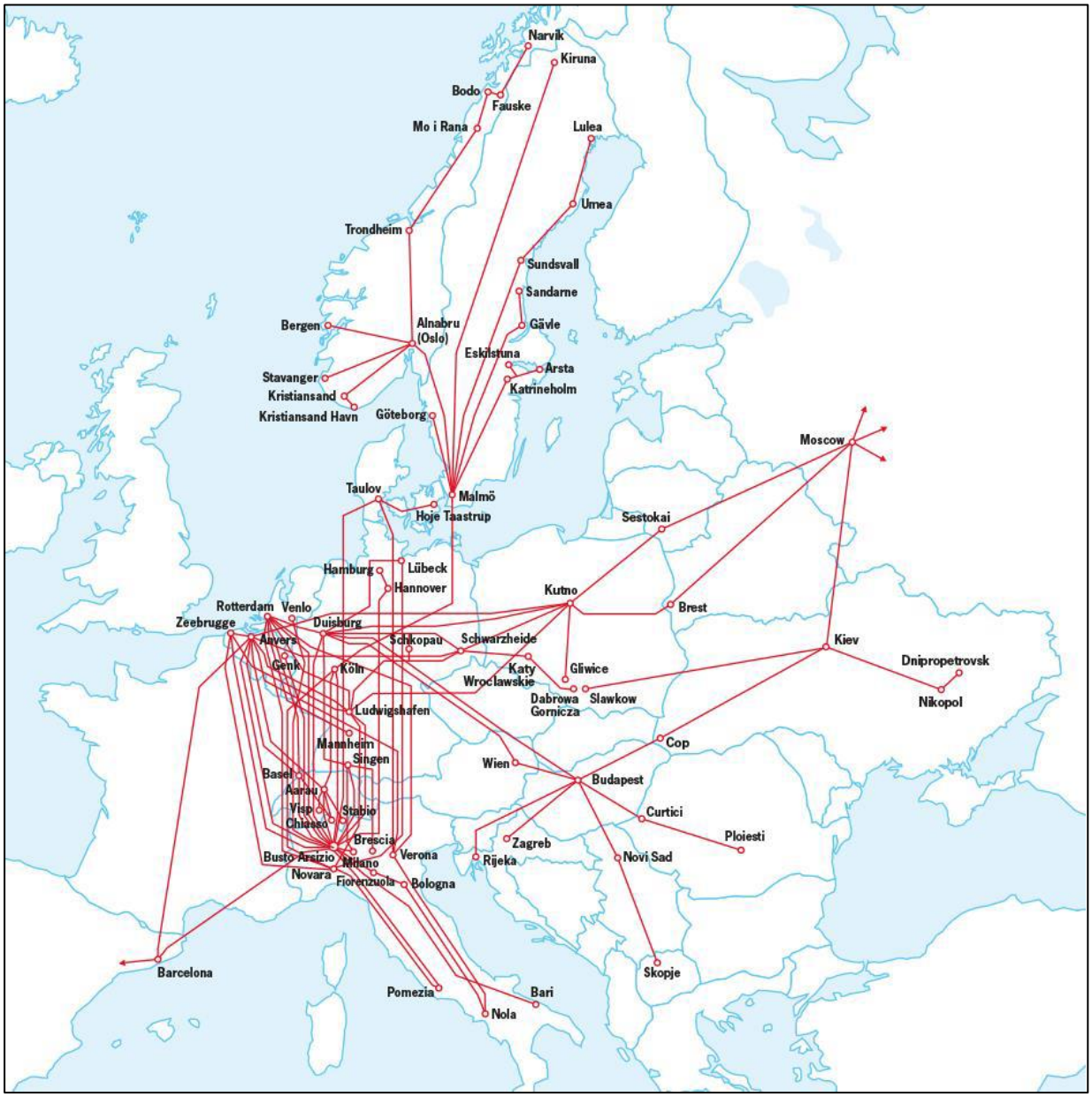
The purpose of this first activity is to map the current services offered to/from the partner regions. The activity focuses on the more relevant intermodal offers, where 'intermodality' is defined as 'the movement of goods in one and the same loading unit or vehicle, which uses at least two different modes in a door-to-door transport chain without handling of the goods themselves in changing modes' (based on the definition used by the European Conference of Ministers of Transport).

Existing intermodal transport solutions between Scandinavia and Central Europe are, thus, sought for. Moreover, the activity is mostly concerned with terminal and train operations, the activities that Woxenius and Bärthel define as 'the core of intermodal transportation' in their 'Intermodal road-rail transport in the European Union' chapter of the 2008 book on the 'Future of Intermodal Freight Transport: Operations, Design and Policy.'

The services provided by several operators active along the Scandria® corridor were assessed to develop the following Actor-Resources-Activity (ARA) diagram.

Activities/Actors	Cargo Net	Real Rail (former Cargo Net Sweden)	Green Cargo Intermodal	Van Dieren	Kombiverkehr	HUPAC	DB Schenker Rail	Hector Rail	CFL Cargo	TX Logistik	Terminal operators	Rental	Actors/Resources
Pre/End haulage		D		I									Lorries
Terminal/Transhipment	D	D	D		I	I					DI		Handling equipment
Terminal Logistics Service		D	D		I	I					DI		Equipm. For terminal logistics services
Terminal Operational Services	D	D	D		I	I					DI		Equipm. For terminal op. Services
Rail haulage							I	DI	D	I			Time slots
Market to Shippers		D	DI	I									Marketing systems
Market to Proxy Costumers	D	D	DI	I	I	I	I			I			Marketing systems
Coordinate/Arrange IFT		D	DI	I									Information systems
Coordinate/Arrange core of IFT	D	D	DI	I	I	I	I			I			Information systems
Supply ILU:s		D	D	I			I					DI	Intermodal loading units
Supply Rail waggon	D	D	D				I	DI	D	I		DI	Rail waggons
Supply Rail engines	D		D				I	DI	D	I		DI	Rail engines

D = Domestic = within Sweden/Norway
I = International = between Central Europe and Sweden/Norway



The network of services offered by the companies entering the ARA diagram are presented in a form similar to the HUPAC one shown above. Tables with the corresponding frequencies of service are also provided.

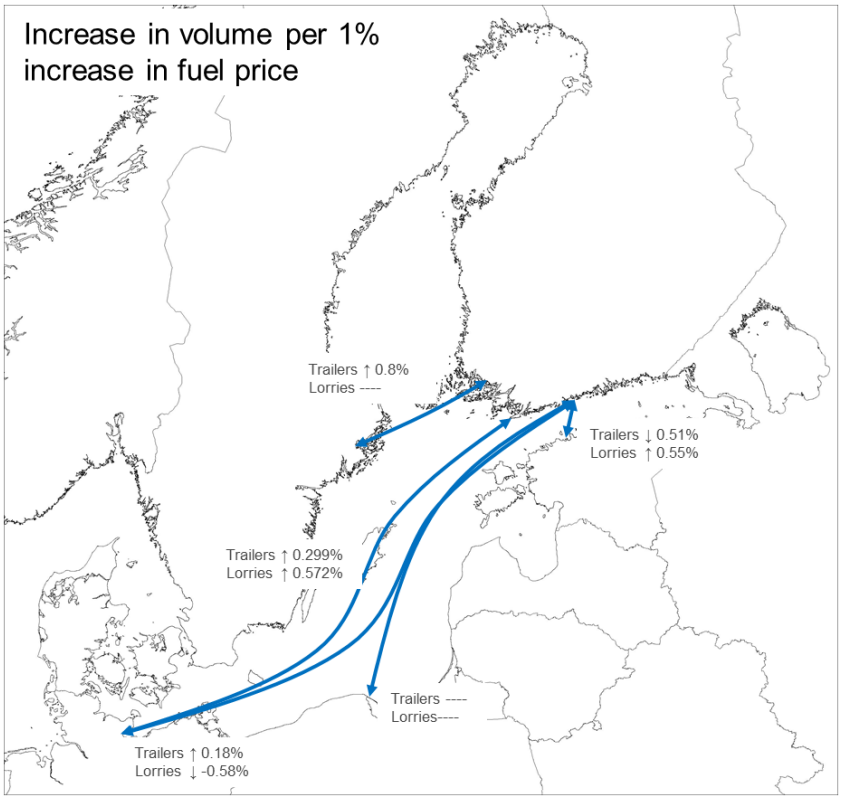
It is concluded that the market offers several intermodal transport solutions from Scandinavia (mainly Malmö, Helsingborg and Trelleborg) to central Europe. The Malmö terminal is the main terminal for goods towards central Europe due to its connection via the Öresund bridge. Collaboration between transport companies is very common. Norwegian and Swedish train operators with mostly domestic services work with other transport companies outside Sweden and Norway to reach central Europe. Outside railroad, the most common connections are with Ro-Ro ships from Trelleborg and Helsingborg.

In addition and in order to illustrate the terminal services offered, a survey was carried out among relevant Scandria2Act partners. Terminals in Rostock, Hallsberg, Örebro, Frövi and Alnabru participated in the survey. It was found that the intermodal terminals of Hallsberg and Alnabru do not offer direct intermodal shuttles to and from central Europe. This is rather surprising given that the terminal of Hallsberg is located just next to the biggest marshalling yard in Scandinavia, and that of Alnabru, one of the biggest rail-road terminals in Europe, is located just next to the largest marshalling yard of Norway. So, while there are intermodal links to/from central Europe offered via Malmö from Alnabru as well as to/from Gothenburg, Stockholm, Eskilstuna, Katrineholm, Gävle, etc., there is no intermodal link, either direct or indirect, offered to/from the Örebro region.

3 The role of Ro-Ro shipping in a stricter regulatory environment

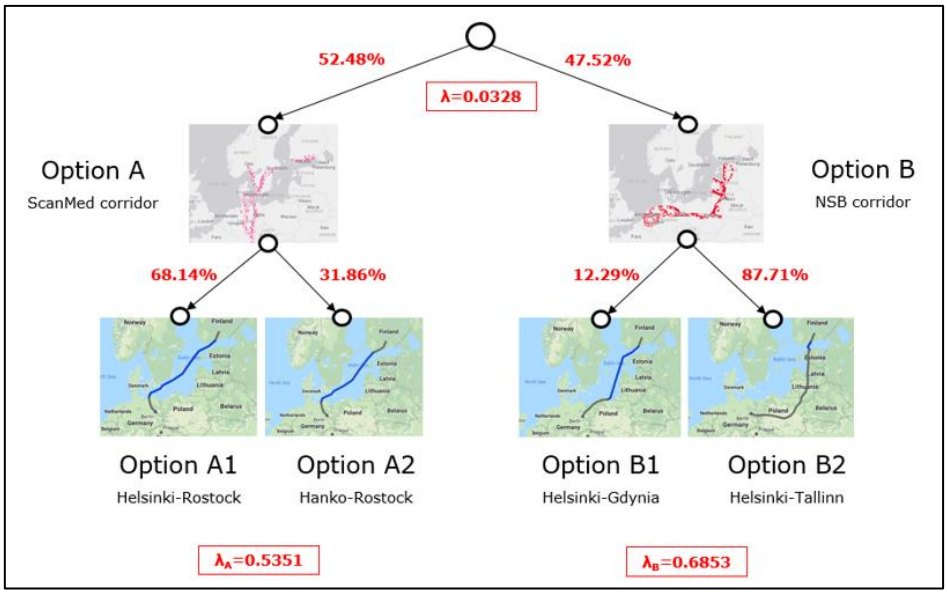
This part of the project investigates the sensitivity of the Ro-Ro services along the Scandria® corridor to fuel cost fluctuations, anticipates the adverse effects of a possible fuel price hike and discusses potential mitigating measures.

Among the 77 Ro-Ro services that include at least one direct connection between two Baltic ports, the Finland-Germany connections were selected for further examination mainly because this is where the ScanMed and NSB core network corridors meet providing two major alternatives, each of which offer at least two options. In terms of abatement options available to the Ro-Ro operators, the study considers only the switching from Heavy Fuel Oil (HFO) to the compliant but more expensive Marine Gas Oil (MGO), which happens to be the only feasible solution in the short-run that does not require a substantial capital investment.



The study deployed two different approaches in meeting its objectives. The first one looked at the problem from the macro-level perspective and the analysis was based on aggregate annual statistics of the ports serving the Finland-Germany connections. A multiple regression model estimated the sensitivity of cargo flows to fuel price fluctuations. Although most of the cargo volumes exhibit a statistically significant sensitivity to fuel price, in all cases this is below 1.0, indicating a rather inelastic behaviour. The results show that an increase in fuel price penalises the volume of lorries on the long-distance Helsinki-Germany route in favour of the shorter Helsinki-Tallinn and Hanko-Germany options. The trailer (unaccompanied) traffic exhibit a different behaviour that might relate to the pricing policies of the Ro-Ro operators in relation to this market segment.

The second approach looked into the route selection problem from the perspective of a cargo owner/shipper and it was based on detailed information pertaining to a specific company. A logit model was used to describe route selection on the basis of the generalised cost associated with each alternative route, which in this case was a function of price, transit time and frequency of service. The selection process was modelled as a 2-stage hierarchical decision. The first stage concerns the selection among the alternative ScanMed and NSB corridors, while one of the two alternative options that correspond to each of the above corridors is selected at the second stage. The model was calibrated on the 2014 data and was used to predict the 2015 modal shares.



The use of two different approaches enables the comparison between them. The results show that in this case the macro-level approach has been much more effective in forecasting the developments of 2015. It captured the gains of NSB over the ScanMed corridor, as well as the fact that the Helsinki-Tallinn option won shares from all other alternatives. This is probably due to the fact that:

(i) the actual case reflects the aggregate port statistics of 2015, which is in line with the logic of the macro-level perspective, and
(ii) the micro-level analysis has been based on a number of assumptions that limit the accuracy of the results.

	2014 share (%)	MICRO HFO (2014) -> MGO (2015) 2015 share (%)	MICRO HFO (2014) -> MGO (2015) Difference (%)	MACRO HFO (2014) -> MGO (2015) 2015 share (%)	MACRO HFO (2014) -> MGO (2015) Difference (%)	Actual case HFO (2014) -> MGO (2015) 2015 share (%)	Actual case HFO (2014) -> MGO (2015) Difference (%)
A1 (Helsinki-Rostock)	35,76	37,83	2,07	32,30	-3,46	32,74	-3,02
A2 (Hanko-Rostock)	16,72	15,80	-0,92	14,14	-2,58	15,08	-1,64
A (ScanMed)	***52,48***	***53,63***	***1,15***	***46,44***	***-6,04***	***47,82***	***-4,66***
B1 (Helsinki-Gdynia)	5,84	11,49	5,65	3,21	-2,63	5,11	-0,73
B2 (Helsinki-Tallinn)	41,68	34,88	-6,80	50,36	8,68	47,07	5,39
B (NSB)	***47,52***	***46,37***	***-1,15***	***53,56***	***6,04***	***52,18***	***4,66***

The task also briefly referred to the main measures have been proposed in the literature for mitigating the adverse effects of the stricter sulphur regulation on the competitiveness of the Ro-Ro industry. Speed reduction, lowering sailing frequency, and fleet and network reconfiguration are among those controlled by the Ro-Ro operator. Measures decided at a higher policy level include the full or partial internalisation of external costs of transport, the easing of port dues, the Eco-bonus system, subsidies for environmental investments, and a tax on land-based modes. The micro-level model was used to assess the effectiveness of an Eco-bonus system following the Swedish formulation. The results indicate that a 30% subsidy on the vessel's operating cost would favour routes involving longer maritime legs in the two corridors, and that the ScanMed corridor would gain 3.31% shares from NSB.

In general, it appears that the Ro-Ro flows have not been affected much by the stricter sulphur regulations. This can be attributed to:

(i) the large drop of fuel prices that coincided with the introduction of the stricter sulphur regulation and resulted in a reduction rather than an increase in costs,
(ii) the 'systematic' nature and long term contracts of Ro-Ro-traffic, and
(iii) the fact that Ro-Ro services pertain to a combination of sea and road transport that is affected by external influences other than the cost of marine fuel.

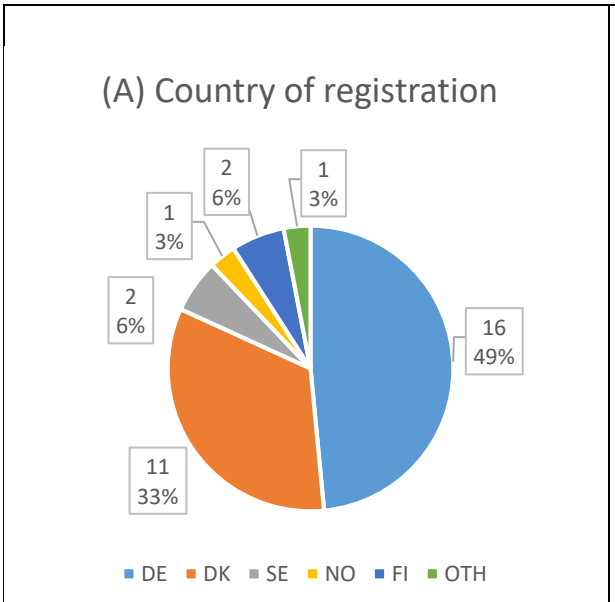
The sensitivity of the Ro-Ro connections to even moderate changes in demand, however, needs to be kept in mind. The withdrawal of the Helsinki-Gdynia service in 2016 due to the drop of its market shares is not uncommon.

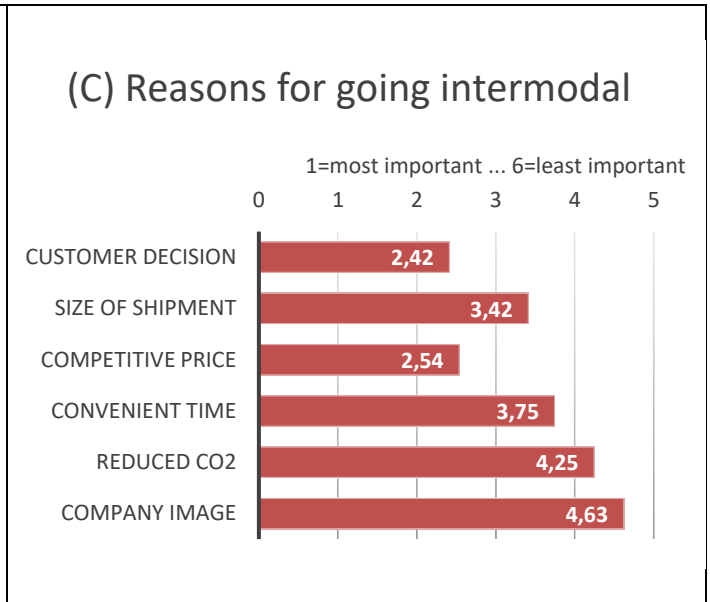
4 Shipper needs in relation to multimodal freight transport services

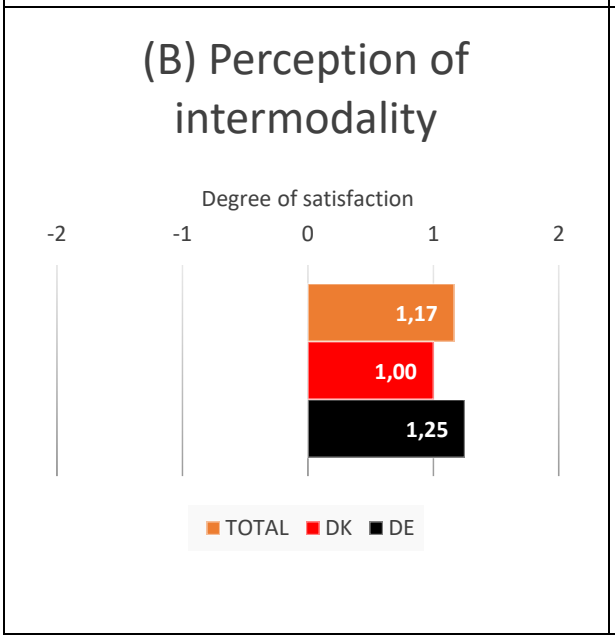
In supporting multimodal freight transport services, Activity 3.2-3 focuses on identifying the priorities of the shippers (cargo owners) in relation to intermodal logistics solutions that comprise the core of multimodality.

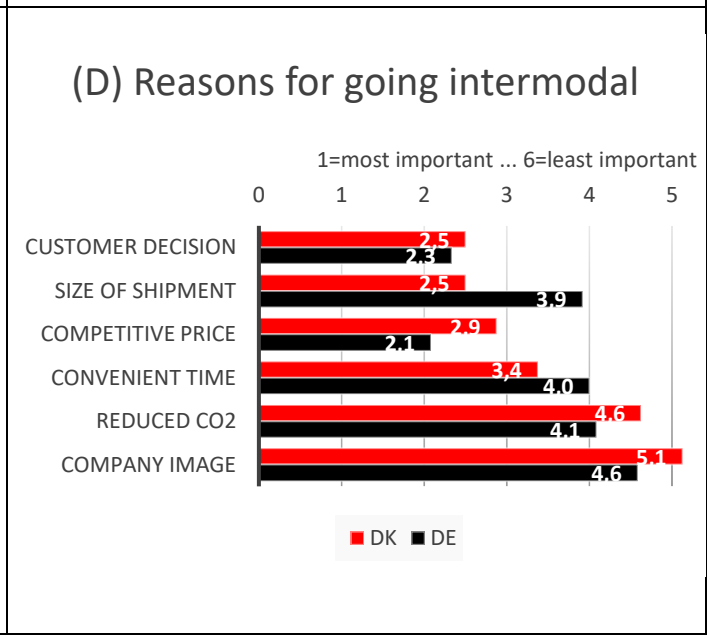
A literature search was performed on this subject. It identified a long list of characteristics that shippers consider necessary for efficient and effective intermodal transport. They include price, delivery time, time reliability of delivery, frequency of shipments, cargo safety and security, reliability of pick up time, ability to respond to customer needs, proactive notification of problems, etc. A number of pre-conditions were also identified. They include the commodity type, value, density and time-sensitivity, freight distance, direction of haul (head-haul/back-haul), meaningful load factors and transhipment costs.

Based on the results of the literature search, a questionnaire was designed for obtaining shippers' assessment of their experience with intermodality, the factors driving it and the measures proposed for its promotion. It is noted that the latter subject has not been treated by the previous studies examined. After being revised on the basis of feedback received from logistics experts, the questionnaire was promoted through shipper associations in the five study countries (Germany, Denmark, Sweden, Norway and Finland). Responses were received through an electronic survey lasted from July 2017 to June 2018. The questionnaire was also distributed in paper form to the participants of the event "Future transport and logistics in the Fehmarnbelt Region – How to be prepared for changing cargo flows" on 29 May 2018 during the Fehmarnbelt days 2018 in Malmö, Sweden. Furthermore, responses were enriched by a number of interviews from selected companies and associations.









The majority of the 33 usable responses obtained comes from Germany and Denmark. The companies that have arranged intermodal shipments during 2016 find their experience more than satisfactory. Germans appear to be 25% happier with intermodality than their Danish counterparts, who are still satisfied. The differential is greater with regard to business types. Freight forwarders, who are more exposed to intermodal realities than shippers, display a much higher satisfaction than the latter, who fall a bit short of the satisfactory level albeit still on the positive side.

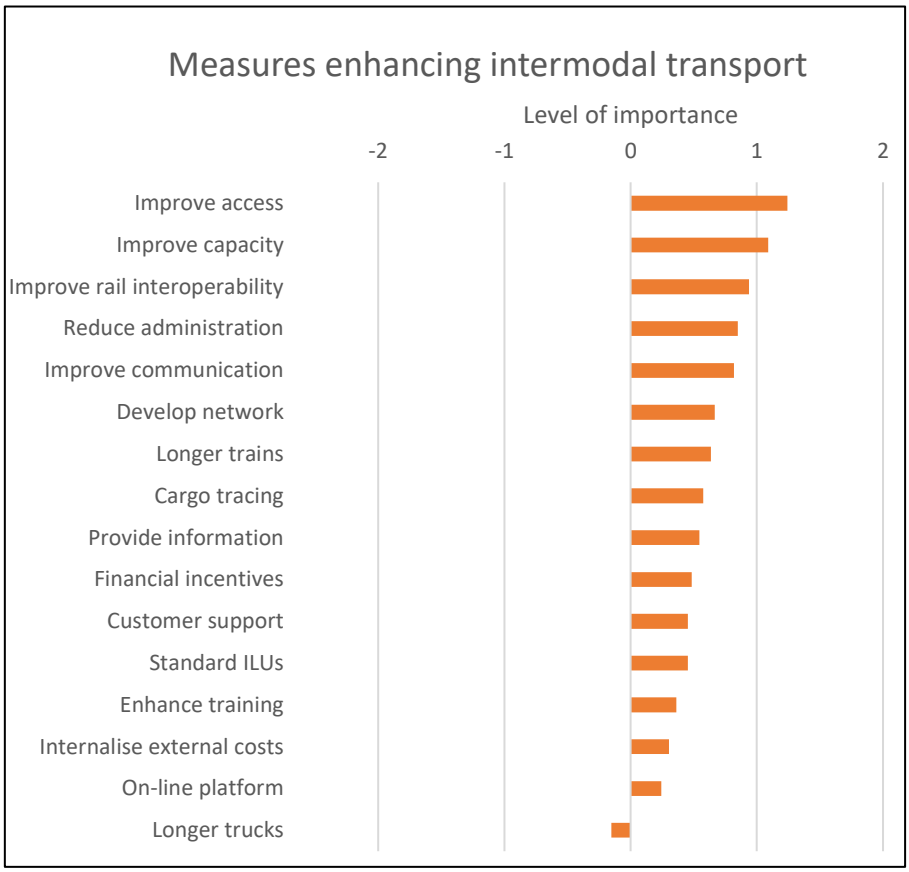
Among the reasons for going intermodal, the specific customer/supplier instructions appear to be the most important one. This finding suggests the need to identify the right decision-makers prior to designing activities promoting intermodal transportation. Competitive pricing follows suit surpassing all other quality characteristics (in Germany, it is even more important than customer preferences). This result contradicts the findings of other studies that assign more importance to attributes such as frequency of service, reliability, etc. The appropriateness of shipment size and the convenience of transit time follow price concerns in the scale of importance. It is interesting to note that the advantages offered by intermodality in terms of low emissions and improved company image appear very low in the importance spectrum despite the emphasis placed on them by the policy makers.

As expected, the type of business has a bearing on these priorities. Competitive pricing is the main concern of shippers, while from the freight forwarders' perspective, customer preferences remain the decisive factor. An interesting observation is that the only occasion that environmental concerns climb higher than shipment size and transit time is when it comes to other businesses, probably pointing to the more distant positioning of this type of respondents to the realities of the market place.

The literature search also led to a list of 16 measures that have been proposed for the advancement of intermodal transport. They are briefly presented in five groups:

- Capacity improvements (additional capacity of existing links/nodes; dense network of logistics centres; and better accesses to ports/terminals)
- Administrative/regulatory issues (interoperability improvements in the rail sector; standardisation of logistics units and transport vehicles including longer trucks/trains; and simplification of administrative burdens in the shipping sector)
- Information and communication infrastructure (stronger customer support; information on available services; cargo tracking and tracing services; communication within the supply chain; and on-line platform for cargo consolidation)
- Market-based measures (financial incentives to intermodal solutions; and internalisation of external costs of transport)
- Training in logistics.

All these measures received a positive response (above average importance) from the respondents with the exception of longer trucks (although weakly supported in Denmark). Infrastructural aspects enjoy the top two positions, namely the improvement of road and rail accesses to multimodal terminals/ports and the strengthening of the capacity of existing facilities/links. Addressing the interoperability problems of rail transport and the administrative/regulatory burdens of (mainly waterborne) transport are also given a lot of attention. Improved communication aiming at information exchange between all actors in the supply chain (e-freight, e-maritime, etc.) attracts the highest attention among the ICT-related measures, while in the market-based group, the provision of financial incentives to the users of intermodal arrangements is more popular than internalising external costs of transport. Neither the enhancement of training in logistics is very high in the priority list.

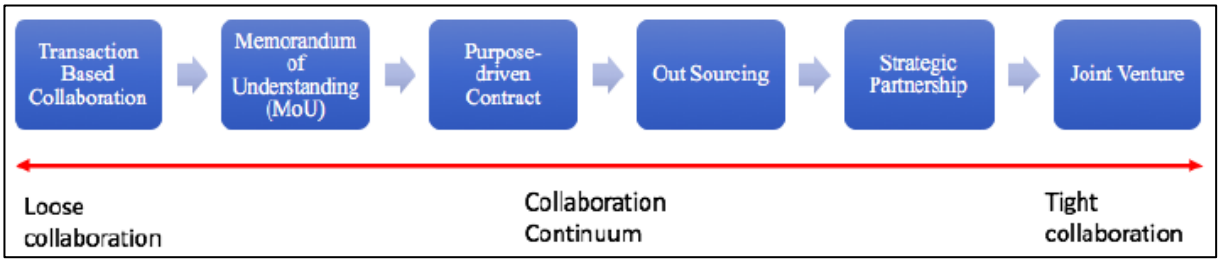


Freight forwarders are much more sensitive than shippers in issues such as improved accesses to ports and terminals, higher density of the logistics centres network, adequate cargo tracking and tracing services, enhanced training in logistics, improved communication within the supply chain and the provision of financial incentives for intermodal solutions. Shippers, on the other hand, wish better customer support and are not very keen in internalising external costs, which seems to be a major concern for the group of other businesses.

5 Business models for multimodal services

This last activity aims at mapping, understanding and capitalising the benefits obtained through multimodal business relationships. Relationships are in many ways the binding tissue of a company converting assets into economic value. Without them, companies cannot gain access to the resources of suppliers neither can they address customer demands. For instance, the ability of a company to offer integrated multimodal solutions depends on the company's relationships with other companies in the supply chain. The characteristics of each type of relationship are summarised in the following table, while the accompanying figure locates the various types on the collaboration tightness axis.

Type of relationship	Description	Activity
Joint-venture	• Horizontal collaboration • Pooling of resources • Creation of synergies • Economies of scale • Long-term commitment – more permanent • Contractual agreement – each part is responsible for profits and losses • The venture is its **own entity** separate and apart from the participants' other business interest	• Exchange / Outplacement of companies and people – long term • Knowledge sharing • Team building events • Joint conferences • Creating a set of common standards and processes for the specific company • This kind of partnerships uses many of the above-mentioned activities because of the level of commitment
Strategic partnership	• Horizontal and vertical collaborations • Based on a long-term agreement in achievement of defined common objectives • Sharing of physical assets and/or Intellectual resources • High level of synergies • Contractual agreement • Long term commitment (min. 3 years)	• Exchange / outplacement of companies and people – long to medium term • Knowledge sharing • Team building events • Joint conferences • This type of partnership uses many different activities in order to collaborate and form the partnership
Outsourcing	• Vertical collaboration • Legally binding agreement on purpose specific collaboration • Medium to short term commitment (min. 1 year)	• Exchange/outplacement of people – medium term/short term • Exchange knowledge on particular themes • Study trips • Conferences
Purpose-driven contract	• Vertical collaboration • Legally binding agreement on purpose specific collaboration • Medium to short-term commitment (min. 1 year)	• Exchange/outplacement of people – medium term/short term • Exchange knowledge on particular themes • Study trips • Conferences
MoU	• Vertical collaboration • Non-legally binding agreement of collaboration • Often short-term (less than 1 year) • Limited integration of resources between the partners	• Personal meetings • Conference calls • Low level of knowledge exchange
Transaction Based Collaboration	• Vertical collaboration • Often a formal or contractual agreement between buyer and seller • Price is often the key nominator • Short-term commitment • No strategic involvement	• Meetings • Conference calls • Minimum exchange of knowledge



Through desktop research and semi-structured interviews, the activity investigates eight multimodal collaboration cases, organised into four sites. The analysis identifies the characteristics, opportunities and challenges of each case. Three of these cases are briefly mentioned below as examples of collaboration arrangements with different degrees of commitment.

The collaboration between Hamburg Port Authority (HPA) and some of their customer freight forwarders enabled the development of Smartports, an IT-system with common standards and interfaces. Via a web-based application, truck drivers receive personalised information on the traffic situation in the port and the surrounding motorways (in co-operation with the German automobile club), the timeslots of opened bridges, closed gates and blocked roads due to heavy duty transport, and the situation in the container terminals. The HPA undertook the investment cost (through a 1-year contract with IBM to develop the system), while the freight forwarders contributed with expertise and the necessary data. Smartports, which takes the form of a MoU, helps manage traffic and container flows, reducing the handling time and costs. Furthermore, by reducing the number of containers in the port, Smartports frees up space creating new possibilities for investments leading to efficiency improvements.

On the other hand, the 30-year leasing contracts that HPA signs with the terminal operators according to the port landlord model, are legally binding agreements that govern a one-time transaction and foresee limited strategic involvement between the parties. Thus, they can be classified under the purpose-driven contract type. HPA needs the operators to develop and create a vibrant and value generating port, while the operators need HPA to gain access to land and infrastructure, where they can develop and improve their business.

The relationship between the Copenhagen Malmø Port (CMP) and Toyota is a strategic partnership. In order to consolidate their sea transport to one single destination in the Nordic region, Toyota proposed in 2002 the development of a car terminal in CMP. Following the conclusion of a 25-year leasing contract, an entire area was cleared and reserved for the new Toyota terminal and facilities. The docking area was not only for Toyota activities. Other car manufactures are able to use the docking area, which creates a vibrant environment that allows add-on businesses, like car pre-delivery inspection centres, to grow. A core element in CMP's business strategy is to maintain a regular dialogue with Toyota. They meet twice a year to discuss their collaboration, including areas of improvement and development. The CMP example illustrates that sometimes ports have to look beyond regular business norms to become more competitive.

The main conclusion of the analysis is that by combining transport modes, multimodal business models introduce another link to the supply chain. Adding an extra link means extra costs associated with the transhipment operations. Given that businesses target on increased profits, the precondition for propagating multimodal transport is to come up with logistics solutions that compensate for the additional transhipment costs. As shown by the cases examined by this activity, an efficient way of doing this is through collaboration relationships that create synergies and economies of scale.

Another important conclusion is that when it comes to collaborative arrangements, there is no such thing as one-size-fits-all. All types of arrangements listed in the table presented above can make an optimal solution depending on factors such as the nature of the collaboration (horizontal/vertical), its duration, the required commitment, the resources engaged, etc.

6 Directions for further work

The four activities of GoA 3.2 have identified a number of preconditions that are necessary for the advancement of multimodal transport. They are summarised below in three main themes: (i) **competitiveness**; (ii) **decarbonisation**; and (iii) **digitalisation**. Due to the importance of multimodal

transport in linking the regions to each other, particularly those in the periphery of Europe, emphasis is given to the role that regions can play in meeting these preconditions.

Competitiveness

Among all advantages of multimodal transport, price has repeatedly been proven as the most decisive factor. However, improvements in competitiveness are easier said than done. They constitute a challenge that requires multiple actions from all involved stakeholders.

Infrastructural improvements in the form of strengthening the capacity of existing facilities/links and upgrading the road/rail accesses to multimodal terminals/ports are considered by the users of the transport system as the most valued precondition. The public sector has a leading role in this regard. The European Coordinators need all the support they can get to meet the challenge of delivering the CNCs as planned. The regions can contribute with a bottom-up perspective that is of particular value in investment planning, especially in relation to urban nodes.

A second group of preconditions that are important for both their effect on competitiveness and the value attached to them by the shippers (in the broader sense of the term) concern the **administrative and regulatory issues** that hinder multimodality. They relate mainly to the rail and waterborne transport, which usually comprise the long haul of a multimodal logistics solution. Once again, the majority of these problems call for public sector action. There are, however, areas in this domain that require the intervention of the regions, particularly in connection to their planning duties and/or their possible involvement in owning/managing transport facilities and services. Synchronisation of transport schedules and opening hours of terminals are examples of such areas.

Preconditions that need to be addressed at a lower level include the **development of a dense network of logistics centres**, as suggested by Activity A3.2-1, and the **vertical and horizontal collaboration** of supply chain actors, as suggested by Activity A3.2-4. The former reduces the cost of last mile that usually comprises a significant share of the total door-to-door transit cost, while the latter widens the spectrum of available services and minimises the administrative costs (vertical collaboration), and also improves flexibility and asset utilisation (horizontal collaboration). In both cases, the regions might be actively involved.

Training in logistics is another area, where the regions may actively foster multimodality, either through direct involvement or through campaigns promoting the profession of logistics and the available training opportunities.

Decarbonisation

Today the environmentally friendly features of multimodal transport do not seem to impress users, as much as expected. Due to the mounting pressures of climate change, though, this will probably change in the future, especially if the external costs of transport are finally internalised.

Decarbonisation is a broad term that includes:

- alternative fuels,
- technological measures improving the energy efficiency of vehicles/vessels (aero- / hydro-dynamic design, use of lighter materials, etc.),
- operational measures improving the energy efficiency of vehicles/vessels (speed optimisation, driving behaviour, etc.),
- asset utilisation (load factor, minimisation of empty runs, etc.),
- demand management (transport avoidance, network design, etc.),
- modal shifts (from road to rail and waterborne transport).

It is worth mentioning that with the exception of alternative fuels, all other measures listed above reduce energy consumption, which does not come free. Therefore, in addition to environmental benefits, all these measures lead to more competitive transport arrangements, comprising win-win solutions.

All stakeholders have a role to play here. European and national authorities are responsible for setting standards with regard to allowable emissions, fuel quality, dimensions and weights of logistics units and vehicles (longer trains/trucks), as well for establishing financial incentives and disincentives. Activity A3.2-2 has shown the impacts that fuel quality legislation and financial incentives (i.e. an Eco-bonus scheme) might have on the market shares of the Ro-Ro industry along the Scandria® corridor. Regional and local authorities can be influential in relation to demand management through actions concerning network design/land uses, transport avoidance campaigns, etc. The transport service providers are in charge of the energy efficiency and utilisation of their fleets, while shippers might play a catalytic role through adjusting their behaviour.

Digitalisation

Digitalisation is expected to have far-reaching impacts on world economy, productivity, income distribution, well-being and the environment. In the logistics field, the widespread digitalisation along with rapid developments in automation, robotics and artificial intelligence transform the entire supply chain together with the corresponding business models.

It is not only about the robots and automated vehicles that are at our doorsteps. Through countless applications, digitalisation is also a means for achieving both the competitiveness and decarbonisation of the other two pillars.

The shippers and freight forwarders of Activity A3.2-3 have indicated their support for all relevant measures proposed (stronger customer support; information on available services; cargo tracking and tracing services; communication within the supply chain; and on-line platform for cargo consolidation).

In addition to direct benefits in their own productivity through specialised ICT applications, the regions have an important role to play in developing the necessary legal framework and providing the appropriate infrastructure for the fast and safe exchange of information.

The three pillars presented above constitute the directions that future work along the Scandria® corridor can take in relation to multimodal freight logistics.