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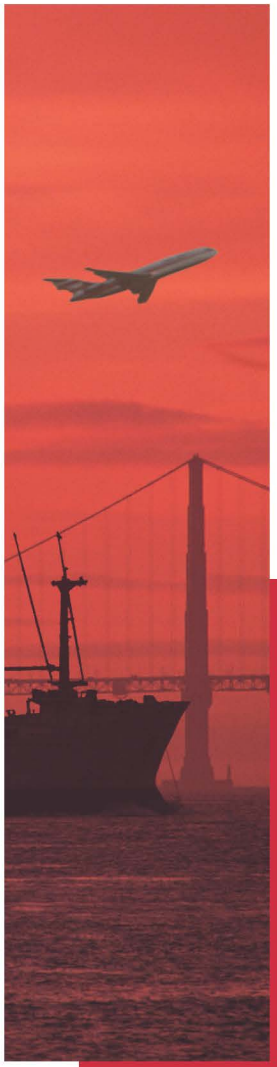

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MODAL SHARE OF FREIGHT TRANSPORT TO AND FROM EU PORTS

STUDY

EN

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POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

TRANSPORT AND TOURISM

MODAL SHARE OF FREIGHT TRANSPORT TO AND FROM EU PORTS

STUDY

This document was requested by the European Parliament's Committee on Transport and Tourism.

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Abstract

This study sheds light on the modal share of port traffic in the EU. It brings together data on port traffic and its characteristics and analyses the various modes used to connect ports with final destinations of goods, including transhipment, short sea operations and inland ports.
It supports the assessment of progress made towards reaching policy objectives on the modal shift from road to alternative modes.

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LIST OF ABBREVIATIONS

Bn	Billion
DSS	Deep Sea Shipping
EFTA	European Free Trade Agreement
EU	European Union
EU13	The Member States which joined the EU in 2004 and 2007 plus Croatia which joined in 2013
EU15	EU Member States before the 2004 enlargement
IWW	Inland Waterway
MoS	Motorways of the Sea
SSS	Short Sea Shipping
TEN-T	Trans-European Network
TEU	Twenty Feet Equivalent Unit

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EXECUTIVE SUMMARY

The objective of this study is to provide the Members of the Committee on Transport and Tourism of the European Parliament with a proper, comprehensive and up-to-date outline of freight transport to and from EU ports by mode. The overview specifically addresses the specific issues of the mode used: rail, road, inland waterways and short sea shipping (SSS) to and from EU ports.

The study includes an analysis of the traffic in seaports, inland ports and road-rail terminals and outlines some differences between Members States / regions.

Finally, it provides useful information on the challenges that EU ports are currently facing as regards traffic growth, congestion and accessibility.

The characteristics of ports and of infrastructures linking ports to the hinterland, the type of goods handled and the dimension of port catchment areas are all features that significantly influence the choice of mode and the potential for modal shift.

The EU is highly dependent on seaports for trade with the rest of the world and within its Internal Market: 74% of goods exchanged (imported and exported) with the rest of the world and about 37% of exchanges among EU Member States transit through seaports. Ports guarantee territorial continuity of the EU by servicing regional and local maritime traffic to link peripheral and island areas. They are the nodes from where the multimodal logistic flows of the trans-European network can be organised, using SSS, rail and inland waterways links to minimise road congestion and energy consumption.[1]

Seaborne traffic of EU ports accounts for over 3 billion tonnes per year.

The 2011 White Paper on Transport states that more and efficient entry points into European markets are needed, avoiding unnecessary traffic crossing Europe. Seaports play a major role as logistics centres and require efficient hinterland connections. Their development is vital to handle increased volumes of freight both by SSS within the EU and with the rest of the world. Inland waterways, where unused potential exists, have to play an increasing role in particular in moving goods to the hinterland and in linking the European seas. In terms of cargo flows in the European seaport system, five main markets can be distinguished: the container market, the ro-ro market, the market for conventional general cargo, the liquid bulk market and the dry bulk market. Each market has its own dynamic: the routing of different types of maritime freight through European ports to the hinterland is guided by complex interactions between a large set of factors and actors. However, all ports and types of trade have two underlying common factors that influence the routing to the hinterland: the connectivity of the port to the hinterland and the level of performance of the port itself.

The readability of port traffic data is complicated by two aspects intrinsically interlinked: transhipment and SSS.

[1] EC Communication Ports: an engine for growth - COM(2013) 295 final.

"Short sea shipping" means the movement of cargo and passengers by sea between ports situated in geographical Europe or between those ports and ports situated in non-European countries having a coastline on the enclosed seas bordering Europe.
Short sea shipping includes domestic and international maritime transport, including feeder services[2], along the coast and to and from the islands, rivers and lakes. The concept of short sea shipping also extends to maritime transport between the Member States of the Union and Norway and Iceland and other States on the Baltic Sea, the Black Sea and the Mediterranean.(EC, 1999) In the case of containers, the share of SSS is important because:

- short sea transport (which represents around 60% of the traffic of EU ports) is destined for (or generated from) the direct hinterland of a port; therefore ports must be equipped to handle the corresponding throughput and forward containers to their final destinations. This quota includes flows exchanged with nearby destinations as per the EU definition of SSS and flows deriving from transhipment operations;
- the deep sea quota must be further analysed since it can be split between (i) traffic calling at the port in order to be transhipped and (ii) traffic calling at the port for inland routing to its final destination. For this reason taking into account the share of transhipment is key.

Conversely, ro-ro transport is essentially a co-modal transport involving an inland stretch by road and a maritime transport which, with some exceptions, is run over short distance ranges (and is therefore attributed to short sea).

The extent to which different countries in the EU use rail and water to transport freight is very mixed. The reasons for this are, among other things:

(i) geographical (island countries generally use rail to a lesser extent; landlocked regions in the centre of Europe, which are used as transit countries to the major ports, use rail to a greater extent);

(ii) economical/political (countries whose development has included heavy industries generally use rail to a greater extent; Baltic and Scandinavian countries have a higher share of rail transport);

(iii) environmental (countries with a long–term environmental policy generally use rail to a greater extent). While for sustainability reasons a modal switch to rail is viewed as beneficial, it is possibly for economical and political reasons (ii above) that some countries have actually witnessed considerable switches of freight away from rail and towards road. Thus, over the period 2000 to 2010, in 8 EU Member States, and particularly in Austria and Belgium, rail has increased its modal share. However, in many other Member States there has been a considerable modal switch to road (for instance, Poland's road share has increased by 23%, Slovakia's by 22% and there have been considerable increases in Bulgaria, Lithuania, Latvia, the Czech Republic and Slovenia) (Eurostat, 2012).

Performances of single ports highlight that:

- road is the most widely used mode of transport to connect EU ports with inland destinations. The high share of short sea traffic, which generally has a smaller hinterland, may partially explain this, but the road is mainly chosen due to better flexibility and reliability together with an easier access to all inland destinations;

[2] Feeder services form a short sea network between ports in order for the freight (usually containers) to be consolidated or redistributed to or from a deep-sea service in one of these ports (hub-port).

- inland waterways (IWW) are extensively used by ports wherever the availability and the standard of infrastructure is suitable for carrying large volumes of goods. This is the case in relation to the ports located on the Rhine-Scheldt delta (Antwerp, Rotterdam and Amsterdam) for which the modal share of IWW is steadily above 30%. Other examples include the Romanian port of Constanta, the French ports of Le Havre and Marseille, and to a lesser extent the German ports of Bremen and Hamburg;
- many ports already exhibit high shares of rail transport. Particularly high modal shares are found in the Baltic ports of Tallin and Riga (though with low absolute throughput), characterised by a majority of bulk transit flows. Looking at ports managing larger absolute flows, best cases are found in Germany (Bremen and Hamburg which accommodate up to 250 trains per day), in the Rhine-Scheldt delta (Rotterdam, Antwerp and Zeebrugge, where the percentage share is lower but absolute flows are quite considerable), and in other ports that manage a considerably lower number of trains overall (Koper in Slovenia, Gdansk and Gdynia in Poland, Trieste and La Spezia in Italy, Felixstowe and Southampton in the UK).

While rail transport is key for the connection of inland destinations with seaports for all the Member States, the potential for inland navigation is concentrated in a restricted number of regions (mainly along the rivers Rhine and Danube). Further potential could be exploited in the Mediterranean area in Italy and France.

All in all, given that modal choice is essentially driven by economic factors, modes typically compete on transport cost, time and reliability. Other aspects to be taken into consideration are specific constraints linked both to the mode of transport (e.g. loads dimensions, inbound/outbound balancing of flows) and to the type of goods to be shipped (e.g. refrigerated cargo, high–value goods, dangerous goods).

In sum, ports considered within this study in many cases show satisfactory levels of modal share for rail and IWW. In order to further improve this performance and to bring other ports up to comparable levels, solutions can be found not only in new infrastructure offers but, more importantly, in an efficient management of the existing supply.

INTRODUCTION

The objective of this study is to provide the Members of the Committee on Transport and Tourism of the European Parliament with a proper, comprehensive and up-to-date outline of freight transport to and from EU ports by mode. The overview specifically addresses the specific issues of the mode used: road, rail, inland waterways and SSS to and from EU ports.

This study includes an analysis of traffic in seaports, inland ports and road-rail terminals and outlines some differences between Members States / regions.

Finally, it provides useful information on the challenges that EU ports are currently facing as regards traffic growth, congestion and accessibility.

In order to define and analyse this issue, a preliminary overview of maritime traffic in different EU countries and ports is paramount. The characteristics of ports and of infrastructures linking ports to the hinterland, the type of goods handled, and the dimension of port catchment areas are all features that significantly influence the mode choice and the potential for modal shift.

The 2011 White Paper on Transport states that, on the coasts, more and efficient entry points into European markets are needed, to avoid unnecessary traffic crossing Europe. Seaports have a major role as logistics centres and require efficient hinterland connections. Their development is vital to handle increased volumes of freight both by SSS within the EU and with the rest of the world. Inland waterways, where unused potential exists, have to play an increasing role in particular in moving goods to the hinterland and in linking the European seas.

Furthermore, as stated in the EC Communication "Single Market Act II"[3], the need for well-connected port infrastructure, efficient and reliable port services, and transparent port funding is emphasised. The availability of adequate port infrastructure, good performance of port services, and a level playing–field are vital if the EU is to remain competitive in the global markets, improve its growth potential, and create a more sustainable and inclusive EU transport–system to underpin the Internal Market.
For these reasons, this study aims at providing a clear overview of the situation regarding modal choices today.

The study further focuses on SSS in order to highlight the importance of short sea vs. deep sea transport.

The text is structured as follows:

- chapter 1 focuses a) on maritime transport in the EU by providing a breakdown by country, port, type of load and distinguishing between short sea and deep sea traffic and b) on inland navigation transport by providing information on main axes and main flows of goods;

[3] EC Communication, Single Market Act II: Together for new growth - COM(2012) 573 final.

- chapter 2 provides in-depth information on the modal share for a selection of main seaports and inland ports in the EU, distinguishing between the characteristics of the various types of goods handled;
- chapter 3 contains conclusions drawn by comparing actual modal shares with policy objectives.

1. OVERVIEW OF PORT TRAFFIC IN THE EU

KEY FINDINGS

- Within the EU, including domestic transport, seaborne traffic accounts for around 20% of transported goods. The relevance of the sector is even higher if one considers import and export flows.
- Five main markets can be distinguished: the container market, the ro-ro market, the market for conventional general cargo, the liquid bulk market, and the dry bulk market.
- The concentration of maritime traffic in ports is lowest in the conventional general cargo segment (more dispersed) and highest in the container market.
- The SSS share, which overall represents nearly 60% of EU maritime traffic, is higher in countries characterised either by high national transport activity or by little maritime throughput.
- The SSS share is higher in the ro-ro sector (short distance transport), followed by the liquid bulk and container sectors.
- The North Sea area accounts for the major share of traffic for every type of load. It is the area which includes the largest European ports. The Mediterranean Sea ranks second despite having a larger number of ports.
- Various routes of navigable waterways exist in many EU countries; the most important fluvial regions are the rivers Rhine and Danube.
- The largest proportion of inland waterway traffic in Europe is recorded in the North Sea maritime ports (Rotterdam, Antwerp, Amsterdam, Ghent) bound for Germany and Switzerland, largely generated along the Rhine axis.

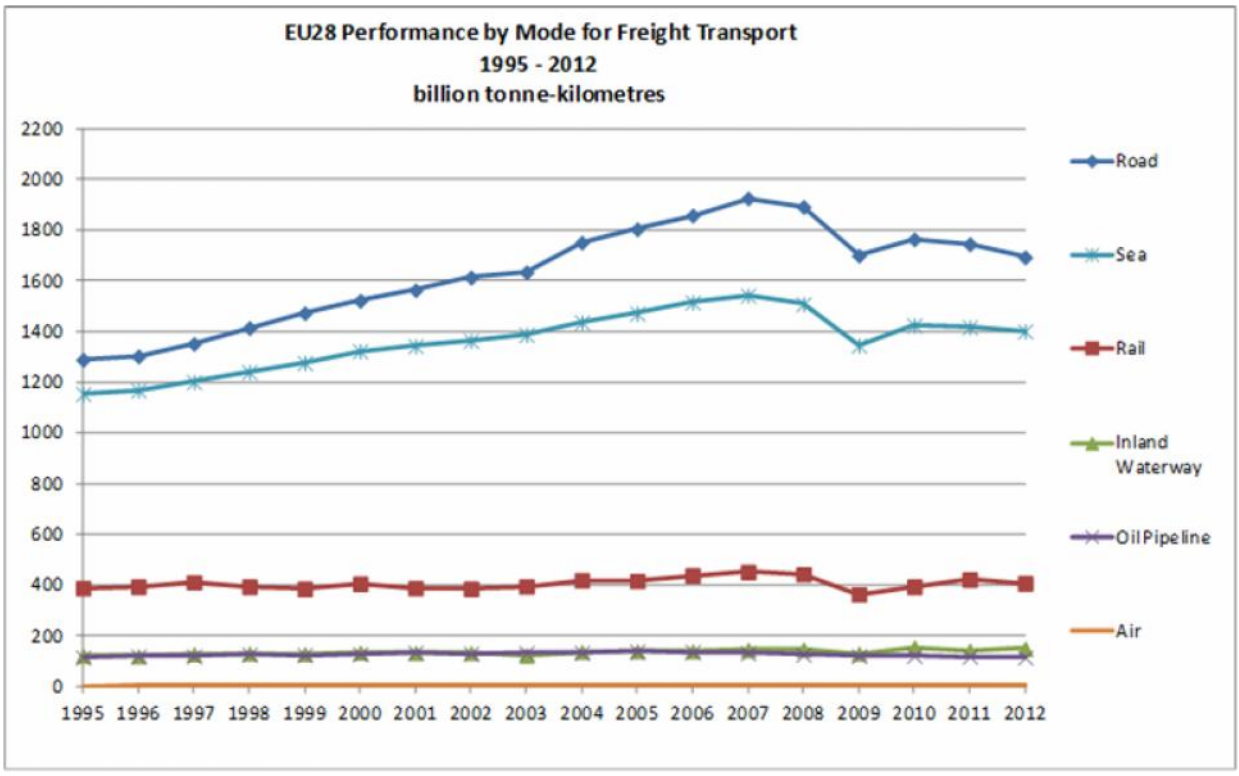
The EU is highly dependent on seaports for trade with the rest of the world and within its Internal Market. 74% of goods imported from and exported to the rest of the world and 37% of intra-EU trade transit through seaports. Ports guarantee territorial continuity of the EU by servicing regional and local maritime traffic to link peripheral and island areas. They are the nodes from where the multimodal logistic flows of the trans-European network can be organised, using SSS, rail and inland waterways links to minimise road congestion and energy consumption.[4]

Based on overall transport figures within the EU, including domestic transport, seaborne traffic accounts for around 20% of transported goods (over 3 billion tonnes).

All in all, in relation to EU internal traffic (excluding extra EU trade) and based on tonne-km performance, the maritime mode is the second strongest performer after road transport as shown in the graph below.

[4] COM(2013) 295: Ports: an engine for growth.

Figure 1: Intra-EU 28 performance by mode – freight transport (billion tonne-km)



Source: Eurostat (2014).

When considering the split between national and international seaborne traffic, Member States exhibit very different figures, mostly depending on their geography: countries characterised by the presence of islands and/or a long coastline display a larger share of domestic cabotage.

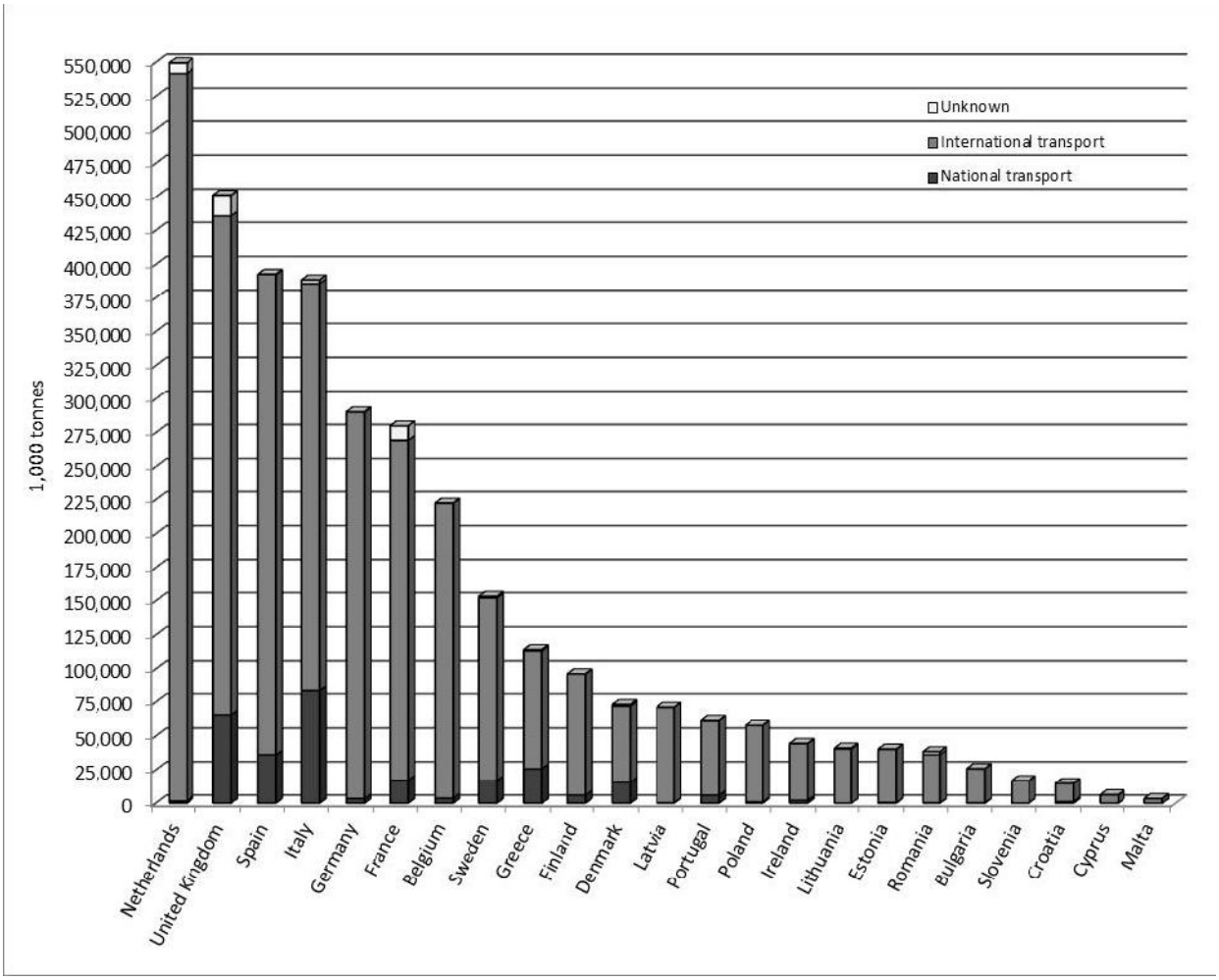
The following table shows the split between national (cabotage) and international traffic by EU Member State. The statistics are based on the traffic of main ports; this explains why national traffic is zero in relation to certain countries (namely Slovenia, Cyprus, Malta and Lithuania) since only one main port is considered. The landlocked countries Austria, Luxembourg, the Czech Republic, Slovakia and Hungary are not represented. The column "Unknown" refers to a relatively small share of traffic in relation to which there is no information available.

Table 1: National (cabotage) and international shipping for EU 28 – Country level 2012

	Total	National transport		International transport		Unknown	
	1000 t	1000 t	%	1000 t	%	1000 t	%
Netherlands	549,563	1,626	0.3	540,110	98.3	7,827	1.4
United Kingdom	451,393	65,259	14.5	370,380	82.1	15,756	3.5
Spain	392,670	36,039	9.2	356,490	90.8	142	0.0
Italy	388,491	83,233	21.4	302,557	77.9	2,701	0.7
Germany	290,360	3,325	1.1	286,685	98.7	350	0.1
France	279,989	17,277	6.2	252,001	90.0	10,711	3.8
Belgium	222,436	3,700	1.7	218,735	98.3	0	0.0
Sweden	153,230	16,842	11.0	135,283	88.3	1,106	0.7
Greece	114,099	25,806	22.6	87,437	76.6	855	0.7
Finland	96,373	5,921	6.1	90,452	93.9	0	0
Denmark	73,062	15,541	21.3	56,237	77.0	1,284	1.8
Latvia	70,990	230	0.3	70,734	99.6	27	0.0
Portugal	61,296	5,829	9.5	55,457	90.5	9	0.0
Poland	57,902	831	1.4	57,072	98.6	0	0
Ireland	44,508	2,099	4.7	42,363	95.2	47	0.1
Lithuania	41,033	0	0.0	40,475	98.6	558	1.4
Estonia	40,342	274	0.7	39,981	99.1	86	0.2
Romania	38,427	58	0.2	36,051	93.8	2,317	6.0
Bulgaria	25,877	58	0.2	25,746	99.5	73	0.3
Slovenia	16,907	0	0.0	16,906	100.0	1	0.0
Croatia	14,839	1,122	7.6	13,555	91.3	163	1.1
Cyprus	6,237	0	0.0	6,114	98.0	122	2.0
Malta	3,321	0	0.0	3,322	100.0	0	0
EU (28	2,989,189	285,069	9.5	2,659,984	89.0	44,135	1.5

Source: Eurostat (2014).

Figure 2: National and international shipping for EU28 – Country level 2012



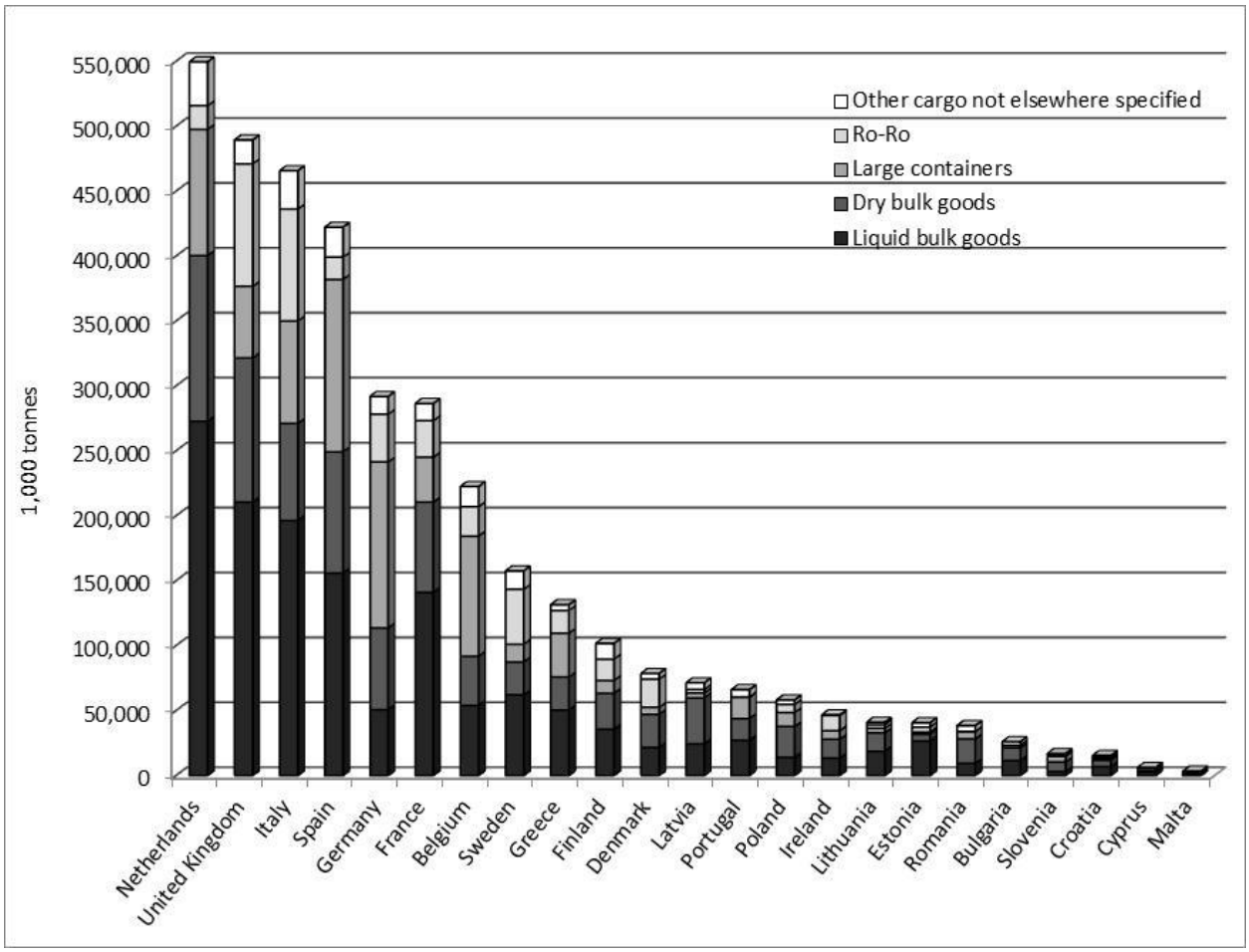
Source: Elaboration on Eurostat (2014).

In terms of cargo flows in the European seaport system, five main markets can be distinguished: the container market, the ro-ro market, the market for conventional general cargo, the liquid bulk market and the dry bulk market. Each market has its own dynamics: the routing of different types of maritime freight through European ports to the hinterland is guided by complex interactions between a large set of factors and actors. However, all ports and types of trade have two underlying common factors that influence the routing to the hinterland: the connectivity of the port to the hinterland and the level of performance of the port itself.

Over 300 ports are active in ro-ro, general cargo, liquid bulk and/or dry bulk handling. There are about 130-140 seaports handling containers, of which around 40 accommodate intercontinental container services. The number of European ports handling containers is, however, increasing. This, combined with the overall concentration of traffic in large gateways and driven by increasing infrastructure requirements to accommodate large vessels, indicates that the role of ports is changing and that there is a tendency to bring the goods closer to their final destination.

Figure 3 shows the total traffic recorded in each country by type of load. Liquid and dry bulks represent the largest share of transported goods. Container transport performance is more relevant in the Netherlands, Spain, and Germany.

Figure 3: Shipping by type of load – Country level 2012



Source: Elaboration on Eurostat (2014).

1.1. Characteristics of seaports traffic

Before analysing the characteristics of port traffic it is worth presenting the total traffic handled at major ports in the EU. It becomes clear that the total traffic has remained nearly stable over time, while the relevance of the major ports has increased, demonstrating a trend toward a concentration of traffic.

The largest ports are all located on the North Sea, demonstrating a higher concentration of traffic in the few ports in that area compared to, for example, the Mediterranean ports. Table 2 shows the ports specialisation as well, based on the actual traffic. Rotterdam is by far the leading port in the EU (the leader for multiple kinds of traffic) and how the specialisation of ports may represent a way to attract high volumes of traffic (among the first ports, for example, Hamburg is highly focusing on container, Amsterdam and Marseille on liquid bulks).

Table 2: Total traffic at major ports in the EU in various years (1000 tons)

Port	Specialisation	2005	2010	2013
Rotterdam (NL)	Multipurpose (all)	345,819	395,763	406,549
Antwerpen (BE)	Container, bulk	145,835	160,012	171,984
Hamburg (DE)	Container, bulk	108,253	104,520	120,568
Amsterdam (NL)	Liquid bulk	47,133	72,702	93,204
Marseille (FR)	Liquid bulk, container	93,308	82,427	76,248
Algeciras (ES)	Container, liquid bulk	55,184	58,565	73,822
Le Havre (FR)	Container, liquid bulk	70,801	65,771	64,395
Immingham (UK)	Dry bulk, ro-ro	60,686	54,029	62,614
Bremerhaven (DE)	Container, ro-ro	33,728	45,943	54,506
Valencia (ES)	Container	34,990	53,075	53,470
Trieste (IT)	Liquid bulk, ro-ro	43,355	40,557	45,986
London (UK)	Multipurpose (container)	53,843	48,062	43,205
Milford Haven (UK)	Liquid bulk	37,547	42,788	41,105
Genova (IT)	Container, liquid bulk, ro-ro	42,640	41,428	40,830
Piraeus (EL)	Container	18,688	13,058	40,192
Göteborg (SE)	Container, liquid bulk, ro-ro	36,479	42,938	38,380
Tees & Hartlepool (UK)	Multipurpose	55,790	35,697	37,641
Dunkerque (FR)	Dry bulk , ro-ro	48,503	36,309	36,634
Southampton (UK)	Container, liquid bulk	39,947	39,365	35,797
Constanta (RO)	Container, Liquid and dry bulks	44,377	30,396	35,650
Barcelona (ES)	Multipurpose (container)	37,061	35,326	34,372
Tallinn (EE)	Liquid bulk, ro-ro	38,816	36,264	28,012
Wilhelmshaven (DE)	Multipurpose	45,977	24,728	24,694
Taranto (IT)	Dry bulk	47,869	34,209	24,496
Top 24 ports		1,586,629	1,593,932	1,684,354
EU ports		3,744,892	3,672,484	3,717,953

Source: Elaboration on Eurostat (2015).

In order to analyse sea-trade flows, the EU is often divided into different maritime basins. In this note the following are identified: North Sea, Mediterranean, Baltic Sea, Black Sea, Other (including UK and Atlantic).

The biggest share in total EU seaborne freight traffic is held by North Sea region ports (31.7%). Volume-wise the "Le Havre-Hamburg" range remains a strong port range in Europe. However, its market share in total European volumes differs depending on the market segment considered:

- 48% or 40.3 million TEU in the container business
- 27% or 269 million tonnes in relation to dry bulk
- 25% or 391 million tonnes in relation to liquid bulk
- 20% or 62 million tonnes in relation to conventional general cargo
- 18% or 82 million tonnes in relation to ro-ro

The second biggest region is the Mediterranean Sea region (only EU ports) with a share of 28.2%. Baltic Sea ports (excluding Russian ports) account for 17.3% of total throughput in EU ports followed by UK & Irish ports (15.3%). The smallest share is held by EU ports along the Atlantic Ocean coast (5.9%) and EU ports along the Black Sea coast (1.7%).

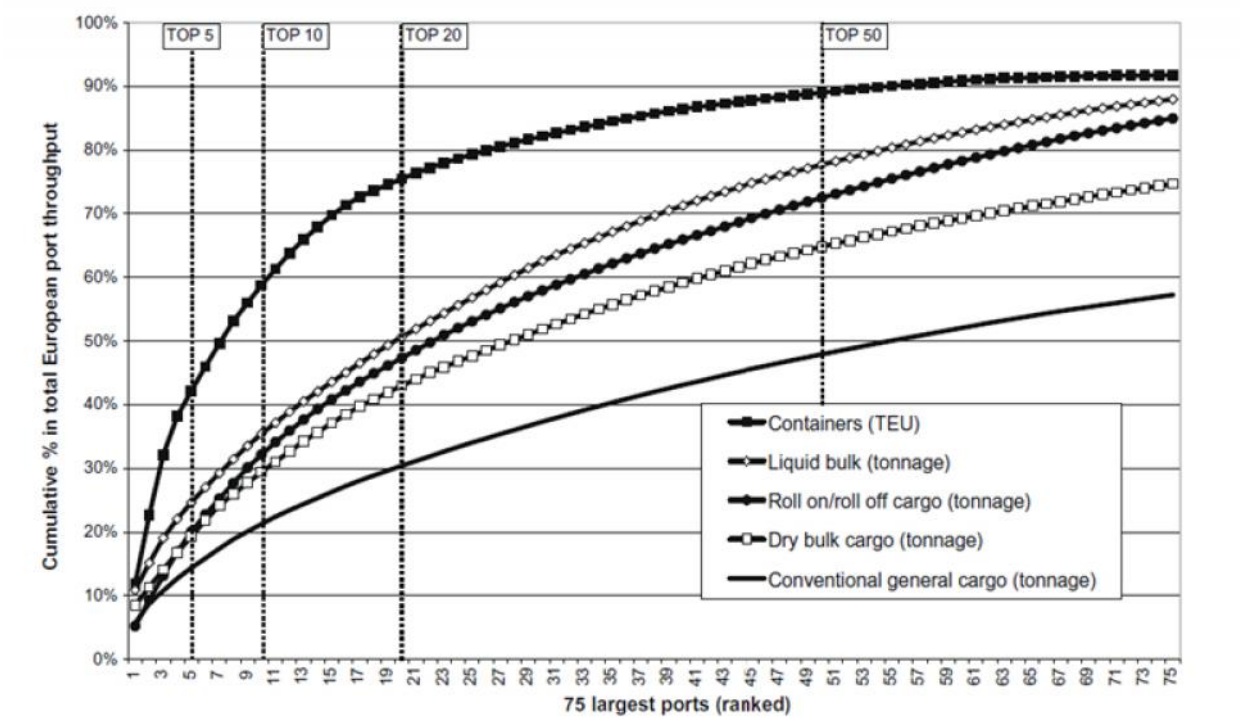
The 83 seaports included in the TEN-T core network handle approximately 70% of the cargo passing through all EU seaports. The greatest number of core seaports (35) is concentrated in the Mediterranean Sea region. These seaports account for 58.4% of the throughput of all seaports within the EU Mediterranean Sea region.[5]

14 of those ports are located along the coastline of Italy. This is due to Italian seaports handling the greatest volume of cargo within the Mediterranean Sea region (460 million tonnes) followed by Spain and France.

The figure 4 compares the five cargo handling segments on the basis of a cumulative market share curve for the 75 largest ports in each of the segments. It can be seen that the concentration is the lowest in the conventional general cargo segment and the highest in the container market.

[5] EC Commission document Impact Assessment – Proposal for a Regulation of the European Parliament and of the Council establishing a framework on the market access to port services and the financial transparency of ports - SWD (2013) 181.

Figure 4: Cumulative market share of the top 75 ports in each cargo segment



Source: ITMMA University of Antwerp and ESPO (2009).

The total traffic presented above is split between different regions. The North Sea (including the so-called Northern Range area[6]) accounts for the major share of traffic for every type of load. It is the area which includes the largest European ports. The Mediterranean Sea ranks second (despite having a larger number of ports).

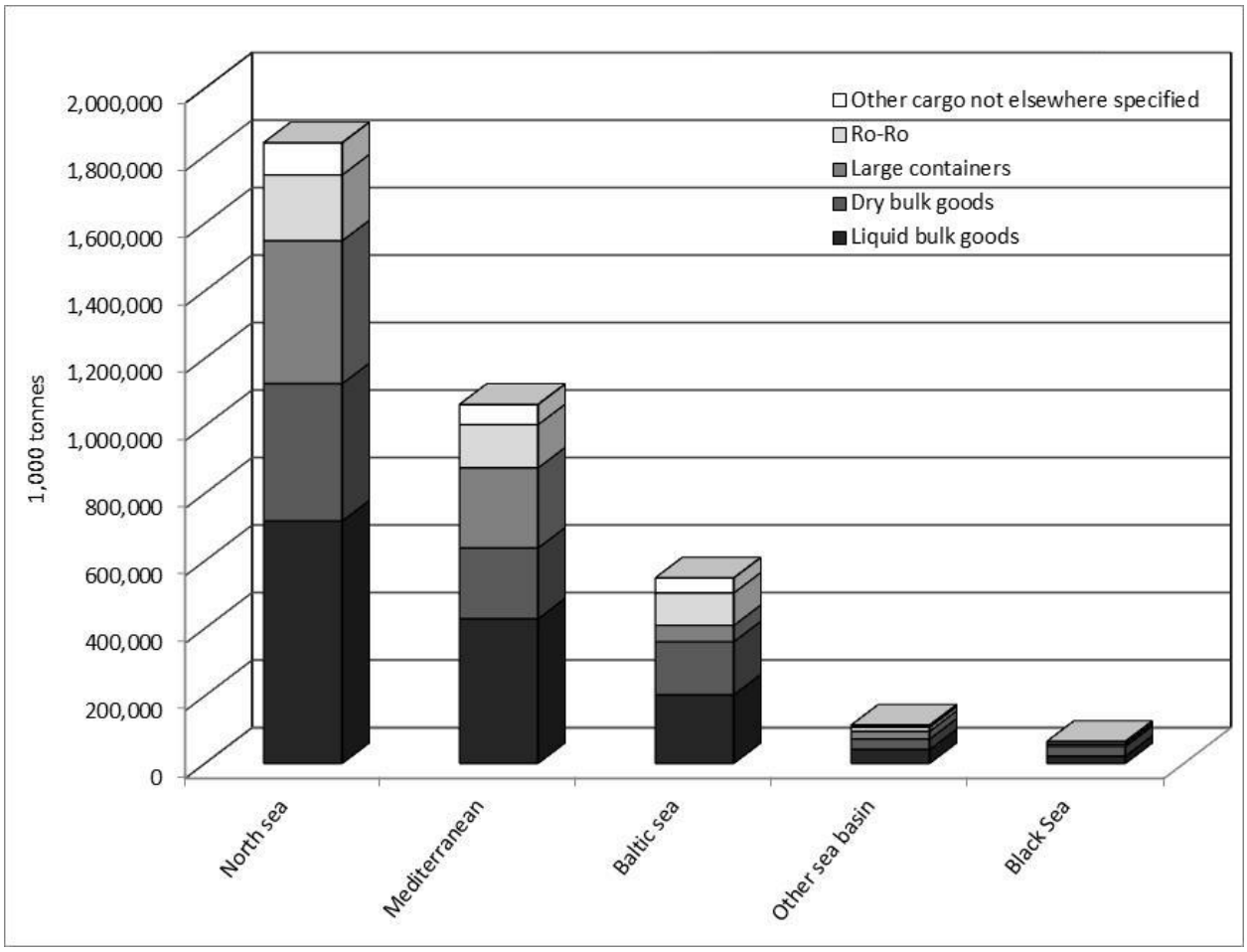
Table 3: Breakdown of traffic by region and type of load (2012, 1000 tonnes)

Regions	Total	Liquid bulk goods	Dry bulk goods	Large containers	Ro-Ro	Other cargo not elsewhere specified
North Sea	1,838,319	717,979	406,648	423,400	195,064	95,225
Mediterranean	1,062,785	427,907	209,598	237,499	128,086	59,696
Baltic Sea	548,890	203,012	157,082	48,396	96,157	44,241
Black Sea	64,439	20,932	28,627	7,204	567	7,108
Other (UK and Atlantic)	112,634	40,586	31,046	23,088	11,864	6,050

Source: Eurostat (2014).

[6] The Northern Range area includes countries bordering on the North Sea i.e. the Netherlands, United Kingdom, Germany, Belgium and the northern part of Spain and France.

Figure 5: Shipping in different regions by type of load – Country level 2012



Source: Elaboration on Eurostat (2014).

Another issue that must be considered when analysing maritime transport is transhipment (mostly of containers). Transhipment is the operation through which containers are transferred from a larger ship (calling at a major port) to a smaller one (calling at the port of destination) and vice versa, implying a temporary storage in the hub maritime terminal where transhipment occurs. This practice allows the container fleet and the port equipment to be used in a more efficient way. When dealing with port statistics transhipment needs to be taken into account for the following reasons:

- it constitutes a share of traffic that neither needs to be shipped inland nor requires any treatment in ports (cargo is just stacked in the yard in order to be loaded onto another ship), with the exception of custom procedures;
- it generates additional short sea traffic: for example, in the case of imported goods, the container arriving at a transhipment port is counted firstly as incoming deep sea traffic, secondly as outgoing short sea traffic and thirdly, at the final port of discharge, as incoming short sea traffic.

The following table summarises the transhipment share of the main EU container ports.

Table 4: Transhipment share of main European ports – 2012

Port	Total TEU 2012	TEU Transhipment 2012	Transhipment 2012 %
Rotterdam (NL)	11,865,916	4,265,000	35.9%
Hamburg (DE)	8,863,896	2,659,000	30.0%
Antwerp (BE)	8,635,169	2,504,000	29.0%
Bremerhaven (DE)	6,115,211	2,750,000	45.0%
Valencia (ES)	4,469,754	2,280,701	51.0%
Algeciras (ES)	4,070,791	3,707,953	91.1%
Felixstowe (UK)	3,700,000	305,000	8.2%
Piraeus (EL)	2,734,004	2,187,000	80.0%
Gioia Tauro (IT)	2,721,000	2,548,000	93.6%
Marsaxlokk (MT)	2,540,000	2,425,000	95.5%
Le Havre (FR)	2,303,750	390,000	16.9%
Genoa (IT)	2,064,806	181,128	8.8%
Zeebrugge (BE)	1,953,170	490,000	25.1%
Barcelona (ES)	1,749,974	435,817	24.9%
Southampton (UK)	1,600,000	88,000	5.5%
La Spezia (IT)	1,247,218	91,111	7.3%
Las Palmas (ES)	1,207,962	790,232	65.4%
Marseille (FR)	1,062,408	95,600	9.0%

Source: Eurostat (2014).

1.2. The relevance of Short sea shipping (SSS)

Deep sea shipping refers to the maritime transport of goods on intercontinental routes, crossing oceans; by contrast, SSS involves relatively short distances, for instance within the EU.

This classification is particularly relevant for container traffic, the most disputable segment of seaborne transport.

As shown above, intercontinental sea trade of containers is the most concentrated sector characterised by transhipment according to a hub and spoke pattern. The ports attracting the largest share of traffic are equipped with advanced, capital intensive cargo-handling installations able to serve large container ships.

SSS includes cargo and passengers traffic by sea between ports situated in geographical Europe or between those ports and ports situated in non-European countries which have a coastline on the enclosed seas bordering Europe.

For long intra-EU distances, e.g. from the Iberian Peninsula to the North Sea and Baltic regions, short sea is, in principle, an alternative to land transport solutions. However, low cargo volumes, smaller ships and much more frequent port calls have a negative impact on the cost and competitiveness of short sea services.

Box 1: Short sea shipping (SSS)

Short sea shipping, abbreviated as SSS, is the maritime transport of goods over relatively short distances, as opposed to the intercontinental cross-ocean deep sea shipping (DSS). In the context of EU transport statistics it is defined as maritime transport of goods between ports in the EU-28 (sometimes also including candidate countries and EFTA countries) on the one hand, and ports situated in geographical Europe, on the Mediterranean and Black Seas on the other hand, i.e. ports in

- EU-28 countries (actually only the 23 maritime Member States: Belgium, Bulgaria, Cyprus, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden and the United Kingdom);
- EEA countries (Iceland and Norway);
- candidate countries (Albania, Iceland, Montenegro and Turkey);
- the Mediterranean Sea area (Algeria, Bosnia–Herzegovina, Egypt, Israel, Lebanon, Libya, Morocco, Occupied Palestinian territory, Syria, and Tunisia);
- the Black Sea area (Georgia, Moldova, Russia and Ukraine).

This definition is derived from Commission Communication COM (1999) 317 final of June 1999 on the development of SSS in Europe. As a result, SSS also includes feeder services: a short-sea network between ports with the objective of consolidating or redistributing freight to or from a deep sea service in one of these ports, the so-called hub port.

Besides the EU definition, there are further approaches to SSS which are worth mentioning. For example, Marlow et al. (1997) associated SSS with the type and size of ship, cargo handling methods, port terminals, networking and information systems.

Other authors (Criley and Dean, 1993) set a maximum ship size for SSS of 5,000 gross tonnage whilst Stopford (1997), instead of using a technical criteria, defined SSS in terms of its function as feeder services in competition with unimodal road transportation[7].

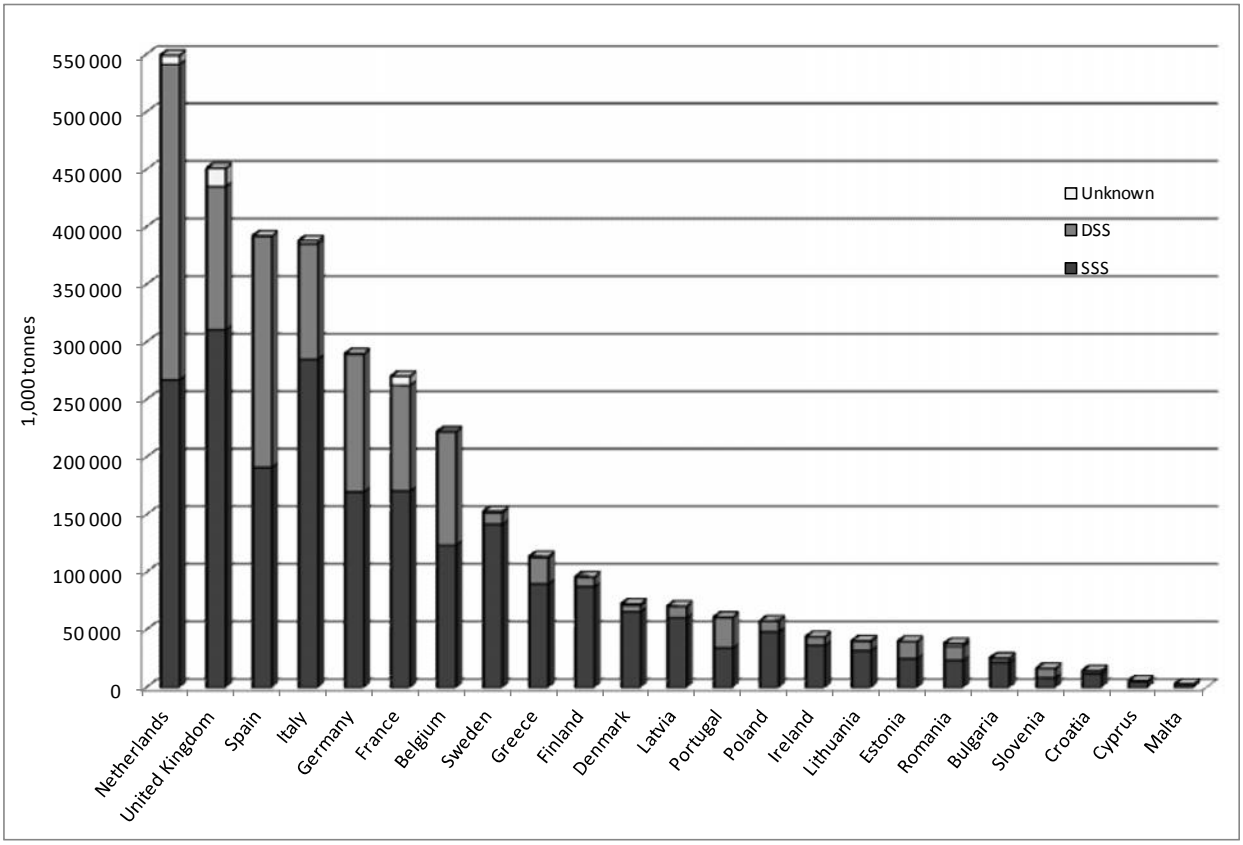
Source: Website of Eurostat.

The differentiation between SSS and DSS helps in understanding the characteristics of the port hinterland. In principle, goods moved by SSS are taken closer to their destination, minimising the inland leg. A push towards an increase of SSS was made by the development of the Motorways of the Sea (MoS) concept, although with less success than expected, and by the container transhipment pattern.

Figure 6 and the following table 5 illustrate the share of SSS vs. DSS by Member State. They demonstrate how DSS flows are concentrated in the seven major markets for maritime traffic (Netherlands, Spain, United Kingdom, Germany, Italy, France, and Belgium).

[7] Sauri S., Torrò M., 2013, Short Sea Shipping in Europe: Issues, Policies and Challenges, PortEconomics.

Figure 6: Short sea shipping (SSS) – Country level 2012



Source: Elaboration on Eurostat (2014).

The following table provides a breakdown of traffic by distance range and by country. It can be seen that the SSS share, which represents nearly 60% of overall EU maritime traffic, is higher in countries characterised by either high national transport activity or by little maritime throughput. A further breakdown of SSS can be provided by comparing table 5 with table 1: the nearly 300 million tonnes of national/cabotage transport represent the 10% of EU traffic. The remaining 50% is therefore attributable to international SSS traffic. In table 5, further explanations are provided analysing the respective shares of SSS/DSS for the major EU ports.

Table 5: Breakdown of EU seaborne traffic by country and distance range – 2012

Country	Total	SSS		DSS		Unknown	
	1000 tonnes	1000 tonnes	%	1000 tonnes	%	1000 tonnes	%
Netherlands	549,563	267,579	48.7	274,156	49.9	7,827	1.4
United Kingdom	451,393	310,998	68.9	124,639	27.6	15,756	3.5
Spain	392,670	191,440	48.8	201,088	51.2	142	0.0
Italy	388,491	285,475	73.5	100,316	25.8	2,701	0.7
Germany	290,360	170,372	58.7	119,638	41.2	350	0.1
France	270,735	170,971	63.2	91,940	34.0	7,824	2.9
Belgium	222,436	123,928	55.7	98,507	44.3	0	0.0
Sweden	153,230	142,110	92.7	10,014	6.5	1,106	0.7
Greece	114,099	90,290	79.1	22,954	20.1	855	0.7
Finland	96,373	87,984	91.3	8,389	8.7	0	0
Denmark	73,062	66,185	90.6	5,593	7.7	1,284	1.8
Latvia	70,990	60,969	85.9	9,994	14.1	27	0.0
Portugal	61,296	34,663	56.6	26,623	43.4	9	0.0
Poland	57,902	48,747	84.2	9,156	15.8	0	0
Ireland	44,508	37,007	83.1	7,454	16.7	47	0.1
Lithuania	41,033	32,391	78.9	8,084	19.7	558	1.4
Estonia	40,342	25,459	63.1	14,796	36.7	86	0.2
Romania	38,427	23,908	62.2	12,202	31.8	2,317	6.0
Bulgaria	25,877	22,111	85.4	3,694	14.3	73	0.3
Slovenia	16,907	8,809	52.1	8,097	47.9	1	0
Croatia	14,839	12,120	81.7	2,557	17.2	163	1.1
Cyprus	6,237	5,676	91.0	438	7.0	122	2.0
Malta	3,321	3,045	91.7	276	8.3	0	0
EU	2,980,130	1,778,276	59.7	1,160,606	38.9	41,248	1.4

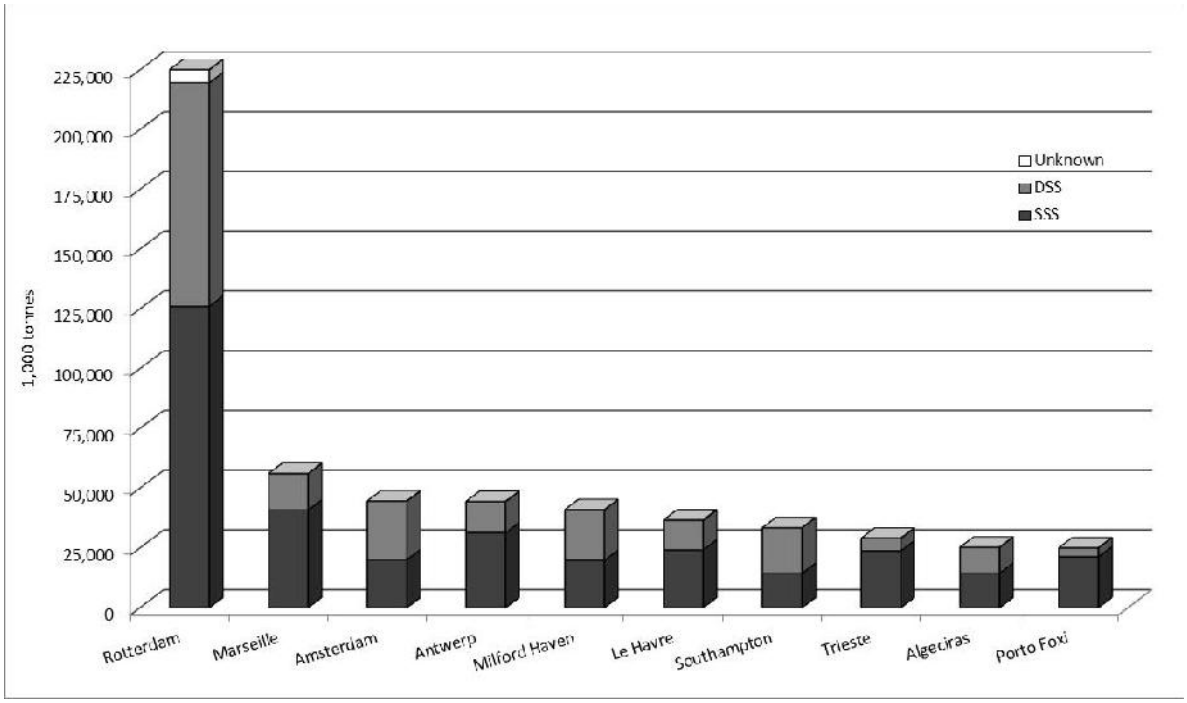
Source: Eurostat (2014).

As the EU definition above suggests, SSS is quite a wide term and embraces different types of traffic, which are analysed in turn below.

In the case of liquid bulk (see
Figure 7), a sector mostly composed by oil, a reasonably high share of SSS exists. This can be attributed to the large share of raw material provided by partners located in the Mediterranean region and North Africa but also Norway and Russia, all of which fall under the short sea definition in terms of transport relations. Moreover, refined products are frequently shipped over a short distance range (e.g. between the North Sea and the Mediterranean).

The liquid bulk sector, despite being the most important in terms of weight, does not entail huge problems for inland forwarding because, on the whole, liquid bulk goods are either processed in locations close to the shore or forwarded by pipelines.

Figure 7: Short sea shipping (SSS) share in the ten main ports for liquid bulk (2012)

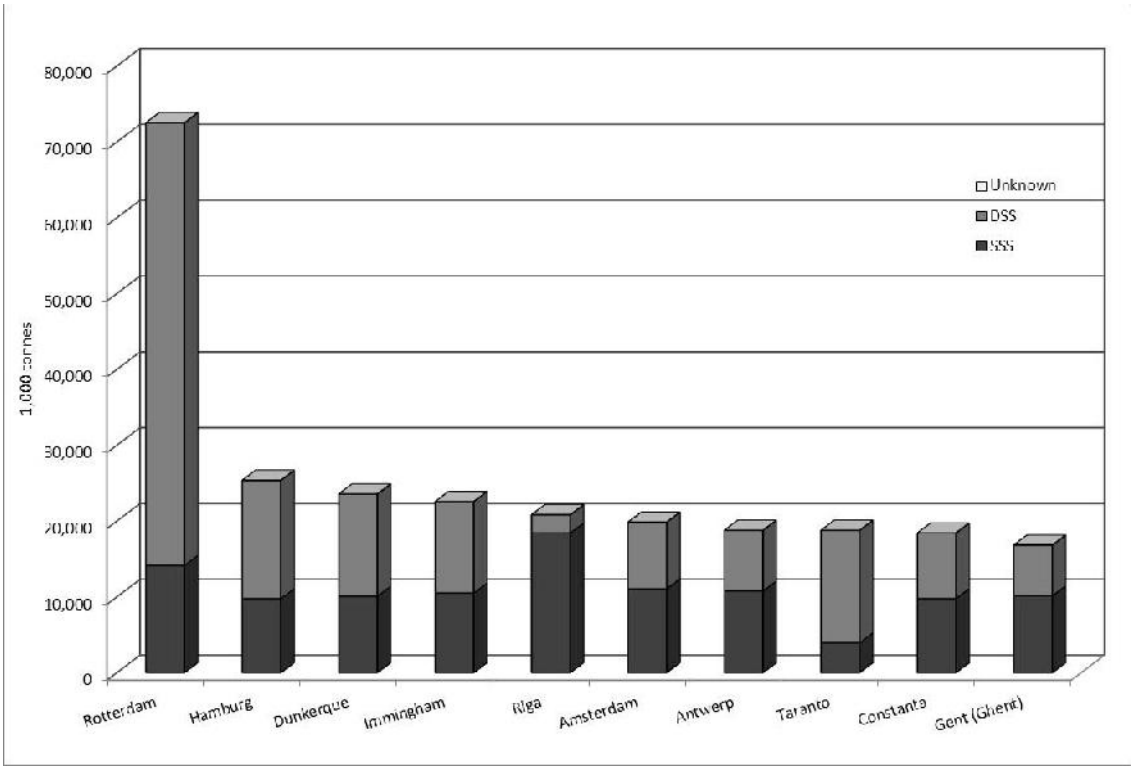


Source: Elaboration on Eurostat (2014).

Dry bulk (see Figure 8), is the sector with the highest share of DSS. This can be attributed to the large share of raw material supplied by overseas partners. However, there are examples such as Riga, where the largest part of traffic derives from SSS activities (outwards).

Similarly to liquid bulk, dry bulk does not entail huge problems for inland forwarding. Flows are quite stable as they are, for example, directed to power plants, steel or other heavy industry plants and are normally conveyed by rail or inland waterway as far as possible.

Figure 8: Short sea shipping (SSS) share in the ten main ports for dry bulk (2012)



Source: Elaboration on Eurostat (2014).

More relevant is the distinction between short sea and deep sea in the case of unitised transport, such as container transport and ro-ro (including MoS).

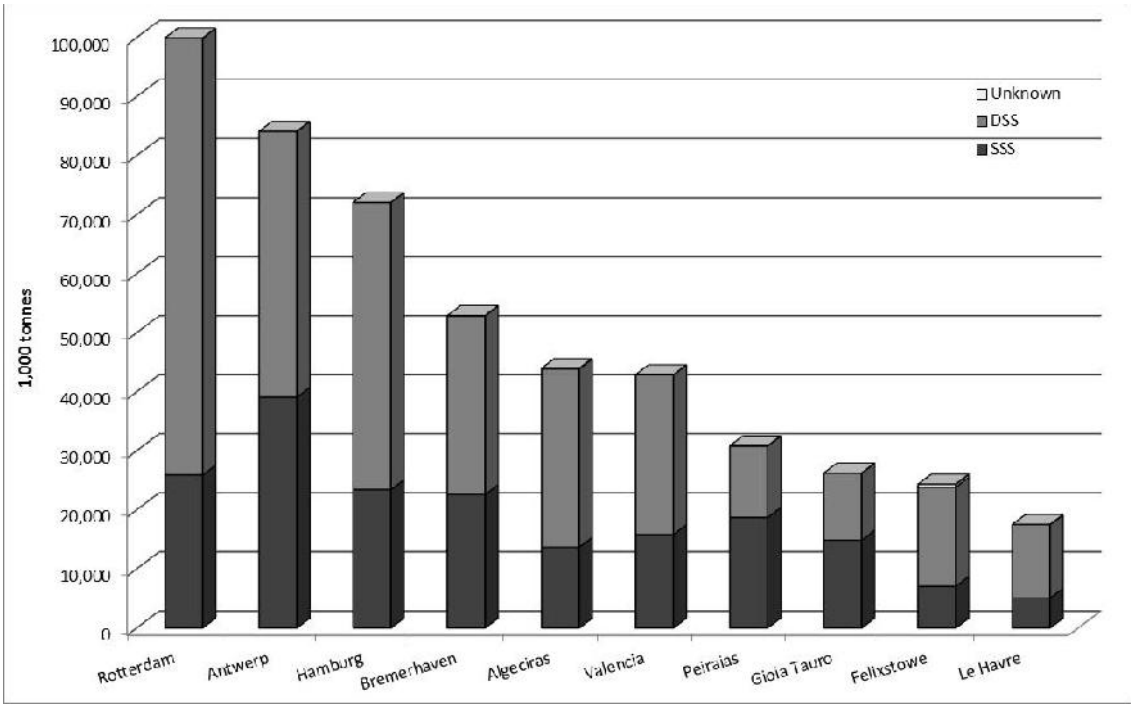
In the case of container shipping, as explained above, the share of SSS is important because:

- the points of destination or origin of SSS are in the direct hinterland of a port; therefore, ports must be equipped to handle the corresponding throughput and forward containers to their final destinations. This quota includes flows exchanged with nearby destinations as per the definition of SSS and flows deriving from transhipment operations;
- the deep sea shipping quota must be further analysed since it can be split between (i) traffic calling at the port for transhipment, (ii) traffic calling at the port for inland routing to its final destination. For this reason the share of transhipment has been presented.

Conversely, ro-ro transport is essentially part of a co-modal transport involving an inland stretch by road and a maritime transport which, with some exceptions, is run over short distance ranges (and is therefore attributed to SSS).

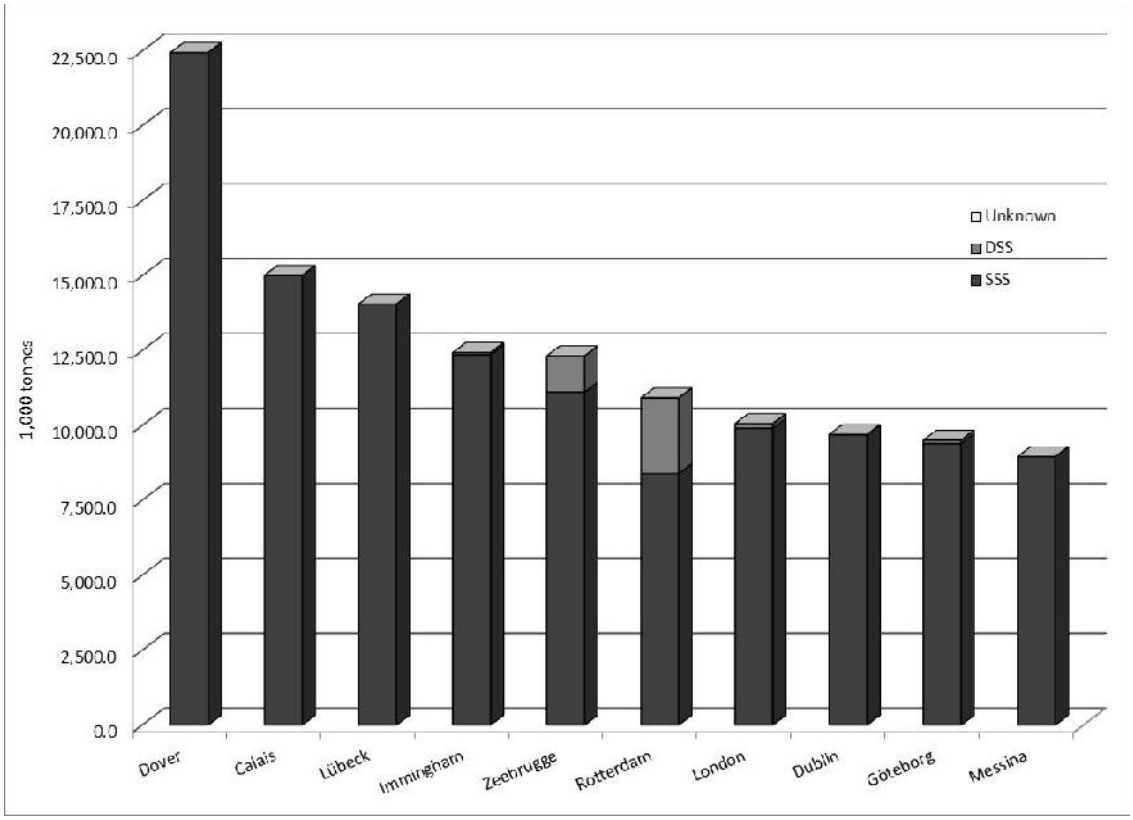
The following graphs present the respective share of DSS and SSS for the most important ports for the two categories, container and ro-ro. While for container traffic major ports show the highest share of DSS, the ro-ro traffic is almost fully represented by SSS.

Figure 9: Short sea shipping (SSS) share in the ten main ports for containers (2012)



Source: Elaboration on Eurostat (2014).

Figure 10: Short sea shipping (SSS) share in the ten main ports for ro-ro units (2012)



Source: Elaboration on Eurostat (2014).

1.3. Inland navigation

Inland waterway transport plays an important role for the transport of goods in Europe. More than 37,000 kilometres of waterways connect hundreds of cities and industrial regions. Some 20 out of 28 Member States have inland waterways, 13 of which have an interconnected waterway network[8].

Around 500 million tonnes of freight is transported on inland waterways annually in the EU. In 2012 a volume of almost 150 billion of tonnes-km was recorded. The largest volumes are accounted for by the Western European countries of Germany (58.5 billion t-km) and the Netherlands (47.5 billion t-km). Other noteworthy transported flows are recorded in Romania (12.5 billion t-km), Belgium (10.4 billion t-km) and France (8.9 billion t-km)[9].
The largest volume of traffic in Europe is registered as flowing from the North Sea maritime ports (Rotterdam, Antwerp, Amsterdam, Ghent) bound for Germany and Switzerland, largely generated along the Rhine axis.

In 2013, approximately two thirds of the total transport on Europe's inland waterways (i.e. around 332 million tonnes), were carried along the Rhine between Switzerland and the delta into the North Sea. 193.5 million tonnes were accounted for by the "traditional Rhine" stretch between Switzerland and the German/Dutch border.

Another important route is the north-south axis from the Netherlands to Northern France via Belgium, with an approximate 15% share of European freight transport. This is followed by 14% of traffic generated by the Danube route (central and Eastern Europe), flowing from west to east through several EU Member States (Romania, Bulgaria, Austria, Slovakia, Hungary, Croatia[10]).

Smaller networks for inland navigation are also exploited in the UK, in Poland, in Italy and the Czech Republic.

[8] http://ec.europa.eu/transport/modes/inland/index_en.htm.
[9] Data from EU transport in figures, 2014.
[10] Data from Central Commission for the navigation of the Rhine, European Commission, Panteia, 2014, Inland Navigation in Europe, Market Observation 2014.

Table 6: Inland Navigation transport by country (billion t-km), 2012

Country	Traffic 2012	Share of EU28 traffic	Main waterway region
Germany	58.5	39%	Rhine
Netherlands	47.5	32%	Rhine
Romania	12.5	8%	Danube
Belgium	10.4	7%	Rhine
France	8.9	6%	Seine, Rhine
Bulgaria	5.3	4%	Danube
Austria	2.2	1%	Danube
Hungary	2.0	1%	Danube
Slovakia	1.0	1%	Danube
Croatia	0.8	1%	Danube
Luxembourg	0.3	0%	Rhine
United Kingdom	0.2	0%	Other
Poland	0.1	0%	Other
Finland	0.1	0%	Other
Italy	0.1	0%	Other
Czech Republic	0.0	0%	Other
Lithuania	0.0	0%	Other
Total EU28	150.0	100%	
Total EU15	128.2	85%	
Total EU13	21.8	15%	

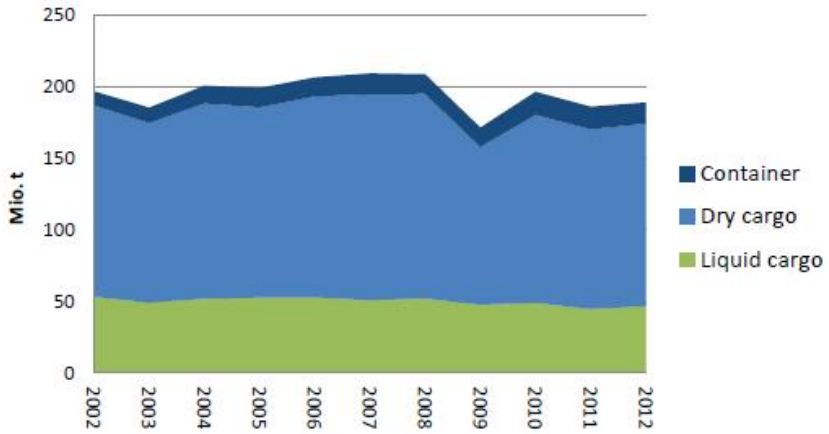
Source: analysis of EU Transport in figures – Eurostat (2014).

Overall, goods volumes have been quite stable over time; since 2004 a tangible increase has been recorded in the EU13 area only (in 2004 statistics show overall transport figures of 126 bn t-km in EU15 and 11 bn t-km in the EU13).

Similarly to maritime traffic, bulk goods (either dry or liquid) are the most frequently transported goods. Inland navigation is a very slow mode of transport, able to carry a relatively high quantity of goods; for this reason it is suitable for the transportation of low value goods. However, over the last few years container traffic has increased in relevance and nowadays, while representing the only growing market segment, is seen as a strategic opportunity for a modal shift towards IWW.

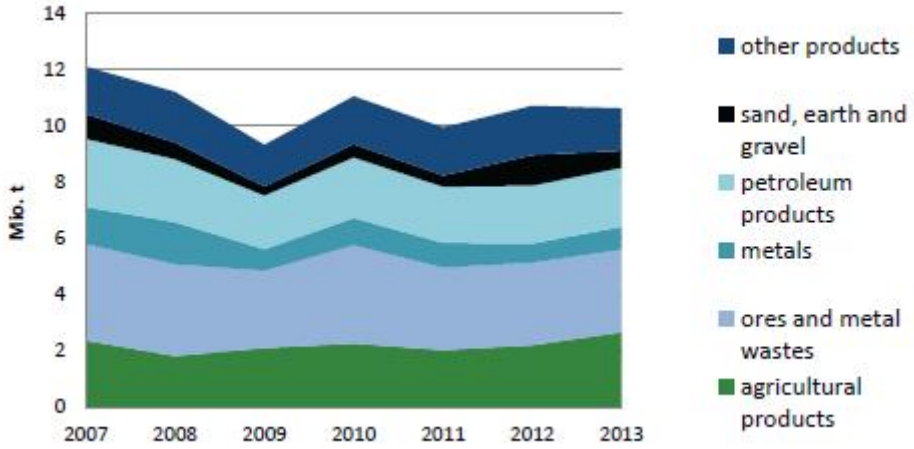
The following figures provide an overview of the breakdown by type of goods transported in specific areas: the traditional Rhine stretch (Germany), the upper Danube (Austria) the lower Danube (Romania).

Figure 11: Inland navigation on the traditional Rhine stretch – trend by type of traffic



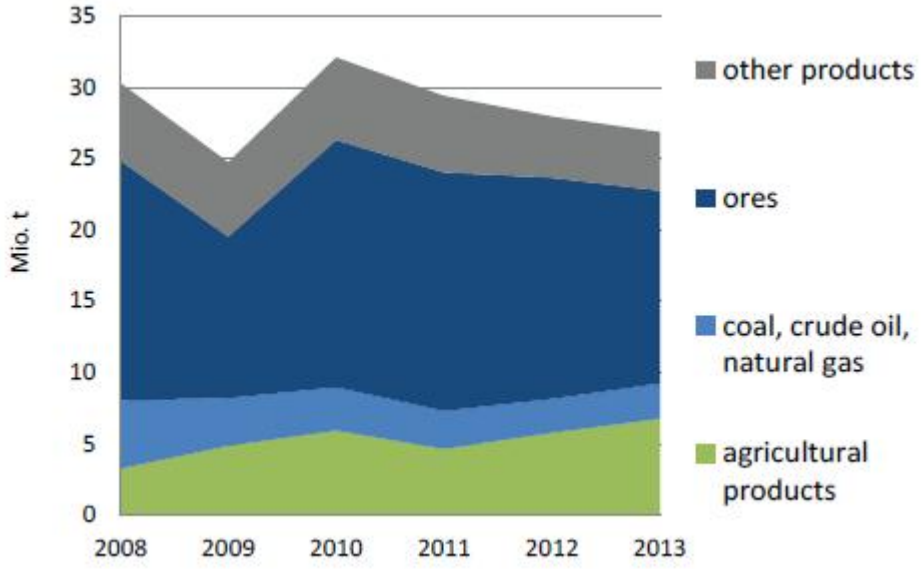
Source: Destatis (Deutschland).

Figure 12: Transport volume on the upper Danube (Austria)



Source: Statistik Austria.

Figure 13: Transport volume on the lower Danube (Romania)



Source: Eurostat.

Inland shipping generally holds a positive record in relation to energy efficiency and environmental performance; for these reasons it is also supported as a key part of low carbon policy strategies.

The EU core network also has additional capacity though its full exploitation is constrained, among other things, by some bottlenecks represented by:

- low infrastructure standards in some stretches of canals (low depth allowed);
- congestion due to old or inadequate lock systems that may cause some delay.

2. FROM PORT TO INLAND DESTINATIONS

KEY FINDINGS

- Characteristics of goods, distance to be covered, dimensions of loads to dispatch and frequency of flows are all factors affecting modal choice.
- In 2015, road is still the most frequently used mode of transport to connect EU ports with inland destinations.
- Inland waterways, where available, represent the most suitable alternative to handle big volumes at low cost. The most important inland ports are located in Germany along the river Rhine: Duisburg is by far the most important river port.
- The inland waterway container market is growing, while for other commodities the trend is quite stable.
- Rail is still underdeveloped in many cases. Except for bulk commodities, for which it is widely used to connect plants in the hinterland, railway transport is used only in certain cases, mainly in those ports that attract high volumes and with strong and large hinterlands (German ports of Hamburg and Bremen, Northern Range ports of Rotterdam and Antwerp) and in some particular cases in the Baltic Sea (Goteborg, Gdynia, Gdansk) and in the Mediterranean (e.g. La Spezia, Koper, Trieste).

2.1. Inland connections to sea ports

The inland connections of ports vary a lot depending on the characteristics of the port in question and in particular on the port activities (type and quantity of goods handled).

The differences depend on a number of factors:

- the nature of goods;
- the distance to be covered;
- the dimension of cargo to be forwarded;
- the frequency of the flows.

Over the last few years, research in this field has been targeted at:

- defining the hinterland of a port, which is intended as the port's catchment area; therefore identifying the inland origin/destination of the goods imported/exported through the port;
- defining the category of goods that can be transported by road/rail/barge, from the port to the inland destination;
- identifying a viable business model to improve the share of more sustainable modes, namely rail and barge;
- proposing and promoting policies aimed at shifting goods from road transport to alternative modes and evaluating consequent environmental benefits.

The performance of a port in terms of modal share must therefore be considered very closely, taking into account the nature of the traded goods and the origins and destinations. Table 7 summarises the characteristics of inland connections, by presenting the characteristics of the inland connections required by category of goods.

Table 7: Port – inland connections, main characteristics by type of commodities

Type of load	Distance	Mode preferred	Constraints / peculiarities
Bulk	• Often short (e.g. power plants / refineries / heavy industry plants) • Longer distance more frequent in case of transit traffic	• Pipeline for oil and gas • Rail/barges for dry bulk (coal/grain) • Road used for smaller/occasional loads	• Low value goods • Demand not easily contestable
Container	• Mostly within a radius of 300 km • Up to 1000-1500 km	• Road for short distance (lower lead time) • IWW where available (low cost, high capacity) • Rail for regular/frequent services	• Traffic more contestable (attracted by different ports) • Road preferred for high value and refrigerated cargoes
Ro-ro	• In general less than 300 km	• Road • More rarely rail (combined or rolling motorways)	• Flexible for short distance traffic • High cost for long distance
General cargo	• In general within a radius of 400-500 km	• Road (more flexible, for smaller loads) • Rail and IWW (if available)	• Higher cost for road • Specialised cargoes (e.g. coils / bars / pipes), different types of wagon needed • High volumes (timber, building materials, etc)

The extent to which different countries in the EU use rail and inland waterways to transport freight is very mixed. The reasons for this are, among other things:

(i) geographical: island countries generally use rail to a lesser extent; landlocked countries in the centre of Europe, which are used as transit countries to the major ports, use rail to a greater extent;

(ii) economical/political: countries whose development has included heavy industries generally use rail to a greater extent; Baltic and Scandinavian countries have a higher share of rail transport);

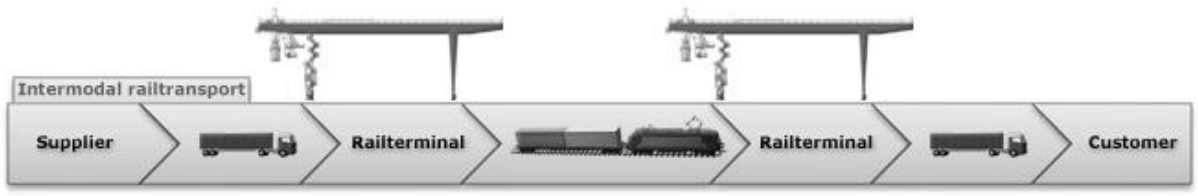
(iii) environmental: countries with a long–term policy on the environment generally use rail to a greater extent. For sustainability reasons, a modal switch to rail is viewed as beneficial; over the period 2000 to 2010, in 8 EU Member States, and particularly in Austria and Belgium, rail has increased its modal share thanks to stronger incentivising policies.

Conversely, some countries have actually witnessed considerable switches of freight away from rail and towards road. For instance, Poland's road share has increased by 23%, Slovakia's by 22% and there have been considerable increases in Bulgaria, Lithuania, Latvia, the Czech Republic and Slovenia) (Eurostat, 2012).

Traditionally, rail has been more suited to the transport of bulk goods over long distances; so as Europe has become less heavily industrialized, the traditional market for rail has diminished. Containerisation reversed this decline somewhat but other trends, such as just-in-time production, have not favoured rail as flexibility is of key importance and rail has suffered from being rather inflexible (both in terms of being unable to deliver the door-to-door solutions that the road can offer and in terms of the unwillingness of the rail industry to respond to changes in needs such as quicker transport, shorter booking time, more frequent smaller loads).

The growth in the use of containers, swap bodies, and low-loaders/liners that can accommodate whole semi-trailers has led to the development of intermodal transport, where rail and/or water is used for longer distance flows and the road segments are confined to the end of the journey. With intermodal transport, it is the unit in which the goods are transported that is handled at the point of transfer rather than the goods themselves.

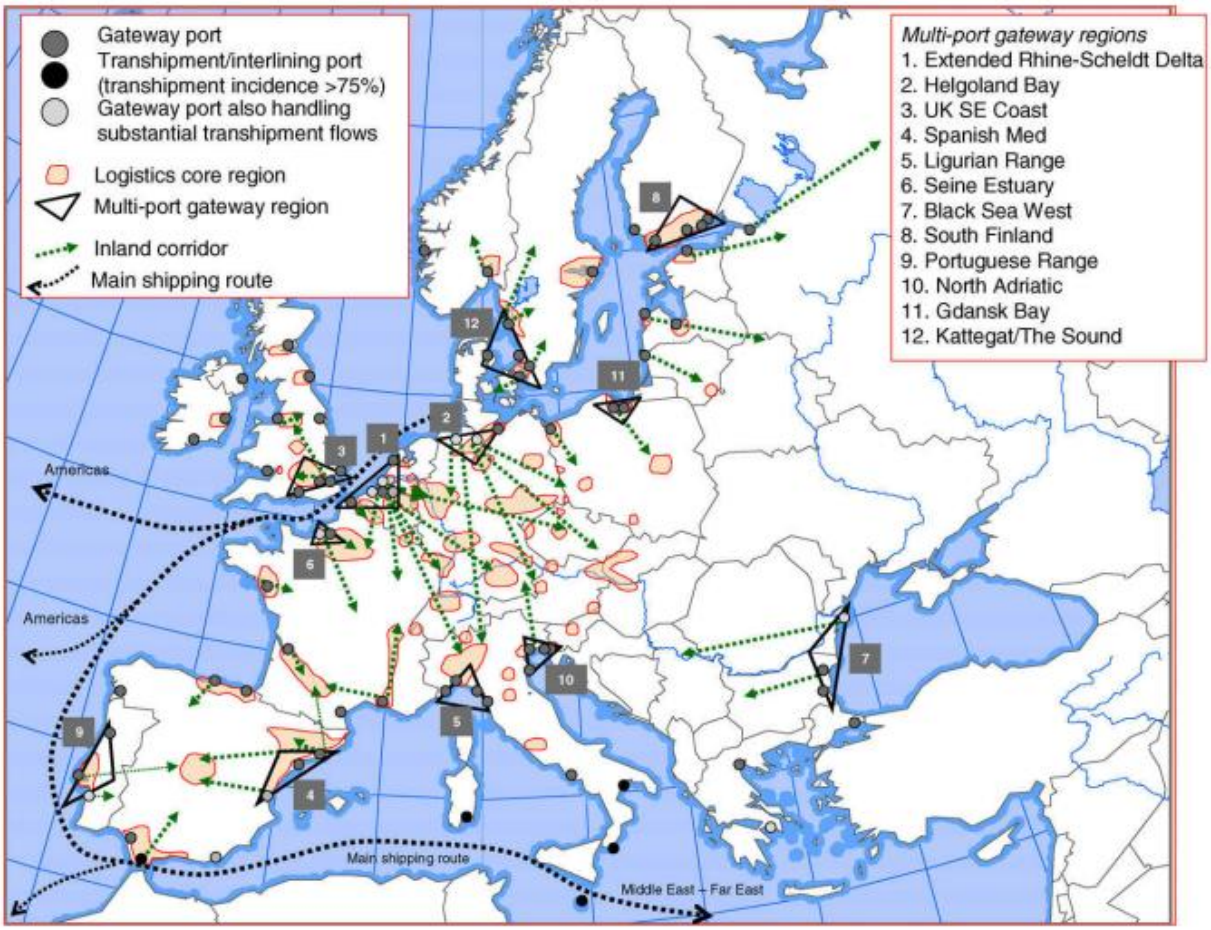
Figure 14: Example of intermodal rail transport solution



Source: Combined Terminal Antwerp, http://www.combinant.be/.

The following map (Fig.15) provides an overview of the most important port ranges for containerised transport, their role and the logistics core regions they are linked to. Much research has been targeted at identifying characteristics of the hinterland for container flow; the principal reason for this research has to be found in the level of market competitiveness, in the higher value of goods, and in the added value of logistics activities related to container transport.

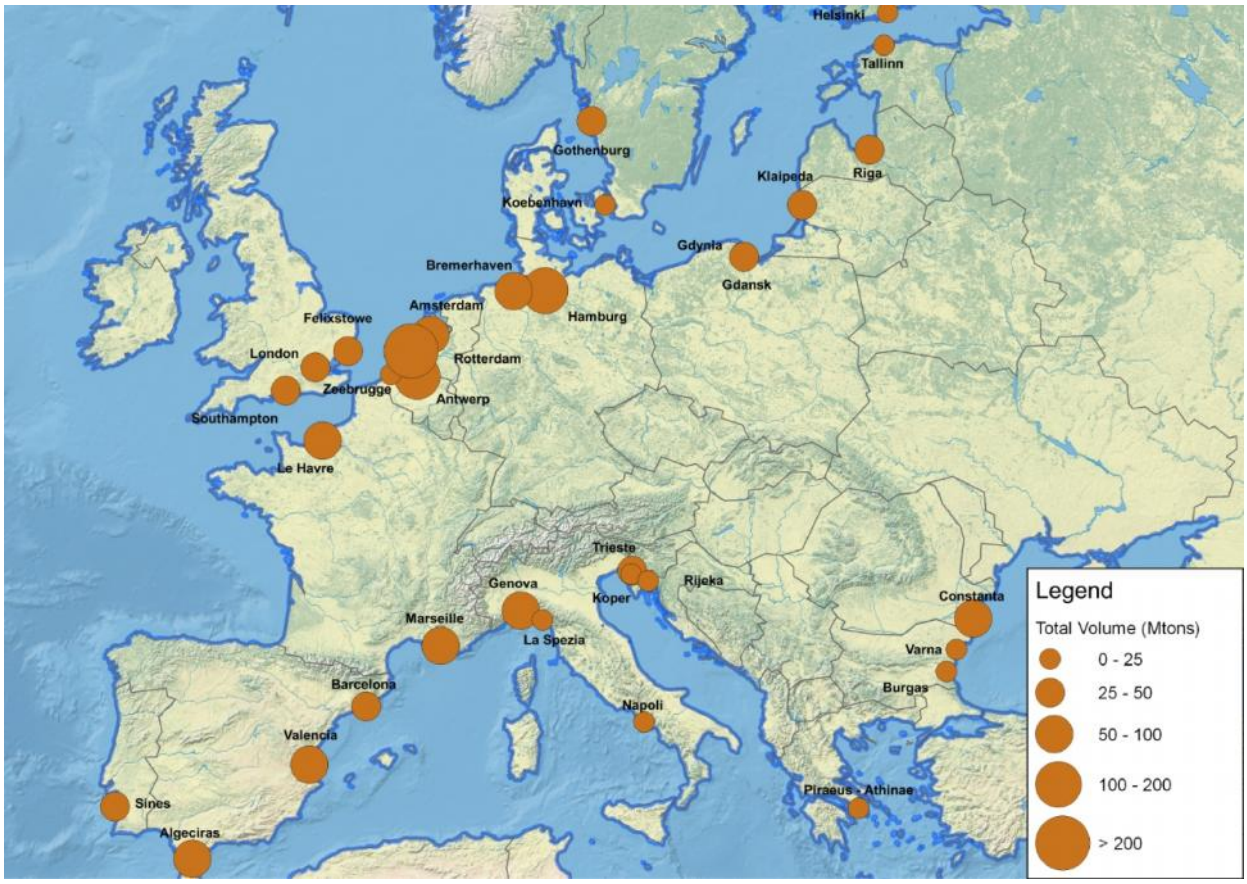
Figure 15: The European container port system and logistics core regions in the hinterland



Source: Notteboom –ITMMA, University of Antwerp, 2011.

In the following map (Fig.16), figures for representative ports (the most important ports for the various ranges) are presented by mode of transport, separating wherever possible the modal share for the totality of port throughput, and the modal share for containerised traffic.

Figure 16: Ports selected by overall throughput classes



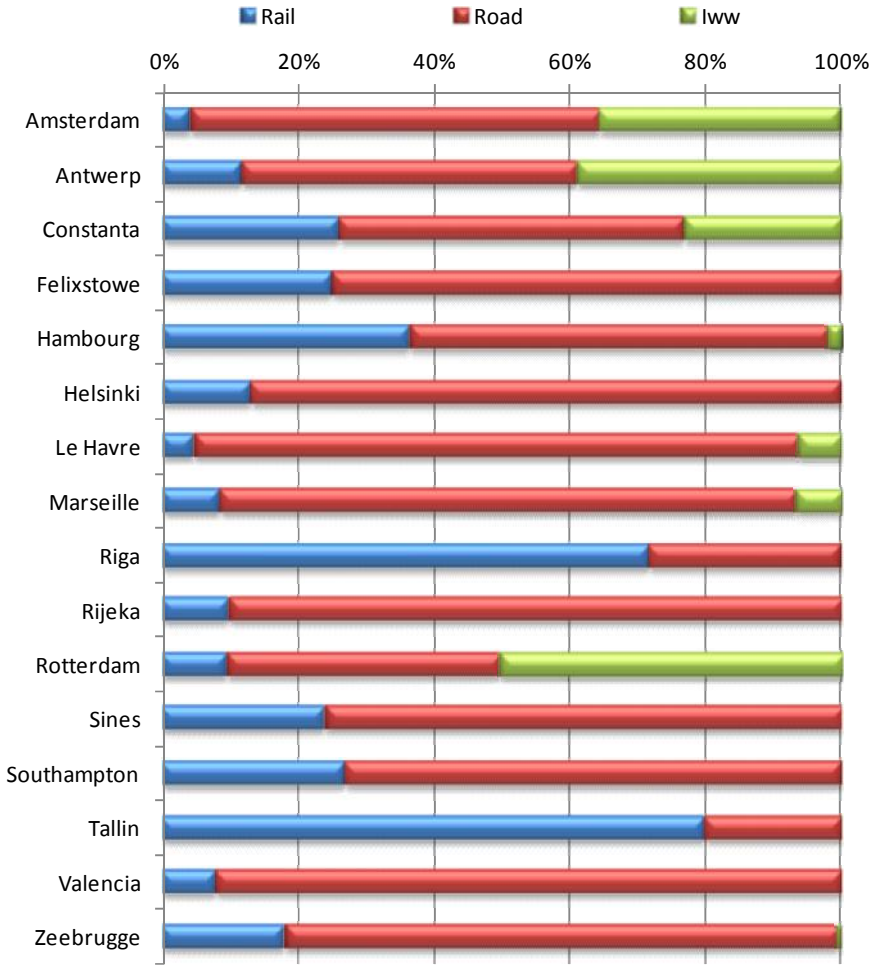
Source: Author's elaboration on 2013 port data.

Figure 17 shows that, overall, road is the most frequently used mode of transport to move goods from port to inland destinations. However, as better highlighted in the following sections, other modes are also shown to be used frequently.

Inland waterways are largely used by ARA (Amsterdam, Rotterdam, Antwerp) ports and in Constanta, all located on the estuary of important navigable rivers. Smaller inland waterways are also used around the French Ports of Marseille and Le Havre.

With respect to rail, Tallin and Riga exhibit very high percentage shares overall. However, taking into consideration the dimension of total port throughput the best rail performance is found in Hamburg.

Figure 17: Modal share in selected ports (overall throughput)



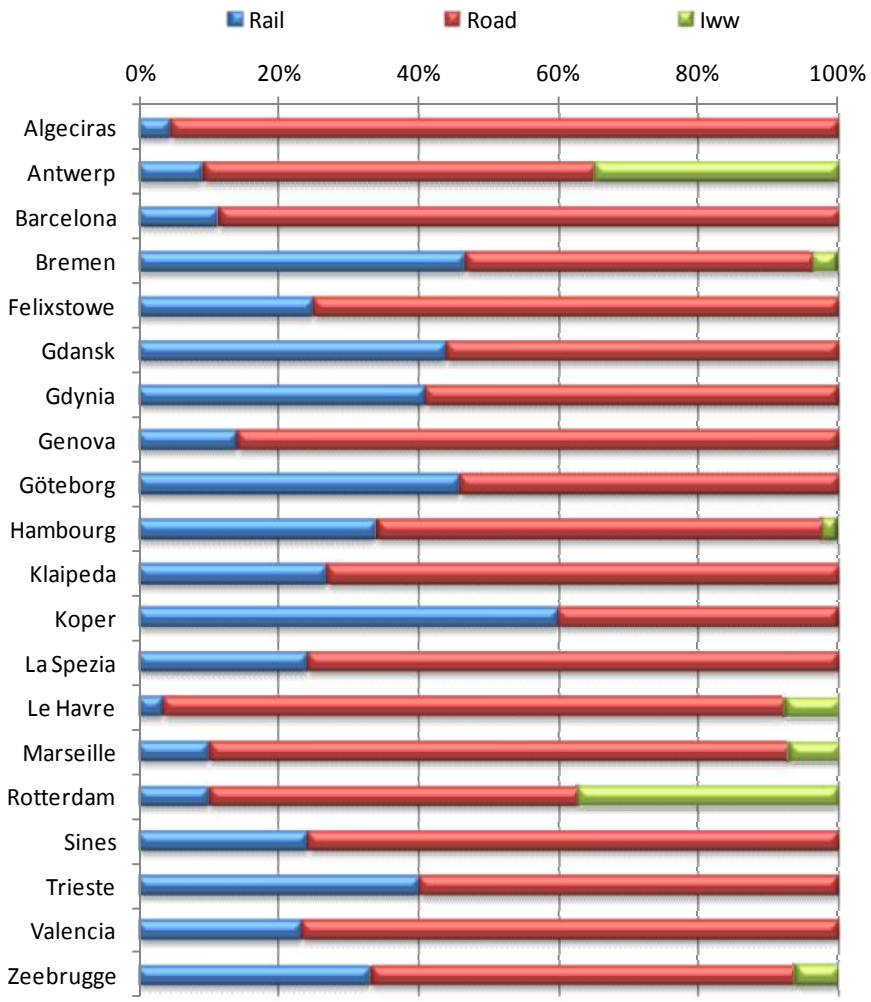
Source: Author's elaboration on 2013 port data.

Similar considerations arise from the analysis undertaken in the following figure 18, regarding the modal share of container transport only.

It is noteworthy that, on average, the rail share is higher than in relation to all goods, with many ports showing figures close to or higher than 40%.

Ports providing a large share of inland waterways use are the same as above. Small shares of IWW are also observed in the German ports of Hamburg and Bremen.

Figure 18: Modal share in selected ports (Container throughput)



Source: Author's elaboration on 2013 port data.

In the following sections, figures are presented and commented by mode of transport used for hinterland traffic for the selected representative ports. 2.2. relates to Rail transport, 2.3 is devoted to IWW share, while in 2.4 figures for road transport are presented.

Finally, section 2.5 presents an overview on traffic at major inland ports.

2.2. Rail connections to sea ports

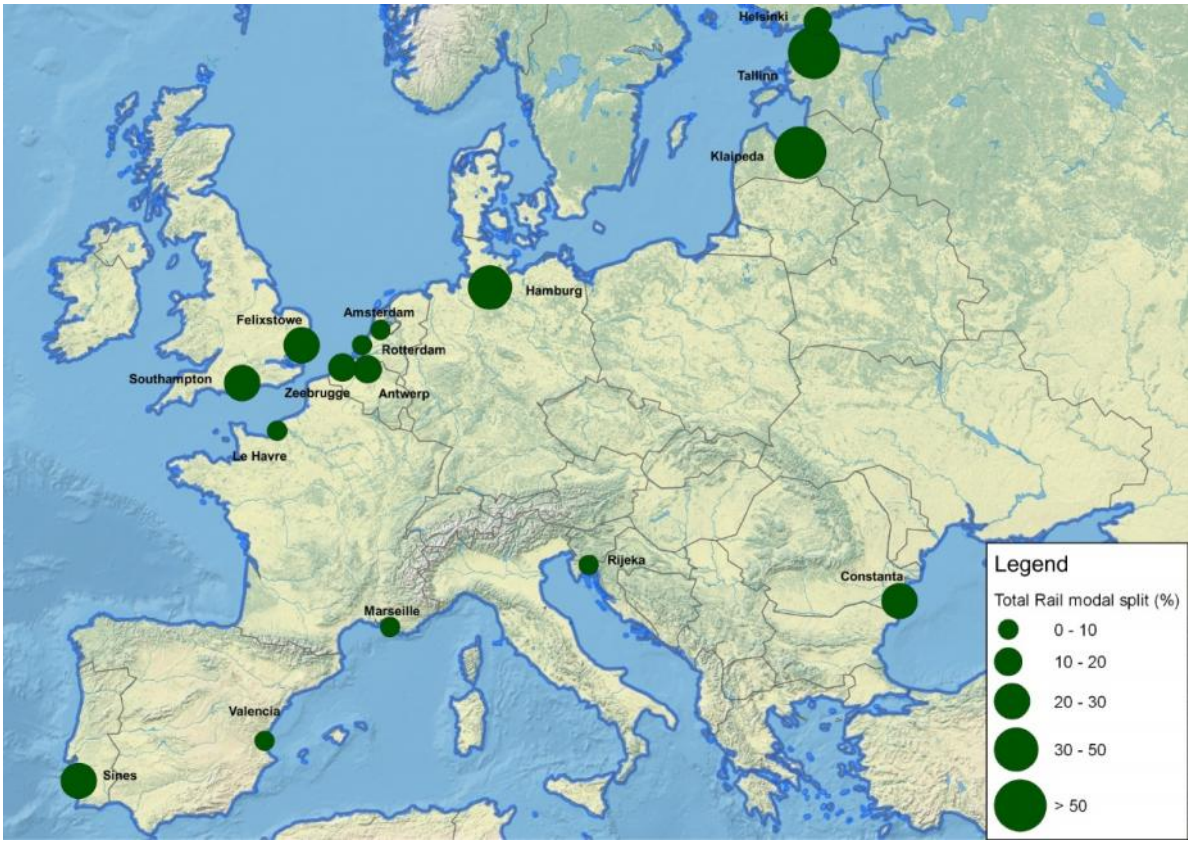
The railway system of ports is one of the key strategic assets of a port's infrastructure.

As explained above, the level of use of rail infrastructure to connect a port with inland destinations depends on different factors including infrastructure, management, and above all the reference market of the port.

The following illustrations highlight, in relation to selected ports, the rail modal share for total throughput and containerised flows, respectively.

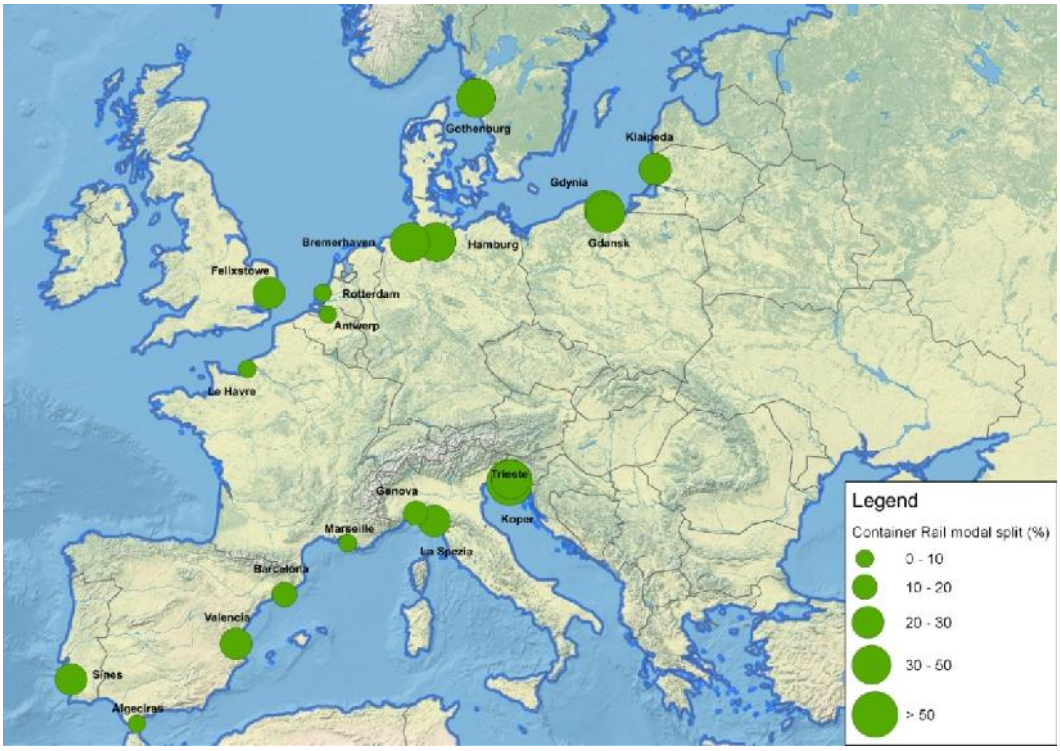
Best performances, not only in terms of modal share but in terms of traffic managed (up to 200 to 250 trains per day), are found in the German ports of Hamburg and Bremerhaven.

Figure 19: Selected ports: rail share for inland connections (total traffic)



Source: Author's elaboration on 2012-2013 port data.

Figure 20: Selected ports: rail share for inland connections (container)

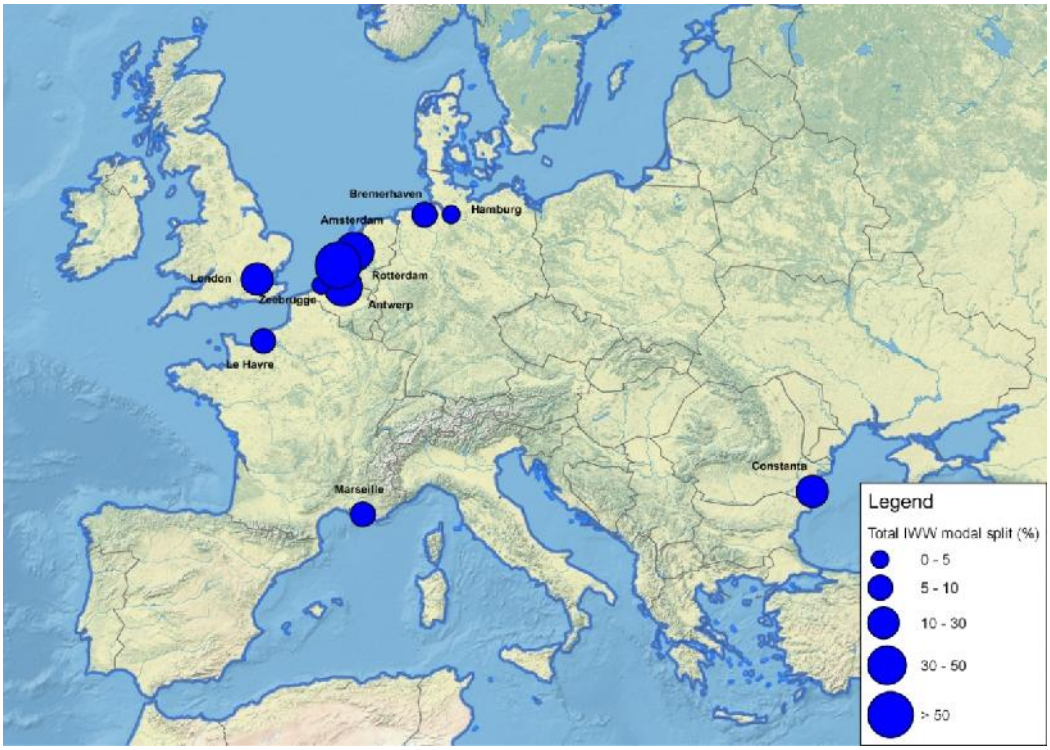


Source: Author's elaboration on 2012-2013 port data.

2.3. Inland waterway connections to sea ports

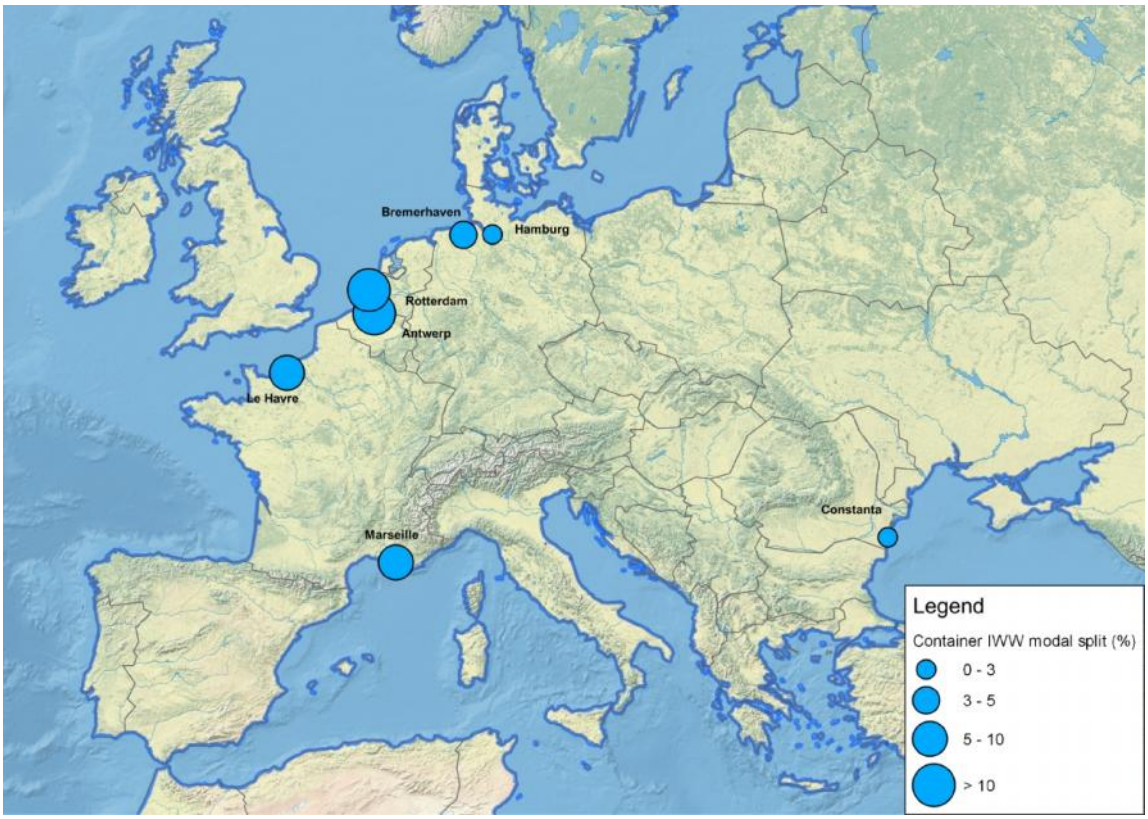
In some cases within the EU, inland waterways are used extensively to reach the hinterland, namely in the ports of Antwerp and Rotterdam; this is thanks to the suitability of the river Rhine and its connected canals for the purpose of inland navigation.

Figure 21: Selected ports: IWW share for inland connections (total traffic)



Source: Author's elaboration on 2012-2013 port data.

Figure 22: Selected ports: IWW share for inland connections (container)

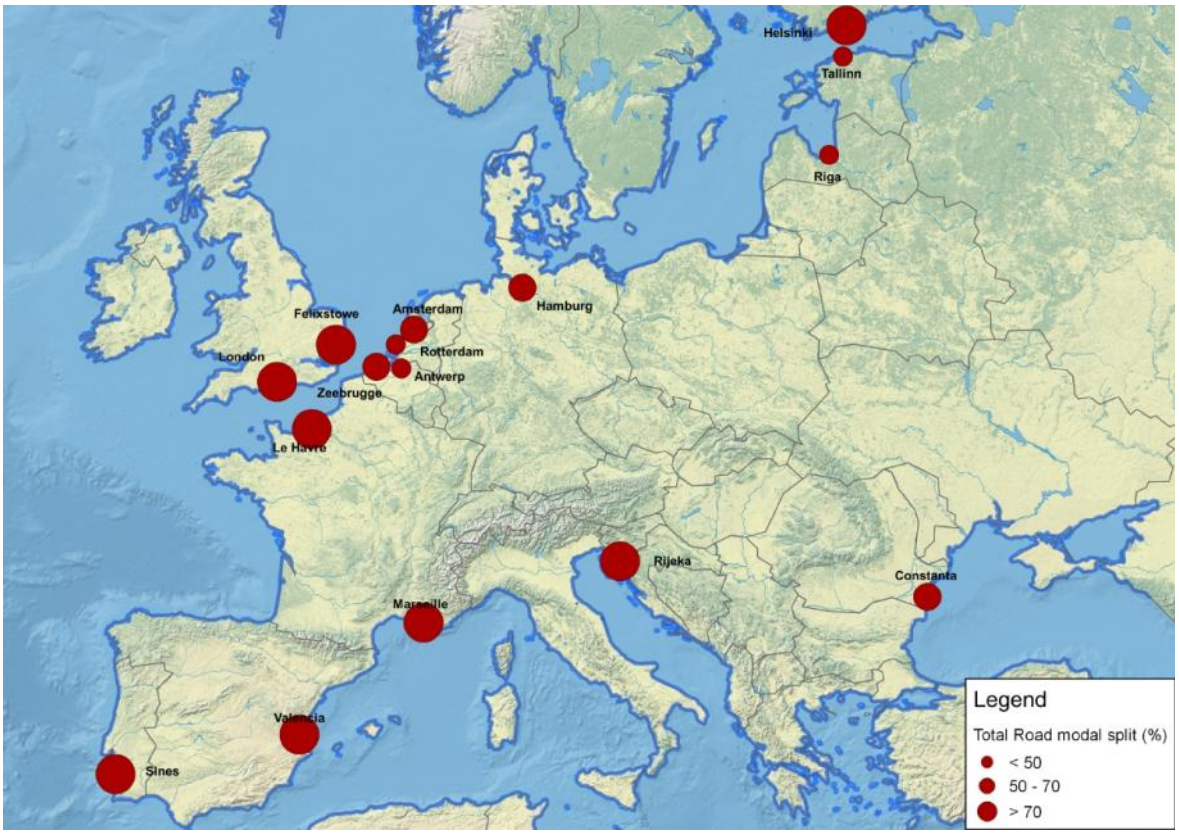


Source: Author's elaboration on 2012-2013 port data.

2.4. Road connections to sea ports

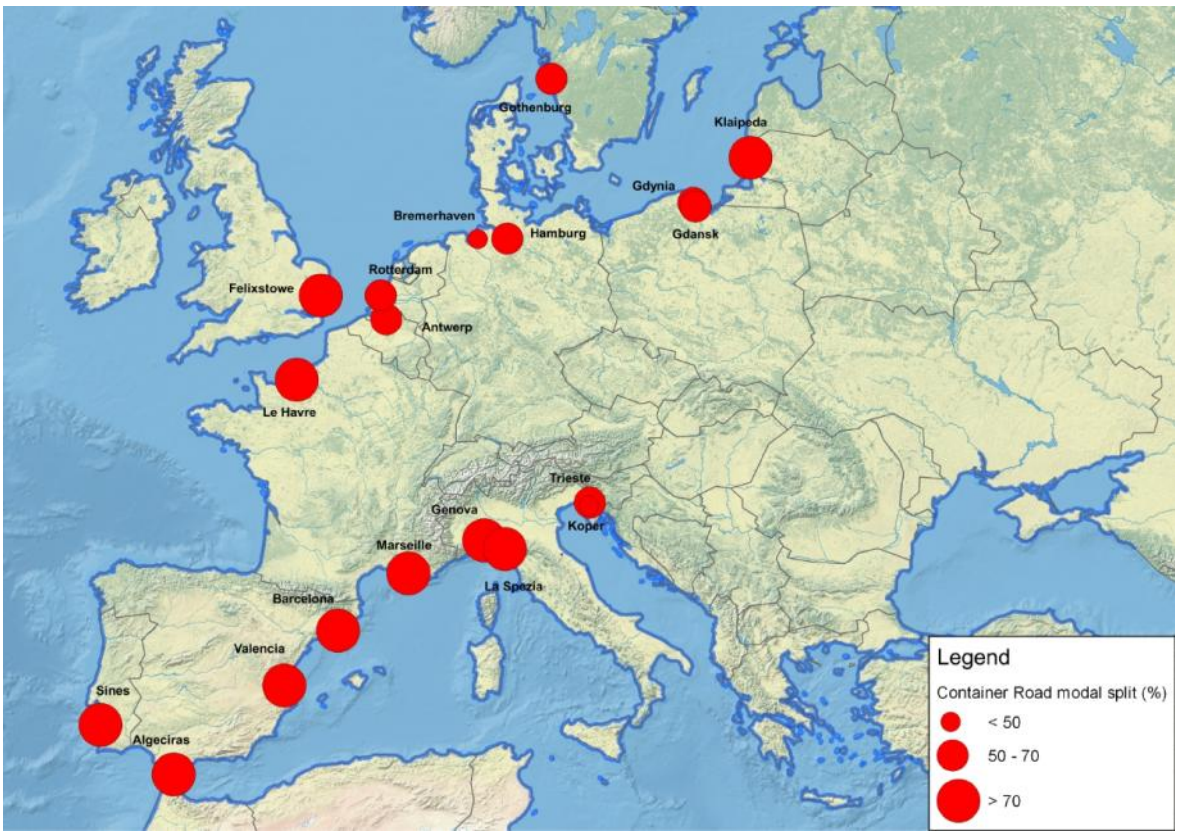
Road connections play the most important role in terms of inland connections to seaports with the exception of a small number of ports (such as Rotterdam where IWW is the most important mode; Riga, Tallin, and Koper where the most important mode is rail).

Figure 23: Selected ports: road share for inland connections (total traffic)



Source: Author's elaboration on 2012-2013 port data.

Figure 24: Selected ports: road share for inland connections (container)



Source: Author's elaboration on 2012-2013 port data.

2.5. Inland ports

The following tables provide an overview of traffic throughput in various inland ports.

The first two tables refer to the most important river ports along the Rhine. Traffic data from 2013 shows that Duisburg is by far the most important inland port.

While the first table considers the total traffic, the second one specifically relates to the container transport.

Table 8: Total riverside port transhipments in the largest Rhine ports 2013

Port	Transhipment 2013 (mio tonnes)
Duisburg (DE)	49.4
Cologne (DE)	11.7
Mannheim (DE)	8.7
Strasbourg (FR)	8.0
Ludwigshafen am Rhein (DE)	7.6
Neuss (DE)	7.6
Basel (CH)	6.8
Karlsruhe (DE)	6.4

Source: Inland navigation in Europe, Market observation 2014.

Though 72% of the overall traffic of the port is related to raw materials (mainly linked to the steel industry), Duisburg is the leading inland port also for container traffic.

The following map illustrates the container traffic at different inland ports.

Figure 25: Riverside container traffic at inland ports (2010)

Source: UIRR.

Inland ports of the upper Danube region show much lower volumes.

Table 9: Inland ports in the Danube region

Port	Riverside transhipments in 2013	TEU volumes in 2013
Regensburg	1,600,000	1,026
Linz	4,400,000	-
Vienna	1,600,000	1,218

Source: Inland navigation in Europe, Market observation 2014.

Finally table 10 provides an overview of the traffic data of the most important Rhine-Danube Core Network corridor ports. Since sometimes data refers to all the different modes of transport used, data is provided by mode of transport and the total traffic is presented where available.

Table 10: Rhine – Danube Core Network Corridor Ports

Inland core ports	Total	IWW		Rail		Road		
		IWW cargo traffic (t)	TEU	Rail Cargo traffic (t)	TEU	Road cargo traffic (t)	TEU	Year
Frankfurt		2,400,000	31,669	1,500,000	30,740			2010
Nuremberg	15,000,000	450,000		4,500,000		10,050,000		2010
Regensburg	7,371,745	1,621,784		2,064,089		3,685,873		2010
Enns		663,013			117,505		108,217	2010
Wien Freudenau	1,217,650		120		191,322		127,548	2010
Bratislava		2,349,962						2011
Komarno		408,970						2010
Komarom		394,021						2010
Budapest		1,002,155						2010
Drobeta-Turnu		491,961						2011
Vidin		1,144,978						2011
Ruse		501,102						2011

Source: IC Consulente et al., Study on TEN-T Core Network Corridor "Rhine–Danube", Draft Final Report, November 2014.

2.6. Future challenges and concluding remarks

The EU White Paper promotes the development and reinforcement of multimodal freight corridors. In the context of the Trans-European Network for Transport (TEN-T) and its intended core network, the priority is to synchronise investments in transport infrastructure with efficient, innovative, and multimodal transport services. The goal is a functional TEN-T network by 2030 and a high-quality TEN-T network with high, adequate capacity by 2050. A connection from all sea ports to the rail freight network and wherever possible to the inland shipping network by 2050 is in keeping with this goal.

A 50% growth of cargo handled in EU ports is predicted by 2030. Europe's ports therefore need to adapt to handle the increased traffic, taking into account the changing nature of trade.

The goal set by the European Commission is a transfer of 30% of goods from road to rail and inland shipping by 2030 and 50% by 2050. As seen above, many ports (even big ports) are close to or have already reached these targets.

These targets rely on an increased efficiency of ports. The efficiency of ports varies greatly across Europe: not all EU ports are performing at the same level, and in recent years there has been a widening gap between ports that have adapted to new logistic and economic requirements and ports that have not kept up. The performance gaps result in traffic detours, longer sea and land trips and, as a consequence, in more transport emissions and more congestion to the detriment of EU citizens and the economy.

In order to transport more cargo to and from the hinterland via short sea, rail, and inland shipping, a concentration of volume streams is necessary. It is therefore likely that the trend of traffic flows concentrating on major ports will continue. On the other hand, other types of traffic that tend to be more widely distributed among a number of ports closer to its final destination (typical of ro-ro and short sea traffic patterns) could lead to an increase in transport by road to the hinterland because the volume needed to make economically responsible intermodal transport possible would not be reached.

Moreover, the concentration of hinterland transport over a core network of hinterland connections via the large European sea ports is in line with the current structural trend of scale increase in (intercontinental) sea transport. This applies to both bulk shipping and container shipping, focusing on limiting the number of ports of call and concentrating on the large sea ports that can act as both a gateway and a hub.

Among the main challenges ahead, accommodating larger ships (now 15-18,000 TEU, but up to 22,000 in the near future) demands not only seaside investments, but also the capacity to handle increasing and more concentrated volumes of goods (containers).

In sum, ports must adapt to changing needs of the industry:

- The size and the complexity of the fleet are increasing: ultra-large container ships appear, but also new types of ro-ro ferries and gas-carriers. Bigger ships require higher peak capacity when delivering more cargo or embarking a high number of passengers.
- An increasing number of large ships with a capacity of 16-18000 TEU, which are able to load and unload up to 4000-5000 TEU per call in a single port. This requires ports to have adequate equipment to handle goods and last mile infrastructures to manage frequent flows of trains to the hinterland, uncongested road connections and – wherever available – inland waterway facilities.

3. CONCLUSIONS

Modern maritime logistics is essentially one chain comprising quayside, terminals, port-related infrastructure (rail/barge), hinterland infrastructure (railways/inland waterways) and hinterland terminals. In the short- and mid-term an optimised utilisation of existing infrastructure and transport systems is vital to face the upcoming challenges of a dynamic market development.

Data on the current modal share to and from ports highlights how road transport is still the predominant choice for freight transport: for a range of reasons including flexibility, reliability, and acceptable cost levels.

The use of other land modes such as rail and inland waterways is, however, considered a prerequisite for the competitiveness of a port. A multimodal offer, including fast and reliable services for rail and efficient manoeuvres within ports allows ports to enlarge their catchment area.

Inland waterways, where available, are the most cost effective mode to move goods between ports and inland destinations. Their overall capacity is not currently fully exploited, with the exceptions of a few successful cases such as the ports of the Rhine-Scheldt delta, entrance to the richest hinterland of the Netherlands, Belgium, Germany (up to the border with Switzerland), the Danube and, to a lesser extent, France.

The most important inland ports are located in Germany along the river Rhine: Duisburg is by far the most important river port. Inland waterway use for container transport is growing, while for other commodities the trend is quite stable.

Over the last twenty years the containerisation process, which has characterised the maritime sector, has switched the focus mainly onto the efficiency of inland transport of containers. The sector has evolved towards a higher concentration, granting a competitive advantage to those ports that, for whatever reason, were able to manage large volumes of containers. Nowadays concentration is an issue in particular in the so-called Northern Range (Rotterdam, Antwerp, Hamburg etc.) and to a lesser extent in Mediterranean ports (Genoa, Valencia, Marseille).

Due to the attraction of growing flows of containers, it has become easier in these ports to organise more efficient transport by rail and to implement strategies to expand the catchment area. However, the attraction of high volumes of boxes is not the only opportunity to attain appreciable results in terms of non–road modal share; there are examples of well managed ports/terminals that have reached significant rail performances also for container throughput around or beneath 1 million TEU: Koper, La Spezia, Trieste in the Mediterranean area; Gdynia, Gdansk and Gothenburg in Northern Europe.

Finally, the ro-ro segment, which has benefitted from policy support over the last ten years mainly thanks to the Motorways of the Sea concept, is generally complemented by inland legs performed as on-road services; few intermodal solutions combine ro-ro with rail services.

The goal set by the European Commission is a transfer of 30% of goods transported by road to rail and inland shipping by 2030 and 50% by 2050. As seen above, many ports (even big ports) are close to or have already reached this target, but others are still far from it.

Incentives to foster modal shifts by using all disposable capacities in barge and railway transportation can be considered as one of the main objectives to tap potentials on the carrier side and to fulfil the growing requirements for environmental-friendly transport solutions.

However, the modal share and in particular the choice of non-road modes, which is among the key objectives of the EU transport policy, is driven by a mix of factors that characterise demand and supply of transport services:

- on the demand side, the requests of the shippers for solutions that optimise lead time, reduce costs, and guarantee safe and reliable services. In relation to short distance shipments, these requests are often met by the solutions offered by road transport; however, rail, and even more so, inland waterways have proved to represent strong alternatives for medium to long distance inland ranges;
- a supply side characterised by high-quality infrastructures within ports and between ports and inland destinations and, more importantly, an efficient management of existing infrastructures. Success stories are those where services are competitive, fast, frequent, and reliable.

Ports must combine these objectives with the changing needs of the industry:

- the increasing size and complexity of the fleet: ultra-large container ships in particular, but also new types of ro-ro ferries and gas-carriers.
- Large ships with a capacity of 16-18000 TEU, which load and unload up to 4000-5000 TEU per call in a single port. This requires that ports are equipped with adequate facilities to handle goods and last mile infrastructures to manage frequent flows of trains to the hinterland, congestion-free road connections and, wherever available, inland waterways services.

Finally, on the infrastructure side, the need for interventions (e.g. on rail tracks and yards) can be based only on the analysis of each port, of its current supply, and of the dimension and characteristics of its hinterland. The draft work plan of the core network corridors, published by the EC (Corridor Studies and Corridor work plan 2014[11]), provides a basis for identifying the priorities that should enable the removal of bottlenecks and the increase of capacity along the main lines and the lines connecting the core ports.

[11] http://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/corridors/corridor-studies_en.htm.

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