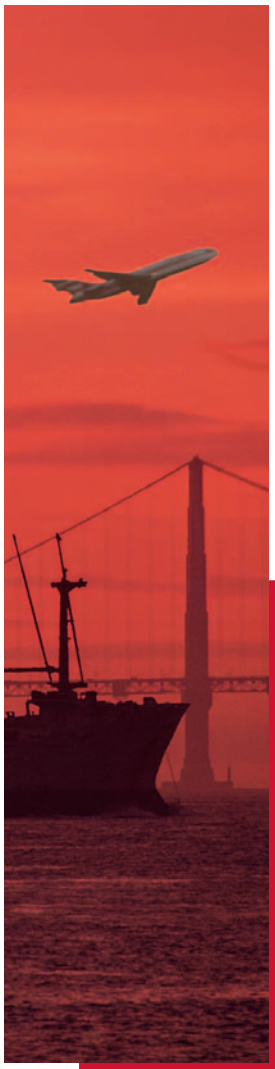
EUROPEAN PARLIAMENT

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B
STRUCTURAL AND COHESION POLICIES



Agriculture and Rural Development

Culture and Education

Fisheries

Regional Development

Transport and Tourism

THE EVOLVING ROLE OF EU SEAPORTS IN GLOBAL MARITIME LOGISTICS

STUDY

EN DE ES FR IT NL PL

2009

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

TRANSPORT AND TOURISM

THE EVOLVING ROLE OF EU SEAPORTS IN GLOBAL MARITIME LOGISTICS – CAPACITIES, CHALLENGES AND STRATEGIES

STUDY

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

AUTHORS

Buck Consultants International (with Mr Karel Vanroye and Mr Bart van Mol)
With the support of Catram Consultants and ISL (Institute of Shipping Economics and Logistics).

RESPONSIBLE ADMINISTRATOR

Mr Nils Danklefsen
Policy Department Structural and Cohesion Policies
European Parliament
B-1047 Brussels
E-mail: poldep-cohesion@europarl.europa.eu

LINGUISTIC VERSIONS

Original: EN
Translations: DE, ES, FR, IT, NL, PL

ABOUT THE EDITOR

To contact the Policy Department or to subscribe to its monthly newsletter please write to: poldep-cohesion@europarl.europa.eu

Manuscript completed in October 2009

This document is available on the Internet at:
http://www.europarl.europa.eu/studies

DISCLAIMER

EUROPEAN PARLIAMENT

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

TRANSPORT AND TOURISM

THE EVOLVING ROLE OF EU SEAPORTS IN GLOBAL MARITIME LOGISTICS – CAPACITIES, CHALLENGES AND STRATEGIES

STUDY

Abstract

The market environment for seaborne trade has changed considerably within the last 15 years. Globalisation, offshoring and the unprecedented growth of containerisation have led to changes in maritime transport and logistics chains. The worldwide economic downturn of 2008–2009 has also had an impact on the ports and maritime sectors. Most ports and shipowners have experienced decreasing freight volumes or throughputs. This study aims to explain the impact of these developments on seaports and to formulate recommendations for the European Parliament.

IP/B/TRAN/FWC/2006-156/lot5/C1/SC4 October 2009

PE 419.121 EN

CONTENTS

ABBREVIATIONS

BDC	Bulk distribution centre
CEU	Car equivalent unit
DWT	Deadweight tonnes
EDC	European distribution centre
EDI	Electronic data interchange
FSU	Former Soviet Union
GDP	Gross domestic product
LCL	Less than containerload
LTL	Less than truckload
M&A	Mergers and acquisitions
PPP	Public-private partnership
PPS	Purchasing power standard
RDC	Regional distribution centre
TEU	Twenty-foot equivalent unit
3PL	Third-party logistics service provider
4PL	Fourth-party logistics service provider
ULCC	Ultra-large crude carrier
VLCC	Very large crude carrier

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Economic growth, offshoring and outsourcing, together with the enlargement of the European Union, have resulted in changes in logistics.

- Supply-chain structures have become more complex, which has led to the emergence of major logistics providers.
- Up until mid-2008, seaborne trade increased substantially, resulting in increasing volumes being handled by EU seaports.

In particular, container trades have seen strong growth, with average annual growth rates of 10%. This growth has had a considerable impact on the shipping and terminal markets.

- Different growth rates between world regions have resulted in an imbalance in container flows. More and more empty containers have to be repositioned, especially in Asia-Europe trade.
- The high potential of the container market, together with changing requirements from shippers, have resulted in consolidation. A high rate of newbuilding and mergers and acquisitions ('M&A') have led to the emergence of major worldwide shipping companies that are controlling a large share of the world fleet.
- Growing container flows have led to capacity problems and congestion at some ports. This problem has been (temporarily) eased as a result of the current economic downturn, but will probably reappear once things return to normal.
- In the terminal-operating sector dominant world players have emerged that are trying to take positions in strategically located ports. To secure (semi-)dedicated terminal capacity, shipping companies have increasingly invested in terminal operations, for example by establishing joint ventures with terminal operators for the exploitation of new terminals.
- Bigger ships are being built to meet the growing demand for container transport. There is a clear increase in the size of container vessels. The dominant Asia-Europe trade is expected to be served with 10 000+ twenty-foot equivalent unit (TEU) vessels. An increase in vessel size is also foreseen in the short sea shipping sector, which is very important for intra-EU flows.

Other markets, such as those for general cargo, RoRo and dry and liquid bulk, have also been transporting growing volumes to and from European ports. These fleets are also expanding, although at a slower pace.

The full impact of the economic downturn cannot be determined as yet. However, it is clear that the maritime sector (and the entire transport sector in general) has been greatly affected. Since the middle of 2008, transport volumes have been decreasing worldwide. Whereas many ports still grew in volume terms in 2008, the decline in container traffic during 2009 has been estimated at 10%. Other market segments (general cargo, RoRo, dry and liquid bulk) are also experiencing a drop in volumes.

The downturn has also resulted in overcapacity of the world fleet. In the past year this has meant that:

- orders for newbuilding are being stopped and shipowners are attempting either to cancel or to postpone the orders already placed;
- the number of laid-up vessels has grown. It is estimated that the idle fleet of container and dry bulk vessels currently represents some 10% of the world fleet;

- scrapping rates are increasing, while charter rates have plummeted.

Although it is still too early to make prognoses for the short to medium term, analysts predict that the malaise in the maritime sector will last a few years. It is estimated that 2008 volumes will not be reached again until 2011 or 2012. Nevertheless it is generally considered that the long-term prognosis towards 2020 remains positive.

The evolution in maritime logistics has led to changes in port organisation, which has gone through several stages. Whereas ports previously used to serve only a city and the immediate hinterland, their geographical market has grown over the last few decades. Since the 1970s, with growing containerisation as the main driver, most ports have evolved into port communities. The different stakeholders involved in port business have started working closely with the port authority in the form of port communities, with a view to optimising internal port processes and making the port more efficient. Port authorities were the driving force behind this reorganisation.

Since the 1990s, a new phase of port evolution has emerged in which cooperative interaction between ports has rapidly gained importance. The main driving forces were the emergence of short sea shipping, increasing vessel sizes and volumes and consequently the growing pressure on port capacity. This phase is called 'port regionalisation'. Different types of port have emerged:

- main ports: these ports attract large volumes in all market segments;
- transhipment ports: these generate large container flows, although their distribution function towards the hinterland is rather limited;
- second-tier ports: these have an important cargo-bundling and distribution function. The transhipment function can still be important, but lower volumes are generated than at main and transhipment ports;
- third-tier ports: these are largely focused on the immediate hinterland. Often not all market segments are handled at these ports.

At present, a 'terminalisation phase' is going on: port business is increasingly focused on terminals through which the hinterland is served. The drivers behind this phase are the role of international investors and further volume growth, together with capacity problems at certain ports. Ports are no longer purely considered transfer centres, but are now becoming comprehensive flow-through areas within logistics chains, which are functionally linked to distribution developments in the hinterland.

Inland terminals will become important consolidation hubs for seaports. They act not only as cargo-bundling points, reducing capacity pressure on seaport terminals, but also as distribution centres. Seaports and inland terminals belong to a tiered intermodal transport system serving the European supply chains.

The role of port authorities has changed alongside the evolving role of ports within the logistics chain. Whereas port authorities used to focus primarily on administration, infrastructure and capacity, they are now increasingly focusing on connectivity between the port area and the hinterland through various types of intermodal transport. Their main role will be to act as facilitators within logistics chains by:

- optimising port processes and infrastructure;
- creating platforms with all stakeholders to address issues affecting logistics performance;
- promoting and sustaining an efficient intermodal transport system;
- developing strategic relations with the hinterland.

While port terminalisation is still unfolding, the next phase in the rapidly changing logistics market is already starting to emerge, i.e. the formation of genuine port networks. Free space in ports is becoming a very limited commodity and port extension projects are not always feasible.

Although the economic downturn has slowed down the process in the short term, capacity shortage in seaports will probably reappear as a serious problem in the medium to long term. In some ranges maximum capacity will be reached in 10-15 years. Ports could overcome this limiting factor by forming networks with other ports in the same range and specialising in specific trades. Moreover, whereas ports are currently mainly competing on throughput, generating added value in terms of direct and indirect employment and creating agglomeration effects will become more important than volumes. This can be achieved by means of specialisation within a network. Links with the hinterland will become even more important.

The environment has become a crucial element of port development as port areas are still some of the most polluted places in Europe. A sustainable modal split and growing use of intermodal transport play an important role in helping to reduce the levels of harmful emissions in port areas. However, it is impossible to make a shift towards intermodal transport without an efficient network of inland terminals and sufficient effective interconnectivity, which is also a requirement for strong port networks. Hence it can be said that intermodality and interconnectivity should be priorities for the European Parliament.

The Green Paper on seaports and maritime infrastructure is a first step. While many of these initiatives are already well established, the European Parliament needs to focus more closely on the issue.

In order to support the role of EU seaports in a fast-changing logistics environment, the European Parliament could initiate:

- a harmonised approach to extending capacity at seaports;
- reliable cargo forecasts;
- easing of congestion in port areas;
- pooling of containers;
- administrative and legislative simplification;
- minimum service levels at inland terminals;
- in-depth examination of the impact of different types of haulage and distribution requirements on transport use;
- the future role of port authorities;
- cooperation between seaports, inland ports and inland terminals.

1. INTRODUCTION

1.1. Background

Shipping and ports are essential for international trade and commerce. 90% of the EU's external trade and over 40% of its internal trade is transported by sea. Europe's leadership in this global industry is unquestionable as it controls 40% of the world fleet. Every year over 3.5 billion tonnes of cargo and 350 million passengers pass through European seaports. Approximately 350 000 people work in ports and related services, which together generate an added value of approximately €20 billion[1].

The market environment for the global sea trade has changed considerably in the last 15 years. Globalisation, the elimination of trade barriers, the unprecedented growth of containerisation and the increase in seaborne trade have had an impact on maritime transport and logistics chains. Since mid-2008, the worldwide economic downturn has also had an impact on freight volumes.

International supply chains have become more and more complex. The ability to deliver integrated supply-chain services has been a trend driven by customer demands. At the same time, technological possibilities are expanding – in particular thanks to advances in information technology. The role and strategic position of the key players in the maritime logistics chain are constantly changing.

At the same time, it is possible to observe trends towards the reorganisation and market concentration of both liner shipping companies and container terminal operators, by means of cooperation agreements, mergers and acquisitions.

For EU seaports – as key interfaces in the international maritime logistics chain – these trends are having a significant impact, particularly on capacity development.

1.2. Objectives of the study

Against this background, the purpose of this study is:

- to provide the European Parliament's Committee on Transport and Tourism with an up-to-date overview of recent changes and developments in global maritime logistics and global sea trade;
- to assess in detail the impact of these developments on ports as regards their capacity, role and strategic position in the logistics process in relation to the other key players;
- to make recommendations to EU policy-makers.

[1] European Commission Green Paper, 'Towards a future maritime policy for the Union: a European vision for the oceans and seas', 7 June 2006.

1.3. Content

This study is structured as follows. Chapter 2 provides an overview of recent developments in international maritime logistics, starting with an analysis of trends in global trade, supply chains and logistics.

Chapter 3 aims to assess and explain the evolving role of EU ports and the new challenges they face in the fast-changing logistics and market environment. The first part of this chapter focuses on the evolution of port organisations, taking into account maritime and hinterland developments. The second part addresses the current situation and future developments.

Chapter 4 deals with recommendations for EU policy-makers. It covers the key question of the measures by which the EU could contribute to the successful and sustainable development of EU ports in the context of their future growth, including potential capacity problems, their role in the maritime logistics chain, and their function within the European transport system in general.

2. MARITIME AND LOGISTICS DEVELOPMENTS

2.1. Introduction

This chapter provides an overview of developments that have an impact on seaports. It begins with a description of developments in international trade and their impact on supply-chain structures and logistics. Special attention is paid to the impact of the worldwide economic downturn. The second section is dedicated to the container market, which now has a significant influence on port developments. The next sections deal with other market segments such as the conventional general cargo market, the RoRo (roll on/roll off) market, and the dry bulk and liquid bulk markets. Although these markets are somewhat overshadowed by the container market, they do account for a significant proportion of global trade and development.

2.2. Trade and logistics trends

2.2.1. Trade development

As a result of world economic growth and the continuing growth in world population and income, trade flows have increased considerably. This increase has also been stimulated by trade liberalisation, globalisation, outsourcing and lower transport rates coupled with greater transport efficiency. Intra-regional volumes remain significant, especially in the EU, but the evolving economic and political environments have increased the proportion of inter-continental flows, leading to considerable changes in transport, logistics and supply-chain management.

Economic growth

Between 2000 and 2007 world GDP[2] grew at an average rate of 3% (WTO, 2007). Among the European Union Member States, large differences in GDP growth were recorded. The strongest growth during this period was generally recorded by those central and eastern European countries that joined the EU in 2004 and 2007. An overview of the individual growth rates for the Member States is given in Annex 1.

While in February 2008 the GDP growth rate for the EU-27 for 2008 was forecast at 2.4%, the real GDP growth rate for that year was only 0.9%. For 2009, a forecast of 2.4% growth was generally accepted, while real growth is estimated at -4% (see Annex 2).

Merchandise trade

In view of the above, it comes as no surprise that merchandise trade has grown strongly over the past decade. Asian exports especially, and Chinese exports in particular, have seen very strong growth (Table 2.1). On the import side, a surge in growth can be observed for South and Central America and for the Commonwealth of Independent States (CIS). Other strong import regions are Africa and the Middle East.

[2] GDP: Gross domestic product – the total market value of all final goods and services produced within a country or region in a given period of time. It is also considered as the sum of gross value added at every stage of production of all final goods and services.

Table 2.1. Volume growth of world merchandise trade for selected regions and economies (annual percentage growth, 2000-2008)

Exports			Countries / Regions	Imports		
2000-2006	2007	2008		2000-2006	2007	2008
5.0	6.0	2.0	**World**	5.0	6.0	2.0
3.0	5.0	1.5	**North America**	5.0	2.0	-2.5
6.0	3.0	1.5	**South and Central America**	6.0	17.5	15.5
4.0	4.0	0.5	**Europe**	4.0	4.0	-1.0
4.0	3.5	0.0	**EU (27)**	3.0	3.5	-1.0
8.0	8.4	5.5	**Commonwealth of Independent States**	17.0	20.0	15.0
10.0	11.5	4.5	**Asia**	9.0	8.0	4.0

Source: WTO (2009)

World merchandise trade grew more strongly than world GDP, which clearly highlights the effects of increasing globalisation and economic integration. For the developed economies, export growth was driven by increased global demand for capital goods. While EU exports grew by 3.5% in 2007, they came to a halt in 2008.

The economic downturn started in mid-2008. Merchandise trade expanded by 'only' 2%, down from 6% in 2007. According to the WTO, world merchandise trade is likely to decrease by some 9% in 2009. Developed economies' exports are forecast to drop by some 10% on average, and those of developing countries by 2–3%.

As can be seen in Figure 2.1, intra-regional trades still account for a large share of world merchandise trade (2007 figures); this is especially true of Europe. Intra-European trade represented more than 31% of the total value of world merchandise trade, whereas the value of inter-regional trade between Europe and other parts of the world accounted for 23% (Table 2.2). This leads to two conclusions:

- intra-European trade accounts for a large proportion of trade volumes;
- Europe accounts for a large share of the total value of world merchandise trade.

Figure 2.1. Intra-regional merchandise trade flows 2007

Intra-regional trade: 54,8% of the total world merchandise trade

Source: WTO (2008)

Table 2.2. Shares of intra- and inter-regional merchandise trade, 2007

Origin	Destination							
	North America	South & Central America	Europe	CIS	Africa	Middle East	Asia	World
World	**18.5**	**3.3**	**43.7**	**2.9**	**2.6**	**3.5**	**24.2**	**100.0**
North America	7.0	1.0	2.4	0.1	0.2	0.4	2.6	**13.6**
South & Central America	1.1	0.9	0.8	0.0	0.1	0.1	0.6	**3.7**
Europe	3.4	0.6	31.2	1.4	1.1	1.1	3.2	**42.4**
CIS	0.2	0.0	2.1	0.8	0.1	0.1	0.4	**3.7**
Africa	0.7	0.1	1.2	0.0	0.3	0.1	0.6	**3.1**
Middle East	0.6	0.0	0.8	0.0	0.2	0.7	2.9	**5.6**
Asia	5.6	0.7	5.2	0.6	0.7	1.1	13.9	**27.9**

Source: WTO (2009)

Seaborne trade

Growth in world GDP and merchandise trade directly affects seaborne trade and the demand for shipping services. In 2007, goods loaded at ports worldwide were estimated to have reached 8.02 billion tonnes, which is equivalent to an annual growth rate of 4.8% (UNCTAD, 2008). Tanker cargo accounted for one third. However, the majority of goods loaded around the world were dry cargo (approximately two thirds), including bulk, breakbulk and containerised cargo. A geographical breakdown by continent shows the dominance of Asia with a share of 40%, followed by America with 23% and Europe with 18%. These three continents accounted for over 80% of the total goods loaded. Africa had a share of 10% and Oceania 9%.

As volumes increased, so did ton-miles. In 2007, a rise of 39% compared with 2000 was recorded, resulting in 32,932 billion ton-miles (UNCTAD, 2008). The number of ton-miles increased by 4.7% in comparison to 2006.

In its 2008 *Review of Maritime Transport*, UNCTAD estimated that world seaborne trade would increase by 44% in 2020 and double by 2030, potentially reaching 11.5 billion tonnes and 16.04 billion tonnes respectively. These estimates are based on an annual growth rate of 3.1%, which matches the annual average growth rate of world seaborne trade during the last three decades. However, it is unclear how the worldwide economic downturn will affect them in the short to medium term. The optimistic trade forecasts of early 2008 have been proven inadequate, and the downturn has delivered shockwaves to the transport sector. Analysts predict that the downward trend in demand for shipping services will last for two to three years, followed by growth from 2012 onwards. However, this projected growth could start sooner or later than 2012.

Volumes handled in EU ports

Twenty-two EU Member States have coastlines, and the Union has a wide range of seaports. Together, these ports are estimated to have handled nearly 3.8 billion tonnes in 2006, 63% of which were inbound flows and 37% were outbound flows. The volume of EU-27 short sea shipping amounted to more than 1.9 billion tonnes, equalling 62% of total EU-27 maritime goods transport. There are over 1 000 seaports in the EU, around 300 of which handle more than 1 million tonnes of goods and 350 000 passengers per year. Liquid bulk was the largest cargo segment (37.9%), followed by dry bulk (24.1%) and containerised cargo (21%). RoRo cargo and general cargo accounted for 10.8% and 6.2% respectively.

The ‘top five’ ports – Rotterdam, Antwerp, Hamburg, Marseille and Amsterdam – handled approximately 915 million tonnes in 2007, or 24% of total throughput. The ‘top ten’ ports accounted for more than 33%. The port of Rotterdam, the number one European port for container, liquid and dry bulk handling, is by far the most important port, handling over 10% of European volume (Table 2.3).

Owing to its proximity to major European production and consumption markets, the north-west European region has the largest ports, located in Belgium, France, Germany, the Netherlands and the United Kingdom. The largest ports in the southern and Mediterranean region are located in France, Italy, Spain and Romania.

It is becoming clear that many EU ports experienced strong growth between 2000 and 2007. Growth rates were more than 50% at the German ports of Hamburg and Bremen. The Spanish ports of Algeciras, Valencia and Barcelona, together with Gioia Tauro (Italy), Constanţa (Romania) and Riga (Latvia), also had growth rates of over 50% between 2000 and 2007.

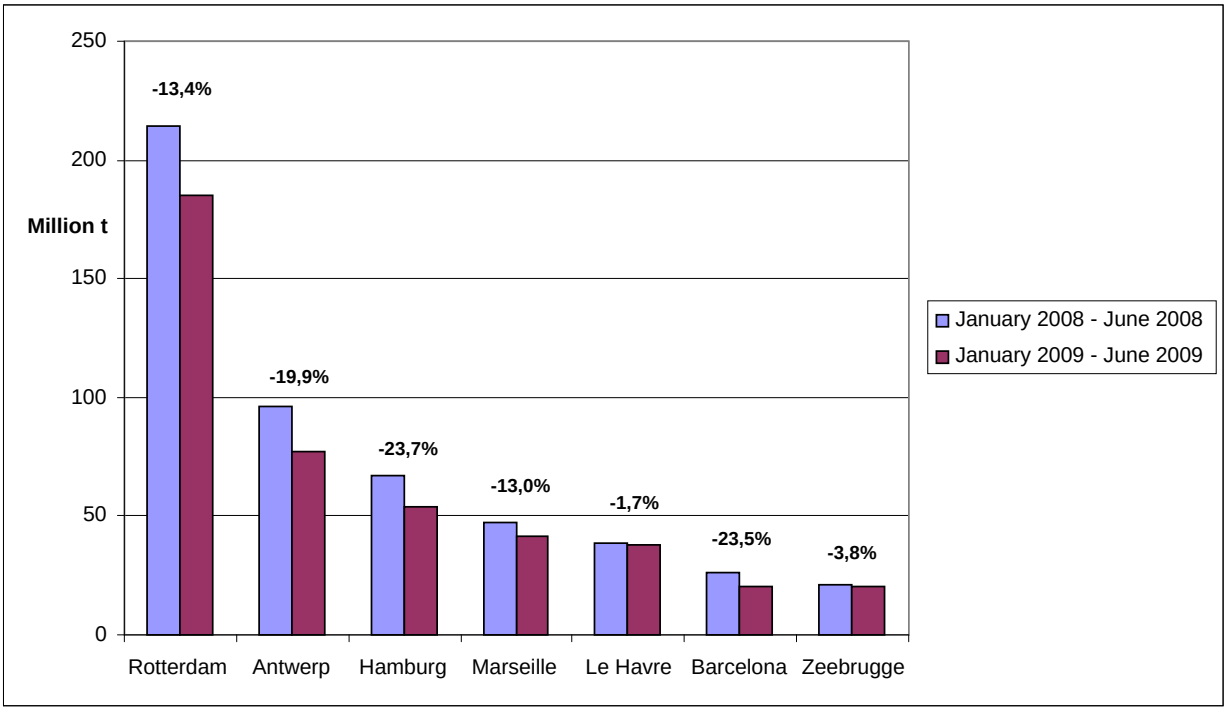
Table 2.3. The 45 largest EU ports in terms of volume, 2007 ranking (in million tonnes)

PORT		2000	2004	2005	2006	2007	2008	% change 00/07	% change 07/08
Rotterdam	NL	320.0	352.8	370.2	378.2	406.8	421.0	+27.1%	+3.5%
Antwerp	BE	130.5	152.3	160.1	167.4	182.9	189.4	+45.1%	+3.6%
Hamburg	DE	85.9	114.5	125.9	135.3	140.9	140.4	+64.0%	-0.3%
Marseille	FR	94.1	94.1	96.5	100.0	96.3	96.0	+2.3%	-0.3%
Amsterdam	NL	64.1	73.2	78.9	84.3	87.8	94.8	+37.0%	+8.0%
Le Havre	FR	67.5	76.2	75.0	73.9	78.9	80.5	+16.9%	+2.0%
Algeciras	ES	44.0	61.3	63.5	66.3	74.5	74.8	+69.3%	+0.4%
Bremen	DE	44.8	52.3	54.2	64.6	69.1	74.5	+54.2%	+7.8%
Immingham	UK	50.0	57.6	60.7	64.0	66.3	65.3	+32.6%	-1.5%
Constanţa	RO	33.1	50.4	60.6	57.1	57.8	61.8	+74.6%	+6.9%
Genoa	IT	50.8	55.8	55.2	55.0	57.2	55.7	+12.6%	-2.6%
Dunkirk	FR	45.3	51.0	53.4	56.6	57.1	57.7	+26.0%	+1.0%
Valencia	ES	25.2	37.5	40.9	47.3	53.3	59.7	+111.5%	+12%
London	UK	47.9	53.3	53.8	51.9	52.7	53.0	+10.0%	+0.6%
Barcelona	ES	29.8	39.3	43.8	46.4	50.0	50.5	+67.8%	+1.0%
Tees & Hartlepool	UK	51.5	53.8	55.8	53.3	49.8	45.4	-3.3%	-8.8%
Taranto	IT	33.9	43.6	47.7	49.4	47.2	43.3	+39.2%	-8.3%
Trieste	IT	47.6	47.3	47.8	48.2	46.1	48.3	-3.2%	+4.8%
Southampton	UK	34.8	38.4	40.0	40.6	43.8	41	+25.9%	-6.4%
Wilhelmshaven	DE	43.4	45.1	46.0	43.1	42.7	40.3	-1.6%	-5.6%
Zeebrugge	BE	35.5	31.8	35.6	39.5	42.1	42.0	+18.6%	-0.2%
Calais	FR	31.9	37.9	38.3	40.5	41.5	40.4	+30.1%	-2.7%
Gothenburg	SE	33.1	36.9	37.1	40.7	41.1	43.3	+24.2%	+5.4%
Bilbao	ES	27.5	31.6	33.2	37.2	38.4	38.0	+39.6%	-1.0%
Forth Ports	UK	41.1	34.9	34.2	31.6	36.7	39.1	-1.07%	+6.5%
Tarragona	ES	27.3	29.8	31.0	31.3	36.1	33.3	+32.2%	-7.8%
Tallinn	EE	29.2	37.3	39.4	41.1	36.0	29.0	+23.3%	-19.4%
Milford Haven	UK	33.8	38.5	37.5	34.3	35.5	35.9	+5.0%	+1.1%
Gioia Tauro	IT	21.6	29.4	24.8	28.6	35.4	--	+63.9%	--
Nantes St Nazaire	FR	36.6	35.1	38.2	38.6	34.0	32.9	-7.1%	-3.2%
Leghorn	IT	24.6	27.1	28.2	28.6	32.9	--	+33.7%	--
Lübeck	DE	25.7	24.7	27.6	30.2	32.3	--	+25.7%	--
Liverpool	UK	30.6	32.2	33.8	33.5	32.3	32.2	+5.6%	-0.3%
Ventspils	LV	34.8	27.8	29.9	29.1	31.0	28.6	-10.9%	-7.7%
Dublin	IE	21.0	25.3	26.9	29.3	30.9	29.5	+47.1%	-4.5%
Venice	IT	28.2	29.8	29.1	30.9	30.2	30.2	+7.1%	0.0%
Klaipeda	LT	19.4	20.3	21.8	23.6	27.4	29.9	+41.2%	+9.1%
Rostock	DE	22.1	21.8	22.9	25.2	26.5	27.2	+19.9%	+2.6%
Ravenna	IT	22.7	25.4	23.9	26.8	26.3	--	+15.9%	--
Riga	LV	13.4	24.0	24.4	25.4	25.9	29.6	+93.3%	+14.3%
Felixstowe	UK	29.7	23.4	23.1	24.6	25.7	25.0	-13.5%	-2.7%
Ghent	BE	24.0	25.0	22.2	24.1	25.1	27.0	+4.6%	+7.7%
Cartagena	ES	17.2	23.2	26.7	25.5	24.0	25.6	+39.5%	+6.7%
Rouen	FR	--	20.2	22.0	23.3	22.2	22.6	--	+1.8%
Naples	IT	15.0	19.7	21.0	20.8	21.5	19.4	+43.3%	-9.8%
(--) Not available									

Source: ISL (2008) and various port websites (2009)

Table 2.3 also confirms that the strong growth came to a halt in 2008, with many ports showing only limited growth or in some cases even a decrease in throughput. Whereas the first half of 2008 remained positive, the impact of the economic crisis became apparent from mid-2008 and has continued in 2009. It is still too early to produce a complete overview, but the mid-year figures for selected ports indicate that 2009 will end with lower volumes handled in the EU ports.

Figure 2.2. Half-year traffic figures for selected ports (in million tonnes)

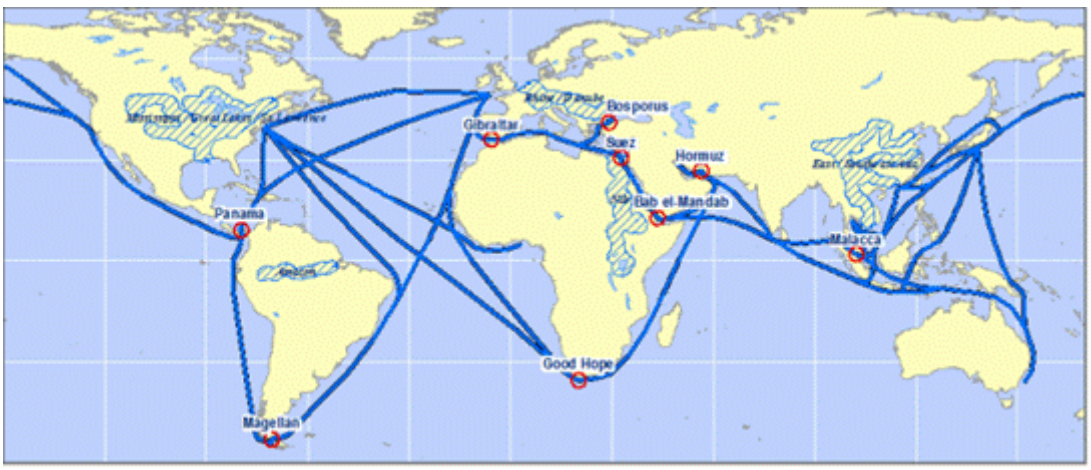


Source: BCI, based on various port websites (2009)

Trade routes

As mentioned previously, trade growth – and maritime freight flows – have slowed down since 2008 owing to the worldwide economic recession. Yet it is less clear whether the international trade routes to and from Europe will also remain practically unchanged in the future. The major maritime trade flows are shown in Figure 2.3.

Figure 2.3. Major maritime trade routes



Source: Rodrigue, Hofstra University (2006)

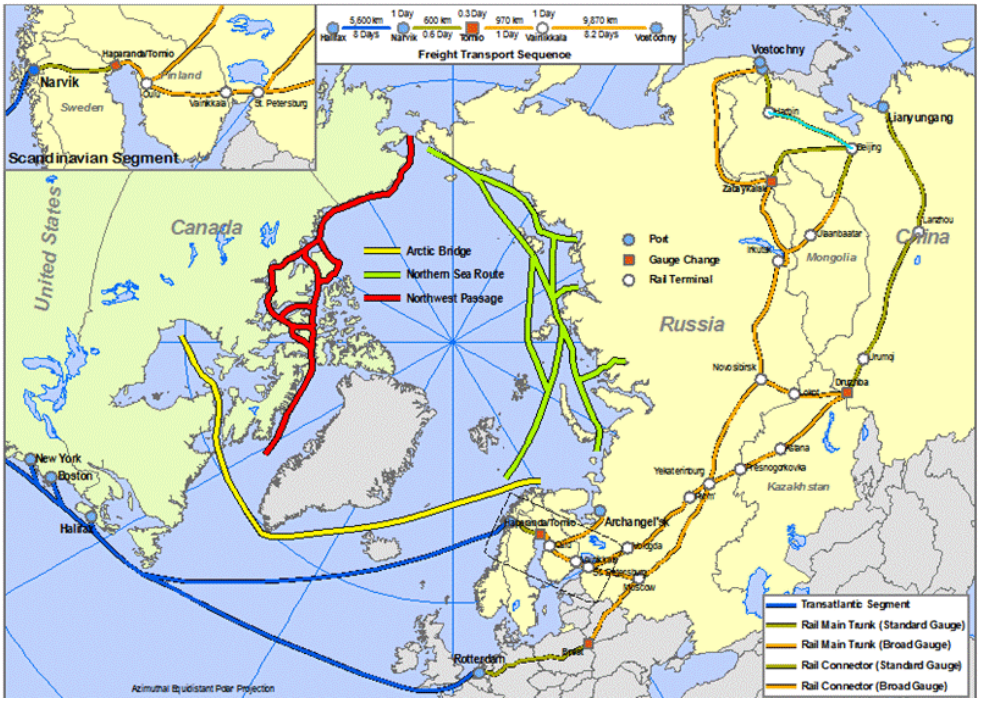
Some new developments may have an impact:

- **Polar shipping routes**: Global warming will probably create a new passage via the Arctic. The north-west passage crossing Canada's Arctic Ocean could become navigable on a regular basis by 2020, in turn reducing transit times and thus lowering ton-miles and transport costs. This new route will have only a marginal impact on trade flows.
- **Overland routes by rail**: Given the increasing trade volumes between China and Europe, more and more attention is being paid to the development of a land bridge as an alternative to deep sea shipping. Although this overland alternative has so far proven too costly – mainly due to operational and administrative complexities – it is becoming increasingly interesting as more and more production sites are located in the Chinese hinterland. A break-even level can be reached for companies located more tan 1000 km inland. However, the total capacity of a normal train is less than 1% of that of an average seagoing vessel[3].
- **Expansion of the Panama Canal**: The new locks on the canal will allow ships to enter it with a maximum length of 366 metres and a draught of 15 metres. This corresponds to a 12 500 TEU[4] container ship or a 120 000 deadweight tonne (DWT)[5] bulk carrier. Bigger ships can be deployed on these routes with a shorter transit time, thus avoiding the Cape Horn passage.
- **Expansion of the Suez Canal**: The canal will gradually be dredged from the current 16 metres to 21 metres in 2012. Following this expansion, the Suez Canal will be accessible to the largest container ships.

An overview of possible future routes is given in Figure 2.4.

[3] In the case of double stacking, this ratio can be twice as large (cf. mini-bridges in the USA).
[4] Twenty-foot equivalent unit: a twenty-foot container is the ISO standard for the measurement of containers, also used as an indication of the capacity of a container ship. For example, a 10 000 TEU container ship has a theoretical maximum capacity of 10 000 twenty-foot containers.
[5] Deadweight tonnes: indication of a ship's transport capacity in metric tonnes.

Figure 2.4. Alternative east-west trade routes



Source: Rodrigue, Hofstra University

First Peking-Hamburg Container Express arrives in Hamburg

'... After only 15 days the first block train from Beijing arrived in Hamburg. The train, which left Beijing on 9 January, went via the Mongolian Republic, Russia, Belarus and Poland before entering Germany. Compared with the transit time by sea of 30 days the train now cuts the voyage by 15 days and will later cut it by 20 days. In addition, we can move goods more economically than by air freight. Now we need to consolidate our experience and plan our next steps', added Dr Norbert Bensel, member of the DB AG board for transport and logistics...

Welt Online, 25 January 2008

2.2.2. Supply chains and logistics

Production systems, which increasingly have worldwide scope, are highly integrated, interdependent and linked through commodity chains. These commodity chains could be defined as functionally integrated networks of production, trade and service activities that cover all the stages in a supply chain, from the transformation of raw materials, through intermediate manufacturing stages, to the delivery of a finished good to a market. They are integrated by transport chains routing goods, parts and raw materials from extraction and transformation sites to markets (Rodrigue, 2006).

Commodity chains are thus a sequential process within a production system to gather resources, transform them into parts and products and finally distribute the manufactured goods to markets. These commodity chains are supported by supply chains and logistics distribution structures, which have become a necessity for supporting global production networks.

Supply chain structures

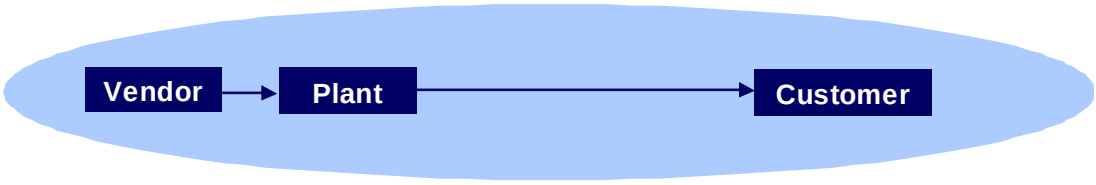
With 27 Member States covering an area of over four million square kilometres, and a population of approximately 500 million, the European producer and consumer market is a dense but geographically extended organisation, with different product requirements in each country and market segment. For this reason, there is no single typical supply chain structure. There are different ways to supply products to the European producer and consumer markets. The starting point is to find the right balance between minimising costs and maximising service. Some factors that influence the optimal supply chain structure include:

- production / sourcing locations
- inbound / outbound transport strategy
- scale of business
- type of product
- location of customers
- required lead-time to the market.

Four supply chain structures can be identified:

1. **Direct distribution**: Products are shipped directly from source to destination (Figure 2.5). This structure is used mainly by companies that are either in the beginning phase of exporting to the European market or in markets where short delivery times are very important. In the automotive sector, for example, many parts are delivered directly from the production plant to the assembly plant.

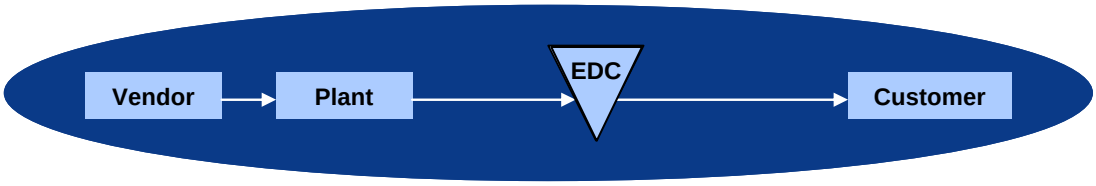
Figure 2.5. Direct distribution



Source: Buck Consultants International

2. **Centralised European distribution structure**: Companies keep their inventories for European markets in a centrally located European distribution centre (EDC), from which they serve the European market (Figure 2.6). This structure was introduced in the early 1990s, when it became much easier to transport goods between the EU Member States following the creation of the Single market. A number of value-added logistics (VAL) activities designed to make products country- or consumer-specific often take place in these EDCs. EDCs are used mainly for slow-moving products. Textiles are an example of goods that are generally distributed from an EDC.

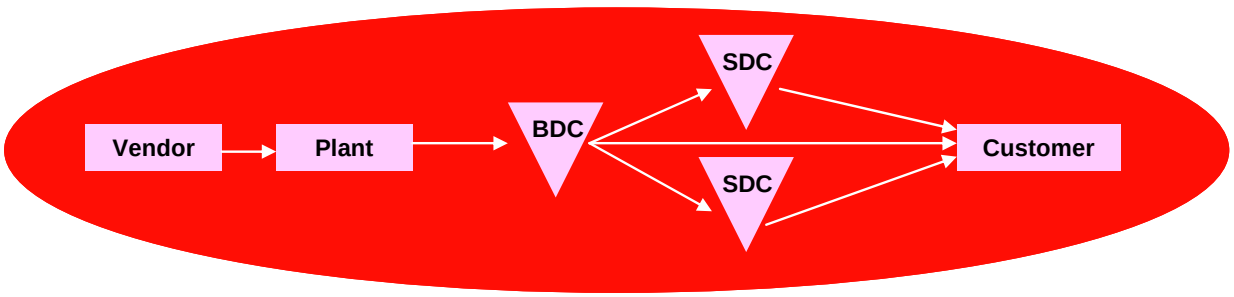
Figure 2.6. Central European distribution structure



Source: Buck Consultants International

3. **Bulk distribution centres with local satellite warehouses**: Products are shipped from their source to a centrally located bulk distribution centre (BDC). The market is served either directly from these BDCs or via satellite warehouses (SDCs) which are replenished via the BDCs (Figure 2.7). VAL activities are generally performed in the satellite warehouses.

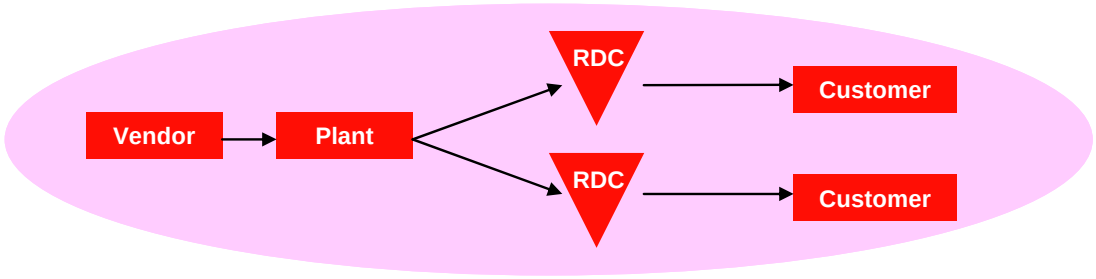
Figure 2.7. Central bulk distribution structure



Source: Buck Consultants International

4. **Regional distribution centres**: Different regions within the European market are served via different regional distribution centres (RDCs). VAL activities take place in the RDCs from where the products are distributed to the markets. These RDCs are mainly used for fast-moving products. The distribution of perishable foodstuffs, for example, requires a smaller scale and proximity to the market distribution system, organised at regional level. The nature of these products basically makes it impossible to distribute them over a longer distance and a longer period of time.

Figure 2.8. Regional distribution centre structure



Source: Buck Consultants International

As mentioned, these structures are far from rigid. A wide variety of supply chain designs can be found in the European logistics market.

Logistics chains

Production costs are highly important in a global and competitive economy. For this reason, not only parts of the production process but also warehousing and distribution are now outsourced. Producers are increasingly focusing on their core activities, allowing them to achieve economies of scale and reduce costs (stocks, labour, machinery, etc). Contract manufacturers are taking over secondary activities. These companies can produce components in larger quantities by supplying to several clients. Larger quantities involve better efficiency, economies of scale and reduction of production costs. As a result of the lifting of historical trade barriers and reduction of import tariffs, suppliers are in many cases located in regions where investment costs are lower, often in eastern European or Asian countries[6] (geographical integration). The growing demand for transport is a direct result of this outsourcing. Another trend is the relocation of parts of a company to these regions. Although transport costs and the risks of insufficient stocks are growing in this supply chain system, the advantages are still greater than the additional costs.

Transport and shipping companies have followed a similar trend. They have increased their capacity to meet demand, resulting in economies of scale and hence reduced transport costs. Lower transport costs enable further outsourcing and relocation, which are also based most upon economies of scale and/or networking through mergers and acquisitions and horizontal and vertical integration.

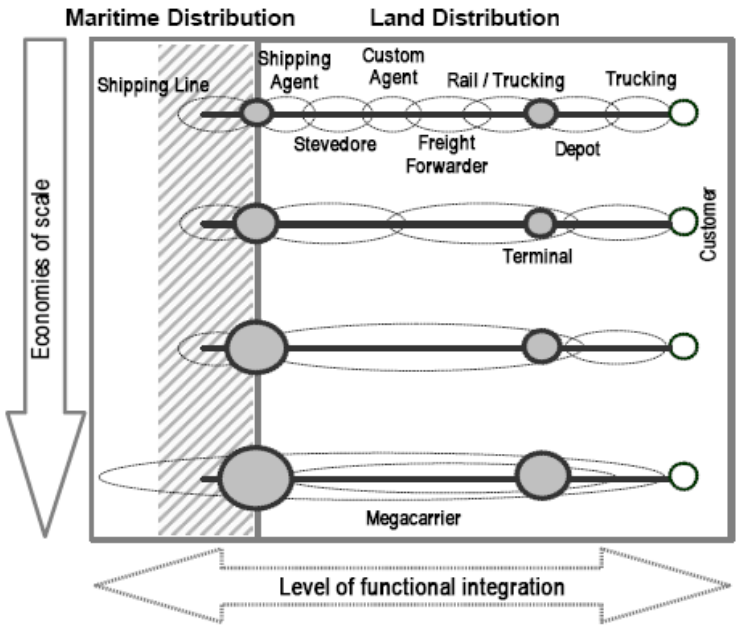
To support the changing supply chains, shipping companies not only have to expand their fleet but also have to reorganise their schedules and services. Outsourcing, relocation, reduction of stocks and just-in-time deliveries have made companies very dependent on a reliable transport system. As a response to the changing market environment, most of the large transport and forwarding companies have re-invented themselves from pure transport or forwarding companies to 3PL or 4PL providers[7], expanding their activities from intermodal transport services and warehousing to value-added activities such as packaging, contract logistics and IT services. This vertical and horizontal integration has often been achieved by means of mergers and acquisitions. Logistics providers often search for locations in or near distribution centres to set up their activities.

The same trend can be noted among the leading container lines, which are increasingly offering forwarding and door-to-door services. This integration of activities is presented in Figure 2.9.

[6] Relocation to eastern Europe is called nearshoring. Relocation to another continent, for example to Asia, is called offshoring.

[7] 3PL: third-party logistics service provider – provides transport and logistics services to clients using their own assets.
4PL: fourth-party logistics service provider – organises manufacturing companies' supply chains using the services of 3PLs.

Figure 2.9. Service integration



Source: Notteboom & Rodrigue (2004), adapted from Robinson (2002)

Whereas the entire transport chain used to be divided into linked activities performed by different operators, functional integration has created a situation where these activities are increasingly performed by fewer players, each providing a wider range of services. The more activities become integrated, the more costs can be reduced.

Both sea and inland ports can be considered the main gateways to a continent, through which both inbound and outbound flows are transported.

Shift from push to pull logistics and supply chains

The trend described above can be defined as a shift from push to pull logistics. Push logistics is supply-based, whereas pull logistics is demand-based. In a supply-driven distribution system, production is 'pushed' on to the market on the assumption that what is being produced will be consumed. Since elements of the supply chain are loosely integrated, parts and/or products must be stored in order to accommodate the chronology of demand. These distribution systems consequently require high inventories. On the other hand, in a demand-driven distribution system, minimal inventory levels are maintained and most of it is inventory in transit, thus increasing the importance of the transport component in distribution. Parts and/or products have to be delivered when and where they are required, increasing the complexity of the logistics chain and making the role of logistics providers even more important.

2.3. Trends in the container market

2.3.1. Global container flows

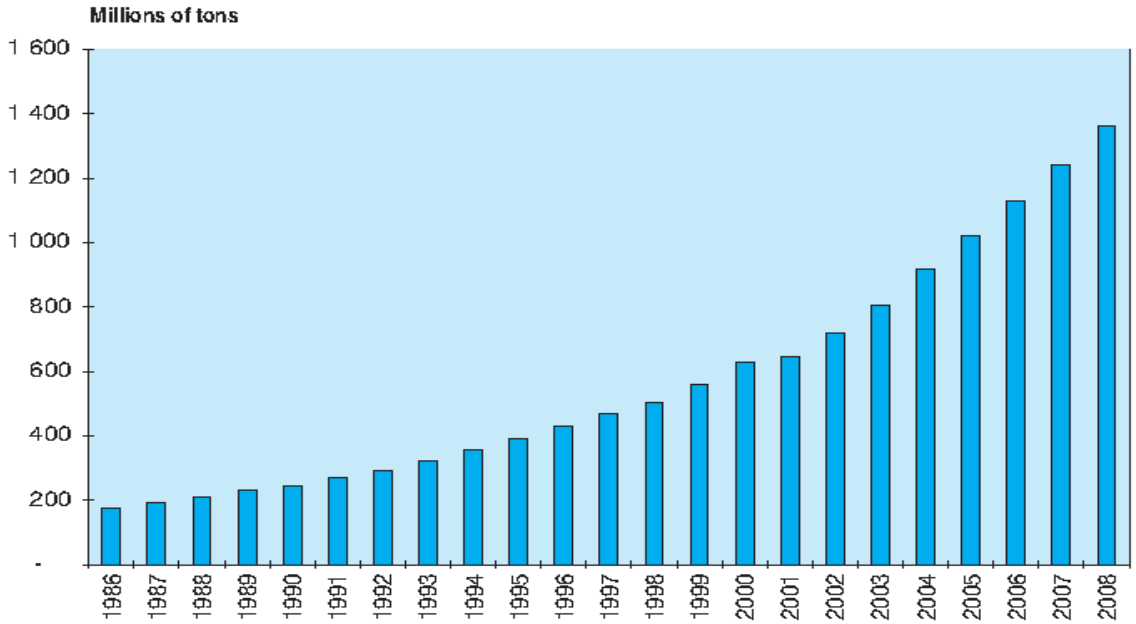
Container transport has expanded enormously over the last 20 years, making it the fastest-growing sector of the maritime industries. This development is not only due to the growth of freight volumes but is also driven by the impact of new production processes and offshoring. A third factor is the substitution effect whereby cargo is increasingly containerised.

Some facts and figures confirm the importance of the container market.

- Estimated figures for 2007 indicate a total volume of 1.24 billion tonnes of containerised cargo, which equates to approximately 143 million TEU.
- Over the last two decades, global container trade in tonnes has increased at an average annual rate of 9.8%.

Figure 2.10 provides an overview of this trend.

Figure 2.10. International containerised trade growth, 1986-2008 (millions of tonnes)



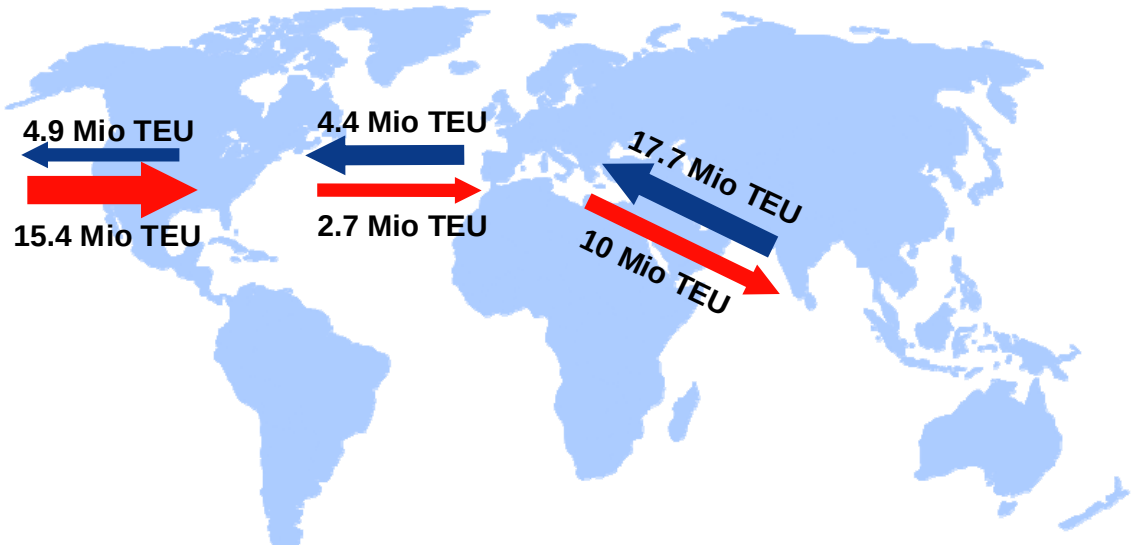
Source: Clarkson Research Services, 2008

Although containerised cargo account for just 15.5% of global seaborne volume in 2007, Drewry Shipping has calculated that approximately 70% of the total value of the world's international seaborne trade was moved in containers.

Containerised trade will continue to grow over the next decade. Forecasts indicate that this trade is expected to reach 371 million TEU in 2020. These figures reflect growth of over 185%, equivalent to an annual growth rate of approximately 7–8% (UNCTAD, 2008). However, they do not factor in the impact of the economic downturn. In the short term, it is rather unlikely that this growth rate will be maintained. As previously mentioned, analysts believe that growth forecasts remain intact in the long term. In other words, it is estimated that by 2012–2013 container flows will reach the same volumes as those recorded at the end of 2008, and will continue to expand by 5–8% on an annual basis. In this scenario a container flow of 211 to 265 million TEU can be expected by 2020.

Growth rates are not the same for all regions of the world. Moreover, a difference between import and export volumes causes an imbalance in container flows. A geographical breakdown highlights the importance of Asia, with much higher export volumes of containerised cargo compared to import volumes. Figure 2.11 provides an indication of this imbalance for major east–west trade.

Figure 2.11. Imbalance of container flows on the east–west route, figures for 2007 in million TEU



Source: Drewry Shipping Consultants (2007) and UNCTAD (2008)

The volumes for Asia-to-Europe trade (westbound) were much higher than those for Europe-to-Asia trade (eastbound). The same is true of the transatlantic trade between Europe and North America. The largest imbalance was found in trans-Pacific trade, with three times more containers moving from Asia to North America than from North America to Asia. It is unclear to what extent the crisis has affected this imbalance, but container imbalance remains a problem.

These imbalances obviously put a great deal of pressure on container logistics. Empty containers need to be continuously repositioned, which has a negative impact on operational efficiency and costs. Table 2.4 indicates the trend in global container handling, including empty container repositioning and transhipment. A sharp increase in the port-to-port handling of empty containers can be noted, as can strong growth in transhipment volumes.

Table 2.4. World container port traffic and its components for selected years, in million TEU

	Total port Handling	Port-to-port Full	Port-to-port Empty	Transhipment
1990	87.9	57.4	14.6	16.0
1995	145.1	92.1	20.8	32.3
2000	235.6	136.7	36.8	62.1
2005 (*)	381	222.5	76.2	82.3
2007 (*)	485	280.2	101.1	103.5
% change 00/07	**+105.86%**	**+104.97%**	**+174.73%**	**+166.67%**
(*) estimated				

Source: UNCTAD (2008), based on Drewry Shipping Consultants

2.3.2. Container traffic handled at European seaports

This section provides a brief overview of the container volumes handled at European seaports. These seaports together handled an estimated 90 million TEU in 2007, including transhipment (ESPO, 2008). At an estimated average weight of 11 tonnes per TEU, this equates to some 989.9 million tonnes of freight. A large share of this volume consisted of intra-European flows.

Table 2.5 provides an overview of the leading European container ports that handled at least 500 000 TEU in 2007.

Table 2.5. Leading container ports in Europe (2007 ranking)

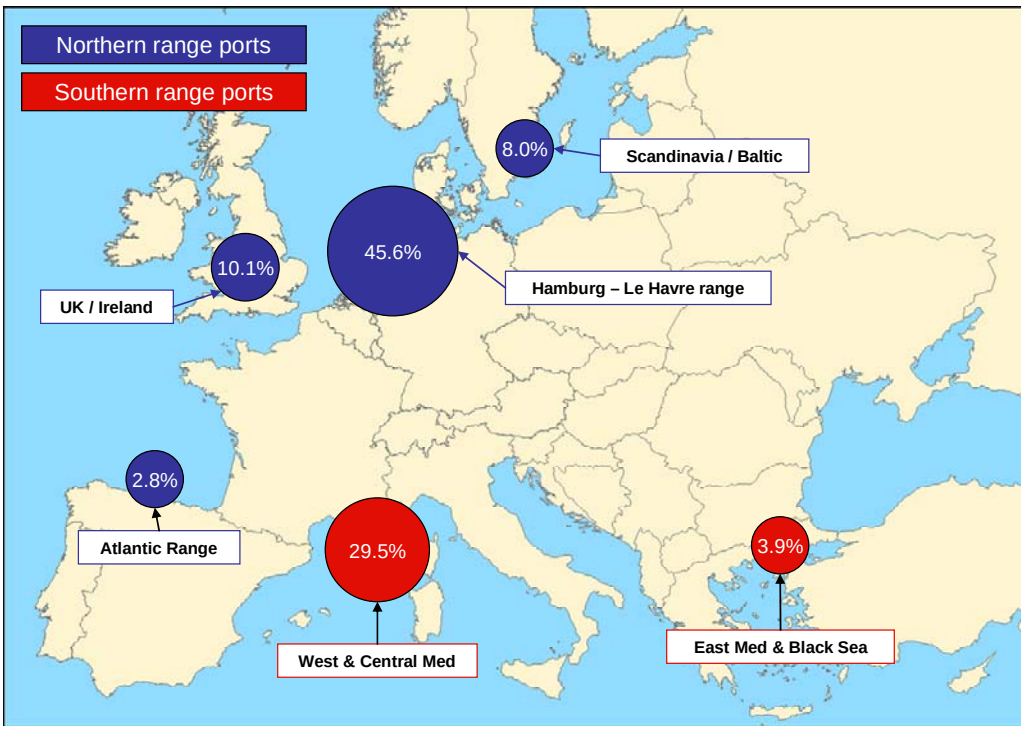
Port		2005	2006	2007	2008	% change 1st half of 2009
Rotterdam	NL	9 286 757	9 690 052	10 790 604	10 783 825	-15.1%
Hamburg	DE	8 087 545	8 861 804	9 889 792	9 737 000	-24%**
Antwerp	BE	6 488 029	7 018 799	8 176 614	8 868 800	-18.5%
Bremerhaven	DE	3 735 574	4 449 624	4 912 177	5 529 000	-20.5%
Gioia Tauro	IT	3 160 981	2 938 176	3 445 337	--	--
Algeciras	ES	3 179 300	3 256 776	3 414 345	3 324 310	-13.7%**
Felixstowe	UK	2 730 000	3 080 000	3 342 000	--	--
Valencia	ES	2 409 821	2 612 139	3 042 665	3 602 112	--
Le Havre	FR	2 118 509	2 137 828	2 638 000	2 495 000	-8%
Barcelona	ES	2 071 481	2 317 368	2 610 037	2 740 602	-34.6%
Zeebrugge	BE	1 407 933	1 653 493	2 020 723	2 209 713	+4%
Marsaxlokk	MA	1 309 000	1 485 000	1 887 405	2 300 000*	--
Southampton	UK	1 375 000	1 500 306	1 869 000	--	--
Genoa	IT	1 624 964	1 657 113	1 855 026	1 766 605	--
Las Palmas	ES	1 301 059	1 311 958	1 453 286	1 310 000	--
Constanţa	RO	768 099	1 037 068	1 411 370	1 400 000	--
Piraeus	EL	1 394 512	1 403 408	1 373 138	--	--
La Spezia	IT	1 024 455	1 136 664	1 187 040	1 246 139	-22.1%
Marseilles	FR	905 687	946 445	1 002 879	847 651	+3%
Tilbury	UK	705 915	742 679	843 808	--	--
Gothenburg	SE	787 705	820 494	840 550	862 500	--
Thamesport	UK	582 000	702 000	800 000*	--	--
Taranto	IT	716 856	892 303	755 934	786 655	+8.2%
Leghorn	IT	658 506	657 592	745 557	--	--
Dublin	IE	590 250	681 000	743 937	676 543	--
Aarhus	DK	581 000	627 000	704 000	--	--
Liverpool	UK	626 000	645 000	675 000	--	--
Gdynia	PL	400 165	461 170	614 373	610 767	--
Kotka	FI	366 667	452 401	570 881	655 802	--
Lisbon	PT	513 061	512 501	554 774	--	--
Bilbao	ES	503 811	523 124	554 568	560 000	-25.2%
Malaga	ES	247 548	464 838	542 405	428 623	-47.1%
Gagliari	IT	650 484	690 392	531 762	307 527	--
* Estimation						
** 1st quarter of 2009						

Source: Buck Consultants International, based on ESPO (2008), ISL (2008), Containerisation International (2009) and various port websites (2009)

The five leading container ports together handled over 43% of all EU containers in 2007. The top ten ports had a share of 61%. Growth rates differed between ports depending on their strategic location, accessibility, capacity, service levels and so on.

Approximately 66.5% of total European container traffic – or a combined throughput of 59.8 million TEU – was handled by the northern range ports. The top three ports – Rotterdam, Antwerp and Hamburg – handled 28.9 million TEU, or 32% of the European total, and approximately half the north European container throughput[8] (Figure 2.12).

Figure 2.12. Market share of port regions in Europe, based on container throughput in TEU (2007)



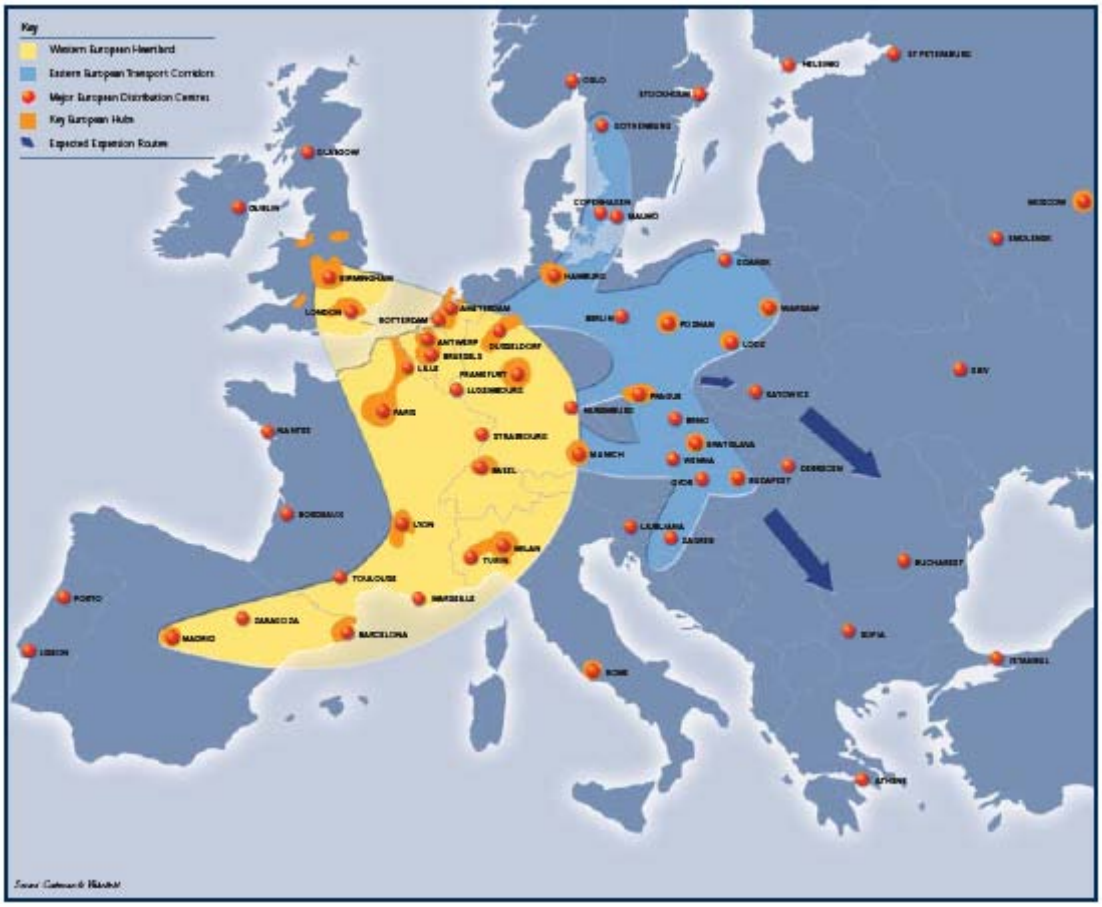
Source: Buck Consultants International (2009), based on ESPO (2008)

The northern range main ports are ports of call[9] on most of the Asia-Europe and trans-Atlantic lines. Furthermore, these ports play an important role as hub ports, boosting transhipment volumes. On average, transhipment accounted for 37% of the ports' total container traffic. This is especially true of Hamburg, which is a major transhipment hub for the Baltic Sea and has thus been able to take advantage of the strong economic growth in this region.

Rotterdam and Antwerp have been able to capitalise on strong cargo-generating centres in Europe's extended 'blue banana' (Figure 2.13) combined with a high density of European distribution centres (EDCs) in Benelux and northern France. The 'blue banana' is defined as the area in which the main economic centres in Europe are located. Originally it comprised the area from the south of the UK to the north of Italy. However, the 'blue banana' has now been extended to include the consumer areas of south-east France and the Spanish regions of Andalusia and Cataluña. In addition, a shift eastwards has taken place towards Hungary and the Czech Republic.

[8] To be compared with the aforementioned 20% as regards total European seaport throughput, demonstrating how important containerisation is for the Le Havre-Hamburg range.
[9] Port of call: a port in which a ship berths and loads and unloads cargo.

Figure 2.13. 'Blue banana'



Source: Cushman & Wakefield, 2006

The southern range ports (i.e. the West Med, Central Med, East Med and Black Sea ports) accounted for some 30 million TEU in 2007, or 33.4% of the total port sample. However, these ports are growing strongly for various reasons, including their emerging role as transhipment hubs (e.g. Algeciras, Gioia Tauro, Marsaxlokk, Taranto) and their growing purchasing power in central and eastern Europe.

Container traffic is characterised by high growth rates. Whereas the volume handled in 2005 was 73.7 million TEU, this increased to an estimated 90 million TEU in 2007 (ESPO, 2008), representing a growth rate of 10.5% per year. A mixed picture emerges from mid-2008 onwards. For 2008, container volumes are estimated at 90.7 million TEU, equating to growth of less than 1% (Notteboom, 2009). Although the available data are still very fragmented, container volumes at most ports declined during the second half of 2008 and the first half of 2009. At the time of writing (August 2009), it is unclear if this decrease will continue during the second half of 2009 or if a (limited) upturn will occur. Whereas some sources indicate that the second half of 2009 will be more positive than the first half, Drewry Shipping Consultants estimate a general decline in container traffic of 10% in 2009, while the status quo is predicted for 2010.

2.3.3. Operational developments

Container fleet extension

During 2008 and the first half of 2009 the upward trend in cellular fleet capacity measured in TEU continued. Table 2.6 shows the relevant figures over a three-and-a-half year period, with a breakdown between the 25 major shipping lines, which together operate over 80% of world container fleet capacity.

Table 2.6. Top 25 container shipping lines

	Situation at 1/1/2006		Situation at 15/2/2008		Situation at 17/8/2009		Capacity on order	
	TEU	Number of ships	TEU	Number of ships	TEU	Number of ships	TEU	Number of ships
APM-Maersk	1 665 272	586	1 919 352	531	2 022 956	539	369 638	70
MSC	784 248	276	1 232 905	372	1 517 200	409	615 285	52
CMA CGM group	507 954	242	893 860	375	1 023 208	365	505 688	60
Evergreen Line	477 911	155	624 357	176	594 154	162	--	--
APL	331 437	104	407 775	126	531 865	135	155 210	21
Hapag-Lloyd	412 344	131	492 058	139	475 282	120	122 500	14
Cosco	322 326	126	430 952	141	469 848	146	425 102	56
CSCL	346 493	123	434 170	140	449 469	139	146 544	17
NYK	302 213	118	382 835	117	412 711	109	112 600	20
Hanjin Shipping	328 794	84	343 297	83	406 462	90	270 448	30
MOL	241 282	80	346 870	111	350 647	93	151 012	29
OOCL	234 141	65	347 686	82	326 035	71	120 476	18
K Line	227 872	75	308 194	93	326 003	91	191 974	36
Hamburg-Sud group	184 438	87	284 097	123	318 079	106	95 305	15
Yang Ming Line	188 206	69	274 281	83	318 008	79	141 402	22
Zim	201 432	85	280 860	111	284 148	93	244 604	29
CSAV Group	234 002	86	265 064	89	278 616	86	135 437	20
Hyundai M.M.	n.a.	39	200 719	47	271 873	53	78 160	7
PIL	134 362	101	175 988	112	186 143	105	61 762	15
UASC	74 004	32	105 175	41	160 985	43	143 272	15
Wan Hai Lines	114 346	68	140 750	82	126 193	67	32 050	11
IRIS Lines	53 512	58	73 829	60	101 802	62	21 040	13
MISC Berhad	40 543	18	93 157	30	101 054	34	38 380	5
Grimaldi	44 363	36	53 478	57	51 312	46	8 924	11
RCL	48 604	41	51 808	41	51 291	39	2 086	2
Total fleet	9 136 632	5 380	11 858 357	5 933	13 469 203	5 949		

Source: AXS Alphaliner, August 2009

Some important trends and conclusions can be drawn from this table. In 2009 the top three shipping lines accounted for one third of total fleet capacity. They are strengthening their position at the top with high capacities on order to come on to the market within the next years. These three lines are APM-Maersk (Denmark), MSC (Switzerland) and CMA-CGM (France). Hapag-Lloyd, ranked number six in the world, is German-owned. Together, these four shipping lines represent 37.5% of world fleet capacity. The other top ten shipping lines

are all Asian-owned. It is consequently safe to say that the container shipping industry is controlled by European and Asian companies.

A second trend can be derived from looking at total fleet capacity, which has increased by approximately 47% over a three-and-a-half year period. During the same period the number of vessels has increased by only 10.6%, leading to the conclusion that vessel capacity is growing faster than the number of vessels. Whilst this increase in size is not surprising, it does give rise to new operational requirements for vessel handling in ports.

Globalisation and the corresponding increase in inter-continental trade have favoured the introduction of larger container vessels as a means of handling larger volumes. Larger container ships also produce economies of scale and thus lower costs per TEU carried. Since the 1990s, an increase from 4 000 TEU to 8 000 TEU vessels has occurred, while the next step, the 13 000–14 000 TEU range, is currently under way (see Table 2.7).

Table 2.7. Container fleet forecast: fully cellular ship deliveries

Vessel size	Forecast 2009		Forecast 2010		Forecast 2011		Forecast 2011	
	TEU	Number of ships	TEU	Number of ships	TEU	Number of ships	TEU	Number of ships
> 10 000 TEU	286 162	24	493 699	39	772 429	39	595 778	47
7 500 – 9 999 TEU	194 967	23	384 095	44	184 270	21	102 300	12
4 000 – 7 499	644 605	128	583 129	110	451 361	86	283 076	55
1 000 – 3 999	302 631	151	274 252	126	144 753	34	26 196	12
100 - 999	33 128	41	31 221	39	5 162	6	0	0
Total	**1 464 493**	**367**	**1 766 396**	**358**	**1 484 862**	**207**	**1 007 350**	**126**
average vessel size	**3 990 TEU**		**4 934 TEU**		**7 172 TEU**		**7 995 TEU**	

Source: AXS Alphaliner (August 2009)

Based on the current order book, the fleet of fully cellular container ships is projected to grow from 4 657 ships with a total capacity of 12.3 million TEU at the beginning of 2009 to 5 577 ships, or 17.8 million TEU, by the beginning of 2013. This represents an annual growth rate of some 10%. The total capacity on order represents 46.3% of existing capacity.

The downturn has led to another approach. While demand for transport services is dropping, previously ordered ships continue to enter the market. This is resulting in a paradoxical situation: although demand is dropping, supply in continuing to increase, leading to fleet overcapacity. In recent months this overcapacity has had the following results.

1. **Charter rates are dropping:** In February 2009 approximately 1 773 container ships, representing some 47% of total TEU capacity, were chartered in. During the previous few years the container ship market had to absorb a huge number of new ships with ever-increasing TEU capacity. Combined with the economic downturn, this overcapacity has caused charter rates to fall sharply. Between mid-2008 and the beginning of 2009 there was a decrease of more than 70% (source: ISL, 2009).
2. **The idle fleet is growing:** At the end of 2008, the idle fleet was estimated at some 210 cellular ships, representing approximately 550 000 TEU or 4.5% of total capacity. In July 2009 this figure had risen to over 500 container ships, with a capacity of 1.2

million TEU, representing nearly 10% of total capacity (source: AXS Alphaliner, 2009). The idle fleet is expected to grow to 2 million TEU by the end of 2009.

3. **Scrapping rates are increasing:** In 2007 only 23 container ships, with a total capacity of 23 862 TEU, were scrapped. This figure had increased to 63 ships or 124 541 TEU in 2008. According to AXS Alphaliner, no fewer than 94 ships, representing 184 700 TEU, were scrapped in the first half of 2009. It estimates that more than 300 000 TEU will be taken out of the fleet by the end of 2009.
4. **Newbuilding orders have come to a halt:** No new orders for container ships were reported during the period from October 2008 to March 2009, something that had not occurred for at least two decades. Furthermore, shipowners are increasingly trying to either cancel the orders already placed or to postpone the delivery of new ships to 2013/2014.

Fleet overcapacity is putting pressure on shipping lines' financial results.

Negative financial result for Maersk Group

Even the world's biggest container shipping line has not been immune to the consequences of the economic recession. The Danish company A.P. Möller-Maersk saw its financial results plummet during the first half of 2009.

The company's incomes decreased by 14% during the first half of 2009 … as a result of falling freight rates (-30%) and a reduction of freight volumes (-7%). The group incurred a loss of over 3 billion DKK (approximately 405 million euro). This sharply contrasted with the first half of 2008 where a profit of 11.98 billion DKK was achieved. The turnover of the container business of Maersk fell by 30% during the first half of 2009 …

Source: De Lloyd, 24 August 2009

Chinese megacarriers are hit by the crisis

Like their Western competitors, Chinese and Taiwanese shipping companies also suffered heavy losses during the first semester of 2009. Cosco Container Line and China Shipping Container Line have reported losses of 631.7 million USD and 500.5 million USD respectively. Meanwhile, Evergreen and Yangming have reported losses of 143 million USD and 190 million USD respectively.

Source: De Lloyd, 31 August 2009

Financial crisis at Hapag-Lloyd continues

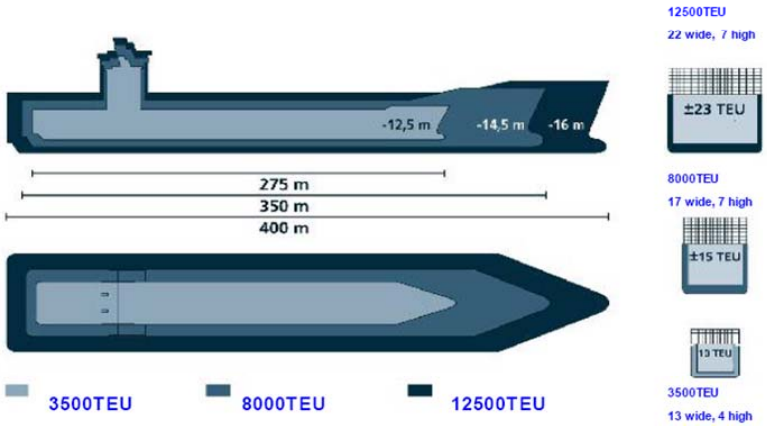
The shareholders of Hapag-Lloyd have yet to agree on a new capital injection for the German shipping company, which is urgently in need of cash. TUI (4.3%) is not yet prepared to supply financial resources and not everybody is convinced within the Albert Ballin consortium (56.7%). Hapag-Lloyd requires a new capital injection from its shareholders of 1 billion USD, in addition to the state-guaranteed loan of 1.4 billion USD.

Source: De Lloyd, 22 July 2009

Port operations

The dimensions of the new generation of +10 000 TEU ships can cause problems in terms of nautical accessibility. Container ships of 12 500 TEU have an average length of 400 metres. They are able to load 22 TEU wide and seven high above deck. At full capacity the average draught is around 16 metres (Figure 2.14).

Figure 2.14. Container vessel size evolution



Source: Ocean Shipping Consultants, 2007

Table 2.8 gives an estimation of the future vessel sizes expected to be handled in EU ports. The new container ships with a capacity of over 10 000 TEU will be deployed mainly on the shipping lanes between Europe and the Far East. The ships with a capacity around 6 500 TEU currently sailing these routes will become the future average vessel size on liner services between Europe and North America. The 4 000 TEU vessels currently used on the trans-Atlantic trade routes will be used on certain short sea trades. This can be described as the vessel substitution effect, which is currently occurring in all EU maritime trades.

Table 2.8. Container vessel size on major container trade routes (in TEU)

	2000	2005	2010	2015
Deep sea east–west				
Far East-Europe				
Typical vessel	4 500–5 500	5 500–7 000	8 000–9 000	10 500
Largest vessel	7 500	9 200	14 500	14 500
Transpacific				
Typical vessel	4 500–5 000	5 500–6 500	7 000	8 500
Largest vessel	6 700	8 100	9 000	10 500
Transatlantic				
Typical vessel	3 500	4 000	5 000	6 500
Largest vessel	4 500	4 800	6 500	8 500
Deep sea north–south				
Typical vessel	2 500	3 000	3 000	3 500
Largest vessel	3 500	3 500	3 500	4 000
Short sea shipping				
Typical vessel	550	650	700	850
Largest vessel	900	1 000	1 200	1 500

Source: Ocean Shipping Consultants, 2007

2.3.4. Organisational developments

Consolidation

The container shipping industry is characterised by high costs, as a result of the demand for regular shipping services, and low freight rates. Approximately six to eight ships are needed to operate a loop with a weekly sailing schedule from several ports of call. Competition, on the other hand, is largely based on reducing freight rates to the level of operational costs, meaning that there are no earnings against the fixed costs. Operational costs have further been forced up by growing bunker costs. These two factors (lower rates and higher costs), together with increasingly tight time schedules and on-time sailing requirements from shippers, have put pressure on the market. This has resulted in decreasing profits and shipping lines' urgent efforts to secure and even strengthen their market shares.

Under these circumstances, adding container slots to the fleet has proven important. Two of the major world carriers, MSC and CMA CGM, have been specifically active in ordering new vessels, enabling them to strengthen their positions among the top three and reduce the gap with Maersk, at number one. However, as mentioned above, this trend has now come to a halt following the crisis.

Mergers and acquisitions (M&A) have also been frequent. An example of a major acquisition involved the takeover of the industrial group Bolloré (including Delmas, Otal, Setramar and Sudcargos) by CMA-CGM, enabling the latter to develop its north-south trade to the African continent.

The most important M&A was that of P&O Nedlloyd by AP Möller-Maersk in 2005, which added nearly half a million TEU capacity to its fleet. In the same year, TUI AG, Hapag-Lloyd's parent company, took over CP Ships. Hapag-Lloyd's capacity more than doubled,

pushing the German shipping line from 17th to sixth in the world ranking. However, both shipping companies have now incurred financial losses.

Although fewer M&As have been recorded in recent years, this pattern will change again. The economic downturn will undoubtedly give rise to a new wave of consolidation in the container liner market.

Cooperation

Cooperation between shipping lines is another means of reducing costs and offering a worldwide service. It ranges from joint marketing to equipment-sharing agreements and schedule coordination. Table 2.9 summarises the most common types of cooperation.

Table 2.9. Cooperation among liner operators

Type	Degree of cooperation
Slot purchase	Slot purchase is the most common, flexible form of slot cooperation. It may be a one-off purchase to cover unexpected shortages or vessel breakdowns. Longer-term agreements also cover gaps in trade when a liner does not have sufficient volume.
Slot exchange	Both carriers wish to exchange some of their capacity in order to increase their sailing frequency or widen their service coverage.
Vessel-sharing agreement	The purpose of a VSA is to share vessels on a specific route. All participants have access to an agreed number of slots on every sailing. This is an advantage for a liner wishing to set up a new route with a number of partners, with minimal investment costs for all participants.
Joint services	This requires greater commitment than a VSA. Participants in a joint service also share certain operational costs.
Alliances	While the types of cooperation listed above all tend to be trade-specific, there is also a type that covers more than one trade: alliances (formerly known as conferences). Participants in alliances operate in a virtual global partnership in a variety of areas, having entered into a *de facto* merger.

Source: Drewry Shipping Consultants

Since the onset of the crisis, cooperation between shipping lines has also sought to consolidate capacity. A recent example is the cooperation between MSC, Hapag-Lloyd and OOCL on the Europe–Canada loop. Since volumes on this trade have declined and vessels' load factors[10] are low, MSC has merged its Canada service with those of Hapag-Lloyd and OOCL. This has reduced capacity on the trade by some 2 500 TEU per week[11]. Another recent example of a vessel-sharing agreement is the cooperation between MSC and CMA-CGM on the south Atlantic route, aimed at rationalising the Atlantic sector. CMA-CGM intends to reduce its capacity on this trade by 21% following a 23% decrease in volume[12].

[10] Load factor refers to the percentage of vessel capacity used. It is obtained by dividing the capacity used by the maximum capacity.
[11] Source: De Lloyd, 24 July 2009.
[12] Source: De Lloyd, 10 August 2009.

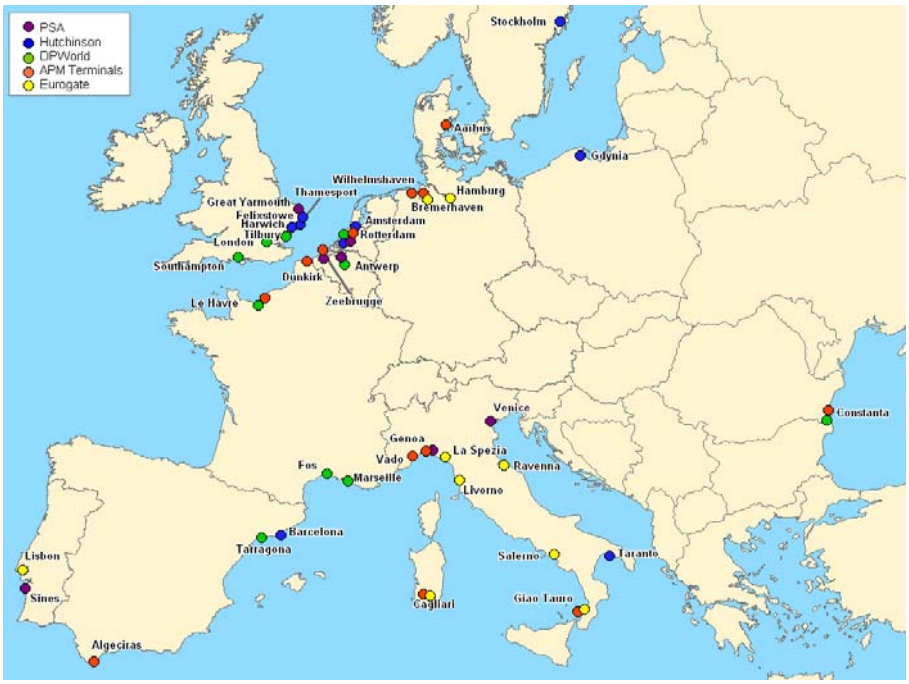
2.3.5. Container terminal development

The current situation in the terminal operating sector is somewhat comparable to that in the container liner shipping industry, with four worldwide operating companies dominating the terminal market. The Singaporean group PSA International (Port of Singapore Authority) has become the number one operator; it handled 50.4 million TEU in 2008, representing a market share of 9.6%. The Hong Kong-based Hutchison Port Holdings was the second biggest operator, with 34.4 million TEU, followed closely by the Danish APM Group with 33.8 million, equating to market shares of 6.6% and 6.5% respectively. The Middle Eastern group DP World was in fourth place after taking over P&O Ports, with 32.9 million TEU or a market share of 6.3%. Together, these four leading companies handled nearly 30% of world container throughput in 2008 (Drewry, 2009). Somewhat behind are Evergreen (Taiwan), Cosco Group (China) and Eurogate (Germany), each of which enjoys a market share of 1-2%.

It is reasonable to expect the top four players to maintain their lead for the time being. Moreover, given the considerable investment costs associated with terminal development, it is to be expected that an increasing number of financial investors, such as banks, hedge funds and private equity groups, will participate directly in bidding (ESPO, 2007).

Figure 2.1.5 shows the four major container terminal operators' EU investments. Eurogate, which is a smaller player globally but is in a strong position in Europe, has also been included. Investments are predominantly concentrated in the north-western port region (between Hamburg and Le Havre).

Figure 2.15. Terminal portfolios of major terminal operators



Source: Buck Consultants International (2009), based on various sources

Like the shipping line industry, the terminal sector saw greater consolidation between 2000 and 2007. The most remarkable development in this respect was DP World's acquisition of the terminal portfolios of CSX World Terminals and P&O Ports, in 2005 and 2006 respectively, for a total of more than USD 8 billion.

Another trend is the shipping lines' growing interest in terminal activities. Over the last few years container lines have been very active in securing (semi-) dedicated terminal capacity in strategic regions, enabling them to improve their operational performance and punctuality and reducing port costs. In particular, CMA-CGM and MSC have been extremely active in this field, holding stakes in 10 and 15 container terminals respectively. Maersk Line, on the other hand, belongs to the AP Möller-Maersk Group, which operates a wide range of terminals through its subsidiary APM Terminals.

Container terminal capacity

Up until 2008 almost all port regions were expected to experience shortages of terminal capacity (see Table 2.10). A utilisation rate of around 70% is considered to be the maximum compatible with smooth operations (congestion problems start to occur at peak times once utilisation exceeds 70% of capacity). Overall congestion starts to occur when the utilisation rate reaches 80%.

Table 2.10. Forecast container handling supply/demand balance to 2015, in million TEU per year

		2005	2015	% change 05/15
North-east continent	Capacity	12.95	23.80	+83.8%
	Demand	11.42	23.63	+107.9%
	Utilisation	**88.2%**	**99.3%**	
North-west continent	Capacity	24.18	51.14	+111.5%
	Demand	18.52	32.89	+77.6%
	Utilisation	**76.6%**	**64.3%**	
British Isles	Capacity	11.54	19.43	+68.4%
	Demand	8.98	15.91	+77.2%
	Utilisation	**77.8%**	**81.9%**	
Scandinavia	Capacity	5.13	6.51	+26.9%
	Demand	3.63	5.05	+39.1%
	Utilisation	**70.7%**	**77.5%**	
East Baltic	Capacity	3.13	8.89	+184%
	Demand	2.17	7.18	+230.9%
	Utilisation	**69.2%**	**80.8%**	
West Mediterranean	Capacity	12.67	30.78	+142.9%
	Demand	10.51	24.03	+128.6%
	Utilisation	**82.9%**	**78.1%**	
Central Mediterranean	Capacity	15.53	29.37	+89.1%
	Demand	12.06	26.32	+118.2%
	Utilisation	**77.7%**	**89.6%**	
East Mediterranean & Black Sea	Capacity	13.37	29.21	+118.5%
	Demand	12.30	32.83	+166.9%
	Utilisation	**92%**	**112.4%**	

Source: Ocean Shipping Consultants (2006)

According to the estimates for 2015, all port regions other than the north-west continent (Netherlands, Belgium and the French Atlantic coast) will have a utilisation rate of over 70%, meaning that congestion will start to occur. Expansion projects at the ***north-west range ports*** have increased capacity considerably, and will continue to do so. Examples include the 'Deurganckdok' and 'Saeftingedok' projects at the port of Antwerp, the 'Maasvlakte II' project in Rotterdam and the 'Le Havre Port 2000' project in Le Havre.

It should be noted that these figures are based on estimates made prior to the economic downturn.

- Overall, capacity demand will grow less strongly than previously estimated. As already mentioned, new growth is not expected to resume for a couple of years.

- The German ports were expected to face severe capacity problems by 2015. These ports have an important transhipment function to and from the Scandinavian and Baltic ports. The economic downturn has hit the Baltic countries particularly hard. For example, Estonia's GDP growth is forecast to be -10.3% in 2009. The GDP growth forecasts for Lithuania and Latvia are -11% and -13.1% respectively, compared with a forecast average decrease of 4% in the EU-27 Member States (see Annexes 1 and 2). This situation is expected to continue in 2010. In addition, the growth of GDPs of Germany, Finland and Sweden are below the EU average, which will in turn impact freight volumes. The aforementioned capacity shortage in the ***north-east continent ports*** is expected to be less acute than previously predicted. This is also true of the *Scandinavian and Baltic ports*.

- Capacity shortages were also forecast for the ***Mediterranean*** and ***Black Sea ports***. As well as the decrease in demand, new container terminal capacity is being created in North Africa. One example is the new port of *Tanger Med* (Morocco), which is adjacent to the port of Algeciras at the Straits of Gibraltar (the western entrance to the Mediterranean). Four new container terminals will become operational between 2007 and 2015, with a total capacity of 8 million TEU. The port hopes to attract large transhipment volumes on the Europe–Asia trade and to become a hub for the Mediterranean region. The first two terminals commenced operations in 2008.

It is very difficult to predict future capacity needs at present. On the one hand, capacity demand has slowed down, while, on the other, port extension projects have been initiated.

Another issue is the fact that the figures in Table 2.10 reflect the situation in an entire region rather than at individual ports. In fact, while many of the smaller ports had sufficient capacity, it was largely the bigger ports that lacked capacity, with limited potential for expansion. The main ports in particular will face greater congestion. Congestion at main ports such as Antwerp, Hamburg and Rotterdam is likely to continue to be problematic in the future.

In addition to new capacity, increased productivity at existing facilities will have a positive impact on terminal use. In 2007 Ocean Shipping Consultants calculated that the average consignment size for a 6 000+ TEU vessel handled at a main port in 2005 was nearly 2 700 TEU. For very large vessels, consignments of up to 5 000 TEU have been handled at single port calls. Optimal terminal design and the use of sufficient gantry cranes can increase a terminal's productivity. For example, one extra gantry crane can handle between 35 and 40 additional containers per hour, amounting to approximately 300 extra containers per shift.

2.3.6. Short sea container shipping

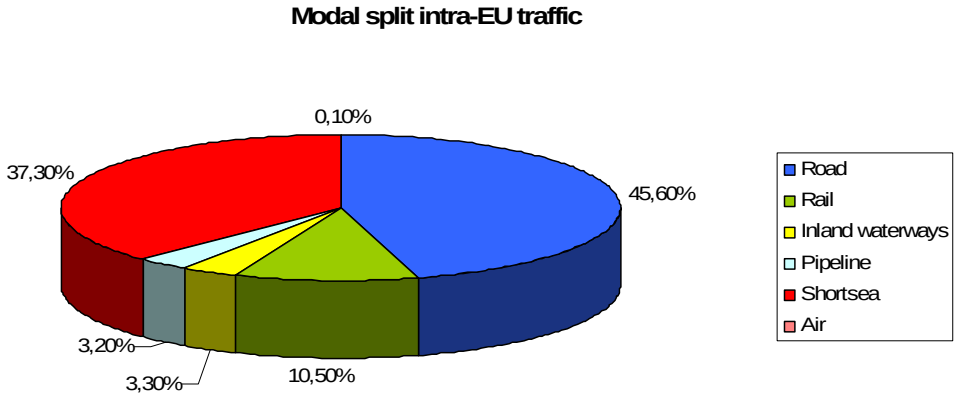
A large proportion of the containers handled in European ports are transported by short sea shipping[13]. The increase in containerisation has also had an impact on the short sea fleet. Like deep sea shipping, the main short sea operators have been very active in acquiring capacity by taking control of their competitors. A few examples include the Icelandic company Samskip, which has acquired the Dutch intermodal operator Geest North Sea Line and the UK-based short sea shipping operator Seawheel. Samskip has become one of the leading intra-European container transport companies. Eimskip, another Icelandic company, has taken full control of the Lithuanian short sea operator Kursiu Linija, thereby strengthening its position in the Baltic region and northern Europe.

The Belgian intermodal transport operator Delphis has taken over the German-based Team Lines and Portlink, propelling it into the top three European short sea shipping operators in the space of a few years.

The Danish concern DFDS A/S has purchased Norfolk Line Containers, a division of the AP Möller-Maersk group, while Cobelfret has acquired the cross-channel ferry business Dart Line. Although far from comprehensive, this summary clearly shows a trend towards consolidation in the sector.

Short sea shipping accounts for a significant share of all goods transported in the EU. It is estimated that 62% of the entire volume of goods transported by sea in the EU, totalling over 1.9 billion tonnes (2006 figures), are transported by short sea shipping. Moreover, short sea shipping attained a share of 37.3% in the modal split for intra-EU transport (Figure 2.16).

Figure 2.16. Modal split for intra-EU transport (2006 figures)

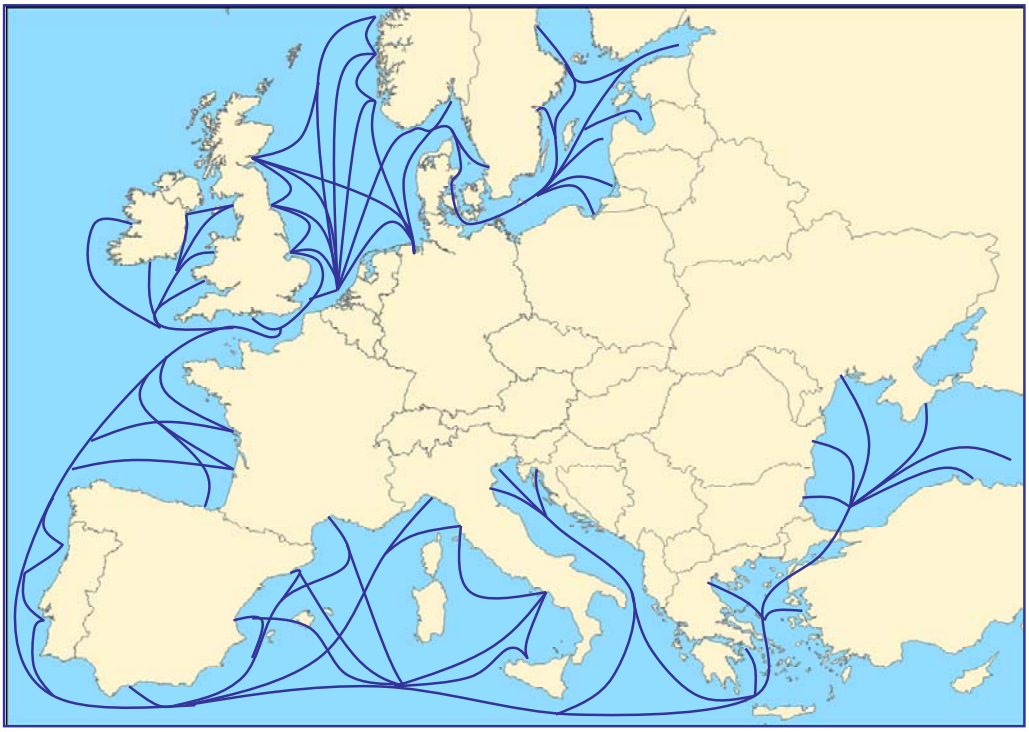


Source: European Commission, 2009

[13] Short sea shipping can more or less be defined as maritime transport between European countries, although much of the intra-European maritime traffic is also undertaken by ocean carriers.

Short sea shipping provides for a myriad of relations between EU seaports (see Figure 2.17). The growth of short sea shipping is a result of increasing intra-European trade and the deep sea hub and feeder concept.

Figure 2.17. Short sea shipping routes in Europe



Source: Buck Consultants International

Although no recent figures are available as yet, it is clear that short sea volumes are being affected by the economic downturn.

2.4. Trends in the general cargo market

2.4.1. General cargo volumes handled in EU ports

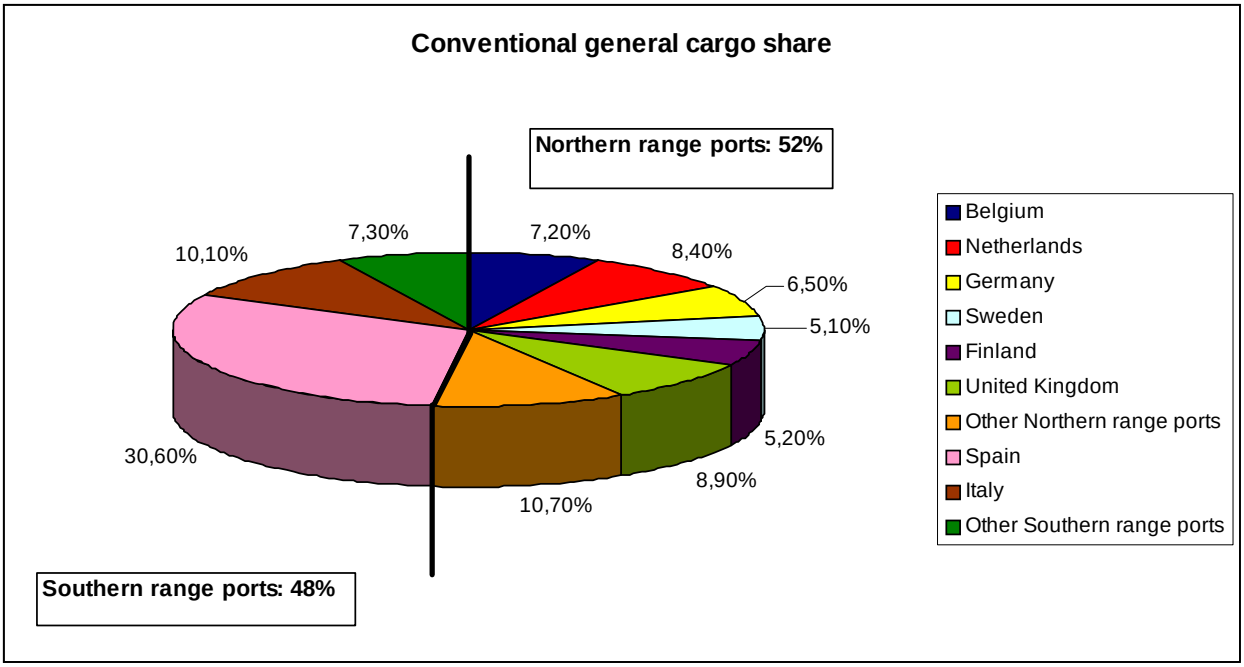
Conventional general cargo – or breakbulk – refers to cargo that is normally packed, bundled or unitised but not transported in containers. Examples of packaging techniques include (big) bags, bales, cardboard boxes, cases, casks, crates, drums and barrels that can be stored on pallets or skids. The term neobulk is often used for specific kinds of general cargo mostly shipped in larger parcels, while project cargo refers to large, non-packed units (ESPO, 2007). The general cargo market deals with shipments of consignments smaller than a ship or hold.

Containerisation has conquered a substantial share of the total general cargo market. Commodities that were previously shipped as conventional general cargo have been increasingly stuffed into containers. As a result, general cargo has lost quite a bit of market share over the last few decades. However, mainly as a result of high demand for project cargo shipments up until 2008, the general cargo market has again been experiencing an upturn. Booming economies in the Far East as well as Brazil, Russia and South Africa have required major investments in infrastructure, industries and equipment, resulting in increased demand for project cargo shipments. Another explanation may be the rising demand for oil and gas exploration and exploitation equipment, as well as the demand for building materials, which has been particularly strong in the Middle East countries.

World economic growth has also impacted on the general cargo market, leading to increasing volumes following a period of negative growth. European seaports are estimated to have handled a total throughput of approximately 261.6 million tonnes in 2006 (ESPO, 2008), up 1.14% on the 2005 figure (258.7 million tonnes). However, in many of these ports the handling of conventional general cargo has to contend with ever-tighter handling space as more and more square metres of terminal space are used for container transhipment. Although conventional general cargo is by far the smallest category, with little growth, cargo handling is labour-intensive and generates higher added value per tonne.

Unlike container handling, general cargo handling at EU ports is fairly balanced between ports in the northern range (52%) and those in the southern range (48%). In the northern range, general cargo handling is mainly spread among six countries (Belgium, the Netherlands, Germany, Sweden, Finland and the UK). In the southern range, Spanish ports are in a dominant position as regards the handling of general cargo, with a market share of more than 30%, followed by the Italian ports with 10.1% (Figure 2.18).

Figure 2.18. Conventional general cargo traffic and market share per country and port range (2006)



Source: Notteboom (2009)

2.4.2. General cargo fleet

At the beginning of 2009, the general cargo fleet consisted of 17 949 ships with a total capacity of 106.8 million DWT (ISL, 2009). This represents a 3.9% increase compared with the previous year and an 11.7% increase compared with 2002; this is much lower than the capacity growth in other segments of the market. The general cargo fleet is smaller, representing just 9.27% of world fleet tonnage.

The fleet consists of fairly small ships with an average vessel size of approximately 6 000 DWT. The average age of a general cargo vessel is nearly 23 years; 70% of the ships are more than 15 years old, while 27.5% are more than 30 years old (built prior to 1978). The fleet is consequently characterised by a relatively higher age and greater scrapping potential. A total of 1 193 ships (or 6.8 million DWT) were scrapped between 2004 and

2008. During the same period, 2 317 new ships entered the market with a total capacity of 17.2 million DWT.

At the beginning of 2009 order books showed a total of 1 799 ships on order with a capacity of 21.2 million DWT, or an average capacity of approximately 11 780 DWT. Although this is still smaller than other average vessel sizes, a trend towards larger vessels can also be observed in this segment. The number of ships on order equates to 10% of the existing fleet, which is far lower than the estimated 27.5% of ships that are reaching (or have even exceeded) the theoretical maximum age of around 30 years.

Like the container fleet, the impact of the crisis on the general cargo fleet is more obvious when one looks at the number of new ships ordered. Whereas in 2008 new orders amounted to 882 general cargo ships (representing a total capacity of 9.4 million DWT), only 11 new ships were ordered during the first quarter of 2009.

2.5. Trends in the RoRo market

The roll on/roll off (RoRo) market can be divided into four sub-categories: the deep sea segment, consisting of car-carrying and container liner trades with RoRo facilities, and a short sea segment consisting of ferry transport for both passengers and freight, on the one hand, and freight-only RoRo transport, on the other. These four sub-categories are briefly discussed below.

2.5.1. Car-carrying trades

Approximately 20-25% of world car production is exported by ship from the country of manufacture. Forecasts for 2015 indicate a worldwide production volume of some 80 million units, with overseas exports accounting for nearly 20 million units (ESPO, 2007). These figures are based on an estimated annual growth rate of 2% in the vehicle manufacturing sector; they do not take into account the impact of the crisis, which has greatly affected car manufacturing. Worldwide vehicle production decreased from 73.3 million vehicles in 2007 to 70.5 million in 2008 (International Organisation of Motor Vehicle Manufacturers, 2009). Unfortunately there are no recent figures available for the impact on car-carrying trades.

2.5.2. Container liner trades with RoRo facilities

The deployment of these so-called ConRo vessels[14] used to be popular in certain liner trades to ports with rather limited ship handling facilities, but has now lost much of its attractiveness. At present, it is used mainly in certain west African and South American ports. The average age of the ConRo fleet is high, with the majority of the ships having entered into service in the 1970s and 1980s. With the exception of some new orders (for example, CMA-CGM subsidiary Delmas recently ordered four new 29 000 DWT ConRo ships), newbuilding has virtually stopped. This market segment is consequently expected to shrink further.

2.5.3. Ferry transport for both passengers and rolling freight

The market is characterised by a substantial drop in passenger traffic on most links, owing to increased competition from low-cost airlines and the Channel Tunnel. On the other hand, the freight transport segment has a high growth rate, especially in the Mediterranean. This has resulted in the replacement of passenger space with freight space and the deployment

[14] ConRo vessels are those that can load both rolling freight (mostly under deck) and containers (on deck).

of faster, more modern vessels. However, some links still have significant passenger traffic, especially those between Sweden and Finland and on the Mediterranean.

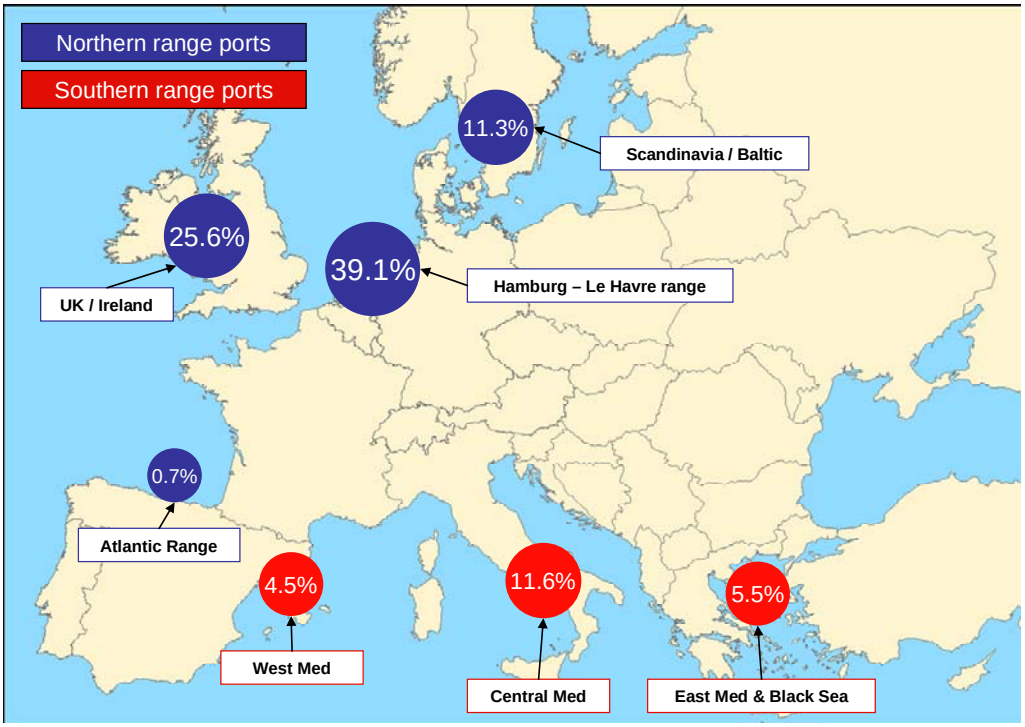
2.5.4. Freight-only RoRo transport

The market for unaccompanied freight transport is growing strongly in many geographical regions, and is characterised by the use of larger vessels. Containers already play an increasingly important role in the North Sea market, and are expected to increase their penetration in other short sea trades as well, replacing trailers and trucks. However, the market between northern Europe and the Mediterranean is still difficult for unaccompanied RoRo transport, owing to the fierce competition from road and rail transport.

2.5.5. RoRo cargo handled in EU ports

RoRo traffic in the EU amounted to 451.5 million tonnes in 2006, representing a 6.1% increase on the previous year (ESPO, 2008). The EU's five leading manufacturing countries are Germany, France, Spain, the UK and Italy. The northern range ports handle the largest share of European RoRo traffic.

Figure 2.19. RoRo traffic and market share per port region (2006)



Source: Buck Consultants International, based on Notteboom (2009)

A large pure car and truck carrier (PCTC) typically calls at five or six ports in Europe. Europe's biggest RoRo ports are Dover (UK), Calais (FR), Lübeck (DE), Zeebrugge (BE), Immingham (UK), Göteborg (SE), Trelleborg (SE), Dunkirk (FR), Rotterdam (NL) and London (UK). The leading deep sea car-carrier operators[15] are also heavily involved in intra-European short sea trade.

[15] NYK (Japan), Mitsui OSK Lines (Japan), K-Line (Japan), Eukor (South Korea) and Wallenius Wilhelmsen (Sweden).

2.5.6. RoRo fleet

In 2006 the top five carriers operated approximately 60% of the ships. In 2007 the fleet comprised 580 vessels with a total capacity of 2.6 million CEU[16]. As indicated in Table 2.11, this fleet has grown steadily since the 1990s. Average vessel size had increased from 4 035 CEU in 1990 to 4 550 CEU by the beginning of 2007. The largest car carriers currently have a capacity of some 8 000 CEU, expected to increase to 11 000 CEU in the near future. Many seaport terminals do not have the necessary infrastructure for handling large car carriers. One can expect car carriers themselves to start taking shares in car terminals in order to secure port operations.

Table 2.11. World car carrier fleet

	1990		2000		2005		2006		2007	
	CEU ('000)	No of ships	CEU ('000)	No of ships	CEU ('000)	No of ships	CEU ('000)	No of ships	CEU ('000)	No of ships
> 6000 CEU	136.5	22	206.8	34	551.2	88	747.0	118	727.1	113
5000-5999 CEU	347.6	64	639.6	117	640.2	117	619.9	114	745.3	135
4000-4999 CEU	394.9	87	512.1	113	631.7	140	648.7	144	689.2	153
3000-3999 CEU	260.4	78	289.5	87	313.7	93	317.0	94	320.9	95
2000-2999 CEU	105.8	42	87.7	35	81.5	33	87.9	36	90.1	37
1-1999 CEU	33.8	24	51.1	37	62.8	46	67.3	47	67.3	47
Total	**1.279.0**	**317**	**1.786.8**	**423**	**2.281.1**	**517**	**2.487.8**	**553**	**2.639.9**	**580**

Source: Fearnleys, 2007

2.6. Trends in the dry bulk market

2.6.1. Dry bulk volumes handled in EU ports

Bulk cargo is commodity cargo that is transported unpackaged in large quantities. UNCTAD (2007) estimated the volume of dry cargo shipments (including dry bulk, containerised cargo, general cargo and RoRo cargo) in 2007 at a total of 5.34 billion tonnes, representing approximately 66.6% of the world total. These figures show an increase of nearly 40% compared with the year 2000. The share of dry bulk cargo was estimated at some 37.7% of world seaborne trade in 2007. The five main bulks – iron ore, coal, grain, bauxite/alumina and rock phosphate – accounted for nearly 25%, while minor dry bulks accounted for 13%. The total volume of dry bulk cargo shipped in 2007 thus amounted to 3 billion tonnes.

This strong growth has been driven mainly by a strong increase in crude steel production as a result of substantial economic growth until mid-2008. Raw materials for production are generally shipped from resource-based economies to industrial economies. Europe is highly dependent on imports of raw materials to support industrial production. The dry bulk volumes at European ports are dominated by coal and iron ore, and strongly linked to electricity and steel production.

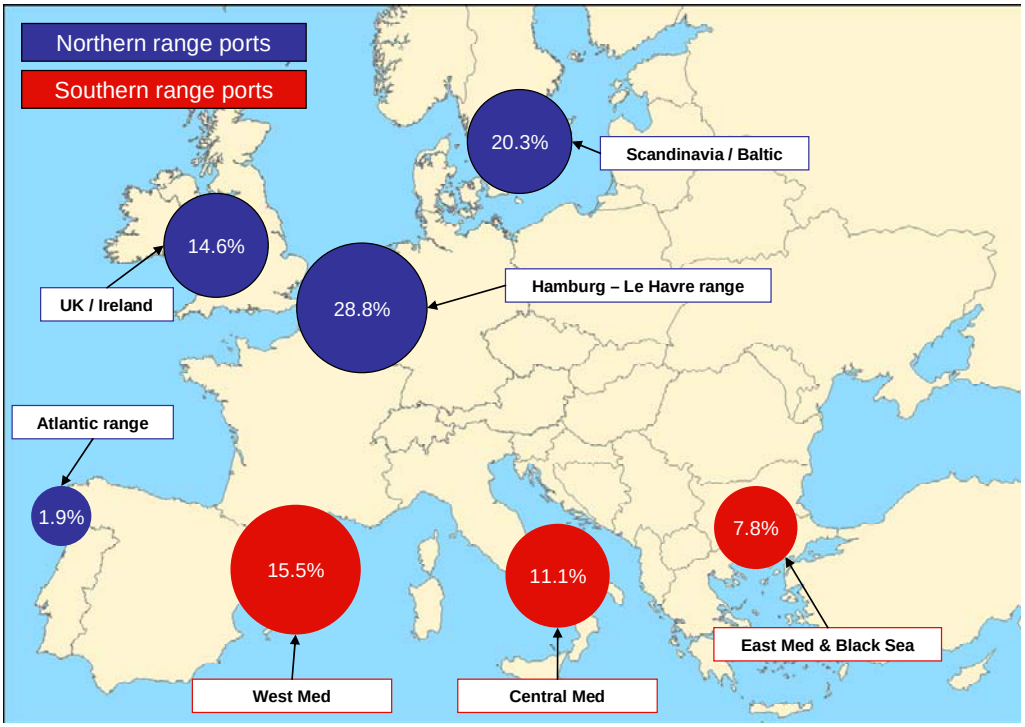
The impact of the downturn is clear from recent steel production figures. Whereas world steel production amounted to some 700 million tonnes in the first half of 2008, it fell to approximately 550 million tonnes in the first half of 2009. This figure represents a 21.3% decrease (source: World Steel Association, 2009). In particular, steel production in the

[16] **C**ar **E**quivalent **U**nit: an indication of a RoRo ship's capacity.

EU-27 has been hit hard, with a decrease of 43.2% compared with the first half of 2008 (in 2008 the EU-27 accounted for 15.7% of world production).

Total dry bulk volumes were estimated at 1.012 million tonnes in 2006 (most recent available figures). This represented a 2.9% increase on 2005. Approximately 65.6% of these volumes are handled at northern range ports (Figure 2.20).

Figure 2.20. Dry bulk cargo traffic and share per port region (2006)



Source: Buck Consultants International (2009), based on ESPO (2008) and Notteboom (2009)

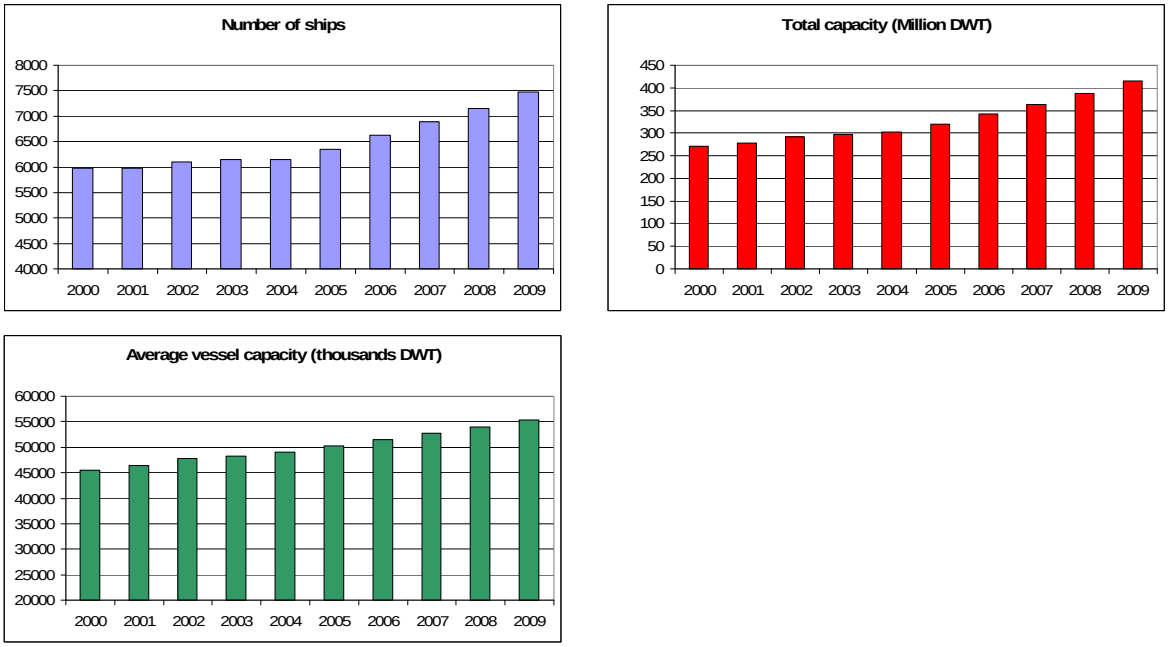
Compared with container traffic, dry bulk volumes are more evenly spread across different ports. Whereas the EU's five leading container ports handled approximately 43% of total EU container volume, its five leading dry bulk ports handled only 19% of total dry bulk volume. These ports are Rotterdam, Hamburg, Dunkirk, Amsterdam and Antwerp.

Lower steel production (and lower production in general) obviously has an impact on the dry bulk volumes handled at EU ports. Although only limited, fragmented results are available for the first half of the year, it may be concluded that all five leading ports saw their dry bulk volumes decrease in 2009. Volumes at these ports dropped by between 20% and 47% compared with the first half of 2008.

2.6.2. Dry bulk fleet

As a result of the growing demand for raw materials until 2008, demand for maritime transport also rose. This increased demand is reflected in the world dry bulk fleet, which grew steadily in the preceding years (Figure 2.21). The fleet consisted of 7 481 ships at the beginning of 2009, with a total capacity of 414.4 million DWT. This represents an increase of 25.1% and 25.5% respectively over 2008.

Figure 2.21. Dry bulk fleet statistics



Source: ISL (2008 and 2009)

With capacity growing faster than the number of ships, a clear increase in size can be observed, from an average 45 450 DWT in 2000 to 55 400 DWT in 2009. One reason is the planned enlargement in the capacity of the Panama Canal, which will allow vessels in the Mini Cape[17] segment into its locks from 2015. Another explanation is economies of scale, which enable ship owners to reduce exploitation costs. The considerable increase in steel production has forced up demand for larger ships, with the two main raw materials for this product – iron ore and coal – being shipped mainly in Capesize vessels. This increase in size will continue in the future, as the average vessel size on order is 87 600 DWT.

Shipyards' order books show a total of 3 425 dry bulk ships on order, with a capacity of 300 million DWT (as at 1 January 2009), representing 45.8% and 72.4% of the current world fleet respectively. The capacity on order is at its highest level ever.

The economic downturn has resulted in overcapacity in the dry bulk fleet. The impact is obvious from the second half of 2008 on.

- Charter rates are plummeting: while the Baltic Dry Index[18] peaked at approximately 11 000 in May 2008 (the highest ever), it was around 1 000 at the beginning of 2009.
- In early 2009 the idle bulk carrier fleet was reported at 450 ships, or 6% of the total number of ships, representing nearly 9% of total fleet capacity.
- Scrapping rates are on the rise. Whereas only 35 ships, with a total capacity of 0.9 million DWT, were scrapped in 2007, this number increased to 76 in 2008, equating to a scrapped capacity of 3.3 million tonnes.
- Some 1 100 new dry bulk carriers were ordered in the first half of 2008, good for an additional 99 million DWT. New orders came to a halt in the second half of 2008.

[17] The maximum vessel dimensions currently allowed in the Panama Canal are limited and correspond to the so-called 'Panamax' vessels. In general, these ships have a capacity of 60 000-80 000 DWT. Once the expansion is completed in 2014 or 2015, the Panama Canal will also be able to accommodate larger ships with a capacity of 80 000 to 120 000 DWT. This fleet segment is called the 'Mini Cape' class.

[18] The Baltic Dry Index is a shipping and trade index created by the London-based Baltic Exchange to measure changes in the cost of transporting raw materials such as metals, grains and fossil fuels by sea.

2.7. Trends in the liquid bulk market

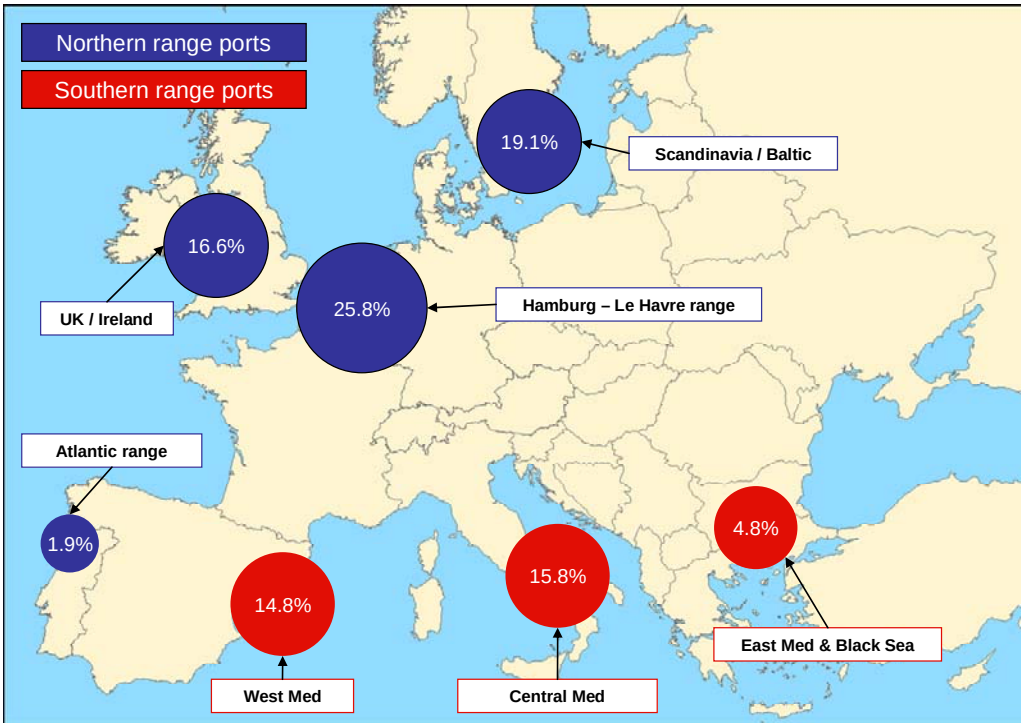
2.7.1. Liquid bulk volumes handled in EU ports

Liquid bulk cargoes include crude oil, petroleum, liquefied gas, gasoline, chemicals and liquid edibles. World liquid seaborne trade remained stable in 2007 with a total volume of 2.68 billion tonnes (UNCTAD, 2008), of which crude oil accounted for more than 65%, at 1.86 billion tonnes. The major loading areas for crude oil are located mainly in developing regions of western Asia, western Africa, South and Central America and North Africa, whereas the major unloading areas are located predominantly in developed regions; North American ports unloaded 29% of total volume, followed by Europe with 28% and Japan with 11%.

A different picture emerges for shipments of other oil products, including liquefied natural gas and petroleum. In contrast to the crude oil trade, a significant proportion of oil products are loaded in developed countries.

The volumes of liquid bulk handled at EU ports remained stable at an estimated 1 581 million tonnes in 2006 (an increase of 0.66% over 2005). Liquid bulk is the largest cargo segment. Once again, the majority of the volumes are handled at northern range ports (Figure 2.22).

Figure 2.22. Liquid bulk traffic and share per port region (2006)



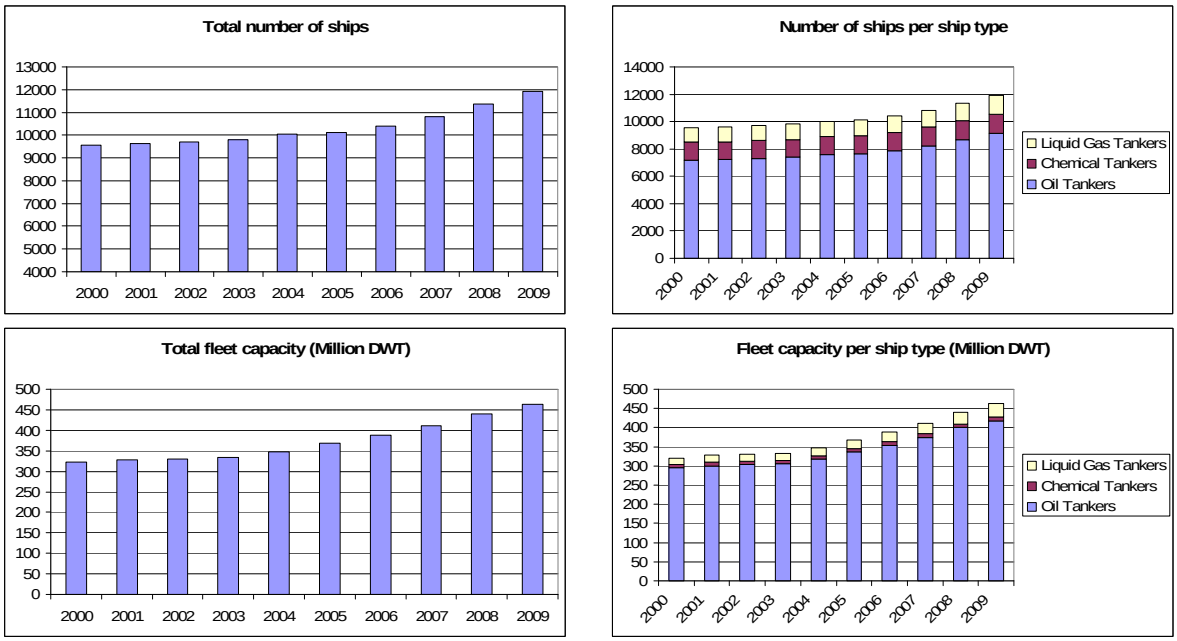
Source: Buck Consultants International (2009), based on Notteboom (2009)

The EU's five leading liquid bulk ports (Rotterdam, Marseille, Le Havre, Wilhelmshaven and Antwerp) handled approximately 23% of total EU volume. Contrary to other market segments, the downturn does not yet seem to have had a significant impact on liquid bulk shipments. Half-year results for the five biggest ports indicate that the volumes of liquid bulk handled either increased slightly or decreased only marginally in the first half of 2009 (compared with the first half of 2008).

2.7.2. Liquid bulk fleet statistics

On 1 January 2009 the liquid bulk fleet totalled 11 925 ships with a total capacity of 463.3 million DWT. This represents an increase of 24.9% and 44.1% respectively compared with the year 2000. As capacity is growing faster than the number of ships, the liquid bulk fleet is also characterised by a clear increase in average vessel size. As indicated in Figure 2.23, the vast majority (more than 75%) of the ships are oil tankers, accounting for more than 90% of total fleet capacity. All ships of 100 000 DWT or more are oil tankers. At the beginning of 2009, 526 ships had a capacity of more than 200 000 DWT.

Figure 2.23. Liquid bulk fleet statistics



Source: ISL (2008 and 2009)

Although all other market segments have been affected by the downturn, 2008 proved to be an excellent year for the tanker market, and the best year ever for freight rates. New orders were placed for 907 tankers with a total capacity of 60 million DWT. As at 1 January 2009, the order book stood at 2 812 ships (equating to 189.7 million DWT). However, it is highly uncertain whether this new capacity will actually enter the market, as it is expected that a considerable share of the ordered tonnage will be cancelled in the months to come (ISL, 2009). New orders have almost ground to a halt.

Lastly, Table 2.12 indicates the average vessel dimensions for different categories of both dry bulk vessels and tankers.

Table 2.12. Average ship dimensions, in metres

		Length	Width	Draft
Dry Bulk Vessels				
Panamax	60.000-80.000 DWT	265.0	34.0	12.0
Mini Cape	80.000-120.000 DWT	290.0	49.0	15.0
Capesize	> 120.000 DWT	300.0	50.0	17.0
Tankers				
Suezmax	100.000-150.000 DWT	285.0	45.0	14.5
VLCC	150.000-300.000 DWT	350.0	55.0	20.0
ULCC	> 300.000 DWT	415.0	63.0	> 20

Source: Various

Conclusion

The market environment for the global sea trade has changed considerably in recent years. As a result of globalisation and offshoring, seaborne trade has increased sharply. Together with EU enlargement, these factors have led to changing supply chain structures in which European and regional distribution centres have rapidly gained in importance.

The sharp increase in seaborne trade has resulted in a thrust towards economies of scale in maritime shipping and put severe pressure on port and terminal capacity, resulting in high utilisation rates and congestion. This is especially true of the container market segment.

In order to achieve economies of scale, larger vessels are ordered and shipping companies compete aggressively to gain market share. A number of dominant world players have emerged in respect of terminal operations and shipping. They offer door-to-door service all over the world at competitive prices.

In addition, volumes in other market segments have increased. An increase in vessel size has been observed, especially in the dry and liquid bulk sector.

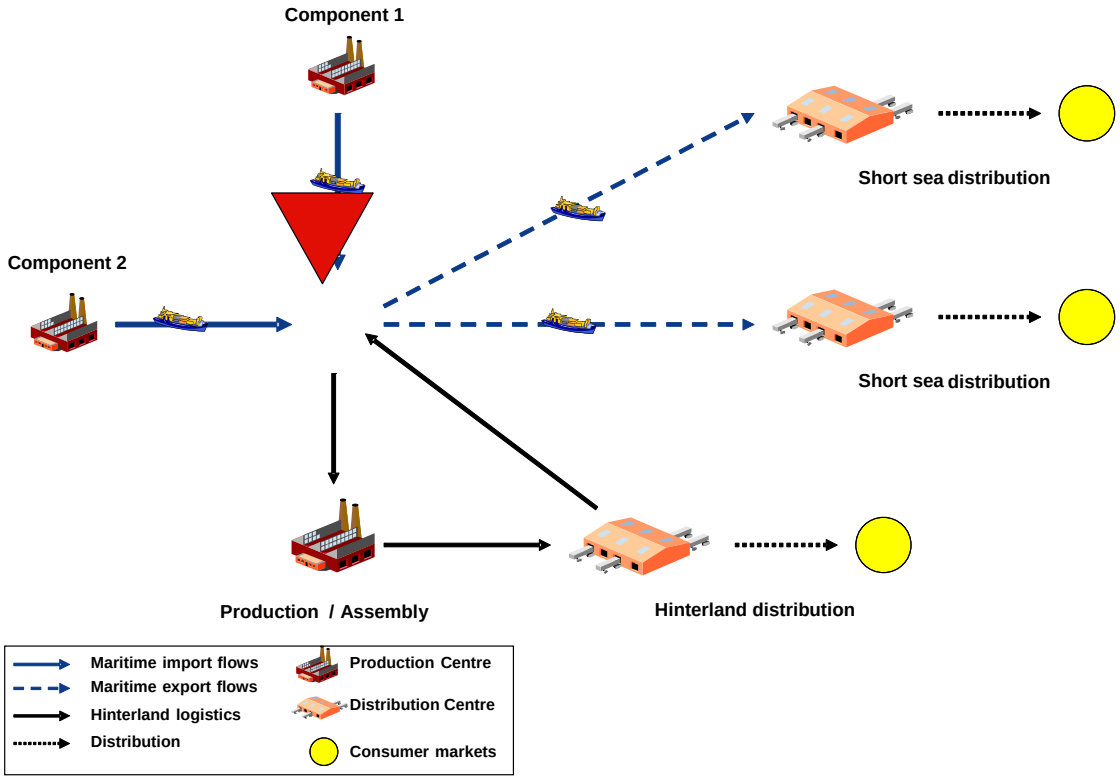
The worldwide recession has affected maritime trade flows. Volume growth is expected to resume only from 2012/2013.

3. EVOLVING ROLE OF EU SEAPORTS

3.1. Introduction

Dominant shipping companies and terminal operators with considerable investment power have emerged. These groups have become increasingly involved in both port and hinterland developments. As such, ports can no longer be considered a separate node in the framework of global supply chains. Seaports, especially the multi-functional ones, are now crucially integrated parts of both transport and product (supply) chains (Figure 3.1).

Figure 3.1. The port complex as part of logistics and supply chains



Source : Buck Consultants International (2009)

This chapter aims to evaluate and explain the evolving role of EU seaports in the fast-changing EU logistics environment. The focus will be on a port's position in the logistics chain, taking into account the impact of port stakeholders and maritime and hinterland developments.

Although port authorities continue to be important players, their role has changed. Other stakeholders such as terminal operators, shipping lines, logistics providers and the surrounding community are increasingly gaining in importance. Consequently, the role and functions of port communities have also changed.

The next chapter will explain the evolution of EU seaports in terms of port organisation and port operations and look briefly at future developments. Specific attention will be paid to the role of port authorities. The evolution of EU seaports has been driven by growing containerisation. Accordingly, the next chapter will focus almost entirely on container transport.

3.2. Past evolutions: from port communities to port regionalisation

3.2.1. Port communities

Ports and port infrastructures have changed considerably over the years. Ports were originally located near cities, but developments in maritime trade have led to continuous redesign. Increased specialisation in cargo handling, growing ship sizes and the need for extra space for cargo handling and storage have resulted in port activities being concentrated at new, larger sites away from the original locations near city centres. Two Mediterranean ports serve as examples. The port of Barcelona is surrounded by an expanding, dynamic urban fabric and has to cope with constraints on capacity. The neighbouring port of Marseille, which is also surrounded by the city, has constructed a new port: Fos. The old port is now used almost exclusively for ferry transport.

Ports no longer serve only a city and the direct hinterland. This change started in the 1970s with the growth of containerisation. Ports such as Ghent and Rouen, where 80% of inbound flows are used by industry located in the port area, have become the exception rather than the general rule.

In port communities the different stakeholders involved in port business, such as terminal operators, shipping companies, forwarders, stevedores and customs authorities, have started cooperating closely with each other and the port authority with a view to optimising internal port processes and making the port more efficient.

Figure 3.2. The port community

Source: Buck Consultants International (2008)

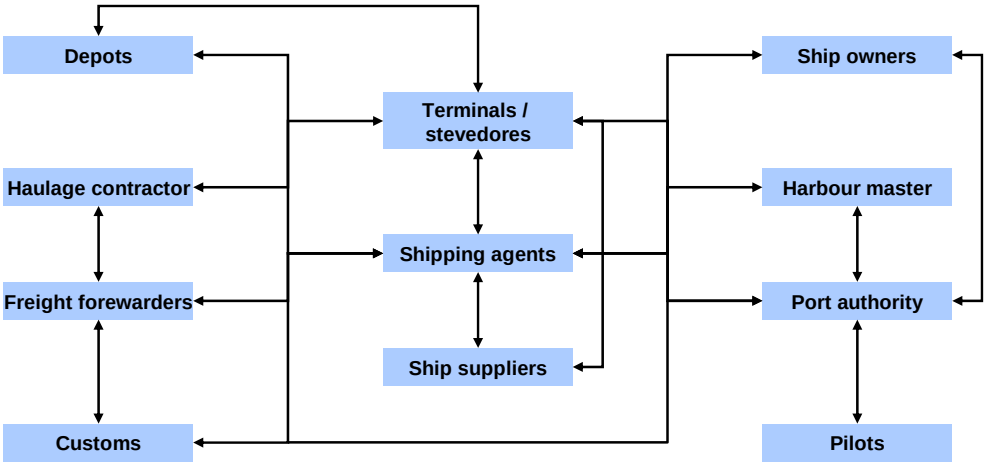
Port authorities were the driving force behind this type of organisation. Port communities were linked to the development of EDI-based[19] information and communication systems. The effectiveness of these systems was based on the transmission of standardised messages. Their weakness lay in the fact that many ports developed their own proprietary systems; although standardised messages were developed under the auspices of the UN, variations in implementation made it extremely costly to link port community systems.

[19] EDI: Electronic Data Interchange.

Examples of such systems include ADHEMAR (Le Havre), PROTIS (Marseille) and SEAGHA (Antwerp).

This internal focus resulted from the specific requirements of container transport. Container vessels require reduced dwell times in ports and high turnaround times at terminals. These requirements could only be met through collaboration with different partners and smoother communication processes, which are often too complicated and time-consuming and sometimes overlap (see Figure 3.3).

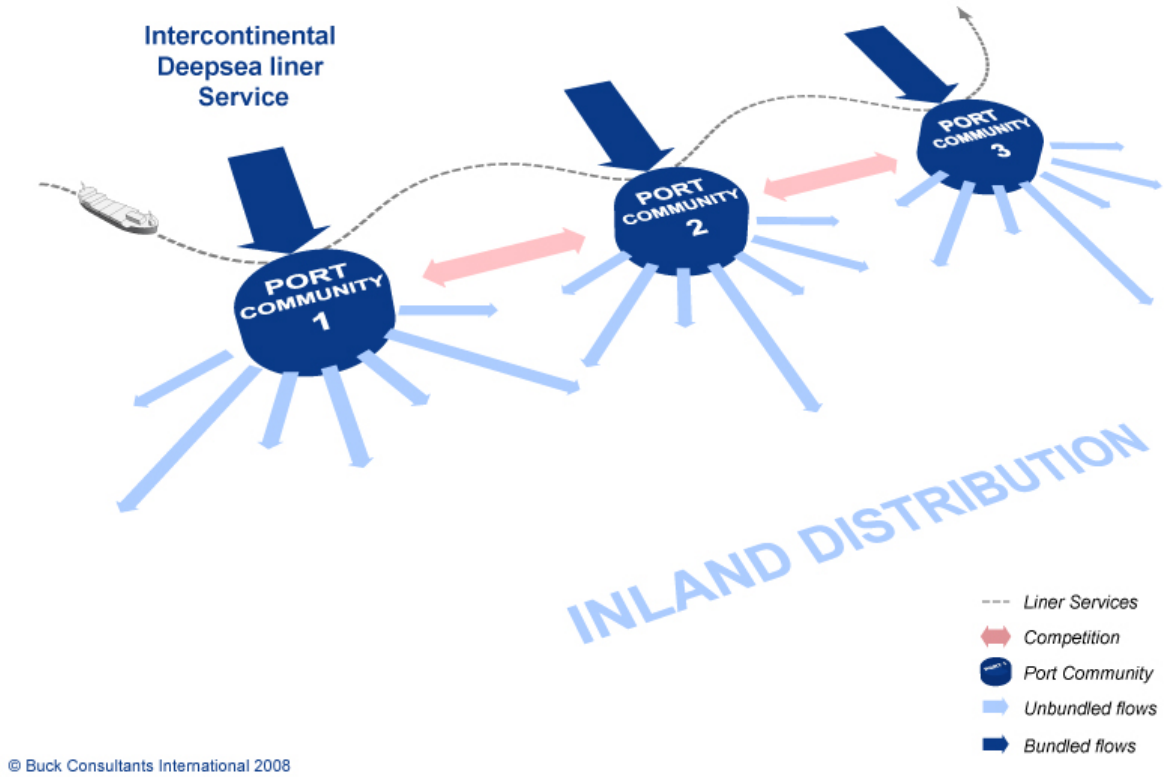
Figure 3.3. Information flows



Source: Buck Consultants International (2009), Rodon and Ramis-Pujol

The port community phase was characterised by little cooperative interaction and strong competition between different ports. This competition was mainly cost-based. The common target shared by stakeholders in the port community was to attract as much cargo as possible. Examples of port competition include that between Antwerp, Hamburg and Rotterdam or between Barcelona, Genoa and Marseille.

Figure 3.4. Port community phase



Source: Buck Consultants International (2008)

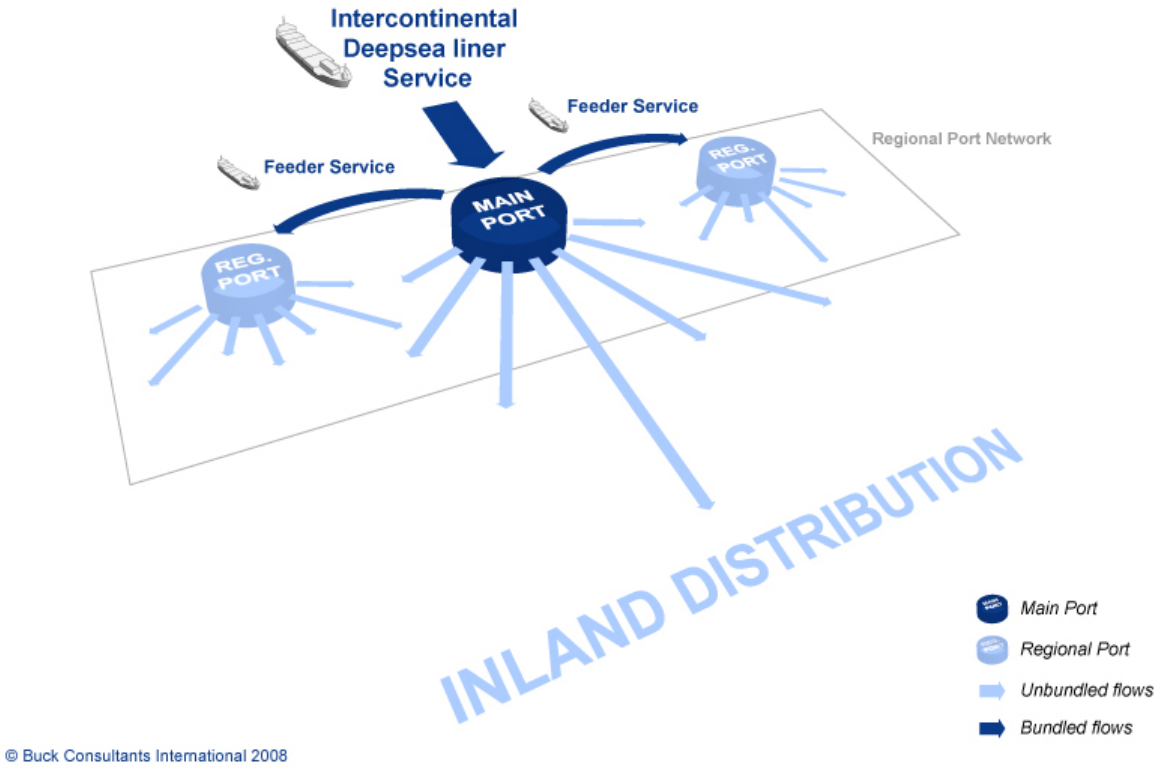
3.2.2. Port regionalisation

A new phase of port development started in the 1990s, in which cooperative interaction between ports rapidly gained in importance. This new phase was triggered by three trends:

- the emergence of short sea shipping as a result of containerisation and intra-trades;
- the increase in average vessel sizes;
- the increase in volumes and the resulting increase in pressure on port capacity.

Instead of calling at several ports in a port range, deep sea container vessels now call only at one or a few hub ports, where both local cargo and transhipment cargo for the entire region are loaded and unloaded. Transhipment cargo is transported either to or from the ports of origin or destination by a dense network of feeder services connecting major hub ports to smaller regional ports. Cargo bundling and distribution are still organised mainly in the port area, and road transport accounts for a large proportion of the modal split.

Figure 3.5. Port regionalisation phase



Source: Buck Consultants International (2008)

Illustration of feedering:

The role of regional ports may be illustrated by the example of a consignment of containers to be shipped from Gothenburg to Shanghai. The consignment is to be delivered to the terminal in Gothenburg on 4 May. The shipping line offers a departure from Gothenburg to Shanghai with a sailing on 5 May and transhipment in Antwerp. A feeder vessel will load the containers and arrive in Antwerp on 7 May. Upon arrival at Antwerp the boxes will be unloaded from the feeder vessel and wait at the terminal to be reloaded on the main deep sea vessel, which sails for Shanghai on 10 May.

By calling at only one hub port instead of various ports, shipowners can significantly reduce the length of their ocean-going vessels' round trips and will consequently need fewer vessels to complete a service loop. It is important to look at the correlation between these liner and feeder services. Just like the deep sea liner industry, feeder services are characterised by an increase in size and by time pressure. Efficient coordination is essential in order to reduce dwell time in ports and keep to schedule.

Different types of ports have emerged.

- **Main ports**: Europe's main traditional ports are Antwerp, Le Havre, Rotterdam and Hamburg, which attract large volumes in all market segments. They fulfil an important function in bundling cargo and distributing it to the hinterland, and handle large volumes of transhipment cargo.
- **Transhipment ports**: these ports, in particular, generate large container flows. Their function in distributing cargo to the hinterland is somewhat limited. They are located

mainly in the Mediterranean. Examples include Algeciras, Marsaxlokk, Gioia Tauro, Cagliari and Taranto.

- **Second-tier ports**: these ports have an important cargo bundling and distribution function. Their transhipment function may still be significant, but they generate lower transhipment volumes than main ports and transhipment ports. They handle all market segments. The EU coastline has many second-tier ports, including – to name just a few – Dunkirk, Immingham, London, Southampton, Bremen, Genoa, Trieste, Valencia, Barcelona, Piraeus, Constanţa and many Scandinavian and Baltic ports.
- **Third-tier ports**: these ports generate hardly any transhipment. They are largely focused on distribution to the direct hinterland. Moreover, many of them do not handle all market segments. Examples include Gijon, Nantes, Ghent and Rouen.

Port competition increasingly has a regional dimension. As well as costs, capacity is very important. Ports try to acquire a strong position within a region and look into cooperating with other ports or locations in the hinterland. Typical examples include the cooperation agreement between the Port of Rotterdam and Zeeland Seaports (Ports of Terneuzen and Vlissingen) and the position Rotterdam has acquired in the Dutch hinterland hub of Venlo, with daily shuttle trains to and from the port. The purpose of such cooperation is to attract cargo, including transhipment cargo as well as import/export flows.

Another type of cooperation is linked to the position of the port range. By cooperating, ports try to upgrade the entire port range. A good example is the cooperation agreement between three West Med ports: Barcelona, Genoa and Marseille. These ports still compete to attract cargo, but also work together to market the West Med range as a main gateway to Europe.

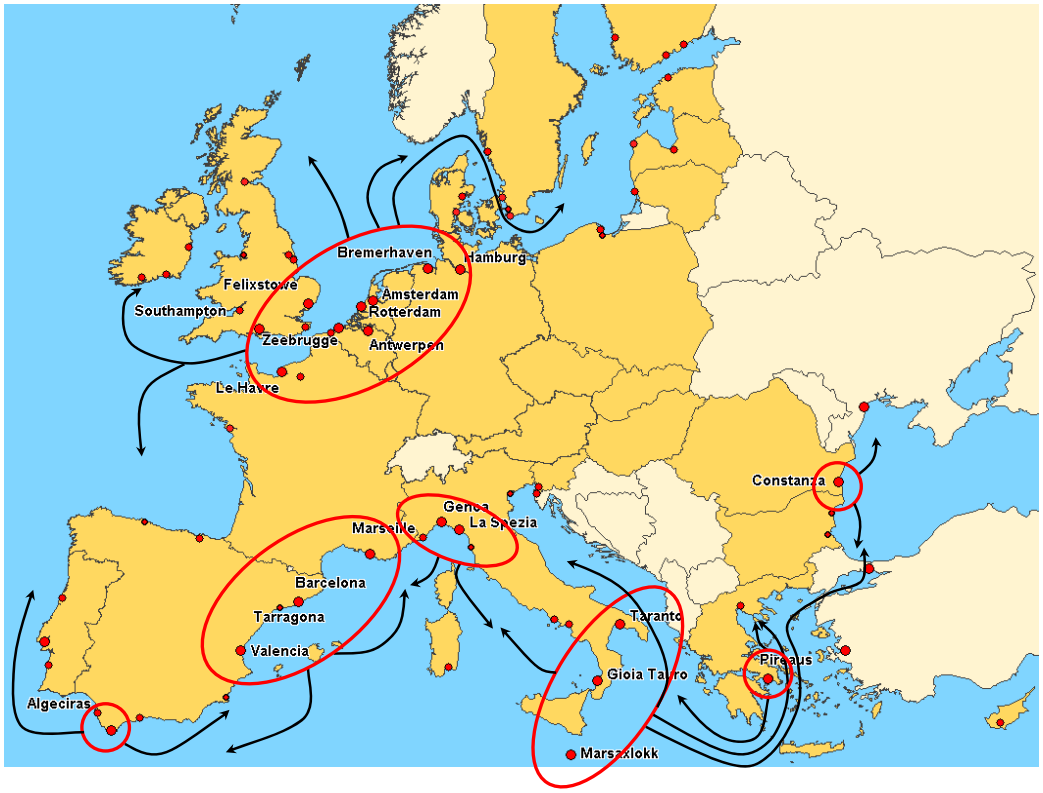
Second-tier ports have been able to absorb some of the traffic flows previously loaded and unloaded at main ports. This is obvious from the strong growth in container volumes. Thanks to these ports' excess capacity and proximity to several main ports, they offer a good alternative to shipping companies wishing to reduce their exposure to the increasing congestion at main ports.

Figure 3.6 illustrates this 'hub and spoke system' at the European level. It shows the main ports of Antwerp, Le Havre, Hamburg and Rotterdam, together with a number of important transhipment ports or second-tier ports with a significant transhipment function.

The transhipment ports and second-tier ports have been handling growing volumes thanks to an increasing number of feeder calls in recent years. The feeders are also becoming larger, enabling them to supply sufficient capacity to link regional ports to main ports effectively. Regional ports have emerged as important distribution sites. Moreover, increased frequency and capacity have reduced transit times between main hubs and second-tier ports.

Some second-tier ports have the potential to become main ports. Growing volumes, especially in the Far East trades, are making it very worthwhile for shipowners to call directly at some of these ports. The port of Constanţa is a good example. These ports will then have the potential to consolidate and grow.

Figure 3.6. Regional port network



Source: Buck Consultants International (2008)

It should be mentioned that the current economic downturn has had a negative impact on all types of ports.

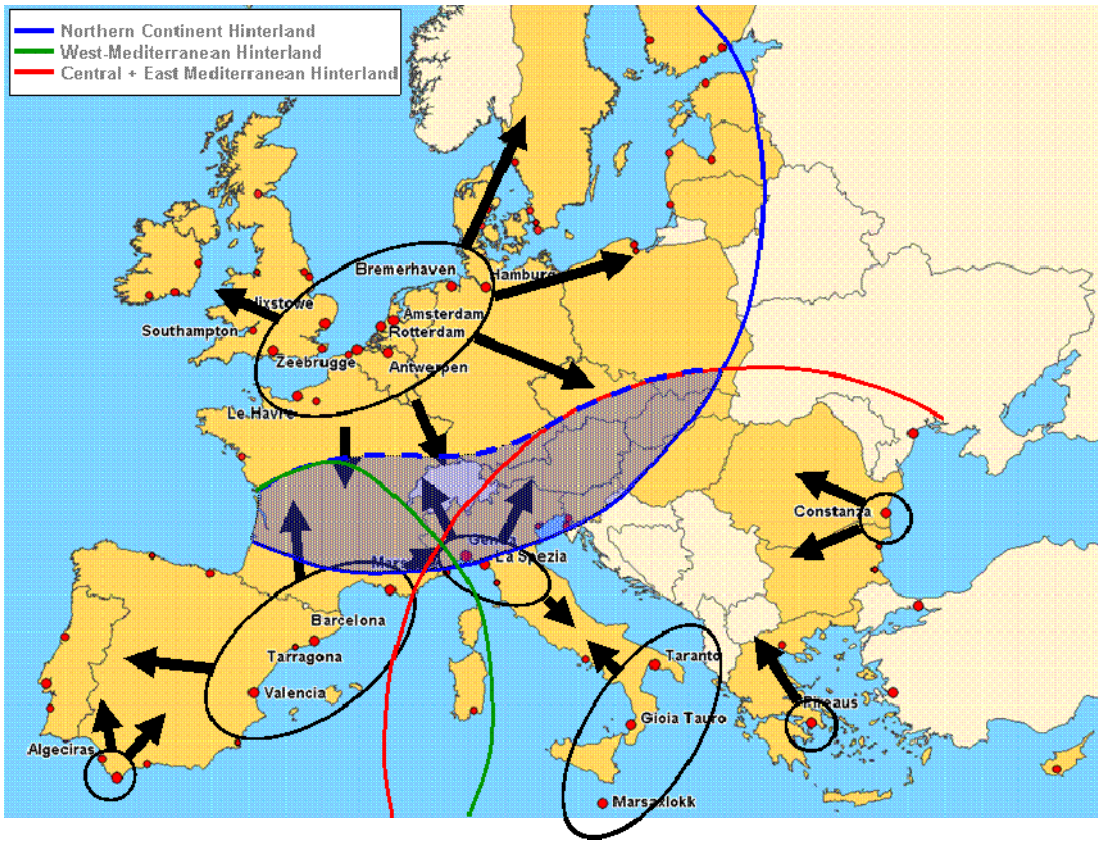
3.3. Current situation: port terminalisation

3.3.1. Inland terminal networks

During the mid-1990s further volume growth and increasing vessel sizes, together with capacity problems at certain ports and the emergence of short sea shipping, led to the regionalisation phase explained in the previous section. This phase was characterised by the growing importance of regional port clusters. Ports are no longer regarded purely as transfer centres, but are now becoming comprehensive flow-through areas within a complex of logistics chains functionally linked to distribution developments in the hinterland.

EU enlargement has added another dimension. Whereas port hinterlands used to be somewhat limited, they have now expanded towards central and eastern Europe. This is clear from Figure 3.7, which shows the hinterland areas within reach of various port regions.

Figure 3.7. Port region hinterlands



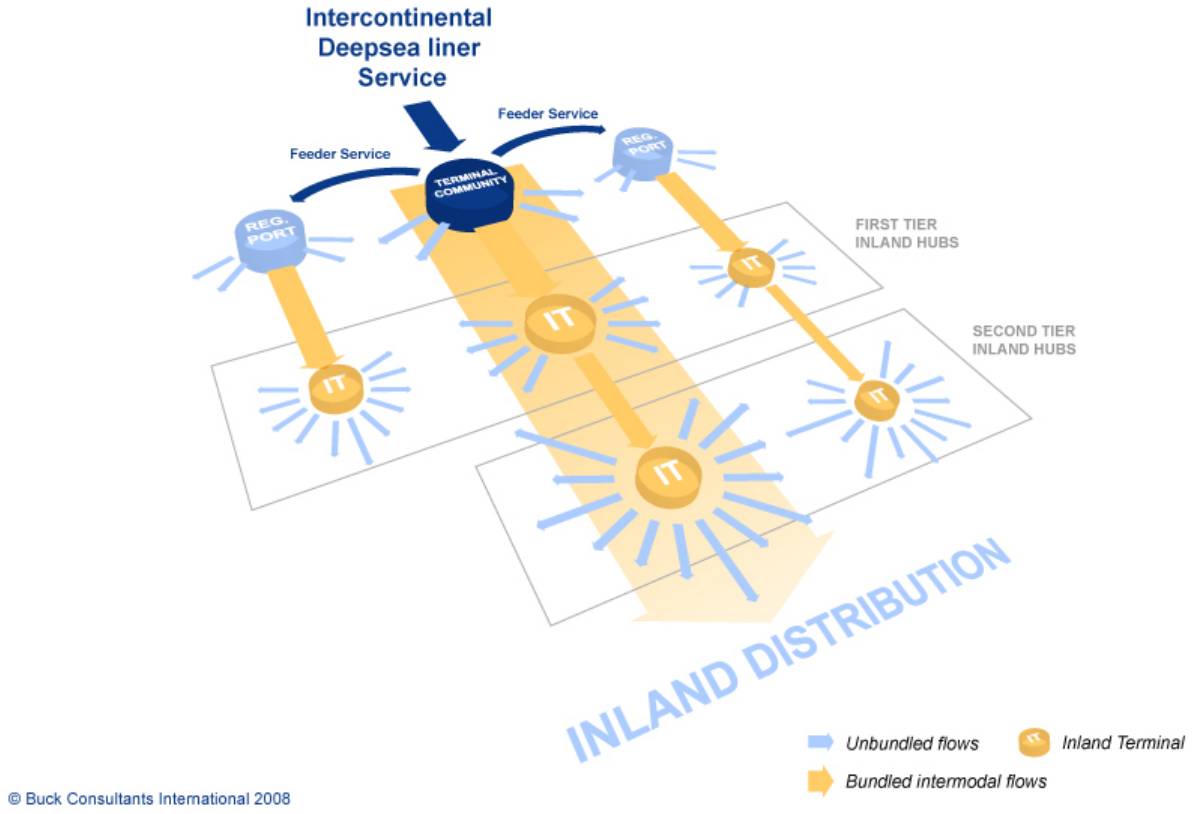
Source: Buck consultants International (2008)

Competition between individual ports, excluding the main ports, used to be limited primarily to the direct hinterland range. During the regionalisation phase, it began to target a more extended hinterland. As Figure 3.7 shows, there is an overlap between the hinterlands of different port regions. The more successful port regions are in expanding their hinterlands, the bigger this overlap will become. Essentially, the diagram conveys one important message: the better a port region penetrates the hinterland, the more successful it will become. This also the reason most port hinterland is now shared, meaning that so-called 'captive' hinterlands are no longer very significant.

The port of Barcelona is a good example of a strategic focus on the hinterland. Convinced that future inter-port competition will primarily target inland services rather than port capacity, the port authority is committed to an inland-oriented strategy. Emphasis is placed on developing efficient connectivity with the hinterland through a network of rail corridors and inland terminals. The port has identified several strategic corridors towards central France, northern Spain and Portugal. Inland terminals are being developed along these corridors to provide the same services as the port itself.

A port's hinterland can be extended only by means of inland terminals and intermodal transport (Figure 3.8).

Figure 3.8. Port terminalisation phase



Source: Buck Consultants International (2008)

Large volumes are transported to and from inland terminals intermodally via trans-European intermodal transport corridors. Cargo bundling takes place at inland terminals, which naturally has a positive impact on terminal capacity at seaports.

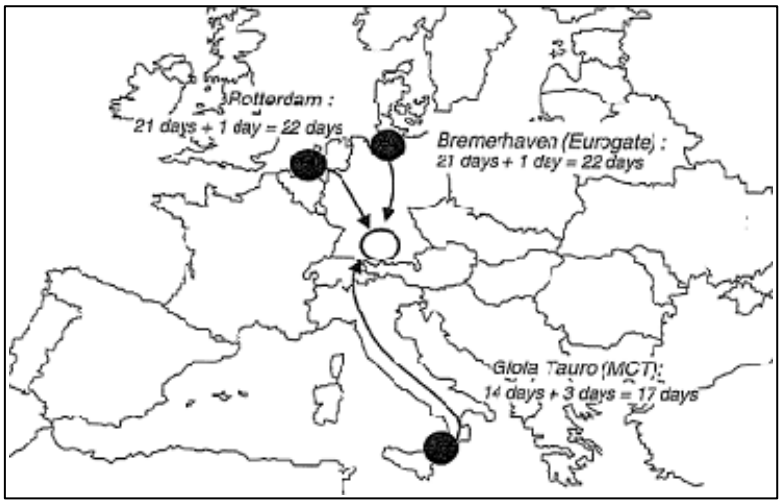
Functional integration has led to strong logistics groups and mega-carriers offering a wide range of services to their clients. For these groups, the choice of ports through which to operate depends largely on a given port's efficiency within the relevant logistics chain(s) and the corresponding reliability of its services. These parameters are then affected by the degree of congestion. Port authorities' commercial role has become relatively less important. Instead, more attention is being paid to reliability and service levels. This new situation also explains why, in selecting ports, shippers or shipowners are increasingly focusing on certain supply chain management characteristics rather than traditional, port-specific values.

Given the current conditions, i.e. an average volume decrease of 20%, hinterland penetration and intermodal service levels can be expected to become even more important. Ports will try to maintain their position as vital nodes in logistics and supply chains in an effort to secure as much cargo as possible and in turn minimise the impact of the crisis.

Logistics groups and mega-carriers are increasingly organising their operations around a network of terminals. Terminals have become the driving force in cooperation between port stakeholders with a view to optimising logistics processes. Accordingly, port organisations are evolving from port communities to terminal communities. International terminal operators provide users with a worldwide formal and informal network.

While port competition focused mainly on the sea during the port community and port regionalisation phases, it now also involves the landside. Competition between ports is based largely on reaching a broad hinterland region. Moreover, there is increasing competition between port regions. This is clearly illustrated by a comparison of transit times between Asian ports and European inland destinations. As shown in Figure 3.9, transit times between Asia and central Europe are much shorter when shipping via a Mediterranean port.

Figure 3.9. Total transit times between Asian ports and European inland destinations



Source: Maritime Economics and Logistics (2006)

As mentioned in Chapter 2, the world terminal scene is dominated by a few large operators with considerable investment power, which have invested heavily in terminals and networks and acquired strong positions in the different port regions. Most new terminal capacity is developed by these operators, enabling them to consolidate their position and importance within main ports and increase their lead over smaller terminal operators in terms of capacity.

In recent years, new terminal capacity has often been developed as part of a consortium with shipping companies. This is the case in Rotterdam, for example, where one of the new terminals for the Maasvlakte II project will be developed by Rotterdam World Gateway. This group is a consortium made up of terminal operator DPWorld, the New World Alliance shipping lines (MOL, Hyundai and APL)[20] and CMA-CGM.

At the same time, terminal operators have signed new agreements with the major shipping lines on semi-dedicated or dedicated terminal capacity at main ports. These agreements will then influence a shipping line's decision to call at a certain port. Shipowners will call at those ports they know to have the capacity available to handle their ships without delays. As a result, terminals are increasingly playing a central role within port organisations (Figure 3.10).

[20] New World Alliance is a cooperative arrangement between the container shipping companies MOL, Hyundai and APL. These shipping lines have concluded agreements on sharing vessel space on certain routes.

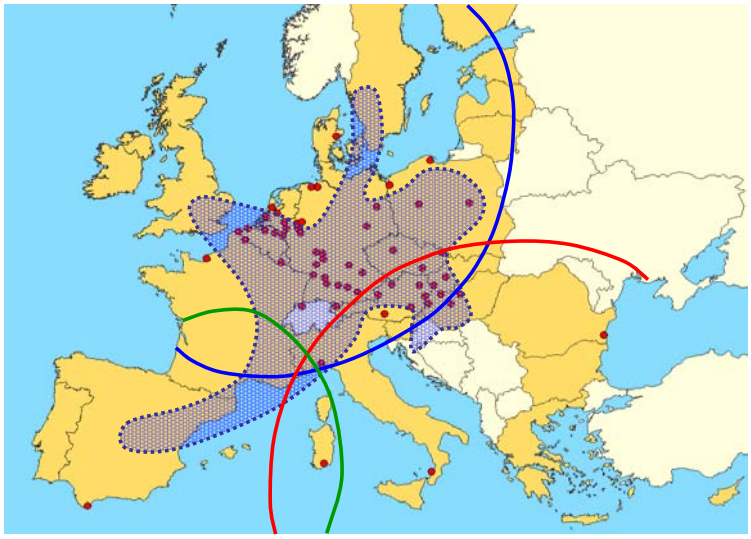
Figure 3.10. Terminal community organisation

Source: Buck Consultants International (2009)

There is no evidence to date that the economic downturn has affected the fundamentals, although some new terminal capacity projects have been postponed or cancelled. As indicated in the previous chapter, shipping lines have invested heavily in new ships. These investments are placing considerable pressure on financial results, as earnings have dropped sharply. In fact, many shipping lines have already reported negative financial results for 2008 and 2009, leaving them with only limited or no resources to invest in terminal capacity. The situation is the same for terminal operators. Nevertheless, a renewed investment wave could be expected to start from 2012/2013, once volumes are up again.

Terminal operators are not only trying to acquire a strong position within seaports, but, as mentioned in Chapter 2, are also focusing increasingly on the hinterland. Figure 3.11 shows the ports of the AP Möller–Maersk Group (Denmark). It clearly indicates the Group's presence along the coastline and in the hinterland through a network of port and hinterland terminals situated in the 'blue banana'.

Figure 3.11. AP Moller–Maersk: port and inland terminal network



Source: Buck Consultants International (2008), adapted from Maersk Line data (2007)

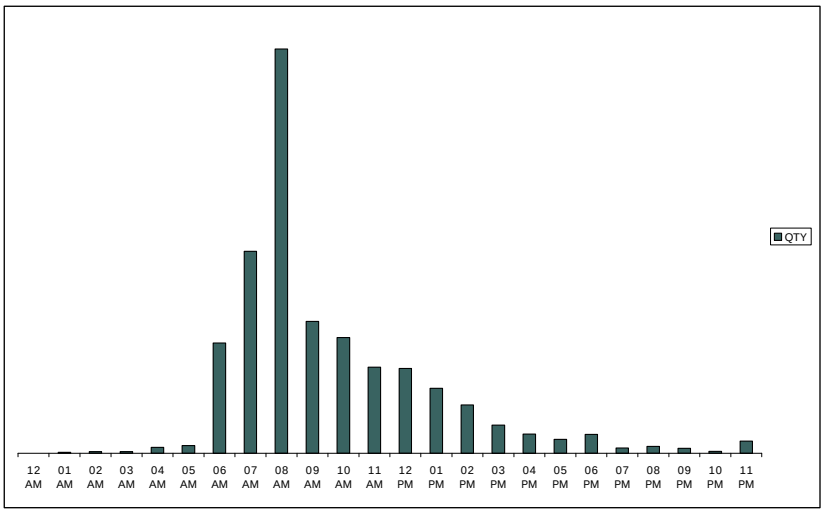
Growing importance of inland terminals

Inland terminals are important cargo bundling points as well as being nodes in the transport system. Prior to the start of the economic downturn, the growing volumes handled at European seaports were having repercussions on inland transport. As well as leading to congestion at terminals, the growth in volume triggered long waiting times at terminal gates and congestion in port areas during peak periods.

Extending the opening times of terminal gates does not bring much relief. In order to extend opening hours, hinterland companies would also have to extend their loading and unloading times. The additional costs would outweigh the benefits, making this option uneconomic for shippers. The concentration of transport moves during the morning peak period is largely a result of slot planning by shippers and consignees.

This is confirmed by the findings of the Maersk shipping line. Figure 3.12 provides an overview of the loading and unloading times requested by customers. The peak time is clearly from 6am to 10am.

Figure 3.12. Loading/unloading times requested by shippers and consignees



Source: Maersk Line Data (2007)

Barges have also faced capacity and berthing problems at port terminals, often having to wait for an available berth. Such congestion problems have put a great deal of pressure on available capacity, making transportation less reliable and generating high costs. Changes to loading and unloading times may bring some relief, but will not solve the congestion problem. Other solutions are required.

As mentioned in Section 2.3.5, terminal capacity at European ports has been characterised by high utilisation rates, which can cause congestion at peak periods. Congestion slows down operations, and every delay generates costs. It is not always possible to expand capacity owing to a lack of space in and around the seaport, high land prices, high investment costs and growing objections from surrounding communities. As a result, terminal operators continually have to find ways of using existing capacity more efficiently.

One such solution is to reduce the average time a container is left waiting on the quay to be loaded, transhipped or pick up by the receiver. Existing financial penalties such as quay rent and demurrage are not sufficient in peak periods. The 'free time' period is often extended as a goodwill gesture.

Better coordination between feeder and deep sea vessel arrivals at a terminal can also bring some relief. The less time a transhipment container stands at the quay, the more capacity is available for handling import or export containers. Unfortunately, this is in the hands of the shipping lines, and creating matching sailing schedules has proven to be a very difficult exercise owing to the growing complexity of liner shipping.

Again, cargo bundling in the hinterland can help to solve the congestion problem. Containers can be collected and stored at inland terminals until they are needed at the deep sea terminal for loading. The same is true of import containers, which can be transported to inland terminals for collection by the receivers. However, effective coordination on arrival at the port terminal is crucial in order to ensure that they do not take up too much terminal capacity. Early arrival of such cargo transported from the hinterland to port terminals would counteract some of the advantages of bundling cargo at inland terminals.

These advantages are obvious. By bundling cargo at an inland terminal and transporting it by rail or barge, the number of individual moves within ports will be reduced. A barge with a capacity of 1 200 tonnes can transport as much cargo as 60 trucks. A 90 TEU barge is

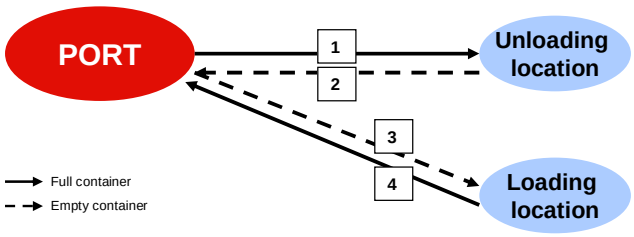
equivalent to 70 trucks. Accordingly, reducing truck moves in and around a port area will go some way to reducing the current congestion problem. It is essential for seaports to have good handling facilities for barge and rail shuttles.

This problem could be thought to have become less relevant for the time being, as volumes have dropped and the problem of congestion has largely disappeared from many ports. However, it is not a question of if, but rather when, 2008 volumes will be reached again. Port and terminal congestion is consequently highly likely to reappear in the future, affecting the main ports in particular.

Empty container depots

One of the main problems in container transport is the high proportion of empty containers transported. This applies not only to intercontinental transport, as discussed in the previous chapter, but also to short sea shipping and transport to and from hinterland locations. At present, most containers have to be picked up or returned to 'empty depots' in the port (Figure 3.13).

Figure 3.13. Transportation of empty containers between port and hinterland

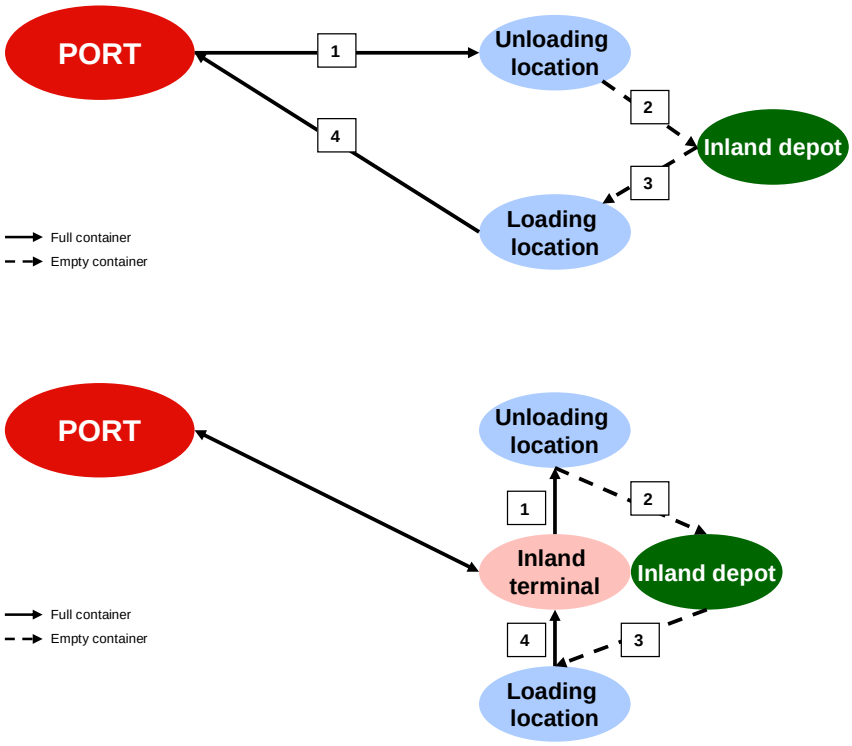


Source: Buck Consultants International (2009)

In this diagram, the import container is picked up from the seaport terminal and unloaded at a hinterland location (1). After stripping, the empty container is returned to a container depot in the port (2), where it is again picked up for stuffing in the same region in which it was previously unloaded (3). After stuffing, the export container is returned to the seaport terminal (4). Current practices for repositioning empty containers consequently entail several transport hauls, which can be avoided by means of cooperation between shipping lines. In the past, trials involving empty containers have been undertaken, but to no avail. Shipping lines fear that cooperation may result in sensitive commercial information being leaked to their competitors.

Accordingly, inland terminals are also important for the repositioning of empty containers. They can be used to reduce the number of hauls of empty containers (Figure 3.14).

Figure 3.14. Empty container depots in the hinterland



Source: Buck Consultants International (2009)

Involvement of terminal operators and shipping companies

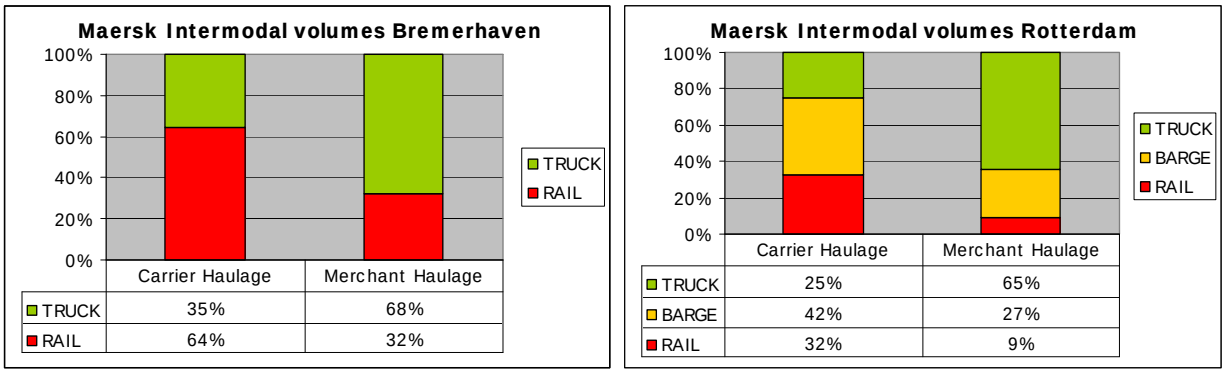
The emergence of major shipping companies and terminal operators has dramatically reduced maritime and terminal costs over the last few years. Although costs remain an important issue, cost-based competition has partly given way to competition based on service levels. Shipping companies try to draw customers in by offering a wide range of services related to their core activity. Their main goal may be defined as trying to fill their ships as much as possible. If this means cargo has to be found in the hinterland, most shipping companies are increasingly willing to do so[21].

This service is called 'carrier haulage'. Basically it means that shipping companies not only carry out maritime transport, but are also responsible for pre-carriage (loading containers and transporting them to ports) and on-carriage (transport from port to destination). Costs can be cut by organising haulage from an inland terminal, where loaded containers are bundled and transported by rail or barge to the deep sea terminal in the port area. Inland costs are estimated to range from 40-80% of total container shipping costs (Notteboom & Rodrigue, 2005). It is estimated that inland access costs can be reduced by one third by bundling cargo and using intermodal transport.

[21] Thanks to economies of scale, ocean freight rates have fallen considerably over recent years. However, this has not been the case for inland transport. On the contrary, inland rates have risen. By incorporating inland services into the services they offer their clients, shipping companies can reduce inland transport costs and at the same time recover part of the low ocean freight rates.

One example may be found in a Maersk case study, which looks at the differences between merchant and carrier haulage[22] for the ports of Bremerhaven and Rotterdam (Figure 3.15). It is clear from the graphs that, at both ports, intermodal transport accounts for a much larger proportion of carrier haulage than of merchant haulage. In carrier haulage, trucks are used only for small distances. Barge and rail transport are used for the main inland haul.

Figure 3.15. Comparison of carrier versus merchant haulage



Source: Maersk Line Data (2006–2007)

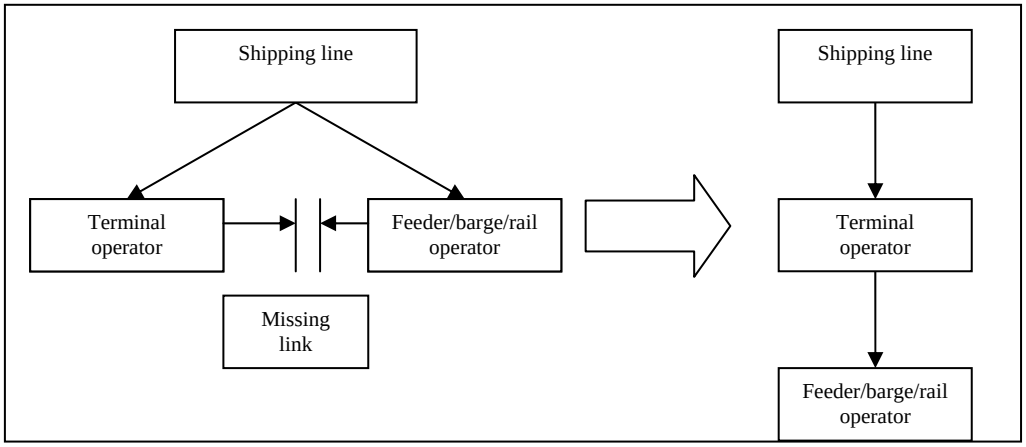
Organisational structures differ between shipping companies. Some shipping lines have created their own logistics and transport divisions. Others keep their focus on their core business and try to achieve network integration through structural or ad hoc cooperation with independent transport operators and logistics service providers.

,Except for a number of major companies such as Maersk, most shipping lines do not own inland transport equipment but work closely with independent operators on a contract basis. Such cooperation can take the form of slot agreements, where an operator dedicates some of its capacity to one shipping line. The emergence of major shipping lines and other kinds of alliances between carriers has given the latter the necessary volume to negotiate good rates with their partners, thereby enabling them to reduce transport costs as a proportion of total logistics costs.

A step up from carrier and merchant haulage is the organisation of terminal operating haulage (TOH). In this concept, inland transport is organised by the terminal operator rather than the shipping lines. The case of DP World may be taken as an example (Figure 3.16). The terminal operator offers shipping lines a wide range of intermodal services towards the hinterland. The advantages are twofold. Firstly, offering additional integrated logistics services confers a competitive advantage. Secondly, by taking over some of the organisation of container flows, a terminal operator can gain greater control over the capacity utilisation rate at deep sea container terminals.

[22] Merchant haulage means that inland transport is organised by parties other than the shipping company.

Figure 3.16. Shipping line haulage versus terminal operator haulage



Source: DP World (2008)

DP World aims to shift the modal split from road to intermodal transport. This change will reduce complexity at the terminal and enhance productivity. In other words, increasing the proportion of intermodal transport used for terminal calls will lead to bigger consignments.

Involvement of logistics operators

It is important to note that 3PLs and 4PLs are becoming increasingly involved in intermodal transport and even the operation of inland terminals as well as logistics and distribution. They are also increasingly organising bundled transportation between inland terminals and deep sea terminals in the port area. One example is the logistics group Wincanton, which is active in several areas, including:

- multimodal transport, with its own fleet of barges and railway company;
- inland terminal operations, with six of its own trimodal terminals along the Rhine;
- warehouse logistics and value-added services.

Areas for improvement

As shown in Table 3.1, road transport is still by far the dominant transport mode at most EU ports. Although there are many reasons for expanding the proportion of intermodal transport through the inland terminal network, it is clear that much improvement is still possible. Such improvement consists in ensuring the availability of adequate infrastructure and capacity for the development of a strong inland hub system.

Table 3.1. Modal split for containers in selected north European ports

	Road	Rail	Barge
Rotterdam	51%	13%	36%
Hamburg	70%	29%	1%
Antwerp	59%	8%	33%
Bremerhaven	15%	70%	15%
Felixstowe	79%	21%	n.a.
Le Havre	86%	8%	6%
Zeebrugge	62%	36%	2%
Thamesport	83%	17%	n.a.
Dunkirk	33%	55%	12%
Amsterdam	44%	12%	44%

Source: Dynamar, 2007

3.3.2. Inland hub system

Ports have become a node in the logistics chain thanks to their connection to inland hub systems. These inland hubs are vital for the future development of ports and of Europe's transportation system. They can be defined as locations allowing for mediation between the intermodal freight infrastructure and service, on the one hand, and freight transport demand, on the other. They fulfil two functions:

1. a terminal function, as discussed in the previous chapter;
2. a logistics function, through European and regional distribution centres.

As explained in Section 2.2.2, logistics activities such as warehousing, distribution and value-added activities (both low-end, such as labelling, and high-end, such as postponed manufacturing activities) are increasingly being performed by logistics subcontractors such as 3PLs and 4PLs. Owing to limited space in port areas and the need to base these activities in proximity to producer and consumer markets, logistics groups are increasingly looking for inland locations. Locations have to satisfy two requirements: proximity to markets and effective, reliable accessibility.

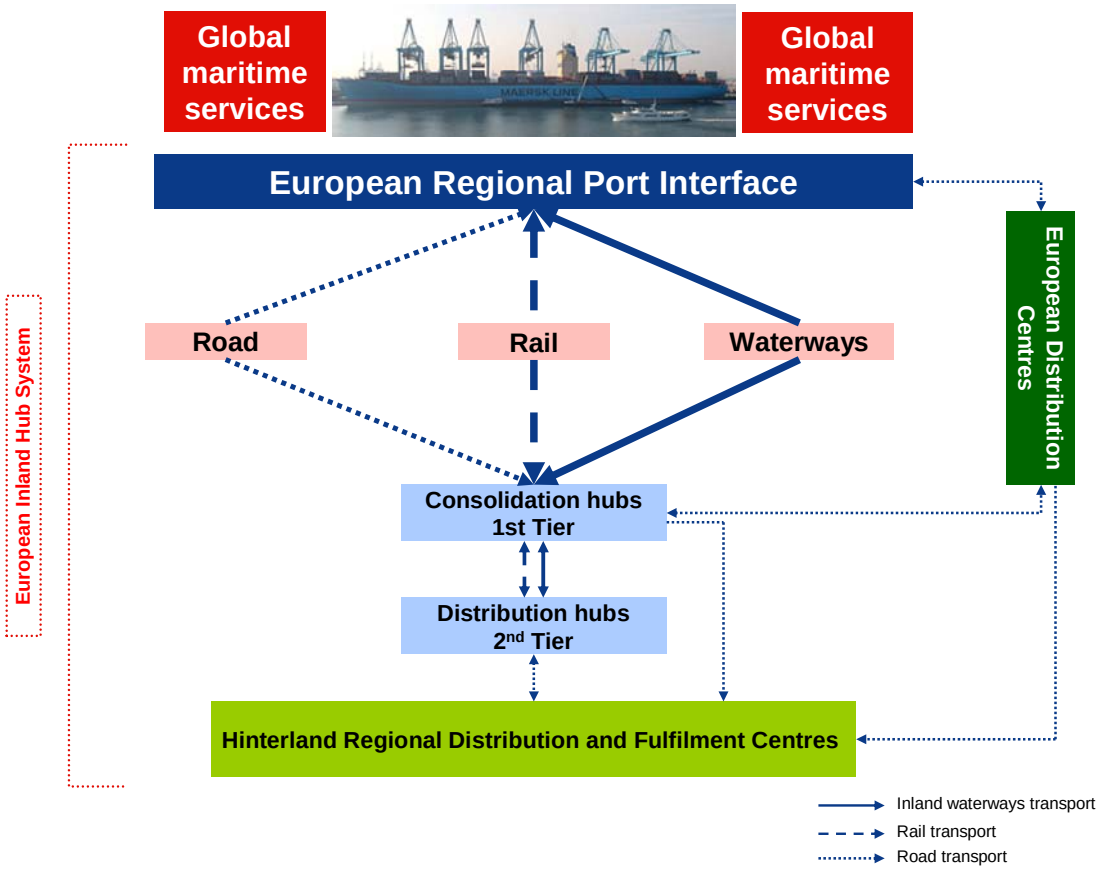
Many distribution centres are consequently located around or near inland terminals. The correlation between the terminal and logistics functions is shown in Figure 3.17.

This diagram shows both the cargo bundling and distribution function of inland terminals and their interaction with distribution and fulfilment centres. The terminals are connected to the seaport by road, rail and inland waterway corridors.

As in the port regionalisation phase, inland terminals also specialise in particular terminal functions. First-tier hubs function mainly as cargo bundling points, where smaller consignments from the hinterland are bundled for transportation to port terminals in larger quantities, or large consignments from the ports are divided into smaller consignments for further transportation to the hinterland. The total distance between the terminal and the seaport is no more than 300 km, and the bundled consignments are large. Owing to their relative proximity to the seaport area, these terminals also attract European distribution centres. Obvious examples of such inland hubs include the ports of Genk, Duisburg, Lyon and Paris.

Second-tier inland terminals are located further inland. They perform a distribution function through regional distribution and fulfilment centres[23]. The terminal of Oradea is a good example, as are the inland terminals of northern Italy, which are connected to terminals in the north-west range by rail shuttle.

Figure 3.17. European inland hub system



Source: Buck Consultants International (2008)

EU enlargement further promoted this first- and second-tier intermodal terminal structure. A study carried out by Cushman & Wakefield and Healey & Baker in 2006[24] showed that north-west Europe is the preferred location for European distribution centres. This region still offers the best access to Europe's core markets in the extended 'blue banana'. The most attractive location is Belgium, followed by France and the Netherlands, thanks to both their central location and the existence of major TEN corridors making it possible to penetrate the hinterland.

A dense network of RDCs is necessary in order to cover the enlarged EU. Preferred RDC countries include Germany, the Czech Republic, Poland and Hungary, ensuring good access to northern and eastern Europe. Emerging markets in Turkey and the former Soviet Union (FSU) are also significant, while countries such as Finland, Poland and Italy are becoming more attractive as well.

[23] Fulfilment centres may be described as locations close to final markets, where the last steps in the production process are carried out, i.e. where products are made market-specific.
[24] European Distribution Report.

3.3.3. Evolving role of port authorities

Various port models exist at European ports, with differing levels of involvement from the public and private sectors (Goss, 1990). The different types are as follows.

- **Tool ports**: the port authority owns, develops and maintains port infrastructure and superstructure[25] (e.g. cargo handling equipment). Cargo handling is usually carried out by private companies. Prior to France's port reform, most of the *'ports autonomes'* were modified tool ports.[26]
- **Landlord ports**: the port authority acts as a regulatory body and landlord. General infrastructure is leased to private operating companies or industries. Port operations are carried out by private companies, which provide and maintain their own superstructure including buildings and cargo handling equipment at the terminals. Most EU ports are landlord ports. Examples include Hamburg, Rotterdam and Antwerp.
- **Fully privatised ports**: port land is privately owned, and both infrastructure and superstructure are privately managed. Some regulatory functions are also privatised. Fully privatised ports are few in number, and are found mainly in the UK. [32]

The role of port authorities has evolved alongside the role of the ports themselves within logistics chains. Table 3.2 gives an overview of this changing role in respect of the tool and landlord port models.

Apart from their traditional functions, port authorities' future role can be described as developing good interconnections between the port area and the hinterland through various intermodal transport systems. Their main role will be to act as facilitators within logistics chains, by :

- optimising port processes and infrastructure;
- playing a central role in developing platforms in conjunction with all stakeholders in order to address issues affecting logistics performance;
- promoting and sustaining an efficient intermodal transport system;
- developing strategic relations with the hinterland.

Port authorities' 'regulatory' functions will become less important. Their main focus will be on embedding the port in strong networks with other ports and inland terminals. In order to put these port networks in a strong position, (member) ports' regulations will have to be harmonised. Accordingly, regulatory aspects will increasingly be decided at the level of the network rather than that of individual ports. On the other hand, port management strategies must constantly be reassessed, given that ports risk losing important clients. This is not because of deficiencies in port infrastructure, but because the client may have rearranged its service network or entered into new partnerships. As such, ports have to deal with new kinds of port competition (cf. the growing emergence of dedicated or liner terminals, which is changing the conditions and rules of competition[27]).

[25] Locks, docks and terminals are an example of port infrastructure. Terminal equipment for handling cargo such as gantry cranes is an example of superstructure.

[26] *Port Reform Toolkit: Module 3, Alternative Management Structures and Port Ownership Models*, World Bank, 2007.

[27] Competition between seaports or terminal operators, i.e. between capacity suppliers, is liable to turn into competition between port customers, i.e. between shipping lines, instead. The implication of this are not yet clear, but it will certainly change the accepted rules on port competition.

Table 3.2. Evolving role of port authorities

Traditional role of port authorities	Current role of port authorities
Port management	**Port management**
implementation of legislation and directives	implementation of legislation and directives
concessions*	concessions*
security	security
environment	environment
Port organisation	**Port organisation**
administration	administration
labour	labour
customs	customs
optimising maritime processes	optimising maritime ***and logistics processes***
Port infrastructure	**Port infrastructure**
maintenance of nautical access	maintenance of nautical access
development and maintenance of nautical infrastructure	development and maintenance of terminal infrastructure
development and maintenance of port infrastructure	development and maintenance of port infrastructure
	development of inland connectivity
Port superstructure**	**Port superstructure****
Facilitator for port stakeholders	**Mediator between port stakeholders**
establishing forums for communication between port stakeholders	establishing forums for communication between port stakeholders
establishing workshops on specific items such as environment, new port procedures and port regulations	***establishing forums for communication between port and hinterland in order to improve cooperation***
Port promotion	**Port promotion**
Port studies	**Port studies**
capacity	capacity
efficiency	efficiency
	networks
	Support for intermodal systems within the port
	Developing an overall strategy on transport within the
	port and in relation to the hinterland
(*) only in a landlord model	
(**) only in a tool port model	

Source: Buck Consultants International (2008)

3.4. Future trends and developments

3.4.1. Port networks

Although port terminalisation is still unfolding, the next phase in the rapidly changing European logistics market is already beginning to emerge: the formation of genuine port networks (see Figure 3.18).

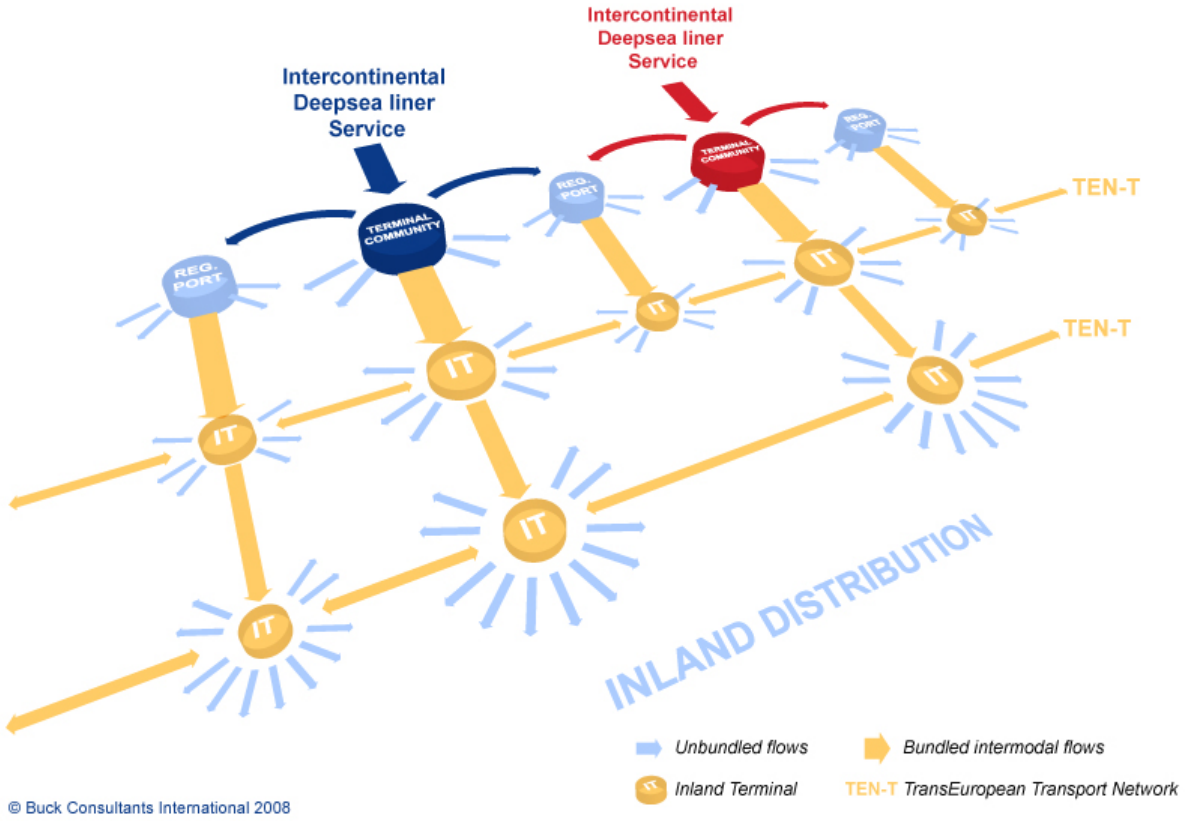
What is driving the formation of port networks is the fact that space at (main) ports is becoming a very limited commodity, and that extending ports beyond traditional port areas or creating new ports is feasible in only a few cases. In some ranges, maximum capacity will consequently be reached in 10 to 15 years. As mentioned previously, the economic downturn may slow down this process, but capacity restrictions will probably remain a hot issue in the long term. One coping mechanism is for ports in the same range to form networks and specialise in specific trades on the basis of type or geography. This will also call for a new approach to port development and port business.

Ports currently compete mainly on throughput: the higher the throughput, the higher their success rate. Added value, which is a much better measure of a port's impact on the economy, is a different story, however. It appears that ports with a high throughput do not necessarily generate high added value per tonne. Accordingly, given the stagnation of port capacity, the next frontier in port development, will be generating added value in terms of direct and indirect employment and creating agglomeration effects[28] through the formation of port networks. Together, these networks will develop joint capacity and expertise in specific trades. Links with the hinterland will become even more important, since port networks need effective connections to the hinterland in order to create agglomeration effects. Inland terminals will take over more and more volumes and functions from seaports, thereby reducing the pressure on seaport capacity.

This will lead to a fine but dense web of European distribution (see Figure 3.18).

[28] Agglomeration effects are savings or benefits obtained by clustering activities.

Figure 3.18. Port network phase



Source: Buck Consultants International (2009)

3.4.2. Port repositioning

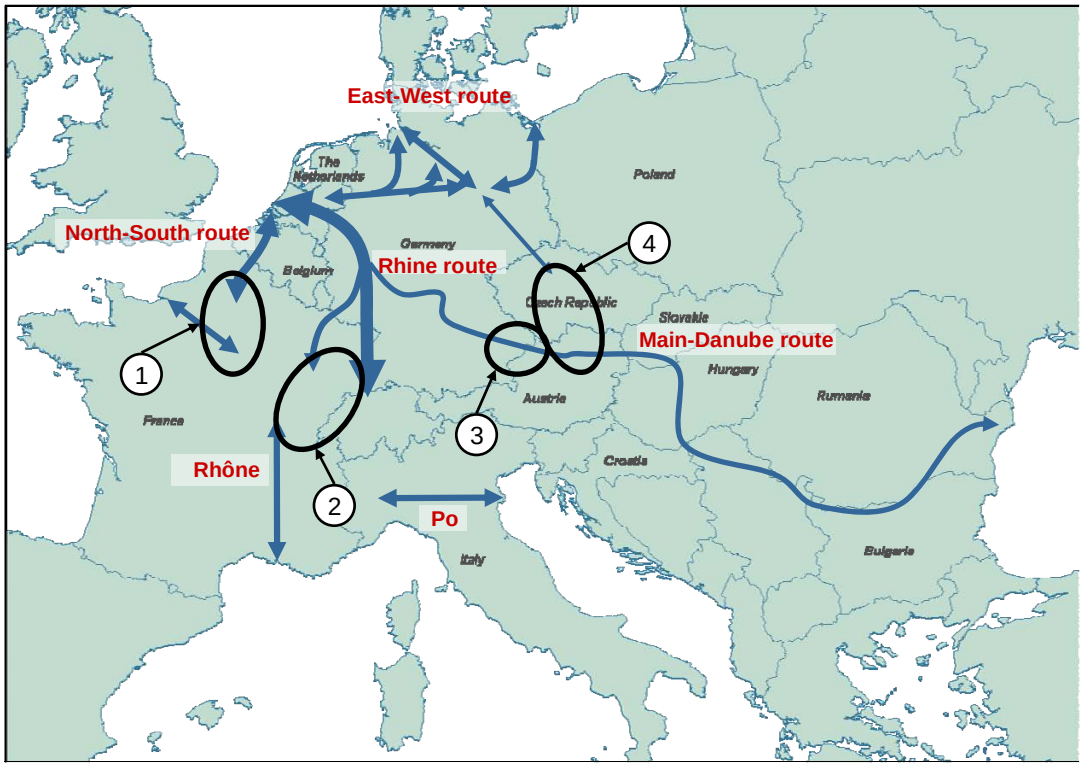
As well as facilitating connections with port areas, the elimination of bottlenecks and missing links in the trans-European network will have a fundamental effect on the position of seaports and the hinterlands they serve. Ports in different ranges, such as the northern and West Med ranges or the Black Sea and Baltic ranges, will become better interconnected and begin to compete for certain cargo flows.

We shall now focus on the possible impact of some infrastructural developments on port repositioning.

Inland waterways

Inland waterways have long been considered a lacklustre mode of transport. The market liberalisation of the late 1990s introduced modern market mechanisms and brought fresh dynamism to the inland waterway market. Policy-makers can see that waterways have huge potential to revitalise the EU's clogged transportation system.

Figure 3.19. European inland waterway network



Source: Buck Consultants International (2008), adapted from PBV

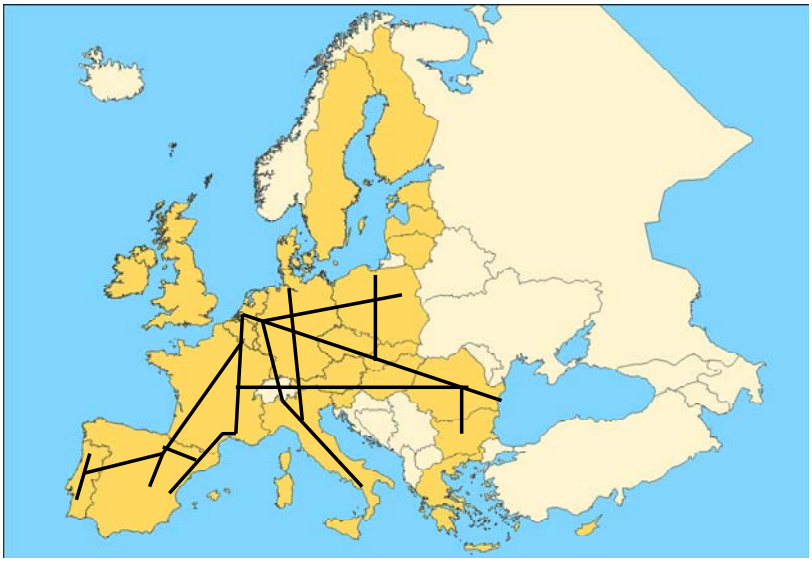
Figure 3.19 shows a number of strategic waterway projects, bottlenecks and missing links.

1. **Seine-Scheldt connection**: this new infrastructure will connect the Seine to the north European waterway network. It will give the ports of Le Havre and Dunkirk better links to the north-west ports. It is expected to be completed between 2015 and 2020. The new waterway connection will have an impact on the positions of the French ports of Le Havre and Dunkirk, as well as those of the Benelux ports; in particular, Zeebrugge will become more easily accessible.
2. **Rhône-Rhine connection**: this connection would link the French Mediterranean ports of Marseille and Fos to the north-west ports. The French Government has not yet approved the project, but it is likely that works would start once the Seine-Scheldt connection has been completed. The new infrastructure, which could be finished by 2030, would put the ports of Marseille and Fos in a stronger position. The port of Fos is accessible to large container vessels. In one scenario, Fos could become one of the container hubs for the northern range's Far East trade. This would allow Marseille to compete with the main ports in the northern range for the same cargo.
3. **Between Straubing and Vilshoven**, on the German part of the Danube river, a capacity problem over a distance of 69 km is a barrier to an effective connection between North Sea and Black Sea ports. Removing this bottleneck would revitalise inland navigation on the Danube and create a seamless connection between North Sea and Black Sea ports.
4. **The Elbe-Danube connection** will link the port of Hamburg to the Black Sea and strengthen its position, as well as providing access to the port of Constanţa and the central European market. This will be especially important for the Far East trade.

Rail corridors

The main rail corridors are shown in Figure 3.20. Rail freight corridors are an ongoing subject of discussion in several forums. They will give priority to freight transport and be vital for decongesting port areas.

Figure 3.20. Main rail corridors in Europe



Source: Buck Consultants International (2008), adapted from RailNetEurope

Further liberalisation of the freight market will contribute to the growing attractiveness of rail. The development of an HST freight network is especially important for EU seaports. The possibility of developing such a network between different airports such as Charles de Gaulle (Paris), Bierset (Luik) and Schiphol (Amsterdam) is currently under investigation. However, shipping and inland transport offer better cold-chain conditions than air transport, and some shippers are already using air transport instead of sea transport for certain goods, including perishables. It is expected that there will be more competition between air and ocean carriage in the future than at present in respect of certain categories of goods. A seaport's connection to an HST freight network could become an additional asset.

3.4.3. Green ports

The environment has become a crucial concern at the level of both individual companies and society as a whole. Although awareness is high and many improvements have already been made, port areas are still among the main polluters in Europe. This pollution takes many forms, including air and water pollution, light and noise pollution and the emission of CO_2 and other gases.

Two hot issues are the high levels of CO_2 emissions and the health risks resulting from the emission of SO_2 and NO_x in port areas. Increasingly, ports are taking up the role of environmental guardians.

One example is the port of Rotterdam's 'Maasvlakte II' expansion programme. In order to obtain a concession to operate a new terminal, interested terminal operators have to show that the terminal will be managed sustainably. They must achieve a modal split in which the proportion of road transport is just 35%. The proportions of barge and rail transport

must be 45% and 20% respectively. The same applies to the port of Antwerp's Deurganckdock expansion.

A sustainable modal split makes a significant contribution to reducing harmful emissions in port areas. With five litres of fuel, a barge can transport one tonne over a distance of 500 km. With the same fuel consumption, a train can carry one tonne of goods over 333 km, and a truck over just 100 km. Given that a 1 200 tonne-barge is equivalent to 60 trucks, that means it takes 6 000 litres of fuel to transport 1 200 tonnes over 500 km by barge. If the same volume were transported the same distance by truck, fuel consumption would rise to 30 000 litres, or five times the figure for transportation by barge.

However, making the shift to intermodal transport calls for an efficient network of inland terminals and the establishment of sufficient effective interconnectivities. These terminals are crucial in that they not only support volume growth and reduce congestion in and around ports, but also offer significant environmental advantages. Moreover, they are often located closer to distribution centres and markets. As a result, the average haul distance by road transport will further decrease, together with the level of greenhouse gas emissions.

The transport sector accounts for 30% of total energy consumption in the EU (EFIB, 2007). Energy prices have risen considerably in recent years, partly because they are starting to incorporate environmental costs. Accordingly, it is impossible to envisage reducing total transport costs without taking environmental costs into account. Reducing fuel consumption is consequently becoming a key goal for the transport sector. Modern trucks with more fuel-efficient engines are one means of achieving it; a modal shift from road to rail or barge is another.

Vessels contribute to pollution as well as trucks. For a 6 600 TEU vessel, the difference in fuel consumption between economical and full service speed has been calculated at an additional seven to eight tonnes of fuel per day. Ports can help to reduce fuel consumption in two ways:

- Ships sail at full speed mainly to catch up to schedule after a delay in port. Eliminating port delays as much as possible will enable ships to sail at an economical speed.
- Providing shore-side electricity enables ships to shut down their engines while in port, thereby reducing the levels of SO_2 and NO_x emissions and thus the air pollution in port areas. This applies to barges in seaports and inland ports as well as deep sea vessels in seaports.

Environmental issues are also creating new obstacles to ports' potential to expand their capacity. Examples include dredging to increase the depth of nautical access and thus vessels' maximum draught, the disposal of dredged specimens, wetlands preservation around ports, water pollution and light and noise externalities, among many others. Investments in ports and port capacity can no longer be considered without calculating the environmental impact. Essentially, geographical expansion has become a complex issue.

Harmonising ecological and economic objectives has proven to be a difficult process. Moreover, lengthy legal proceedings sometimes cause uncertainty and delay, contributing to the growing mismatch between demand and supply in the area of port and port-related capacity.

Conclusion

Four significant trends have led to changes in ports' organisational structures over the last few decades:

- structural changes to supply chains and logistics systems,
- extension of port hinterlands,
- continual growth in the volumes handled by seaports,
- continual growth in vessel sizes.

Ports have evolved from port communities, in which the main focus was on optimising internal port (management) processes and attracting volume, to terminal communities whose main focus is on serving the hinterland through a network of inland terminals. These terminals attract various logistics activities as well as acting as cargo bundling points.

The role of port authorities has evolved alongside the changes in port structures. Ports have become facilitators within logistics chains. Whereas port authorities used to focus primarily on internal port infrastructure, capacity and efficiency, they now focus increasingly on intermodal connectivity. Their main functions can be defined as:

- optimising port processes and infrastructure,
- promoting the port as a node in an efficient intermodal transport system,
- developing strategic networks with the hinterland,
- organising and addressing logistics performance issues within stakeholder forums.

Further volume growth, limited potential for extending capacity in port areas and the elimination of bottlenecks on inland corridors will lead to the formation of port networks in which individual ports will increasingly specialise in specific trades on the basis of type or geography. Future trends include:

- further product and service specialisation,
- greater focus on hinterland connections and relations,
- greater emphasis on value-added activities within the port rather than purely on attracting more volume or weight,
- cooperation between ports with a view to developing joint capacity in order to cope with congestion problems.

So far there is no evidence that the economic downturn has impacted the fundamentals of these trends. Although volumes are (temporarily) dropping and port congestion has become less of an issue, port capacity shortage is expected to re-emerge as a hot issue in the medium to long term.

Port developments are, and will increasingly be, measured against one important factor: the environment. Environmental issues are putting new constraints on port operations and extensions. Port developments will have to find the right balance between handling growing volumes within fast-changing logistics chains and reducing the negative impact on the environment.

4. RECOMMENDATIONS

The importance of EU seaports in trade and transport has been discussed in the preceding chapters. Approximately 80% of all goods carriage to, from and between EU countries takes place via maritime transport. Sufficient, reliable port and hinterland capacity are of the utmost importance for the EU's economic competitiveness if it is to be able to cope with future economic growth and increasing transport volumes.

Issuing the 'Green Paper on seaports and maritime infrastructure' was a first step; it lists the following focus points:

- ports will have a role to play in the trans-European transport network (TEN-T);
- the importance of maritime safety;
- support for maritime and port projects, including cargo tracking and tracing, electronic chart display and information systems.

Many of these initiatives, such as the development of trans-European networks and the 'motorways of the sea' concept, are already well established. However, the European Parliament needs to focus more closely on seaports in order to ensure smooth trade flows in the medium and long term as well. This chapter makes a number of other recommendations to EU policy makers, in relation to the following aspects:

- a harmonised approach to extending seaports' capacity;
- development of reliable cargo forecasts;
- easing of congestion in port areas;
- pooling of containers;
- administrative and legislative simplification;
- minimum service levels at inland terminals;
- the impact of different types of haulage and distribution requirements on transport use;
- the future role of port authorities;
- cooperation between seaports, inland ports and inland terminals.

These aspects will be discussed in different sections.

4.1. A harmonised approach to extending seaports' capacity

As discussed in previous chapters, port capacity has become, and will continue to be, an issue in most port ranges. In view of the growth in maritime trade, many ports are considering extension projects or already have them in progress (although in some cases their timing will be slowed down as a result of the economic downturn). However, owing to a myriad of different rules and sometimes-conflicting interests, taking port extension projects from conception to realisation is a lengthy, tiresome and costly process. They create uncertainty and are not transparent to private terminal investors. Moreover, rules and regulations on port extension projects differ across the EU. There is consequently a need for a harmonised, simplified EU approach.

The European Parliament could consider enhancing transparency by developing a harmonised methodology for capacity extension projects and new infrastructure in general. Two aspects could be explored:

- developing a common European approach to the decision-making process in respect of infrastructure investment projects and port extension projects in particular;

- setting fixed (maximum) terms for the various parts of the decision-making process so as to avoid lengthy, tiresome procedures.

4.2. Reliable cargo forecasts

The Port Statistics Directive (96/64/EC) has harmonised port data in the EU. Comprehensive historic data are now available. When it comes to creating new port and terminal capacity, however, reliable forecasts are required. At present, ports across the EU use differing approaches, which have not always proven reliable. In some cases there is a significant difference between forecast volumes and actual throughput. Given that planning new infrastructure is a time-consuming, costly process necessitating huge investment, there is a need for a harmonised European approach able to deliver reliable forecasts.

Eurostat could play an important role in developing a harmonised European forecasting method based on reliable, harmonised data such as volumes handled in ports, economic forecasts and regional/geographical growth projections. In other words, a common data infrastructure could be created to allow specialised service providers to generate their own forecasts.

4.3. Easing congestion in port areas

Many EU port areas have suffered, and may again suffer, from congestion in the medium to long term, as explained in Chapter 3. Listed below are various measures that could be envisaged with a view to easing congestion in port areas.

1. Better use should be made of transport capacity by bundling flows in port areas and at inland terminals. Bundling flows has many advantages, including:

   - reducing complexity at terminals, and
   - promoting the use of intermodal freight transport and contributing to better use of existing capacity.

   However, several impediments exist at present:

   - firstly, shippers and service providers need to make a mental shift in order to cooperate and consider opportunities for cargo bundling;
   - secondly, existing incentives for modal shifts, such as the Marco Polo programme, are not always market-driven and tend to be administratively cumbersome. As a result of cumbersome administrative requirements, the barriers to entry are too high for many companies. Secondly, decision-making processes are generally very lengthy. Finally – and this is in line with the findings of the earlier PACT-programme – many projects are not commercially viable without subsidies.

   European transport policy should take steps to raise awareness of cargo bundling and transport efficiency. In concrete terms, business cases could be developed to demonstrate their positive impact. Market-driven alternatives to existing modal shift frameworks should also be considered. Emphasis should be placed on providing the market with the necessary tools and support to redesign and improve operational procedures and processes with a view to achieving better utilisation rates for intermodal or other transport capacity. As well as boosting intermodal utilisation rates, there is also a need to improve road transport loading rates. There are indications that two in five truck runs are empty. Improving truck loading rates would have a significant positive impact on the freight market and substantially reduce toxic emissions.

In conclusion, a framework for addressing the issue of transport efficiency (for all modes) is urgently required. It is probable that such a framework would have a greater impact on the use of freight intermodalism than the current modal shift initiatives.

2. New, innovative infrastructure needs to be developed.

   In order to ease congestion, a new, innovative approach to infrastructure in port areas is required. In this connection, 'underground logistics systems' are usually discussed in the context of unit transport by pipelines (UTP). In addition, new approaches to cargo carriers are needed. The use of 'zeppelins' for project cargo springs to mind. The EU could facilitate the development of a PPP-initiative[29] to consider the feasibility of such opportunities.

4.4. Pooling of containers

As discussed in the previous chapter, one of the main problems in the field of container transport is the transportation of empty containers. This applies not only to intercontinental transport, but also to short sea shipping and transport to and from hinterland locations. Currently, most containers have to be picked up or returned to 'empty depots' in the seaport area or at the inland terminal.

The main reason for transporting empties is that containers are mostly owned by shipowners, and different shipping lines are used for import and export flows. The concept of pooling, or so-called 'grey boxes', could substantially reduce the transport of empties. However, it has proven very difficult to introduce pooling of containers. Shipping lines regard the high cost of repositioning empty containers as a trade-off for retaining control over boxes. The European Parliament should consider removing the various impediments. As a starting point, a stakeholder forum could be set up to assess the situation.

4.5. Administrative and legislative simplification

Increasingly complex procedures are having a significant impact on port efficiency, including both sea and landside aspects. In particular, problems with customs clearance are costly and time-consuming. In a logistics environment in which timely deliveries have become important, time losses resulting from complex administrative procedures and legislation are unacceptable.

Simplifying seaports' administrative and regulatory environment would enhance the overall efficiency and reliability of EU transport. The documentation accompanying a container is a good example. A single EU transportation document would significantly reduce the administrative burden. The same applies to harmonised rules and regulations on EU seaports. The regulations on dangerous goods at seaport terminals are one example. Different ports in different countries often have different rules as to whether, and how, goods have to be declared to the port authority and how long certain goods may stay at the terminal.

[29] Public-private partnership.

4.6. Minimum service levels at inland terminals

Inland terminals have become vital nodes in the EU transport system. They are connected to EU seaports and play an important role in import and export flows. However, service levels differ across the EU. Minimum service levels should therefore be defined, such as plugs for reefer containers[30] and waste disposal facilities. This applies to operators (barge, rail and truck), logistics providers and shippers. The European Parliament could start by organising an industry hearing.

4.7. Impact of different types of haulage and distribution requirements on transport use

Firstly, the impact of carrier and merchant haulage on transport use is unknown, as only fragmented data are available. Accordingly, transport policy should consider how these types of haulage influence intermodal transport use and the resulting effect on capacity use at seaports.

Secondly, micro-economic decisions influence transport use. Companies are sometimes very focused on internal processes and fail to see the impact of their decisions on a societal level. The impact of such decisions on port and terminal congestion should be examined, and solutions envisaged. These could relate to aspects such as terminal opening hours and congestion fees.

4.8. Future role of port authorities

In order to cope with future volume growth and prevent ports from becoming congested, port authorities could either choose to build up new capacity or try to embed the port in a larger network of ports and inland terminals. EU transport policy could encourage ports to become actively involved in port networks. Furthermore, harmonisation would enhance ports' transparency, thereby simplifying operations for individual companies such as shippers, forwarders and logistics providers.

4.9. Cooperation between seaports, inland ports and inland terminals

In order to develop efficient logistics chains, seaports and inland terminals/ports need to cooperate closely. Economies of scale can be achieved by bundling cargo flows in the hinterland. For instance, the ports of Rotterdam and Barcelona are pursuing active hinterland policies. The port of Antwerp is also placing strategic emphasis on cooperation with inland terminals. The European Parliament could set up a stakeholder forum to promote cooperation and discuss possible impediments.

[30] A reefer container is a thermal container with refrigerating appliances to control the cargo's temperature.

Conclusion

Although the EU has already undertaken numerous initiatives, European transport policy needs to focus more closely on easing trade flows and maintaining sufficient port capacity. To this end, nine recommendations have been formulated. One of the main challenges for EU ports policy is that of further harmonising regulations and forecasting methods and providing decision-makers with harmonised data. Another important task is to raise awareness and provide incentives and support to the market with a view to generating market-driven initiatives.

BIBLIOGRAPHY

Sources

- BRS (Barry Rogliano Salles), *Shipping and Shipbuilding Markets in 2006 and Prospects*, 2007.
- BRS (Barry Rogliano Salles), 'The Containership Market in 2006', 2007.
- BUCK CONSULTANTS INTERNATIONAL, 'Impact of Chinese Developments on European Logistics (Port) Regions', December 2006.
- BUCK CONSULTANTS INTERNATIONAL, 'Supply Chain Structures of the Future: An Industry Sector Approach', Nijmegen, 2006.
- BUCK CONSULTANTS INTERNATIONAL, 'Container Port Development', Nijmegen, 2007.
- COMMISSION OF THE EUROPEAN COMMUNITIES, Green Paper entitled 'Towards a future maritime policy for the Union: a European vision for the oceans and seas', 2006.
- CONTAINERISATION INTERNATIONAL, *Yearbook 2009*, London, 2008.
- CUSHMAN & WAKEFIELD, *European Distribution Report 2006*, London, 2006.
- DREWRY SHIPPING CONSULTANTS, 'Shipping Markets: Global Port Congestion – No Quick Fix', February 2005.
- EFIP, *Annual Report 2006-2007: A Look at European Inland Ports Activity*, Brussels, 2007.
- EFIP, 'Consultation on the Progressive Implementation of a Rail Freight-oriented Network', Brussels, 2007.
- ESPO, 'Factual Report on the European Port Sector', Brussels, 2004-2005.
- ESPO, *Annual Report 2006-2007*, Brussels, 2007.
- ESPO, *Annual Report 2007-2008*, Brussels, 2008.
- ESPO and ITTMA, 'Economic Analysis of the European Seaport System', Brussels/Antwerp, 2009.
- ESPO, 'Overall Market Dynamics and their Influence on the Port Sector', Brussels, 2004.
- EUROPEAN COMMISSION, Directorate-General for Energy and Transport, *Energy and Transport in Figures*, Part 3: 'Transport'.
- EUROPEAN COMMISSION, Directorate-General for Energy and Transport, *Building Bridges: Extension of the Major Trans-European Transport Axes to the Neighbouring Countries*, Brussels, 2007.
- EUROPEAN COMMISSION, Directorate-General for Energy and Transport, *Maritime Transport Policy: Improving the Competitiveness, Safety and Security of European Shipping*, Brussels, 2006.
- EUROSTAT, *Panorama of Transport*, 2007.

- EUROSTAT, *Panorama of Transport*, 2009 edition, Luxembourg, 2009.
- EUROSTAT, *Statistics in Focus: Short Sea Shipping 2000-2003*, 2005.
- GOSS, R, *Economic Policies and Seaports*, 1990.
- HYPOVEREINSBANK, *Wettbewerbsfaktor Terminalkapazitäten: Neue Prognosen für die Containerschifffahrt*, Hamburg, 2008.
- ISL (Institute of Shipping Economics and Logistics), *ISL Market Analysis,* 'The Dry Bulk Market', Bremen, May 2006.
- ISL (Institute of Shipping Economics and Logistics), *ISL Market Analysis,* 'World Seaborne Container Trade and Port Traffic', Bremen, June 2006.
- ISL (Institute of Shipping Economics and Logistics), *ISL Market Analysis,* 'World Port Development', Bremen, November/December, 2006.
- ISL (Institute of Shipping Economics and Logistics), *Tonnage Measurement Study: Final Report*, Bremen/Brussels, 2006.
- ISL (Institute of Shipping Economics and Logistics), *Shipping Statistics Yearbook 2008*, Bremen, December 2008.
- ISL (Institute of Shipping Economics and Logistics), *Shipping Statistics and Market Review*, Volume 53, Nos. 1/2, Bremen, 2009.
- ISL (Institute of Shipping Economics and Logistics), *Shipping Statistics and Market Review*, Volume 53, No. 3, Bremen, 2009.
- ISL (Institute of Shipping Economics and Logistics), *Shipping Statistics and Market Review*, Volume 53, No. 4, Bremen, 2009.
- ISL (Institute of Shipping Economics and Logistics), *Shipping Statistics and Market Review*, Volume 53, No. 5/6, Bremen, 2009.
- JONES LANG LASALLE, *European Warehousing Report*, April 2006.
- NDL/HIDC (Holland International Distribution Council), *European Supply Chain Structures: The Netherlands as Logistics Gateway to Europe*, Zoetmeer, 2007.
- NOTTEBOOM, T. (ITTMA) and RODRIGUE, J-P, 'Port Regionalisation: Towards a new phase in port development', Antwerp and New York, submitted for publication to *Maritime Policy and Management*, January 2005.
- NOTTEBOOM, T. (ITTMA), *Economic Analysis of the European Seaport System: Report Serving as Input for the Discussion on the TEN-T Policy*, Antwerp, 2009.
- OSC (Ocean Shipping Consultants), 'European and Mediterranean Containerport Markets to 2015', press release, Chertsey, 2006.
- REALISE (Regional Action for Logistical Integration of Shipping across Europe), *Final Report on Statistics*, Erasmus University, 2005.
- RODON, J. and RAMIS-PUJOL, J., 'Exploring the Intricacies of Integrating with a Port Community System', ESADE, Universitat Ramon Llull, 2006.

- RODRIGUE, J-P., 'Corridors and the Maritime/Land Interface: North America and the Pacific', Hofstra University, Department of Economics and Geography, New York, 2007.
- RODRIGUE, J-P., COMTOIS, C. and SLACK, B., *The Geography of Transport Systems*, London and New York, 2006.
- SEL, S., 'Maritieme wereldsteden: Vanuit welke grootsteden wordt de maritieme sector gestuurd?', University of Antwerp, Faculteit Toegepaste Economische Wetenschappen, 2005-2006.
- UNCTAD, *Review of Maritime Transport 2007*, New York and Geneva, 2007.
- UNCTAD, *Review of Maritime Transport 2008*, New York and Geneva, 2008.
- UNCTAD, *Trade and Development Report 2006*, New York and Geneva, 2006.
- VAN HOOYDONK, E., *Soft Values of Seaports: A Plea for Soft Values Management by Port Authorities*, University of Antwerp, 2006.
- VIL (Flanders Institute for Logistics), *Achterlandverbindingen: Multimodale schakel tussen verladers en de Vlaamse havens*, Antwerp, 2005.
- VIL (Flanders Institute for Logistics), *Behoefteanalyse Hinterlandverbindingen Havens*, Antwerp, 2005.
- VIL (Flanders Institute for Logistics), *Verbetertrajecten Hinterlandverbindingen Havens*, Antwerp, 2005.
- WORLD BANK, *Port Reform Toolkit: Public-Private Infrastructure Advisory Facility*, 2003.
- WTO, *International Trade Statistics 2007*, 2008.
- WTO, *International Trade Statistics 2008*, 2009.
- WTO, *World Trade Developments*, 2007.

Presentations

- BUCK CONSULTANTS INTERNATIONAL, 'From 'lowest cost produced to 'lowest cost to serve', London, November 2006.
- ESPO, 'EU transport, seaport and maritime policies: Heading towards the same goal?', presentation by Patrick Verhoeven to the Mare Forum, Brussels, 23 November 2006.
- MAERSK LINE, 'Ocean carriers and inland terminals: Strategies for growth', presented by Cees van Altena to the European Conference and Exhibition on Inland Terminals, Antwerp, November 2007.
- MUSSO, E. and PAROLA, F., University of Genoa, Italian Centre of Excellence for Integrated Logistics, 'Mediterranean ports in the global network: How to make the hub and spoke paradigm sustainable?', presentation given on 12 December 2005.
- NOTTEBOOM, T., 'The facilitating role of port authorities in the logistics chain', presentation to the ESPO/EFIP International Workshop on 'Ports – Facilitators in the Logistics Chain', Strasbourg, 11 March 2008.
- OSC (Ocean Shipping Consultants), 'Attracting investments to seaports: an introduction', presentation by Andrew Penfold, Stockholm, June 2006.
- OSC (Ocean Shipping Consultants), Container trade and port demand in the East Med / Black Sea region', presentation by Steve Hanrahan, Istanbul, June 2007.
- OSC (Ocean Shipping Consultants), 'Trade concentration and the use of large vessels in the container trades', presentation by Andrew Penfold, La Coruna, April 2007.
- OSC (Ocean Shipping Consultants), 'Changes in the shipping industry and port implications', presented by Andrew Penfold, Rotterdam, September 2005.
- RODRIGUE, J-P., 'Ten global trends impacting North American rail freight distribution', presented to the Railway Association of Canada Annual Rail-Government Interface Meeting, Ottawa, May 2007.
- WINCANTON, 'A common response of sea and inland ports to the European Commission's new freight transport agenda', presentation by Wilfried Schumacher to the ESPO/EFIP International Workshop on 'Ports – Facilitators in the Logistics Chain', Strasbourg, 11 March 2008.

Newsletters and press releases

- AXS-Alphaliner, *Weekly News*, Week 2009/01.
- AXS-Alphaliner, *Weekly News*, Week 2009/26.
- AXS-Alphaliner, *Weekly News*, Week 2009/28.
- WTO, 'World Trade 2008, Prospects for 2009: WTO sees 9% global trade decline in 2009 as recession strikes', 24 March 2009.

Websites

- www.portofrotterdam.com
- www.portofantwerp.be
- www.hafen-hamburg.de
- www.marseille-ports.fr
- www.havre-port.fr
- www.portofamsterdam.com
- www.apba.es
- www.abports.co.uk
- www.portofgenova.it
- www.thpal.co.uk
- www.portoflondon.co.uk
- www.bremenports.de
- www.portdedunkirque.fr
- www.constantza-port.ro
- www.ts.camcom.it
- www.wilhelmshaven-port.de
- www.port.tarranto.it
- www.apb.es
- www.mhpa.co.uk
- www.calais-port.com
- www.valenciaport.es
- www.ts.ee
- www.portgot.se
- www.nantes.port.fr
- www.forthports.co.uk
- www.merseydocks.co.uk
- www.zeebruggeport.be
- www.bilbaoport.es
- www.porttarragona.es

- www.port.venice.it
- www.portodigioiatauro.it
- www.portofventspils.lv
- www.portauthotity.li.it
- www.port.ravenna.it
- www.dublinport.ie
- www.portofgent.be
- www.freeportofriga.lv
- www.portoffelixstowe.co.uk
- www.portofgdansk.pl
- www.puertocartagena.com
- www.rostock-ports.de
- www.olp.gr
- www.portofklaipeda.lt
- www.mma.gov.mt/ports_marsaxlokk
- www.aarhushavn.dk
- www.porto.cagliari.it
- www.portofkotka.fi
- www.portofhelsinki.fi
- www.portfocus.com
- www.eurogate.de
- www.hph.com
- www.psa.com
- www.dpworld.be
- www.apm.org.uk
- www.espo.be
- www.iaphworldports.org
- www.ppiaf.org/Port/Toolkit/index.html
- www.portfocus.com/index.html
- www.brs-paris.com
- www.platou.com/EconomicResearch/MarketInformation/Tables_Graphs,

- www.lrfairplay.com
- www.cargosystems.net/freightpubs/cs/top100.htm
- www.worldcargonews.com/
- www.eurift.net/en/index.html
- http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1090,30070682,1090_33076576&_dad=portal&_schema=PORTAL
- www.isl.org
- www.ndl.nl
- www.osclimited.com
- www.europe.eu

ANNEX 1

Table EU-27, Real GDP growth rate (percentage change on previous year)

				Forecast	Forecast
	2006	2007	2008	2009	2010
Austria	3.5	3.5	2.0	-4.0	-0.1
Belgium	3.0	2.8	1.1	-3.5	-0.2
Bulgaria	6.3	6.2	6.0	-1.6	-0.1
Cyprus	4.1	4.4	3.7	0.3	0.7
Czech Republic	6.8	6.1	3.0	-2.7	0.3
Denmark	3.3	1.6	-1.2	-3.3	0.3
Estonia	10.4	6.3	-3.6	-10.3	-0.8
Finland	4.9	4.2	1.0	-4.7	0.2
France	2.2	2.3	0.4	-3.0	-0.2
Germany	3.0	2.5	1.3	-5.4	0.3
Greece	4.5	4.0	2.9	-0.9	0.1
Hungary	4.0	1.2	0.6	-6.3	-0.3
Ireland	5.7	6.0	-2.3	-9.0	-2.6
Italy	2.0	1.6	-1.0	-4.4	0.1
Latvia	12.2	10.0	-4.6	-13.1	-3.2
Lithuania	7.8	8.9	3.0	-11.0	-4.7
Luxembourg	6.4	5.2	-0.9	-3.0	0.1
Malta	3,3	4.2	2.5	-0.9	0.2
Netherlands	3.4	3.5	2.1	-3.5	-0.4
Poland	6.2	6.6	5.0	-1.4	0.8
Portugal	1.4	1.9	0.0	-3.7	-0.8
Romania	7.9	6.2	7.1	-4.0	0.0
Slovakia	8.5	10.4	6.4	-2.6	0.7
Slovenia	5.9	6.8	3.5	-3.4	0.7
Spain	3.9	3.7	1.2	-3.2	-1.0
Sweden	4.2	2.6	-0.2	-4.0	0.8
United Kingdom	2.9	2.6	0.7	-3.8	0.1
EU-27	**3.2**	**2.8**	**0.9**	**-4.0**	**-0.1**
EU-15	**2.9**	**2.6**	**0.6**	**-4.0**	**-0.1**

Source: Eurostat (August 2009)

ANNEX 2

Table EU-27, comparison of GDP growth forecasts (percentage change on previous year)

	Situation at February 2008		Situation at August 2009		
	2008*	2009*	2008	2009*	2010*
Austria	2.7	2.4	2.0	-4.0	-0.1
Belgium	2.1	2.2	1.1	-3.5	-0.2
Bulgaria	6.0	6.2	6.0	-1.6	-0.1
Cyprus	3.9	3.9	3.7	0.3	0.7
Czech Republic	5.0	4.9	3.0	-2.7	0.3
Denmark	1.3	1.4	-1.2	-3.3	0.3
Estonia	6.4	6.2	-3.6	-10.3	-0.8
Finland	3.4	2.8	1.0	-4.7	0.2
France	2.0	1.8	0.4	-3.0	-0.2
Germany	2.1	2.2	1.3	-5.4	0.3
Greece	3.8	3.7	2.9	-0.9	0.1
Hungary	2.6	3.4	0.6	-6.3	-0.3
Ireland	3.5	3.8	-2.3	-9.0	-2.6
Italy	1.4	1.6	-1.0	-4.4	0.1
Latvia	7.2	6.2	-4.6	-13.1	-3.2
Lithuania	7.5	6.3	3.0	-11.0	-4.7
Luxembourg	4.7	4.5	-0.9	-3.0	0.1
Malta	2.8	2.9	2.5	-0.9	0.2
Netherlands	2.6	2.5	2.1	-3.5	-0.4
Poland	5.6	5.2	5.0	-1.4	0.8
Portugal	2.0	2.1	0.0	-3.7	-0.8
Romania	5.9	5.8	7.1	-4.0	0.0
Slovakia	7.0	6.2	6.4	-2.6	0.7
Slovenia	4.6	4.0	3.5	-3.4	0.7
Spain	3.0	2.3	1.2	-3.2	-1.0
Sweden	3.1	2.4	-0.2	-4.0	0.8
United Kingdom	2.2	2.5	0.7	-3.8	0.1
EU-27	**2.4**	**2.4**	**0.9**	**-4.0**	**-0.1**
EU-15	**2.2**	**2.2**	**0.6**	**-4.0**	**-0.1**

Source: Eurostat (February 2008 and August 2009)

EUROPEAN PARLIAMENT

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT B
STRUCTURAL AND COHESION POLICIES

Role

The Policy Departments are research units that provide specialised advice to committees, inter-parliamentary delegations and other parliamentary bodies.

Policy Areas

- Agriculture and Rural Development
- Culture and Education
- Fisheries
- Regional Development
- Transport and Tourism

Documents

Visit the European Parliament website: **http://www.europarl.europa.eu/studies**

PHOTO CREDIT: iStock International Inc., Photodisk, Phovoir

ISBN 978-2-823-3013-5