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Analysis of Waterborne Transport in Europe

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Analysis of Waterborne Transport in Europe

Cooperation between
F&L and Universities

by Andreas Kubek

Foreword

The importance of transportation and logistics for our society is often neglected by the general public and politics, although Europaen Transport modes are the vital links of the European Single Market. The landborne modes are faced with an increasing capacity problem. This alarming fact and the fascination of the shipping industry, with all its tradition and history, encouraged me to look deeper into the potential of waterborne transport within the European Union.

Having been inspired by a booklet produced by the European Freight & Logistic Leader Club (F&L) with the title "Barging, Inland Waterways, short Sea Shipping" I tried to combine already published knowledge on this topic with the practical experience of leading experts involved in waterborne transport - Shippers, Operators, Ports and Governments - to create a practical assessment on the potential of waterborne transport in the EU.

Thanks to the help of the working group members of the F&L which helped me to understand the basic obstacles waterborne transport faces in Europe today, I was able to create a detailed set of specific questions and standard questionnaires, upon which this study for the F&L is based. Armed with this set of questions and inspired by the interest and support of the members of the F&L, a research was conducted extensively among the members of F&L and other leading actors involved in waterborne transport as well as members of several European institutions, governments and research facilities.

The scope of the study covered the European Union Countries and the collected data is compiled in the production of the following report, which hopefully provides a useful tool for a better understanding of the potential of the waterborne transport mode as part of an integrated European transport network to increase the sustainable mobility within the European single market.

I want to thank all F&L members, experts and professionals who supported me with this challenging research and offer lots of their valuable time. I also want to thank especially my father, Director of LKW Walter, Kufstein, and F&L Management Commettee Member for all his support and expertise as well as the long and interesting discussions.

I hope this report will contribute towards achieving a more efficient integration among transport modes and contribute to a competitive and environmental friendly European transport sector.

This study was also produced for the Vienna Economics & Business University as a research.

The Author
Born in 1972 in Vienna, Austria. He completed his University studies in 1999 with an MBA at the Vienna Economics & Business University, after having spent a term at the Stockholm School of Economics.

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1 Introduction

Water has always been the elixir of life. Also, water has been the main form of transport throughout the existence of human civilisations. Many important settlements have been founded on the water, rivers, lakes, or the sea. It is only during this century that the importance of water in transportation has decreased drastically and in many transport concepts waterborne transportation had been totally forgotten.

In recent years, waterborne transport in Europe has again found its way into the minds of the decision-makers within the transport sector. It often, however, remains with verbal declaration, without implementation, expressing commitment to this environmental friendly mode of transport, especially by politicians. As a result, waterborne transportation is still the "stepchild" of European transport policies.

Purpose of the study:

The author will try to answer the following research question in this research.

What is the current situation of waterborne transport in Europe and what obstacles and challenges does it face?

This research wants to provide a concise and complete overview of the current situation of waterborne transport in the European Union. It will also attempt to illustrate the main challenges and obstacles that waterborne transportation faces to becoming a major player within an integrated European transport network. This research also wants to provide decision-makers with a basis for discussion through illustrating the distance between their positions and providing insight into ways to overcome these differences.

This should also provide readers, who have no experience with waterborne transport, with an understandable and concise overview of waterborne transport, especially shippers and policy makers. It should help to update these readers on the current situation of shipping in Europe and end widespread prejudices on waterborne transport, which gives it a bad image and does not reflect reality.

For readers currently involved in waterborne transport, it should provide a complete overview of all parts of waterborne transport in the European Union, and especially

raise awareness of the different positions among the various actors involved in waterborne transport.

Methodology:

The whole study is based on three different sources of information:

- The author has been continuously monitoring transport related print media as well as publications on the internet over a period of several years on the topic of waterborne transport out of personal interest. This and detailed studies of the available literature as well as publications by various organisations, especially the European Commission, OECD and the European Freight & Logistics Leaders Club (F&L) have been the basis for this study. The author also visited various symposiums on this topic.

- The second source of information was a survey among leading experts in the transport sector undertaken by the author in 1998.

- The author has furthermore a substantial amount of practical experience in the transport sector. He has done various internships in leading transport companies in Italy, Austria and Great Britain. These companies were involved in road, rail and waterborne transport as well as intermodal transport.

In the course of this research the author is concentrating on developments within Europe, which he defines for this study as the European Union (EU) and the European Economic Area (EEA). Also the Central and eastern European countries have to be kept in mind not only in regards to a possible enlargement of the EU, but also considering the heavy increases in transport volumes from and to these countries, and the burden this development puts on the European transport infrastructure. Transport issues cannot be seen anymore as regional geographically limited issues, as the liberalisation of world trade continues.

The author focused on analysing the research question mainly from the perspective of the 4 key-actors:

- ***Shippers:*** The industries which are buying the transport service and who are deciding how their goods are transported.

- ***Operators:*** The companies who produce the transport service, these can be specialised shipping companies, multimodal transport companies and freight forwarders.

- ***Governments*** and other policy influencing institutions: These are the organisations influencing the transport policies of national and international governments. They can be part of the government like the ministries, but also specialised agencies dealing with the issues of waterborne transport and providing the legislators with proposals and information as well as expertise.

- ***Ports*** and infrastructure providers: The operators of the logistic knots, where waterborne transport connects with other modes or final destination. this includes, port operators, but also terminals and other infrastructure providers who help shifting cargo from one mode to another.

The author has attempted to select a sample of experts, who were interviewed, with as much balance as possible to create a complete picture of the problem. With a sample of n=51, the author does not claim that the survey is 100 percent representative, rather, it represents the views of waterborne transport of some of the most important participants within the European transport industry. The author has tried to balance the sample regarding its (what is its? the participants?) importance in the European transportation sector with regional and sector criteria. Of course, availability and willingness to participate in this survey also influenced the sample.

The author wants to thank all of the experts who were so kind in taking a small portion of their precious time to participate in this survey. The author was very motivated by the enthusiasm they exhibited regarding the topic of this study.

The survey was conducted through a pre-structured questionnaire which had a general part consisting of 11 questions that were identical for all four participant groups involved and a specific section differing across the four categories of participants (shippers, operators, ports and infrastructure and government and institutions). Please find a copy of the questionnaires in the Annex.

The experts answered the questionnaire and returned it to the author. As the experts' time constraints permitted, in

some cases the results were discussed afterwards and additional information was gathered. Otherwise, only uncertainties and misunderstandings were clarified via telephone, email, or physical meeting.

The set of questions utilised was a compromise between trying to collect quantitative, comparable information and the need for qualitative information. The composition of the questionnaire reflected the complexity of the problem and the small number and high diversity of the experts involved.

Trends and developments on the European transport market 1.1

Hand in hand with the new management concepts and business trends, which dominate today's European economic structure a chance in the role of transport with in the production chain . Just to think of the just in time concept. One new approach to transportation is to view it as "rolling" stock.

Probably the most important development, which influenced the transport sector, was the ongoing liberalisation of world trade and the resulting centralisation of production. This resulted in extremely increased transport volumes and distances. A result of these developments is that the European transport network is at the limit of its capacity and full of congestion and bottlenecks.

In this section the author wants to shortly review two trends how the transport sector reacted to the above mentioned developments:

1.1.1 The trend in Europe from singlemodal to multimodal transportation.

Waterborne transport can no longer be looked at with a single mode approach, rather one has to look at waterborne transport as part of an integrated multimodal transport system. One of the obstacles and challenges waterborne transport faces is related to this development towards multimodality in Europe. It should be noted that combined transport by rail faces similar problems, but the author thinks these are key issues regarding future developments in waterborne transport. 65% of the shippers interviewed during the course of this study are currently using

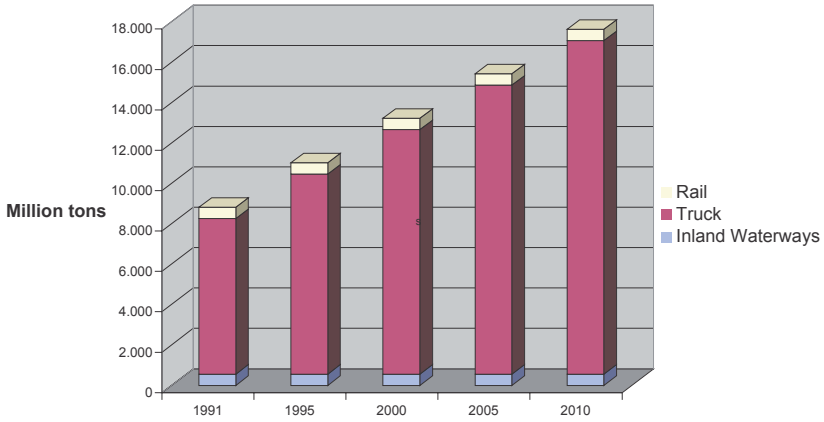
multimodal transportation as one of their main means of transport.

There are many *different types of multimodal transport* and the terminology is often mixed and not used appropriately. Here is a short overview of the different types. These definitions were taken from the official terminology of the European Conference of Ministers of Transport (ECMT, 1998b):

- ***MULTIMODAL TRANSPORT:*** Carriage of goods by at least two different modes of transport.
- ***INTERMODAL TRANSPORT:*** The movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes.
- ***COMBINED TRANSPORT:*** Intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final leg carried out by road is as short as possible.
- ***PIGGYBACK TRANSPORT:*** Combined transport by rail and road
- ***ROLLING ROAD:*** Transport of complete road vehicles on low-floor throughout wagons.

What are the reasons for the implementation of multimodal transport?

During the last three decades, we saw an enormous increase in transport volume, which was more than double the increase of the GDP in the same time period. The increase of GDP was an average annual rate of 2 percent while the transport volume increased by an average of 5 percent annually in the European Union (F&L, 1997). Most of this additional volume was absorbed by road transport and the other modes remained constant as you can see in the following figure 1. Forecasts say this trend is continuing.



Source: NEA, 1995a

Figure 1 Transport volume forecast for the EU until 2010

Already now and if the forecasts are correct the current road infrastructure will reach the limits of its capacities, and it will be impossible to enlarge the infrastructure to such an extend that it can absorb the whole additional transport volume. This fact and an higher concern regarding environmental pollution by the public which will in the long run result in including the external costs of transportation in the transport prices, will lead to an increased usage of other modes than road transport.

According to forecasts, the current road infrastructure will reach the limits of its capacities and it will be impossible to enlarge the infrastructure to such an extent that it can absorb the entire additional transport volume. This fact and a higher concern by the public regarding environmental pollution will in the long run result in including the external costs of transportation in the transport prices, thus leading to an increased usage of modes other than road transport.

The Concept of Intermodality was borne from the above mentioned problem and the fact that no mode is perfect or can satisfy all customer needs. The concept of intermodality is to best utilise the advantages of each mode and by doing so create a more efficient transport system, which covers the whole transport chain from door to door. The main prerequisite to this concept is the interconnectivity of transport modes and loading units. A technical standardisation of transport equipment is needed to ensure this across Europe, or even globally. Furthermore, the communications among the different participants in the transport chain needs to be improved. The European transport sec-

tor has to move from a competition of transport modes to a competition of different transport systems.

Intermodality is core to reaching a transport policy which ensures the sustainable mobility within Europe for the coming years.

Problems and obstacles of intermodal transport

In the current modally oriented transport system, any change of mode within a journey involves a change of system rather than just a technical transhipment. This creates friction costs that can make intermodal transport uncompetitive in comparison with unimodal haulage.

Friction costs are a measurement of the inefficiency of a transport operation. They are expressed in the form of:

- higher prices,
- longer journeys, more delays, or less on time reliability,
- lower quality services,
- limitations on the type of goods,
- higher risk of damage to the cargo, and
- more complex administrative procedures.

In order to make intermodal transport attractive for the user, friction costs must be identified, quantified, qualified, and reduced.

At the same time, logistic services within the intermodal transport chain will need to provide added value in order to offset friction costs. The nodes and transfer points in the network should be particularly well suited to offering services such as warehousing, information management, or product customisation. The market must be able to identify and exploit these opportunities, and intermodal transport policy must eliminate any bottlenecks which may prevent operators from realising such opportunities (European Commission, 1997a).

Intermodal transport users incur friction costs because of lack of interconnectivity at three levels:

(1) infrastructure and transport means,

(2) operations and the use of the infrastructure, especially terminals, and

(3) modal based services and regulations.

The conclusion drawn by the European Commission on the situation of Intermodal freight transport today is the following: "Intermodal freight transport in Europe today seems unable to meet the increasingly complex logistics requirements of an economy which operates in a competitive and global market." Transfers between modes generally create too many friction costs and do not allow sufficient scope for offering value-added services in the door-to-door chain. A better use of all infrastructure across the different modes will therefore become imperative, particularly in view of the projected growth of freight transport."(European Commission, 1997a, p.11)

1.1.2 Trend towards a fair and efficient pricing in the European transport sector

An important issue in European transport policy is the goal to reach a fair and efficient pricing in transport by internalising the external costs. This could lead to a fairer competition between the different modes, but not everybody views this idea so positive. There are fears that European products become less competitive on the world market as this most probable would lead to a raise in prices. Already now transport costs represent in Europe 5-6% of the total product costs compared to 2-4% in the USA and the Far East (F&L, 1997).

To achieve this goal of fair and effective pricing, transport prices have to reflect the full social costs. The social costs consist of external and internal costs. The internal costs are already paid by the transport operators, and include fuel and vehicle costs, accident insurance costs, etc.... The external costs are currently paid by the general public and are very difficult to measure. To do so, one must to be able to express them in monetary terms. Here is a short list of the different categories of external costs (European Commission, 1995b):

- Environmental Costs:
- Congestion Costs:
- Infrastructure Costs:
- Accident Costs:

It probably not realistic to try to include all externalities into

the transport costs, but there are concrete plans to include the environmental impact and the costs of infrastructure into the transport prices (European Commission, 1998b). This can be done by, for example, fuel taxation and road pricing.

For waterborne transport, this trend has a significant impact. The environmental costs are very favourable for shipping - see chapter 2.2.- on the other hand the "fair" payment for infrastructure use could be of great disadvantage for inland waterways, but also railways, and might get them uncompetitive. This could lead to a reduced importance of these environmental and safe modes.

2 Facts and figures on waterborne transportation in the European Union

In this chapter the author wants to draw a brief picture of the current situation of waterborne transport in the European Union. First some figures on the development of the waterborne transport sector in general. Then he wants to give a short overview of the advantages waterborne transport has followed by a more detailed analysis of short sea shipping, inland waterways and the infrastructure necessary for shipping. At the end of this chapter the author gives an country specific view on the situation of waterborne transport in the 15 EU member states.

Structure of European waterborne transport 2.1.

The European shipping industry accounted for a total turnover of 37,3 billion Euro in 1995 this was 11,6% of the total turnover of transport modes. This turnover was generated in 15.767 companies in the European Union who employ 234.900 people, this is only 5,2% of the total employment in the European transport sector(Eurostat, 1999). This numbers give waterborne transport a very good turnover per person employed ratio of 158.790 Euro per person annually. The average in the European transport sector is 83.900 Euro per person.

These are just some basic figures to be able to assess the size of the waterborne transport sector, looking at the industry structure itself there strong centralisation tendencies visible. But still it is very fragmented and many small operators exist. This is by some experts seen as a main problem of waterborne transport itself, that there companies missing which bundle the various small operators, and offer a joined service, which can fit the Shippers needs, more on this in the chapter 3.

On western European inland waterways, over 10.000 shipping companies operate. (Pro-Concept, 1999) Generally, the industry is very fragmented and consists of many small companies, often independent barge owners that own only one to three ships on which they live with their families year round. In recent years, the tendency towards concentration has been significant for the development in the other modes and industries. For example, the number of try cargo shipping companies in Germany has reduced in 1998 by 10 percent when compared to 1997. (ITZ, 1999) The number of companies which operate push and pull convoys reduced in the same time period by 15 percent, but the number of employees has only been reduced by

0,6 percent. This indicates that existing companies have absorbed the majority of the dissolved companies through mergers and acquisitions. In France, Belgium, and the Netherlands, these tendencies are not as obvious because of political regulations, but concentration tendencies are also noticeable there.

The short sea shipping industry is much more liberalised, but there are the same tendencies visible like on inland waterways. There exist pure short sea shipping operators and deep sea shipping companies which operate also short sea shipping. The centralisation is also taking place, mergers and acquisitions are omnipresent. These acquisitions don't take only place within the industry, but also with companies of other modes. The trend is towards multimodal companies. A current example would be the Deutsche Post which through the acquisition of Danzas and Nedloyd recently caused headlines.

2.1.1 The goods transported

In this section the author wants to give a quick overview on which goods are transported by which modes. Here there is a problem visible, that the author encountered during the whole course of the study regarding statistical material. While inland waterways where always included in the statistic, data on short sea shipping was often missing. This might be due to the fact that sometimes it is difficult to divide short sea shipping from deep sea shipping, but could also be an indication that short sea shipping has come into the mind of policy makers only recently as individual mode.

(NST/R classification groups in brackets)	Road	Rail	Inland waterways	Total
Agricultural products (0, 1)	29	13	13	**25**
Coal, other solid mineral fuels (2)	1	12	12	**4**
Petroleum and petroleum products (3)	5	8	19	**6**
Iron ore, steel other metal products (4, 5)	8	20	18	**11**
Cement, building materials (6)	19	11	25	**18**
Chemicals, fertilizers (7, 8)	9	11	10	**10**
Machinery, manufactured articles (9)	29	25	3	**26**
All goods	100	100	100	**100**

Source: Eurostat, 1999

Table 1 Group of goods transported by each mode (% of tkm)

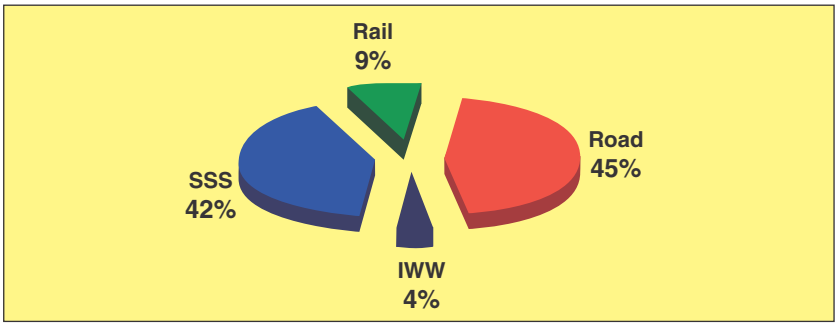
Looking at the table 1 above it is shows that inland waterways have a big share in the goods traditionally transported in bulk and high quantities, like cement and building materials (25%) petroleum an its products (19%) and iron ore, steel and other metal products(18%). All these industries are traditionally located at a waterway, this allows it to use waterborne transport in an unimodal way.

There waterborne transport is very much competitive with the other modes, especially railways which target the same kind of goods. This is also proved by the fact that the share of inland waterways is in all these groups the same or higher than the share of rail. Often the share of inland waterways is also bigger than the one of road transport in these commodity groups which are characterised by high volumes and low value.

An exception to this is of course machinery and manufactured articles. This has also to do with value of the goods and other factors, on which will be focused later in this study. It is only to mention that waterborne transport also could be competitive with these not so traditional cargo groups, if used in intermodal transport, for example containerised. Also this will be elaborated later.

2.1.2 The Modal split in the EU

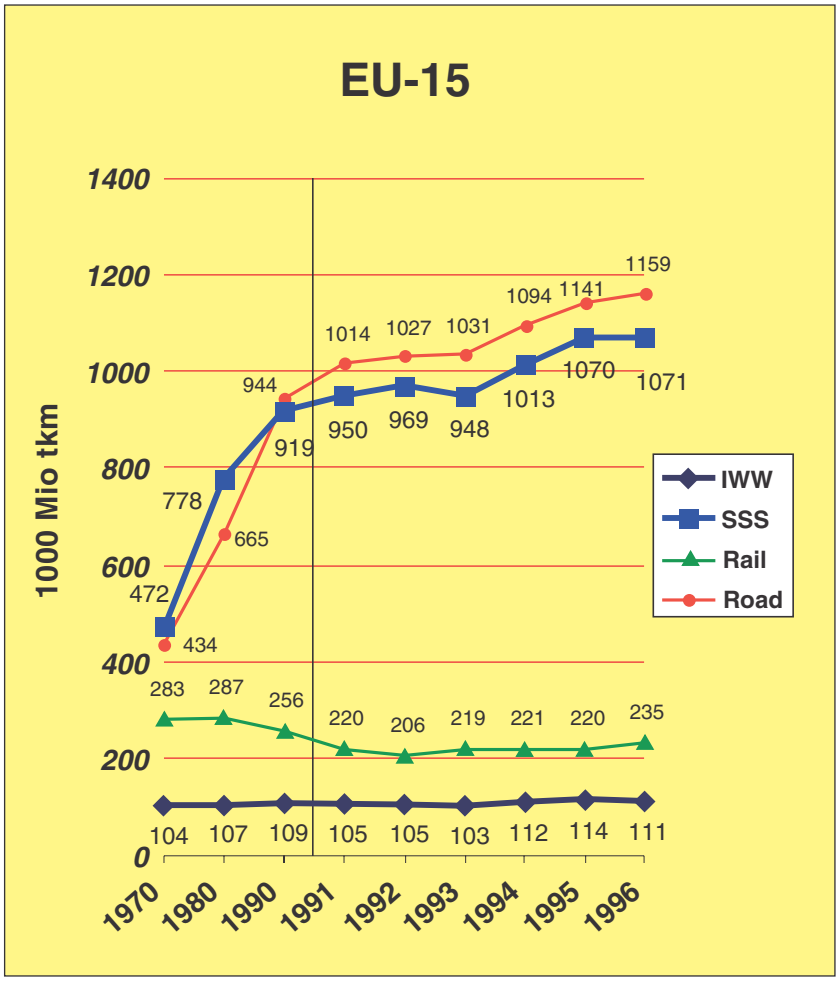
Analysing the modal split between the different mode, the author has decided to exclude pipelines and air transportation as they are in not so direct competition with the other modes. Instead of pipelines the author has decided to include short sea shipping in the modal split. The numbers (tkm) used for short sea shipping in this analysis are only national and intra EU maritime transport. This classification was used also in the country specific analysis in chapter 2.6.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 2 The modal split in the European Union

It is interesting that the two waterborne transport modes account together for 46% of the total transports. This is slightly more than the dominant road transportation. In the total EU modal split rail transport has a much bigger share than inland waterways this is mainly due to the fact that in many countries no inland waterways are in use for freight transport. The detailed national shares and differences can be found in chapter 2.6.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 3 Development of waterborne transport in EU-15 (1970-1996)

The historical development of the different modes in the EU show that Road has taken the biggest share of the increased transport volume, its share almost tripled since 1970. But also short sea shipping has seen a steady increase and also more than doubled since 1970, but it lost

its role of the dominating mode to the road. Rail, which in 1970 still had more than half the volume of the road since then has even decreased, but saw a slight increase in the last years Inland waterways basically stayed the same but increased by almost 10%in 1995.

The substantial share of tkm of waterborne transport, especially short sea shipping, compared to the road can also be explained by the different average distances transported. Road has an average of 100 km per ton while inland waterways have an average of 230km, there are no figures on short sea shipping available but as more than 90% is don internationally (within the EU) the distances, might be even higher than on inland waterways. Nevertheless these figures show, that waterborne transport is of substantial importance within European transportation, a fact which often is forgotten by the public, but also by Governments and Shippers.

2.1.3 Maritime cargo flows in the EU

Among the four European maritime regions, the North Sea has the largest portion of short sea shipping trade in Europe with 43% of the European SSS trade both for intra-North Sea (245 million tons) and for trade from and to other European regions (251 million tons).In the Atlantic region, most of the maritime cargo flows are from and to other regions, while in the Mediterranean, intra-area trade is the dominant form. (IPSI,1997)

	Intra-area		From and to other areas		Total	
Baltic Sea	137	22%	97	18%	234	20%
North Sea	245	39%	251	47%	496	43%
Atlantic	84	13%	121	23%	205	18%
Mediterranean	159	25%	63	12%	222	19%
Total	625		532		1157	

Source: IPSI, 1997

Table 2 The intra-European maritime trade in the four European maritime regions (in million tons) in 1992/93

A general growth of maritime cargo flows in short sea shipping may be expected in the future. The volumes on different routes may vary, depending on individual growth rates for different countries and regions. For the following countries, major changes are expected in economy with a

growth of trade volumes above average:

- Russia (3,1% in export and 5,3% in import),
- the Baltic States (5% - 7% in export and 7,9% - 9,7% in import),
- Poland (6,6% in export and 4,1% in import)

For the former communist countries in the Black Sea region, the current political situation and economic problems does not allow an exact forecast for the development of maritime cargo flows. The growth rates vary between different types of cargo. In general, larger growth is expected for unitised cargo than for bulk and oil.

	General cargo	Containers/ RO-RO	Dry bulk	Liquid bulk	Oil
Baltic Sea	4,2%	N/A	3,8%	4,5%	1,6%
North Sea	2,7%	2,5%	1,2%	1,7%	
Atlantic	N/A				
Mediterranean	1,0% - 3,3%				

Source: COWI 1995, NEA 1995

Table 3 Average annual growth rates for the cargo types (% of tkm)

An additional growth of cargo volumes in short sea shipping has to expected, if the legal or financial framework conditions change or if the traffic obstacles cause a change of traffic patterns. This may be expected for some congested areas in Central Europe. If those restrictions apply to land transport, the maritime cargo volumes may increase. These restrictions would influence first of all the maritime trade in the North and Baltic Sea. For the Baltic Sea region e.g. an increase of RO-RO and LO-LO traffic up to 40%, i.e. up to 57,6 million tons compared to the basis forecast may be expected (COWI, 1995).

This was just a short overview on maritime cargo flows in the European Union, specific transport corridors will be analysed later on in the study.

2.2. Reasons for waterborne transport in Europe

This chapter wants to give a short overview of the reasons for the importance of waterborne transport in Europe. It explains the main advantages of waterborne transport in Eu-

rope and compares it with the other modes. These advantages are also the main arguments for a further development and improvement of the waterborne transport mode.

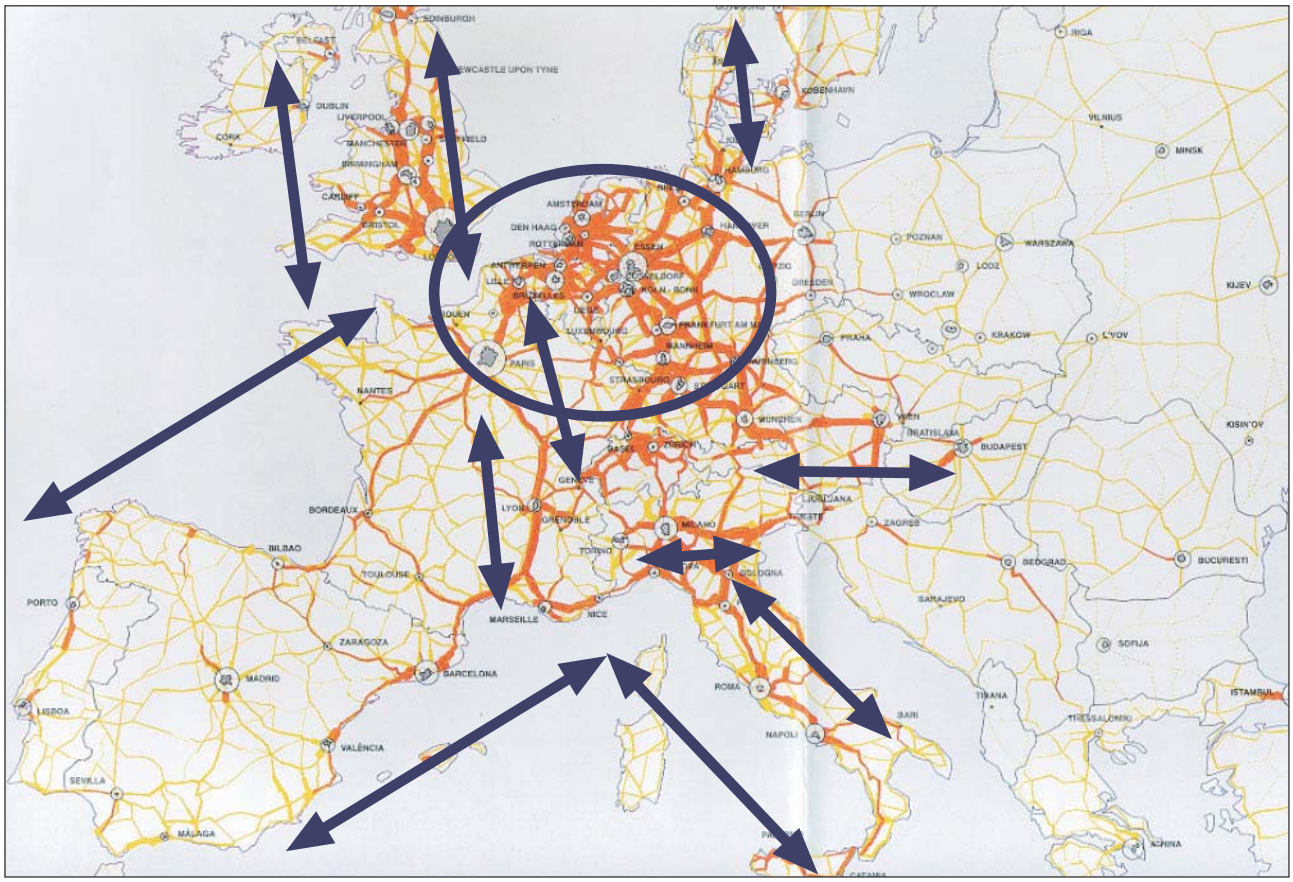
2.2.1 The geographical configuration of Europe - cheap natural infrastructure

The European Union has a favourable geographical configuration which makes it particularly well suited for waterborne transport. It provides this mode with cheap natural infrastructure, which proofs to be a competitive advantage of waterborne transport. The European Union coastline is more than 67.000 kilometres long. Only a few industrial and economic centres are situated more than 400 kilometres from a port. Roughly 60 to 70 percent of all European industrial centres are located between 150 to 200 kilometres from the coast (European Commission, 1995a) and are therefore in principal, conveniently located in terms of access to waterborne sea transport.

But in addition to this, one should not forget the wide European network of rivers and canals. Europe benefits from a widely dispersed network of 25.000 kilometres of inland waterways, of which 12.000 kilometres (European Commission, 1995a) have been included in the Trans-European Transport Network. These waterways can also be penetrated by purpose-build coastal vessels, but are mainly used by canal and river barges which transport more than 430 million tons a year (European Commission, 1995a) in the European Union. Vessels can load and Unload in inland ports of important economic and industrial centres such as Duisburg, Mannheim, Strasbourg, Vienna as well as Paris, Lyon, Liège, Gent, Cologne and Brussels. Via waterways these centres are directly connected to major sea and river ports in other European Union countries, but also to other European countries in Scandinavia, Eastern and Central Europe.

Since the opening of the Rhine-Main-Danube canal exists a direct inland waterway connection from the North Sea through the whole of Central Europe to the Black Sea. This finished route and the planned Danube - Oder Canal get even more importance under the aspect of the increased traffic since the fall of the Iron Curtain at the end of the 1980ties, and the poor infrastructure in these countries, which is already used over their limits.

To illustrate the size of this problem, one should look at the development of trade between the 15 memberstates of the European Union and the 10 potential candidates in Central and Eastern Europe (CEC-10). Imports into the EU from the CEC-10 countries have more than doubled in the last seven years from 50 million tonnes in 1990 to over 110 million tonnes in 1997. Exports from the EU have increased by four times from 10 million tonnes in 1990 to almost 46 million tonnes in 1997 (EUROSTAT, 1999). When this growth and the future integration of the CEC-10 countries into the European Union are considered, the existing infrastructure is even more important as it can assume more freight in a smaller amount of time and with less investment. For example, the Danube has a potential of 100 million tonnes per year more than new rail or road connections that still have to be constructed.



Source: European Commission

Note: Arrows represent existing routes of waterborne transport

Figure 4 Areas of intense road freight traffic compared with existing routes of waterborne transport

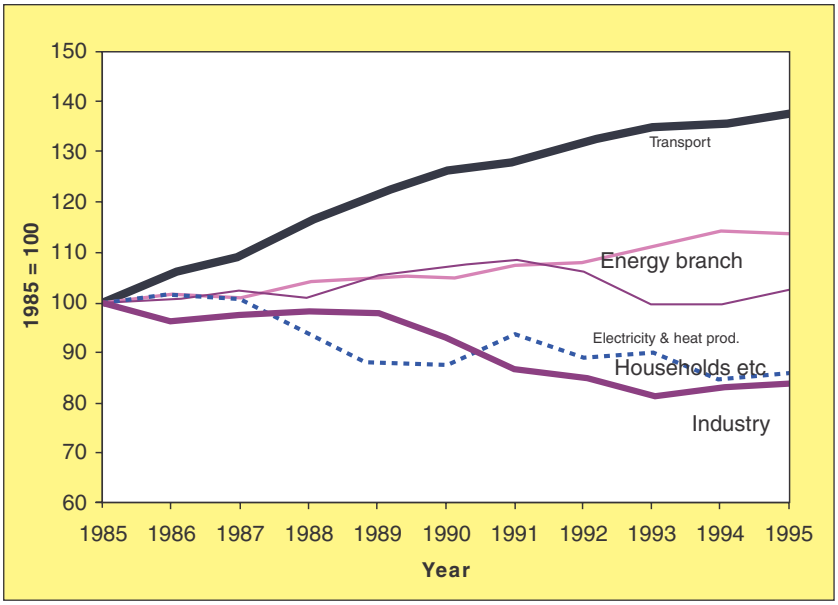
If one looks at the figure 4, which shows the main routes of road freight traffic in Europe, one can see that parallel to the main routes, with the highest volume of traffic, there are also waterways(inland waterways and short sea shipping corridors), which could take some of the cargo still transported by road.

Europe is very well equipped with waterways, which is cheap natural infrastructure.

2.2.2 Energy and environmental performance

Another big advantage of waterborne transportation is the efficient energy and environmental performance. This fact is receiving increased attention as we learn more about the effects of CO_2 emissions, such as the greenhouse effect. Also the energy consumption is getting more important as we have learned about the limitation of resources in fossil fuels.

This effects especially Transportation as one can see in the following figure 5. The quantity of CO_2 emissions from fossil fuels caused by transport has increased dramatically by almost 40% compared to other producers of CO_2 emissions. And that although new technologies have reduced the emissions in the same period by 15% (F&L,1997).

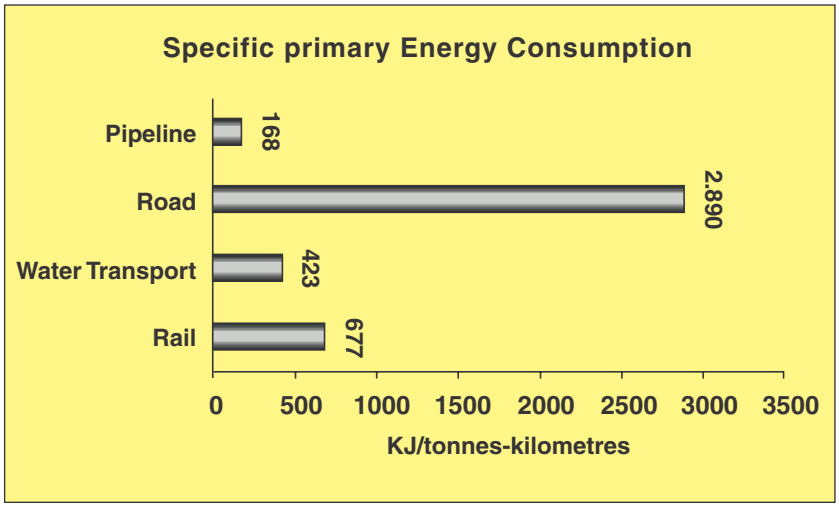


Source: EUROSTAT, 1999

Figure 5 CO_2 emissions from fossil fuels in Europe

With this increased environmental consciousness in Europe which found also its way into European politics the call for an internalisation of the external costs to reach a cost truth, is getting louder, especially regarding transport. Most countries are working already on concepts, like for example roadpricing. And EU policy also concentrates on this topic.

This however would have great effects on the competitive situation within different modes as one of the most important competitive factors: cost is changed dramatically. Policy makers hope to shift cargo from the "polluting" transport mode road to the "environmental friendly " modes rail and waterborne transport. But this cannot be the only measure to make waterborne and rail transportation more competitive. Many critical voices are stating that national transport policies are focusing too much on making road transportation more expensive, through high fuel taxation and roadpricing, while neglecting the necessary measures to improve the structure of other modes and that ships and trains cannot offer door-to-door service. However, internalisation of external costs will lead to fairer pricing and improve the competitive situation of waterborne transportation.



Source: Whitelegg, 1993

Figure 6 Different modes of freight transport in terms of energy use

Regarding energy consumption waterborne transport is far the best mode. With 423 Kilo Joules per tonnes-kilometres, it uses only 2/3 of the energy needed by rail and only 15

percent of the energy used by road transport. Of course while looking at this and the emission figures below (table 4), one has to keep in mind that waterborne transport is only efficient with high volumes of goods as only full loaded vessels can attain the high levels of efficient energy and environmental performance.

Specific Total Emissions (grams/tons - kilometres)					
	Rail	**Water Transport**	Road	Pipeline	Air
CO_2	41	**30**	207	10	1.206
CH_4	0,06	**0,3**	0,3	0,02	2,0
Volatile Organic Compounds	0,08	**0,1**	1,1	0,02	3,0
NO_X	0,2	**0,4**	3,6	0,02	5,5
CO	0,05	**0,12**	2,4	0,00	1,4

Source: Whitelegg, 1993

Table 4 Different modes of freight transport in Terms of Emissions

As one can see in table 4 waterborne transport has also a very good data regarding air pollution especially regarding CO_2 emissions, which are the main cause of the greenhouse effect. The comparison with rail transportation is very difficult, as it is only easy to measure the pollution done by fuel driven train engines, but looking at the apparently "clean" electricity driven railways it is difficult to distinguish how "clean" this energy really is, it depends on how the electricity is produced: by using renewable energies like waterpower and the "clean"(?) nuclear power or if it is produced by caloric power plants, using fossil energy sources.

Also regarding noise levels, waterborne transport has a very good performance, and the big advantage of short sea shipping in this aspect is also that it doesn't pass through highly populated areas like the other modes. The factor of water pollution is a problem, especially by dumping waste into the sea.

2.2.3 Cost

This is the main competitive advantage of waterborne transport in persuading the shippers to shift cargo from other modes to shipping. Waterborne transport is extremely cheap especially for high quantities, if one look at

the pure transportation costs on the water. But there are some factors that increase the costs dramatically.

The biggest "enemy" of waterborne transport are the pre- and on-carriage costs. As a door-to-door service via waterways is rarely possible, the goods have to be brought by another mode from or/and to the harbour. The working group for waterborne transport of the European Freight and Logistic Leaders Club (F&L) has made following findings: "Pre- and on-carriage cost can represent a major share in the total transportation cost due to minimum tariffs which are applied in certain countries, i.e. local legislation can penalise efficiency." (F&L, 1998, S. 14) In this study the authors bring also a drastic examples of waterborne transport, where the actual sea freight rate from Nordic countries to Italy is cheaper than the on-carriage cost from Italian ports to the final destination in Italy.

Further additional costs, which arise only with waterborne transport, are pilot fees and port fees, ... more on these in chapter 3. On inland waterways, due to the insufficient infrastructure regarding the minimum dept and the height of bridges, cargo has to be reloaded or ships are stuck, which causes additional costs for the operator.

These few examples show, that the obvious advantage: cost is not as sufficient as would be imagined. Cost can be seen as an area, where waterborne transport faces most serious obstacles and challenges. If they can be solved, then cost will become one of the big competitive advantages, which would help to shift cargo onto the waterborne modes.

2.2.4 Capacity

Another big advantage of waterborne transport is the high capacity of its vessels, which is one of the reasons for the two, before mentioned, advantages: environmental and energy performance as well as cost. Of course there are many different type of ships, but to illustrate the difference here some examples, comparing capacities in carrying containers.

Lorry	2 TEU
Train	80 TEU
Inland ship	160 TEU
Feeder ship	600 TEU
Ocean-going container ship	Up to 6690 TEU

Source: Eurostat, 1999 Note: TEU..... Twenty-foot Equivalent Unit (6.10 m)

Table 5 Capacity of different transport vehicles in TEU

Just imagining that there are 80 trucks needed, which represent a queue of almost $1^1/_2$ kilometres[1], to take the same amount of containers as one single inland ship or that a feeder ship has the same capacity as $7^1/_2$ trains. Not to talk about an Ocean going containership, which can take as much containers as a over 60 kilometres long truck queue of 3.345 trucks.

Of course on inland waterways this capacity is not only defined by the vessel itself, it depends also on the height of the bridges along these waterways as they influence, with how many layers this ships can be loaded, Also the depth of the waterway influences the capacity. A general rule says 10 cm more depth allows an increase of 10% more cargo (Martin, 1999).

This high capacities are not always only an advantage, as due to this high capacities shipping is only efficient at routes with high transport volumes. Only then the capacities can be exploited with a high enough frequency, to ensure the flexibility and transit time required by the shippers.

2.2.5 Room for expansion

While there is increasing congestion in road transport, waterborne transport still has available capacity . The existing European short sea fleet could accommodate extra cargo as well as the European canal and river barges without high investments in additional vessels. Actually especially on the inland waterways the existing over-capacities have escalated into a price dumping, which makes an economically efficient operation almost impossible, and the EU legislation has taken measures to reduce this capacities. This will be discussed further in the section on inland waterways.

1 Taking a standard truck with a length of 18 meters.

The infrastructural costs associated with the capacity expansion are relatively low. In short sea shipping would relate mainly to port projects (European Commission, 1995a). Thos projects can often be identified, prepared in less time than is generally the case for major projects related to other modes of transport. Comparatively small port projects, both in terms of scale and costs, can often have a disproportionately large impact on transport development. relatively inexpensive projects such as the removal of sandbars or the construction of safety breakwaters can make ports much more accessible for maritime transport. A growth in short sea transport would not require in most parts of the European Union (southern ports in general being an exception) expensive infrastructural works in the ports. Investments in capacity increase in short sea shipping are therefore in general more cost effective than in land modes.

Also the necessary investments for inland waterways would be much lower than investments for comparable capacity increases in rail or road transportation (Einem, 1999), but. Although the politics seem to be aware of this fact the improvement of the infrastructure of European inland waterways is still the "stepchild" in European transport policy. The investments into infrastructure have constantly declined from 2,1% of all infrastructural investments in 1980 to 1,7% in 1988 (EMCT, 1992) compared to 27,7% into Rail and 70,6% into Roads (see also Chapter 2.5.).

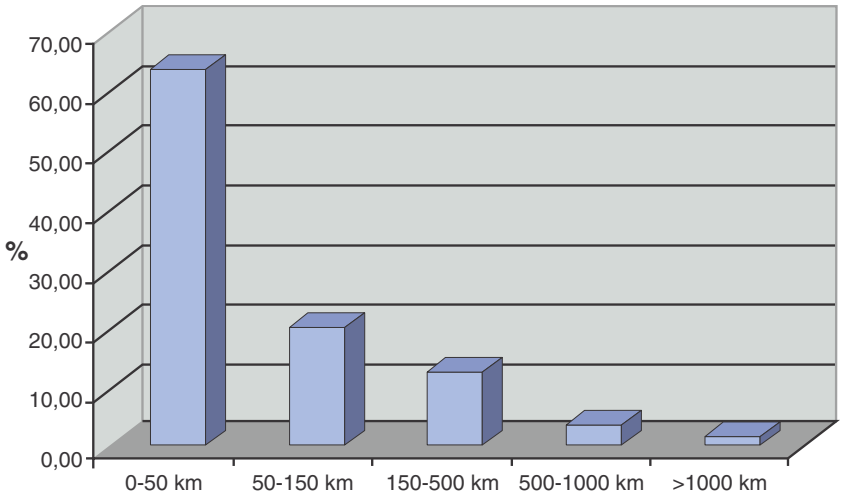
The opening of the Rhine-Main-Danube Canal in 1992 was probably the largest improvement in the European inland waterway system. It linked the European "water highway", Rhine, with the important Transeuropean connection, Danube, creating a 3500 kilometres long axis through the whole of Europe thus creating a direct inland waterway connection from the North Sea to the Black Sea.

Taking this in account and the possibilities that arise from this connection it is not understandable why the German government has still not abolished the 69 kilometres bottleneck between Straubing and Vilshofen in Bavaria. In 1997 on 94 days the water level was under the 2 meters mark, which caused that ships only could pass empty. After the Duisburg Treaty which was signed in 1966, Germany should have already finished the complete infrastructural expansion of the Danube a long time ago (Martin, 1999). This example shows the real problem for capacity expansion on

inland waterways, some relatively small infrastructural problem of 69 kilometres is reducing the competitiveness of the whole Danube shipping so dramatically, as the important factor reliability can not be guaranteed. With comparably cheap infrastructural measures an enormous capacity potential could be accessed, at the Danube it would be up to 100 Mio tonnes a year. Currently only 10% a capacity of 10Mio tonnes is used. Of course to be able to access the full potential of the Danube also other infrastructural problems have to be solved, like for example the bottlenecks Wachau and the from Vienna to the Slovakian border.

2.2.6 Advantages compared to other modes

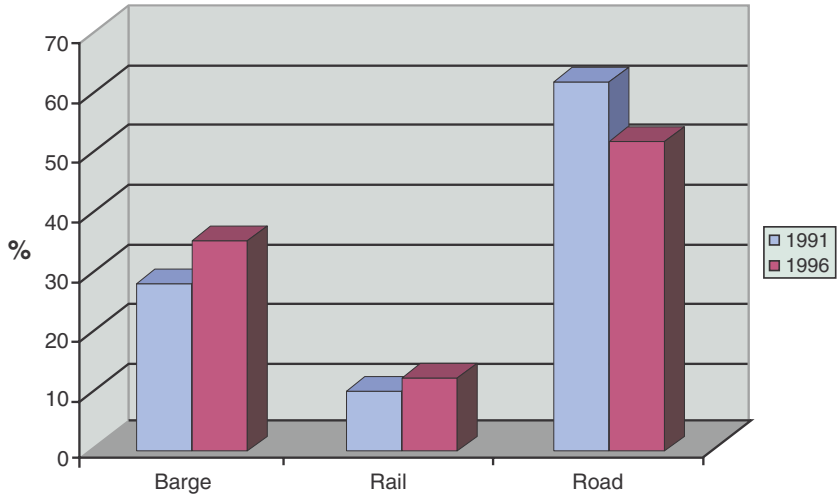
Compared to ***Road****:* Waterborne and road transport are, at the moment, only partially direct competitors. This is due to the attributes of road transport being much different than waterborne or rail traffic, such as the volume transported (truck: low volume / ships: high volume), the type of goods transported, and the distance transported. For example, the following figure 7 illustrates that over 60 percent of the goods carried by truck are transported over a distance under 50 kilometres, while shipping is generally used over longer distances, also due to high transhipment costs.



Source: NEA, 1992

Figure 7 Distance over which goods are transported by road in the EU (1990)

However, as more than 80 % of the lorry transports in Europe are done over a distance lower than 150 kilometres (see figure 7above), a direct competition especially of inland waterways over this distance could substantially contribute to ease traffic problems in urban or industrial areas. Especially in Northern Europe with its dense canal system, where many factories have direct access to canals on their premises, this could prove a substantial solution. A big contribution to the road congestion in this area is inland movements of overseas containers from or to the biggest deep-sea ports in Europe.



Source: ECT, 1998

Figure 8 Inland movements of containers from the Port of Rotterdam (% of TEU)

As one can see in figure 8, the model share of container feedering from and to the Port of Rotterdam, which is with 5,5 Mio Twenty-foot Equivalent Unit (TEU) far the biggest container port in Europe. One can see a significant shift from Road to Barges between 1991 and 1996, but there is still significant room for improvement, even with the existing services available.

The lower cost advantage of waterborne transport has diminished, as the fierce competition on the road, immediately after the liberalisation, led to very low transport prices for transport by truck. The present concentration and consolidation phase is not terminated yet and it is unlikely that road freights increase in the near future. Another advantage of the road over waterborne transport is its ability to

cover door to door services. For waterborne transport high pre- and on-carriage costs arise (s.2.2.3.).

According to a survey made in the EU project IPSI, shippers choose truck transport for following reasons (IPSI, 1997)

- *Availability:* Trucks may arrive and leave at any time, are easy accessible and offer door-to-door logistics
- *Flexibility:* Trucks are not dependent upon specific routes and the drivers may adapt to varying traffic conditions as they occur. Further, the capacity supplied can easily be adapted to demand.
- *Speed:* Truck transport is fast, at least in principle.

In order to be competitive, short sea shipping services must compete on this basis, and furthermore, regularity of service is a significant requirement.

Transit time is longer for inland waterways and short sea shipments than for trucking. In a Norwegian study related to export of fresh salmon, currently being transported by truck from the West Coast of Norway to the continent (Paris) by truck, it is shown that transit times can be met by waterborne transport even at speeds well below 30 knots on the vessel.(F&L, 1998)

Taking the capacity of the current road infrastructure and the forecasted increases in transport Volume, especially also from and to the CEC countries, it is obvious that this infrastructure cannot accommodate these increases even closely. On the other hand there is a high spare capacity on the waterborne modes, which can be even multiplied by relatively small investments (Einem, 1999). This fact also led to the increased usage of combined transport (s. 1.3.1).

Compared to ***Rail****:* This is the mode that is in real direct competition to waterborne transport. As it in many way has the same features. It is comparable environmental friendly, can accommodate high volumes of goods, is slow, (???this is not clear???) is comparable cheap and has problems to offer door-to-door service .(has a comparable bad image with shippers).

Price proves to be a tight competitive advantage as shipping is still relatively cheap (Pro-concept, 1998). This price gap could easily be enlarged if high transhipment and other additional costs of waterborne transport would be

reduced. Additionally, as some critics say, if railway prices would be based upon on a liberalised market, which still does not exist due to strong state support and protectionism of the railways. In the following table 6, one can see a direct price comparison of a 40' container transport from Vienna to Tokyo between inland waterway feedering and rail feedering both via the Port Rotterdam. This shows that waterborne transport can be a cost efficient alternative when compared to rail.

	Rail feedering	**IWW feedering**	+/- %
Vienna-Rotterdam (incl. transhipment)	1.000.- US$	767.- US$	***- 23,3%***
Rotterdam-Tokyo (incl. transhipment)	1.542.- US$	1.542.- US$	*+/- 0%*
Total Vienna-Rotterdam-Tokyo	**2.542.- US$**	**2.309.- US$**	***- 9,17%***

Source: Pro-Concept, 1998

Table 6 Price comparison of transport of a 40' container from Vienna to Tokyo between rail and inland waterway feedering.

Waterborne transport has also two other very important advantages: the most important one, which could give it the winning edge in a competitive situation is, that most of the operators in shipping are private businesses, which stand in fierce competition to each other. This of course raises the quality of service, while railway companies are mainly state owned, and government controlled, as well as monopolists. This has its effect on the quality of service as anyone, who had to deal with railways, will confirm. Although almost all governments have already started reforms towards more competitiveness, and the liberalisation of the railways has been formally adopted. Still efficient services as customers would need are very rare. This is mainly due to the fact that national protectionist interests are stronger than the drive towards efficient transport service.
This protectionism is not only caused by politics, but also by very strong national interest groups, especially the labour unions, which represent over one million[2] (Eurostat, 1999) of employees in the rail-sector of the EU compared with 235.000 in waterborne transport. As a result railway companies are very reluctant to try and allow foreign operations. They foresee and fear drastic measures by the unions

2 1994 figures.

as a result, like rails being blocked, strikes or even sabotage of railway infrastructure.

Another example, how the formal liberalisation of railway transport is kept from being effective, is the example of operating a railway connection from the Port of Rotterdam to the Port of Antwerp. On this route the train engine and personnel has to be changed four times. From the harbour in Rotterdam to the train station Rotterdam, from the train station to the border, from the border to the train station of Antwerp, and from the train station to the Port of Antwerp. Officially this is due to different signalling systems, different training programs of the personnel, and other required qualifications.

How ever, at this point it is to mention that also in waterborne transport the liberalisation is not perfect, in short sea shipping the situation is better, as all cabotage restrictions have already been abolished, but on the inland waterways there are specific restrictions, for every river different. Problems are not only cabotage restrictions, but also that different captain patents are not valid on all the rivers... . Especially Germany is still restricting the liberalisation on waterways, as it has not joined yet the Belgrade convention which secures the freedom of shipping on the Danube. Basically the concept of the freedom of shipping on the rivers Rhine, Main, Elbe and Danube was already drafted on the Vienna Congress at the beginning of the nineteenth century.

There are many very good concepts like for instance rail-freeways, but changes in state owned companies which even had a monopoly status for almost the whole century, proof very slow and difficult. This is why operators of combined transport still face great difficulties to offer a competitive package, here waterborne transport could prove an attractive alternative especially in container feedering. The factor of state ownership has also advantages: politics are very supportive, with subsidies or other advantages, this hinders a fair and realistic competition. Also in the national transport policies one can feel the affinity of railways towards politics, which can be seen also in the investments in infrastructure.

The second advantage of water over rail is the infrastructure. Short sea shipping doesn't need any expensive rail network, which proofs to become always more difficult to

expand, as residents initiatives proof to become stronger and stronger. Short sea shipping only needs efficient ports. But also inland waterways, which expansions face similar problems as railways, are more efficient regarding infrastructure. Even the Austrian federal minister of transport, Dr. Einem, who often is portrayed as a "Railway-Minister" admitted in a speech on "The Danube- A trans European waterway"(Einem, 1999), that it would less expensive to make barging more competitive than railways.

Compared to ***Pipeline****:* The main area where waterborne transportation and pipelines are in direct competition is the transportation of crude oil and natural gas. The main advantage of waterborne transport is cost as it doesn't need the high infrastructure investments and maintenance like pipelines. It is also more flexible as it can load or unload cargo at any seaport, waterborne transport also has a wider range as it can cover the whole globe.

2.2.7 Positive effects on the development of other sectors

Waterborne transport also plays an important role in a broader political and economic context, from an increased competitiveness of the waterborne modes also other sectors benefit.

In case of islands and peripheral regions of the European Union shipping, is by far the most important and, in many instances the only, mode of transport both for passengers and goods. Thus it can contribute to the development of islands and peripheral regions of the Union by economically stimulating these regions (European Commission,1995a) and a sufficient supply of efficient transport services can increase the attractiveness of a location for establishing new businesses.

Generally one can say, that geographic areas with a poor transport infrastructure are overall underdeveloped areas. The big advantages of waterborne transport is that relatively few infrastructural measures are needed and a sufficient transport network can be installed comparably fast.

Barging and short sea shipping also contribute significantly to the development of European shipbuilding. In 1992, 17% of all vessels of 6.000 GRT[3] or less built world-wide, were

3 This figure is often used as a dividing line between deep sea ships and short sea ships.

constructed in European Union shipyards, that are 96[4] out of all 560 vessels build in 1992 world-wide(European Commission,1995a). This numbers illustrate very well the importance of European shipbuilding industry, which could be actively stimulated by an increase in waterborne transport.

2.3. Short sea shipping in the EU

The maritime waterborne transport within the European Union is called short sea shipping. This chapter gives a short overview of the current situation of short sea shipping in Europe, its important corridors, its fleet and its growth potential.

Short Sea shipping is actually not described by the length of the journey, it can be either short or long distance and both types have their specific advantages and inconveniences. Short sea shipping is separated from deep sea shipping by the fact, if it crosses an ocean or not. Basically all sea transport within the EU is short sea shipping for the sake of consistency, the author has also included shipments from and to the Spanish Canary Islands, which one could argue are already deep sea shipping.

Short sea shipping has received yet another competitive advantage, as the cabotage restrictions in the EU/EEA have been changed. Any EU/EEA ship that is allowed to trade in her own country may also trade in any other EU/EEA country. This change has opened up a significant potential for growth for this transport mode, particularly if new services are established with intermodal operations in mind.

2.3.1 Types of short sea shipping

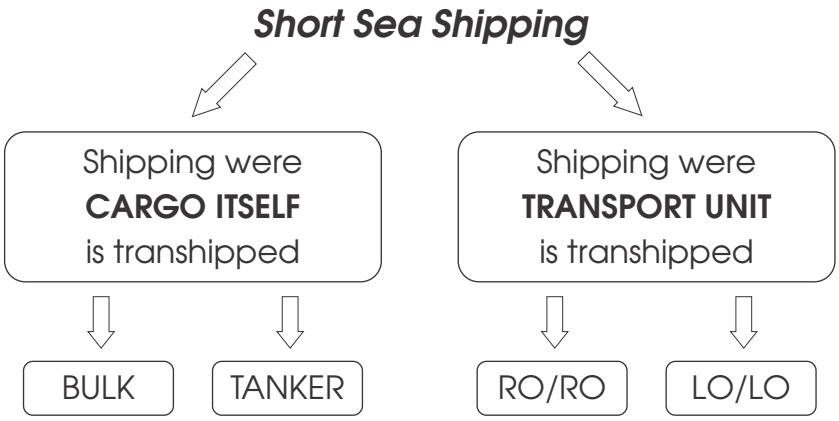
In this study the author separates the different parts of short sea shipping under the criteria if a portable transport unit, for example a container or a trailer, is used or the cargo is loaded directly into the vessel.

This type of short sea shipping were cargo is directly loaded onto the vessels, without using an additional transport unit can be divided principally between dry(Bulk vessels) and liquid (tanker vessels) cargo. These represent the traditional part of short sea shipping, carrying mainly high

4 Excluding passenger ships.

quantities of low value cargo, like iron ore and other raw materials, building materials or agricultural goods.

The other big category are short sea transports where the cargo is stored in portable transport units, like containers or swap bodies. This kind of transportation is mainly used in combination with other modes. Within this category, the author divides, regarding the way these units can be loaded, between ro/ro and lo/lo short sea shipping.



Source: Andreas Kubek

Figure 9 Different types of short sea shipping

- *Roll On/Roll Off (ro/ro):* These are mainly Ferry Services, which are shuttle services between two ports with vessels that can load rolling cargo (Road or Rail). Rolling cargo can be whole trucks or trains, trailer as well as containers and swap bodies on mafis.
- *Load On/Load Off (lo/lo):* This are mainly container feedering services and other specialised short sea shipping. It can be deep sea shipping companies operate feeder services (i.e. shuttle services with smaller vessels linking smaller ports with main ports) with the objective of connecting as many ports as possible to their main trade routes, but there are also many specialised short sea operators that offer regular and scheduled services between European ports.

2.3.2 The main corridors of short sea shipping and its growth potential

In a large scale "Corridors Study", which was co-financed by the European Commission and undertaken in 1993 by

the Policy Research Corporation N.V. and the Institut Français de la Mer the competitive situation of short sea shipping has been examined. Eight important shipping corridors in the European Union, of which three went beyond its external borders, were selected for analysis. The goal of the study was to identify for each of these eight corridors the types and quantities of goods that could be transferred from land modes to short sea shipping . The study also was to identify the main obstacles preventing such a transfer.

The following general conclusions were drawn by the Commission from the study.(European Commission, 1993a):

- Trade can be shifted from land modes to short sea shipping. However this will only be possible if short sea shipping improves the efficiency of its operations and is integrated into multimodal transport chains.
- The cargo transfer potential is sufficient to justify substantial new investments in short sea shipping within the next few years.
- The cargo transfer potential is such that if realised in practice it could reduce substantially the growth of land traffic on congested corridors.
- The use of inland waterways ports by short sea vessels could provide efficient new transport services between certain major European industrial centres.

The detailed findings of this study were based on available statistical information with figures from 1990/91, here the details for the eight corridors (European Commission, 1993a):

Spain - United Kingdom

Short sea shipping has already a market share of 81% (75,5% northbound and 87% southbound) of the total trade volume in this corridor. Road transport (crossing of the channel either by ferry or rail) holds a share of 17% (22% northbound and 12% southbound). The remainder, less than 2% is transported by rail and other modes. In terms of value, road transport represents 50%, short sea shipping 33%. The total volume of trade in 1990 was 9,3 million tonnes, of which 4,5 million tons were south-north and 4,8 million tons were north-south.

38 to 40% of the road mode share of traffic could be shifted in the short and medium term to short sea shipping.

The potential transfer in volume terms would be around 0,6 million tons (0,2 million tons south - north and 0,4 million tons north - south). This would represent approximately 6% of the total traffic. A more difficult, long-term effort could shift additional traffic volume of 4 to 5% of the total traffic to short sea shipping. However, the amount of cargo that can in practice be transferred is effected by the impact of the Chunnel (Channel Tunnel). This consideration also applies to the Portugal-United Kingdom corridor.

Portugal - United Kingdom

The share of short sea shipping in this corridor is 93% (93.6% south-north and 92.6% north-south) in traffic volume, but only 47.5% in value. Road transport accounts for 6.5% of traffic volume. (6.1% south-north and 7% north-south). The total volume amounts to 3,2 million tons (1,7 million south-north and 1,5 million north-south).

Because of the already high share of short sea shipping, it is estimated that less than 3% of the total traffic volume could be transferred in the short and medium term to short sea. The potential transfer in volume terms would be 100,000 tonnes. An additional 2.5% could be transferred in the longer term.

Iberian Peninsula - Germany

In the trade of Spain and Portugal to Germany, road is the predominant mode of transport with more than 51% (similar share in both directions). Short sea follows with 23.5% (similar share in both directions). Rail carries 8.5% (12% north-south and 5% south-north) and 17% is carried by inland waterways (13% north-south and 20% south-north).

The total volume of trade between Portugal and Germany was 1,8 million tons (0,7 million north-south and 1,1 million south-north).

The total volume of trade between Spain and Germany was 7,4 million tons (3,7 million tons in each direction).

Short sea shipping could capture from road transport another 20% of the total traffic volume in the short and medium term and a further 13% in the long term, if it is able to compete for the expensive commodities trade. The volume transferable in the short to medium term would be 1,8

million tons (of which 0,5 million south-north and 1,3 million north-south).

UK/Ireland - Italy/Greece

Total traffic volumes between the UK and Greece are modest, standing at 220.000 tons northbound and 160.000 tons southbound in 1992. The direct short sea route is the long sea route via Gibraltar. The other alternatives are land transport combined with ferry crossings (Greece -Italy and France-United Kingdom/Ireland). Now the Chunnel also plays an important role as it offers the only alternative to waterborne transport by ferries.

Short sea shipping suffers from fragmentation and a relatively low frequency of service. A relatively fast ro/ro vessel could complete the voyage in six days. Consolidation of cargo among existing operators could improve effective frequency to a service every 2-3 days. The greatest frequency at present is one service per week. This transit time could however only be achieved if, for northern Europe, a UK port was the last port of call and a Greek port the first in the eastern Mediterranean.

A higher proportion of the southern Italian market could also be captured by a "direct" short sea service if the problems of transit time and frequency of service were satisfactorily resolved. A direct ro/ro service could be attractive on cost grounds. Alternatively, East Mediterranean services could call in southern Italy en route for the UK. However, overall trade is limited and container lines already capture a substantial proportion of the market.

Italy - Danubian Countries[5]

In 1989, short sea carried 31% (17%eastbound and 34% westbound) of the total traffic between Italy and the Danubian Countries[6]; 41% went by road (66% eastbound and 36% westbound) and 27% went by rail (16% eastbound and 30% westbound).
The possible transfer from land transport to the maritime mode could represent up to 6% of total traffic volume or 1,4 million tons (0,4 west-east and 1 east-west). The further

5 Austria, Czech Republic, Slovakia, Hungary, Romania, Bulgaria and the countries of former Yugoslavia.
6 These include, for the purposes of this calculation, Austria, former Czechoslovakia, former Yugoslavia, Hungary, Romania and Bulgaria.

development of sea-river traffic on the Danube and the possibility of further restrictions on road freight in Austria and Switzerland could mean further potential for transfer, even in the short term.

Benelux/Germany - Nordic Countries/Baltic Sea

Short sea shipping is the dominant mode of transport in this corridor, with 70% of total traffic from the Nordic countries and Poland to Benelux/Germany and 55% from Benelux/Germany to the Nordic countries and Poland. Road transport accounts for 30% of total traffic from Benelux/Germany to the Nordic countries and Poland to Benelux/Germany.

The total traffic between both regions has a volume of 175 million tonnes, of which 52 originated in Benelux/Germany and 123 in the Nordic countries and Poland.

A significant transfer is possible in the Benelux/Germany to Nordic countries/Baltic Sea trade. This is conditional on improvement of the overall cost position of short sea shipping through effective intermodal management.

More recent research conducted by the same consultants estimated that for example for the port of Zeebrugge alone the increase in short sea shipping traffic could be between 2 million tons and 4 million tons over the next ten years.

Benelux/Germany - UK/Ireland

Because of the insular position of the UK and Ireland, all transport of goods (except air travel) between these countries and the continent involved by definition a maritime component at least before the Channel Tunnel commenced operation. The objective on this corridor is to increase the use of those routes in which the maritime leg is maximised, the "direct" short sea routes.

The main problem in increasing the "direct" short sea share of the traffic between Ireland and the Benelux countries, is that of attracting sufficient volume to justify more frequent and faster sailings. The same is true of the southern and central corridor routes to mainland Britain, which are in competition with the route through Northern Ireland, the "Land Bridge" route.

In the UK-Netherlands/Germany/Denmark corridor the "short sea" alternatives are the routes from North Sea ports as opposed to Channel ports.

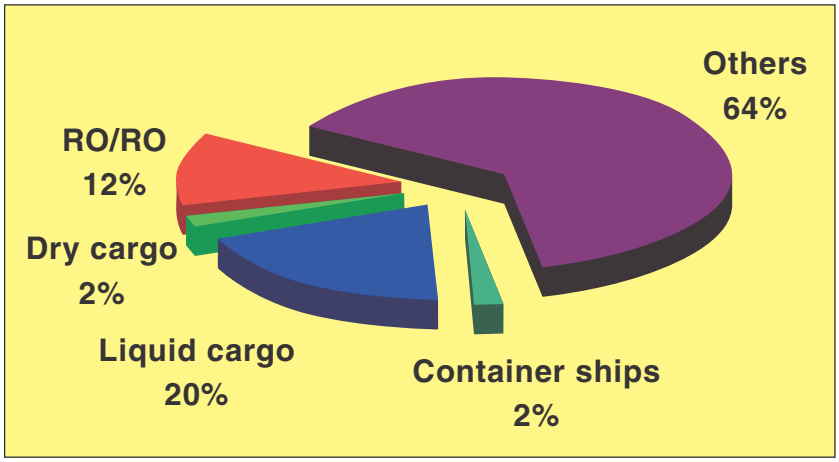
Benelux/Germany - Black Sea Area

Short sea shipping represents 56% of total traffic from Benelux/Germany towards the Black Sea Area but only 41% from the Black Sea Area to Benelux/Germany. Road transport represents only 18% of the total traffic from Benelux/Germany to the Black Sea Area, whereas it represents 34% in the opposite direction. The volume involved is 5,2 million tons from Benelux/Germany to the Black Sea Area and 3,7 million tons form the Black Sea Area to Benelux/Germany.

There are no concrete estimates of how much additional traffic short sea shipping could capture. The main obstacle facing short sea shipping in this corridor is that of delivery time. Delivery is slow due to delays in ports, long sailing times and sometimes the sailing schedules of the shipping lines. The handling capability for containers is also poor in several ports in the Black Sea Area.

2.3.3 The European fleet of short sea shipping

Most vessels employed in short sea shipping have characteristic features which distinguish them from ocean-going vessels. In contrast to deep sea container transport, which is carried out with cellular container ships, short sea shipping, for the most part, continues to use multi-purpose dry cargo vessels (European Commission, 1995a). Short sea Ro/Ro vessels are in general all-round vessels, which are moreless suitable for all existing types of wheeled cargo or for all cargo capable of being horizontally loaded or discharged. Recently build coasters are especially characterised by a high flexibility in their operational possibilities, smaller units have mainly canal going ability (sea/river going vessels).



Source: European Commission, 1995a

Figure 10 The European Union short sea shipping fleet

The European Union short sea shipping fleet has a comparable high share of RO/RO ships, it is 1/3 higher than the share in the rest of the world. Also the share of the container ships used for short sea shipping is considerable higher. This is an indication, that the European union fleet is more focused on intermodal transport than the other short sea shipping fleets.

2.3.4 Short sea shipping as part of an integrated European transport network

Sustainable mobility, which is the main goal in European transport policy, requires multimodal transport networks, in which the advantages of the individual modes are combined in a way which increases efficiency, reduces pressure on the environment and makes best use of existing resources. Short sea shipping is not yet ready to fully meet these objectives.

But still in shipping the industry is still to fragmented and integrated multimodal transport organisations are rare. But the concentration tendencies found in other sectors are also taking place in the shipping industry, in the last years lots of mergers and acquisitions took place, which should hopefully increase the efficiency and competitiveness of the whole industry, and lead towards integrated multimodal transport organisations, which can offer a full range of transport services, a "one-stop-shop". This is what the shippers really want, a reliable partner who can fulfil all their transport needs out of one hand.

The lack of integration into the modal chain is a core problem of short sea shipping. Short sea shipping will only develop its full potential if it is appropriately integrated in the transport chain. Modern trade and industry require door-to-door transport services and just in time delivery of goods and components. Integrated multimodal transport organisation, which guarantees regular and reliable service, can best meet its needs.

According to the results of the study mentioned above (The "Corridors" study), the potential cargo transfer from other transport modes is sufficient to justify new investments in short sea shipping in the next years. These investments are to be made mainly into efficient port infrastructure, as an integrated multimodal transport chain is only as good as its links. As already mentioned in the chapter on multimodal transport, this is were the highest friction costs and time-losses arise, which hamper the competitiveness of short sea shipping.

To improve these multimodal knots, it is necessary to increase its inter-connectivity and efficiency towards time, cost and reliability. The concrete obstacles waterborne transport faces will be targeted in detail in chapter 3.1.5.

One should not forget, that short sea shipping in intermodal transport is already now,with the existing infrastructure, a vital link for many European countries, like Great Britain, Ireland or Scandinavia, where no landborne border-crossing transport would be possible without the use of ferries. Here the author sees a main potential for an increase of short sea shipping in combined transport, as trucks or trains have to use the waterborne mode anyway, why should they not use it on longer distance. For example a truck on its way from the U.K. to Spain, why should he use the ferry only from Dover to Calais and then drive through France, but not take a ferry from Dover to Bilbao and then only make the a shot distance on road. This could even speed up the whole transport, as the driver can have the requested resting period on the ship and no further stops are needed and the delay of transhipment would occur anyway.

Another type of short sea shipping, where there is still potential for growth with the current infrastructure is overseas container feedering. In Europe there is the tendency that deep sea container ships only call in a few big harbours to

speed up its service. From the other ports the containers are transported by feeder short sea ships. The advantage of this system with only a few Hub-ports and many feeder ports is that the reduced number of port calls the deep sea vessels can speed up the voyage dramatically, but also by not having to take big detours like for example in the Mediterranean. This type of short sea shipping has seen a big increase in the last decade and proofs to be very efficient. This system helps also reduce the distance of goods being transported on other modes and as such reduces the restrains put on the road and rail infrastructure.

2.4. Barging and inland waterways

This chapter deals with the other type of waterborne transport within the European union. Inland navigation can also be called barging, it is the transport mode which uses National or Regional canal networks. It can also be called inland waterway navigation. Inland Waterways are rivers, lakes or major international canals establishing the links between these rivers. The chapter gives a short overview on the types of inland waterway navigation, the European network of inland waterways, its fleet and the scraping policy of the EU. It also illustrates the importance of inland waterways with two totally contrary examples: the Rhine a very developed waterway and the Danube a comparable underdeveloped waterway with a high strategic importance.

The structure of the industry, its problems and challenges are totally different to short sea shipping, that is why this clear distinction is necessary. Short sea vessels can also sometimes navigate on inland waterways. In this study this is then counted to short sea shipping.

2.4.1 Types of inland waterway transportation

Generally one can divide vessels operating on inland waterways the same way as in short sea shipping regarding the type of cargo and if a independent transport unit is used. In addition to this there is another classification by the type of vessel which is used. Inland waterway transportation can be undertaken by self-propelled vessels or on push-convoys and pull convoys composed of several barges. A barge is a type of ship to carry cargo, which has no own engine, and can only be moved by push or pull vessels mainly in a convoy of several barges. Furthermore

can also purpose-build short sea ships operate on inland waterways. (see figure 11)

2.4.2 The European inland waterway network

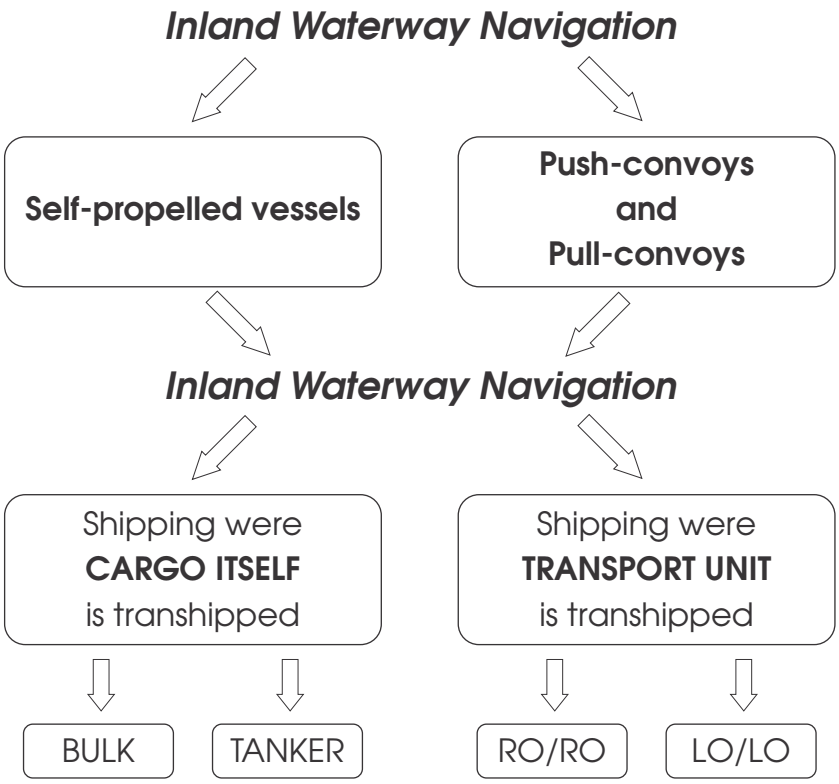
Europe is in the advantageous position, that it has a widespread network of inland waterways and canals as well as a long tradition of inland navigation. The figure 12 shows the main navigable inland waterways in Europe which amount now to an total length of 30.191 kilometres .

The river and canal system in Central Europe (Central and Northern Germany and Benelux) with the center in the Rhine estuary is the backbone for inland watertransport. Links to Central and Eastern parts of Germany (via Mittellandkanal, Weser, Elbe), to Poland (via Havel, Spree and Oder), to the Czech Republic (via Elbe and Vltava) and to Southern Germany, Switzerland and France (via Rhine, Main, Mosel and Neckar) are existing.

Thus in Germany and the Benelux countries almost all industrial zones, except the region of Munich, have direct access to inland waterways. Therefore the percentage of inland waterways in the hinterland transport to and from the major Belgian and Dutch ports is relatively high (between 30% and 70%). The port of Rotterdam with 83,6 Mio tons of inland navigation has the highest volume. (ISPI, 1997) Belgian and Dutch ports have an important function as transit ports for origins and destinations in Germany, France, Switzerland etc..

Due to the well developed road and rail hinterland connections the portion of inland waterways for the major German ports of Bremen / Bremerhaven and Hamburg is lower (between 10 % and 16 %). Although currently inland waterway is primarily used for bulk cargo, but a growing importance of container transport using inland navigation has been forecasted especially for the rivers in the Rhine estuary.

So far the Rhine-Main-Danube Canal and the Danube is the only Transeuropean inland waterway linking Central Europe with Southeastern Europe and the Black Sea. Furthermore, the Russian river system (Neva, Volga and Don) connects the Baltic Sea with the Black Sea.



Source: Andreas Kubek

Figure 11 Different types of inland waterway navigation

Beside these waterway systems exist more navigable rivers and canals over Europe. The most important ones forming the Transeuropean network are:

- In France: the rivers Seine / Oise as well as Rhône / Saône, but the percentage of inland waterway transport for the French North Sea ports is relatively small due to the geographical situation. In the future, new canals are planned to link the Rhône / Saône with the Rhine and the Moselle. This will form new Transeuropean inland waterways from Central Europe to Southwestern Mediterranean. Furthermore it is planned to integrate the Seine / Oise into the inland waterway system in the Benelux countries.
- In Italy: the only navigable inland waterway is the Po, But the volumes transported are very low, but there is an initiative planned to revive the inland shipping on the Po.
- In Finland: The Saimaa Canal and the many Finish lakes account for over 29% of the European inland waterways with a total length of 6120 kilometers.

- In the UK: For geographical reasons the inland navigation in the UK plays only a minor role even including coastal shipping. Relatively few waterways are of sufficient size to make inland navigation a competitive option. Most of the inland waterways are concentrated in the South-East, Yorkshire and Humberside. Nearly half of the total UK freight tons kilometres are carried on the river Thames.

Source: BMV, 1998

Figure 12 Connecting waterway system in Europe

2.4.3 The Rhine - The "Highway" of inland waterways

The Rhine, a river of 1.238 kilometres is the "Highway" of European inland waterways. For shipping a distance of 862 kilometres from Basel in Switzerland to the North Sea is of immense importance. In addition to this, the Rhine has an ideal connection to the connected network of European inland waterways, through navigable tributaries like the Maas, Ruhr, Mosel, Lahn, Main and Neckar, but also canals like the Amsterdam-Rhine-Canal, Juliana-Canal, Weser-

Datteln-Canal, Rhine-Herne-Canal, Rhine-Marne-Canal, Rhine-Rhone-Canal and of course the Rhine-Main-Danube Canal.

The Rhine-shipping has been integrated in an efficient network of waterways since the beginning of the industrialisation in Western Europe, which nowadays reaches out from France to the North Sea and to Switzerland as well as throughout the whole south-eastern Europe until the Black Sea. Along the Rhine one important industrial region follows the other, and the Rhine-region is with 400 to 500 inhabitants per km_ one of the areas in Europe with the highest population density and a GDP per capita of around 24.000 US$ (Pro-concept, 1998).

Another indicator for the importance of the Rhine are its harbours. On a distance of 817 kilometres there are 42 Ports in an average distance of 20 kilometres, among them 7 of the 10 biggest European inland ports. The most important is Duisburg in Germany, which is the biggest inland port in Europe and its annual volume of 49,3 million tons (1997) makes up for more volume than the following three ports (2nd to 4th in size) together (Eurostat, 1999).

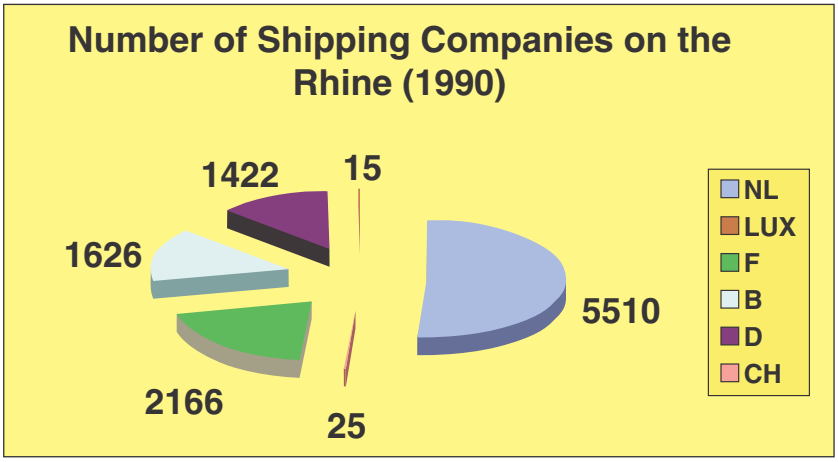
As important for waterborne transport on the Rhine is the circumstance, that the two biggest seaports, Rotterdam and Antwerp, as well as the 6th biggest seaport Amsterdam which accounted together for a volume of 472 million tons in 1997, are situated at its mouth into the North Sea, which makes it the most important transhipment area for Europe's oversee transports.

Since the Rhine-shipping-act of 1868 the navigation on the Rhine from Basel to the open sea was free. The control is in the hands of the Central commission for Rhineshipping. In 1969 the Rhine-shipping-act was revised in Mannheim (the Mannheim Act). In 1979 the Mannheim act was limited to free access on the Rhine only for Rhine littoral states (excluding Austria) and European Community members. This measure got effective in 1985.

On the Rhine there is a free price formation for border-crossing transports, which account only for a little more than half of the transport volume on the Rhine. For internal transports prices are regulated except in Switzerland in all states along the Rhine. Market access is generally restricted, although the degree of restriction is different in the

different states(Pro-concept, 1998). In Germany the market access is most liberalised, but also here are cabotage restrictions for vessels from non-EU member states, except Switzerland.

Also on the Rhine concentration tendencies among shipping companies are noticeable. The number of shipping companies operating on the Rhine have sunk from almost 22.000 in 1965 to just over 10.000 in 1990. The majority of these companies (52%) is from the Netherlands, the second biggest contingency has France with 20% and then Belgium(15%) followed by Germany (13%) as shown in the figure 13.



Source: Pro-Concept, 1998

Figure 13 Number of shipping companies on the Rhine in 1990

Pro-Concept have undertaken a strength / weaknesses analysis of inland navigation on the Rhine regarding competitive factors (Pro-Concept,1998) compared to the main competitor Rail:

- Reliability: Shipping can compete with its main competitor, the railways.
- Price: Shipping has significant advantages as it is 10-20% cheaper than the railways.
- Transhipment: Due to the competition of terminals in bigger Rhine ports, inland navigation has some slight advantages, which could be compensated by the privatisation of railway terminals.
- Equipment: Overcapacities in shipping give the waterborne mode a competitive advantage.

- Flexibility: Slight advantages of shipping.
- Quality: The quality of services seems to be equal.
- Security: due to low speed shipping is saver, which is also proved by the accident statistic.
- Density of departures: Here rail has some advantages towards shipping, but with the bundling of services between certain ports shipping can be competitive.

Looking at these findings, one can see that inland waterway transportation on the Rhine can be very competitive especially towards its main rival rail. This explains its success in taking a bigger share of containers hinterland traffic from road to the Port of Rotterdam than rail.

2.4.4 The Danube - Transeuropean waterway with high capacity reserves

The Danube has a length of 2.888 kilometres and a total incline of 678m. It reaches from Central Europe to the Black Sea. Despite its long tradition, inland waterways transport on the Danube has not boomed and developed as well as on the Rhine. One reason for this might be the low density of population (average under 100 inhabitants per km^2) in the region and the low wealth with an annual GDP per capita of 360 US$ to 3.400US$.

Furthermore, the area is very low industrialised and the Black Sea, which is the Sea connection of the Danube, is only of marginal importance for Europe's overseas business. But probably the main disadvantage are the poor nautical conditions, especially the depth of the Danube, which makes some parts impassable for several weeks a year. The last, but equally important disadvantage of the Danube is, that it runs through political unstable areas, especially the Balkans, which as we see today, proves very hindering to an efficient service of waterborne transport. In this decade, the wars and embargoes on the Balkan have caused an interruption of the continuous shipping for several years.

The Danube has, on a distance of 2.400 kilometres, 44 inland ports, which makes the average distance between ports 55 kilometres, three times of the distance on the Rhine. The biggest port in volume is Reni in Ukraine, which has with over 10 millions tons a year only the fifth of the volume of the biggest Rhineport Duisburg. Also the Seaports

Constanta and Ust Dunaisk are tiny, compared to Rotterdam or Antwerp.

The Belgrade Treaty, which was signed in 1948 by all Danube littoral states except Germany, declares the border crossing traffic on the Danube for free. According to the treaty, the shipping fees can only be cost covering to keep up the sustainability of shipping. In this treaty also the Danube-Commission was founded, it meets once a year, and is a legal entity and has the status of an embassy. Each signatory state nominates one member of the Commission. The office of the Commission is in Budapest.

The responsibilities of the Commission range from nautical to hydraulic engineering matters as well as statistical responsibilities and legal matters. In the past, the Danube Commission has contributed substantially to the development of the Danube, especially the undertaken constructions. When the development of the Danube is finished, it should reach between Regensburg and Vienna a minimum depth of 2,7 meters, which is far from being accomplished. Not even a minimum depth of 2 meters, which would be the wish of the shipping industry, is reached in some areas, for example between Vilshof and Straubing, in the Wachau or between Vienna and the border. Between Vienna and Braila it should reach a minimum depth of 3,5 meters and from Braila on to the Black sea a minimum depth of 7,3 meters.

The fact that Germany has not joined the treaty is a big hindering factor as also the use of harbours along the Danube depends on mutuality. Ships are only allowed to use one countries harbour, if this countries ships are also allowed to use the harbours of the other country.

The total Volume transported on the Danube in 1990 was 61,6 million tons, which are only 27% of the volume transported on German waterways. The total transport performance with 24,4 billion tkm looks better, it is 46% of the transport performance of the German inland waterway transport.

Pro-Concept have undertaken a strength / weaknesses analysis of inland navigation on the Danube regarding competitive factors (Pro-Concept,1998):

- Reliability: Shipping has advantages towards its main competitor, the railways especially in Eastern Europe.

- Price: Shipping has significant price advantages, which can disappear immediately when railways are subsidised.
- Transhipment: There exist big deficits in shipping as well as in rail in Eastern Europe
- Equipment: The equipment of the DDSG, the Ukrainian shipping companies, partly also of the Navrom as well as the Bulgarian catamarans fit today's needs. In case of an increased traffic volume on the Danube equipment, should not pose a limitation.
- Flexibility: Shipping has advantages.
- Quality: Shipping has advantages.
- Security: Shipping has advantages
- Density of departures: Here exist big deficits in shipping as well as in rail.

The construction of the Rhine-Main-Danube Canal proofed to be a big success and opens a totally new potential for shipping on the Danube. The forecasted 3 Mio tons a year on the Rhine-Main-Danube Canal were more than outdated with 6 Million tons in 1993 and 7 Million tons in 1994.The capacity limit of 18 million tons might be reached earlier than ever expected by the biggest optimists. The Danube-Oder canal, if ever build, could become a similar success.

All things considered it is to say that the Danube is compared to the Rhine and the other waterways in northern Europe an underdeveloped waterway. This is due to several facts: infrastructural, political but also competitive reasons.

2.4.5 The scraping policy of the EU

On 27th of April 1989 the Council and the Commission of the European Union adopted measures, which are commonly known as the "Scrapping Scheme" of the European Union. The aim of these measures is to remove the structural imbalance between supply and demand in the inland waterway transport sector. The scheme is implemented since 1990 and the main points (European Commission, 1998b) are the following:

- Within a harmonised Community framework, national scraping funds have been set up in each member state whose inland waterways are linked to those of another member state and the tonnage of whose fleet is above

100 000 tonnes. The member states directly involved are Belgium, Germany, France, the Netherlands and - since its entry into the EU in 1995 - Austria. Vessels registered in other member states(such as Luxembourg), but operating within the same network, must belong to one of the scrapping funds.

- The scope of the scrapping scheme shall extend to the entire active fleet of inland vessels using the interlinked inland waterways and are registered in a member state, although a limited number of exemptions is provided.
- The aim of the community's first scrapping was to withdraw (between 1.1. and 1.12.1990) 10% of the dry-cargo vessel fleet capacity and 15% of the tanker vessel fleet capacity from the market. The latest scrapping programme, planned over three years from 1996 to 1998 as a support measure in the process of liberalising the market, seeks to reduce the capacity of the community fleet by further 15% .
- The "Old for New" scheme was set up to prevent the gains from the scrapping scheme being cancelled out by extra capacity coming into service at the same time. This means that the owners of the vessels wishing to bring extra capacity into service must at present:
  - Either scrap a tonnage of carrying capacity equivalent to one and a half times that of the new vessel without receiving a scrapping premium.
  - Or, where they decide to scrap no tonnage, pay into the scrapping fund a special contribution equivalent to one and a half times the scrapping premium fixed for the type of vessel brought into service.
- The total amount required for the granting of scrapping premiums under the 1990 scheme was made available to the scrapping funds by the governments concerned in the form of interest-free loans. As far as tanker capacity is concerned, these loans had been paid off by 1995 by the industry in the form of annual contributions, paid into the funds and calculated on the basis of tonnage and type of vessel. In the case of dry capacity they have been paid off in the course of 1997. The 1996-1998 programme is being co-financed from the community budget (1996 only), from contributions from the industry and from the budgets of the member states concerned.
- There is a system of mutual financial support between the funds in order to ensure that the time limit for repay-

ment of the interest free loans is the same in all member states. This mutual financial support also extends to all the expenditure and all the resources of the scraping funds.

- Over the same period the Swiss authorities have adopted similar measures for their fleet. Operations under the Swiss fund have been coordinated with those of the other funds at the community level.

2.4.6 The European fleet of inland vessels as a result to the scrapping programme

In the literature on inland waterway transportation, the author found the main distinction between three types of vessels: dry cargo carriers, tanker vessels and pusher craft. He could not find comparable date on the capacity of the EU inland navigation fleet regarding container ships and ferries. And in looking at the results of the scrapping programme, which is done in this chapter, these are not relevant. This doesn't mean it is not important. Actually the author gives this type of inland shipping, which is mainly part of a multimodal transport chain, very high importance and growth potential.
From the following table 7 it is clear, that the scraping of capacity has been accompanied by an increase in the average capacity by ship of the fleet, and hence an improvement in productivity especially as far as tanker capacity is concerned. The average tanker capacity has risen from 1.088 tons (1990) to 1.300 tonnes(1997), that is an increase by almost 20%, compared to an 8,6% increase of the average tonnage of the total inland fleet.

	Number	Tonnage	kW	Average tonnage	Average kW
Total fleet 01.01.90	14.555	12.476.694	384.183	872	757
Total fleet 01.01.97	11.930	11.293.867	354.476	947	779
Change 1990-1997	***-2.625***	***-1.182.827***	***-29.707***	***75***	***22***
Change % 1990-1997	***-18,0%***	***-9,5%***	***-7,7%***	***8,6%***	***2,9%***

Source: European Commission, 1998b

Table 7 Comparative position of the EU inland fleet between 1990 and 1997

If account is taken of the added-value coefficients, the reduction in capacity achieved as a result of the EU scrapping measures between 1.1.1990 and 31.12. 1996 in tons equivalent (teq) is as shown in table 8.

	Active fleet 1991	*Scrapping*	%	Active fleet 1996
Dry cargo carriers	7.819.964 teq	1.116.746 teq	14,3 %	7.338.125 teq
Tanker vessels	1.710.625 teq	372.284 teq	21,8 %	1.611.059 teq
Pusher craft	330.171 kW	72.404 kW	22%	354.476 kW

Source: European Commission, 1998b

Table 8 Capacity of the EU fleet of inland vessels before and after the scrapping programme

It has to be mentioned, that the various types of vessel, as shown in these tables, are not classified according to their notional productivity. Indeed, the new capacity placed on the market during this period, more than 530 000 tons dry capacity and more than 200 000 tons tanker capacity, have a notional capacity clearly exceeding the older capacity (European Commission, 1998b), by the virtue of their modern equipment and fittings. It is therefor clear that the impact of the new tonnage on supply is not the same as that of the old tonnage equivalent in scrapped volume, and the results obtained to date therefor need to be placed in a relative context.

2.4.7 Inland waterways as part of an integrated European transport network

Inland waterways are a key part of the Trans European Transport Networks (TEN). The biggest problem is still their unreliability due to their dependence on weather and their inflexibility. In combined transport the container feedering is the most important part of inland navigation. In the northern region especially in the hinterland of the ports Rotterdam and Antwerp inland waterways play already an important role in containerised transport (see chapter 2.5.3.).

Another way where inland waterways could get an important role in combined transport is as kind of "floating road" doing piggy back transports of trucks in areas with road congestion, like it is done already now by the railways. With the introduction of roadpricing in Europe this could become a feasible alternative.

One problem of combined transport on inland waterways compared to pure road transport from the viewpoints of the shippers is the higher risk of damages, because of multiple transhipments. It was also said by some experts contacted in this survey, that cargo is handled more carefully by road transporters as the truck driver can be held directly reliable for occurring damages. Whereas in the combined waterborne transport not such a direct tie between the cargo and the captain of the ship exists, too many people are handling the cargo and it is hard to determine, whose fault it was. This problem also exists in combined transportation Road - Rail.

Nevertheless the challenges the European transport sector is facing in the next decades cannot be solved without an integration of inland waterways in a combined European Transport Network. Inland waterways have the capacity reserves Europe will need.

2.5. Infrastructure for waterborne transport in the EU

This chapter provides a good overview on the European infrastructure for waterborne transport. Sea ports and inland ports are the essential links of waterborne transport with the starting point and final destination as well as with other modes. But also the inland waterways represent a vital part of the infrastructure which is partly given by nature, but has to be improved, maintained and connected with canals.

2.5.1 Sea ports

Sea ports are a vital element for the EU both in terms of trade and transport, as Europe's competitiveness depends on an efficient and cost-effective transport and port-system. To illustrate the importance of sea ports to the European Union, it has to be mentioned, that EU ports are facilitating more than 90% of the Union's trade with third countries and approximately 30% of intra-EU traffic, as well as the movement of more than 200 million passengers.(European Commission,1998a). In total, EU ports have handled approximately 2,7 billion tons of cargo in 1996.

The recent trends in trade liberalisation and globalisation of the world economy are having a significant impact on the European ports, on one hand these trends have drastically weakened the link between manufacturing and the

location of factors of production and have stimulated a noticeable shift in manufacturing activities towards countries with a comparative advantage. On the other hand due to the liberalisation of the internal market in the EU, which brought also a liberalisation of transport services, like for example the abolishing of the cabotage restrictions, but also due to the technological changes and the standardisation of loading units, the competition between and within ports is increasing.

Basically the Ports of the European Union can be divided into four groups, according to their regions.: The Baltic Sea, The North Sea, the Atlantic and the Mediterranean Region. Looking at the table 9 below, it is obvious, that the North Sea region is by far the most important one, not only in regards to deep sea cargo, with 44% of the total EU deep sea volume, but also in short sea shipping port traffic. The North Sea region ports accommodate half of the total EU short sea volume, both regional and interregional, which makes this region to the current centre of waterborne transportation in the EU (also in transports on inland waterways).

Region	Deep Sea	Interregional	Regional	Total
Baltic sea	47	121	98	**266**
North Sea	359	494	355	**1209**
Atlantic	136	219	19	**374**
Mediterranean	270	146	245	**661**
Total	**812**	**980**	**717**	**2510**

Source: European Commission, 1998a

Table 9 Estimated Turnover in EU ports by region in 1993
in Million tonnes

Port, Country	1970	1980	1990	1996	1997	Change 97/96 %
1 Rotterdam, NL	226	276	288	284	303	+6.7
2 Antwerpen, B	78	82	102	107	112	+5.0
3 Marseille, F	74	103	90	91	94	+3.9
4 Hamburg, D	47	63	61	71	77	+7.8
5 Le Havre, F	58	77	54	56	60	+6.3
6 Amsterdam, NL	21	34	47	55	57	+3.2
7 London, UK	64	48	58	53	56	+5.4
8 Tees & Hartlep., UK	23	38	40	45	51	+14.8
9 Trieste, I	27	38	34	41	46	+11.9
10 Genoa, I	53	51	44	47	43	-7.4
11 Forth Ports, UK		29	25	46	43	-5.4
12 Algeciras, E	8	22	25	37	40	+8.7
13 Dunkerque, F	25	41	37	35	37	+4.6
14 Wilhelmshaven, D	22	32	16	37	36	-2.2
15 Milford Haven, UK	41	39	32	37	35	-5.5
16 Bremen/B'haven, D	23	25	28	32	34	+8.0
17 Southampton, UK	28	25	29	34	33	-3.3
18 Zeebrugge, B	8	12	30	28	32	+13.7
19 Tarragona, E	4	20	24	31	31	+0.0
20 Liverpool, UK	31	13	23	31	31	+0.1
Gothenburg, S	20	22	26	28	30	+8.4
Bilbao, E	11	21	25	29		
Lisbon, P	9	14	14	13		
Saloniki, EL	8	9	14	13		
Dublin, IRL	7	7	8	11		
København, DK	6	7	9	10		
Helsinki, FIN	4	5	8	10		
Sum of top 20 ports	**861**	**1068**	**1088**	**1196**	**1251**	**+4.6**
			1970-1997: +1.4% p.a.			

Source: Eurostat, 1999

Table 10 Major sea ports in the European Union (in million tonnes)

One of the reasons for this is that the North Sea region has the greatest concentration of industry and population in the European Union. The ports in the region handled approximately 6% more in 1996 than in 1993 (European Commission, 1998a). It has been forecasted that maritime traffic in the region will grow and most growth is associated with containers. As a result of the concentration of traffic, some hinterland connections are facing problems of capacity and congestion, which are rather bottlenecks than missing links. Apart from the need to improve the quality

and capacity of the connecting road and rail network in the hinterland, attention also needs to be given to a shift from landborne to inland waterway transportation, because otherwise the needed capacity for hinterland traffic cannot be provided, and the attractiveness of the ports will suffer.

Port, Country	1990	1995	1996	1997	Change 97/96 %
1 Rotterdam, NL	3667	4787	4971	5445	+9.5
2 Hamburg, D	1969	2890	3054	3338	+9.3
3 Antwerpen, B	1549	2329	2654	2969	+11.9
4 Felixstowe, UK	1436	1924	2065	2237	+8.3
5 Bremen/B'haven, D	1198	1524	1543	1703	+10.3
6 Algeciras, E	553	1155	1307	1538	+17.7
7 Gioia Tauro, I	0	16	572	1448	+153.2
8 Le Havre, F	858	970	1020	1185	+16.2
9 Genoa, I	310	615	826	1180	+42.9
10 Barcelona, E	448	689	765	950	+24.2
11 Valencia, E	387	672	710	832	+17.2
12 La Spezia, I	450	965	970	616	-36.5
13 Southampton, UK	345	681	805		
14 Piraeus, EL	426	600	575		
15 Zeebrugge, B	342	528	553		
16 Marseille, F	482	498	544		
17 Gothenburg, S	352	458	489		
18 Liverpool, UK	239	406	420		
19 Livorno, I	416	424	417		
20 Tilbury, UK	363	338	395		
21 Helsinki, FIN	246	336	370		
22 Thamesport, UK	9	275	350		
23 Dublin, IRL	215	297	328		
24 Bilbao, E	189	297	301		
25 Las Palmas, E	184	281	300		
26 Lisbon, P	264	248	288		
27 Teesport, UK	110	195	280		
28 Napoli, I	133	226	271		
29 Aarhus, DK	156	223	247		
30 Thessaloniki, EL	54	211	239		
Sum of above ports	**17348**	**25059**	**27630**		
Hong Kong	5101	12550	13460	14386	+6.9
Singapore	5224	11846	12944	14136	+9.2

Source: Eurostat, 1999

Table 11 Major container ports in the European Union (in 1000 TEU)

Furthermore, many ports in the region are faced with tidal restrictions. The principal problems relate to the depth of access channels and berths, which is important for deep sea ships, and the width of sea locks, which is important for short sea vessels (European Commission, 1998a).In this region the biggest and most important ports of Europe are situated. The most important of all is Rotterdam, which accounts alone, with 303 million tons in 1997 for one quarter of the total volume of the biggest 20 Ports in the EU. If one look at the table 10, one can see, that Rotterdam handles almost three times as much cargo as the second biggest port Antwerp, which is also located in the region. In total six of the biggest ports in the EU are located in the region.

As mentioned before in this study, the containerised transport bears one of the biggest potentials for increasing the volume of short sea shipping. As one can see in table 11, the North Sea region is dominating, as the five biggest container ports are located there. Again the most important one is Rotterdam with almost 5,5 million TEU in 1997, followed by Hamburg with around 3,3 million TEU. But compared to the big Asian container ports, like Hong Kong or Singapore, the European counterparts are tiny.

In the ***Mediterranean*** region, which is with a total of 661 million tons the second biggest region regarding turnover in EU ports the situation is one of great complexity and contrasts. There are enormous differences in scale, development and trading relationships and for most of the region development and cohesion are important issues. The ports in this region which used to be the centre of world trade in former times, now have been lagging behind their northern competitors in terms of investments, pricing, efficient management and physical accessibility to large European markets(European Commission, 1998a).

The ports handled approximately 4,4% more in 1995 than in 1990. There has been a substantial growth in container traffic in the recent years, and this trend is clearly ongoing. In order to facilitate this growth in traffic, attention should be given to integrating the ports more satisfactorily into .the transport chain. Measures to achieve this need to include rectifying organisational and operational problems in the port areas, developing port information and logistical systems, which are compatible to those of the land networks and promoting short sea shipping, particularly in view of

the increasing economic links with the non-member countries in the region. In doing so, the ports should be able to gain more traffic and achieve higher utilisation rates (European Commission, 1998a).

The biggest ports in the region are Marseilles in France, Trieste and Genoa in Italy and Tarragona in Spain. Regarding container traffic we can find the above mentioned phenomena of hub ports, deep sea vessels only make one port call in the whole region. The most noticeable example is Gioia Tauro in Italy, which was only founded recently at the beginning of the nineties and has become in a fiew years the 7th biggest container port in the European Union with 1,5 million TEU in 1997. The port has almost no hinterland and is purely feedered mainly by short sea shipping.

Other important container ports in the region are Genoa and La Spezia, Barcelona and Valencia as well as Pireaus. To Genoa and La Spezia it is to say that Genoa was able to take one third of the cargo from La Spezia between 1996 and 1997 as, due to conflicts with labour unions in La Spezia operators, mainly one, the Messina Line, switched all their traffic to Genoa.

The strength of maritime transport in the ***Atlantic*** region lies in bulk-traffic-links to other parts of Europe and the rest of the world. This traffic accounts for 77% of the total turnover (European Commission, 1998a) and tends to serve the heavy industry situated close to the ports, including refineries, power stations and chemical works. It also serves the agricultural sector through the importation of animal feedstuffs and the export of cereals. It provides the basis for the development of general cargo traffic. As the ports are closely related to industrial and agricultural activities, they play an important role in the regional economies.

The ports handled approximately 5,5% more in 1996 than in 1993. However, ports in the Atlantic region are experiencing difficulties in retaining present levels of traffic, and the opportunities for expansion are limited, mainly because the ports do not have the same levels of population as those in many other parts of the Union. In fact, in most cases their effective hinterlands do not extend beyond 200 km from the coast. One of the main problems is that the ports are inadequately connected with the strategic land network and are missing east-west axial transport corridors (European Commission, 1998a).

The ***Baltic Sea*** region is a region of fundamental change and transition. The opening of Eastern Europe is bringing new opportunities for trade and travel. The ports in the region handled 10,5% more in 1996 than in 1993. It has been estimated that international traffic will grow by 65% until 2010 (European Commission, 1998a). Maritime transport has considerable potential in the region since geographically the Baltic Sea often offers the shortest routes.

The port systems in countries which are members of the Union are characterised by a large number of smaller and medium sized ports. Specialisation and co-operation between the ports could be a way forward in order to use resources most effectively. In order to deal with the potential growth in maritime transport, priority in this region needs to be given to linking and integrating ports more effectively with land transport, in particular those ports with considerable amounts of international traffic and to the development of EDI systems (European Commission, 1998a).

2.5.2 Inland ports

It is difficult to make a general statement on inlandports in the EU as there are big differences for example between the ports along the Rhine and the Danube, as mentioned in the section on Rhine and Danube. Generally it is to say, that the ports in the Benelux region and Germany especially along the Rhine are more efficient and integrated than others (Pro-Concept, 1998).

The by far biggest inlandport in the European Union is Duisburg, which handles with almost 50 million tons a year in 1997 more volume, than for example Mediterranean ports like Trieste or Genoa in the same year. But it is also an exception for an inlandport. The 2nd biggest inlandport is Liège in Belgium, with only a little more than one third of the volume of Duisburg namely 17,5 million tons annually. But Liège and Paris, which is 3rd in the EU ranking with 17 million tonnes, are also exceptions, the rest of the top ten ports have less than 10 million tonnes.

To illustrate the importance of the Rhine it should be mentioned again that 7 of the top 10 ports in the EU are located on the Rhine. In comparison to that, the Port of Vienna only has an annual volume of 1,7 millions, or Mantova, a Port on the Po in Italy, only has a volume of 500.000 tons a year. The table 12 illustrates very well the dominance of

Belgium, France and Germany, which has 14 ports within the top 20, among inlandports.

	Port	Country	1995	1996	1997	Change 97/96 %
1	Duisburg	D	48.4	44.4	49.3	11.0
2	Liège	B	14.9	15.8	17.5	11.2
3	Paris	F	20.3	18.5	17.0	-8.1
4	Strasbourg	F	9.7	9.3	9.3	-0.3
5	NV Zeekanaal, Brabant	B	8.5	8.6	8.7	1.2
6	Karlsrue	D	10.3	10.3	8.4	-18.6
7	Ludwigshafen	D	8.2	7.7	8.0	3.7
8	Köln	D	6.8	7.6	8.0	4.4
9	Mannheim	D	7.7	7.9	7.8	-1.2
10	Dortmund	D	5.4	4.8	5.4	12.6
11	Heilbronn	D	4.9	5.2	4.9	-5.3
12	Bruxelles / Brussel	B	5.1	4.8	4.9	1.0
13	Ports Rhénans Alsace	F	0.4	4.5	4.8	5.4
14	Neuss	D	4.9	4.7	4.3	-8.5
15	Frankfurt am Main	D	3.6	3.8	3.7	-1.6
16	Saarlouis / Dilligen	D	2.5	3.6	3.3	-9.0
17	Düsseldorf	D	3.0	3.0	3.2	7.6
18	Krefeld	D	3.4	3.3	3.1	-6.3
19	Kehl	D	3.1	2.9	2.9	-0.8
20	Magdeburg	D	2.5	2.2	2.8	28.7
	Berlin	D	3.4	2.4	2.3	-2.0
	Västerås	S	2.4	2.7	2.1	-21.4
	Wien	A	1.4	1.7	1.7	-5.3
	Arnhem	NL	1.3	1.7	1.7	0.0
	Köping	S	1.6	1.5	1.5	3.6
	Mertert	L	1.6	1.4	1.4	4.8
	Linz	A	1.1	1.2	1.0	-11.3
	Mantova	I	0.5	0.7	0.5	-20.4
	Varkaus	FIN	0.3	0.4	0.4	-7.7
for information:						
	Basel	CH	8.0	7.2	7.8	9.5

Source: Eurostat, 1999

Table 12 Major inland ports in the European Union (in million tonnes)

Mr. Waltuis of the Port of Rotterdam mentioned in a speech at a symposium in Vienna that an increasing growth of

small ports and terminals along the canal system in the hinterland of the port of Rotterdam can be witnessed, due to the increasing share of inland waterways in the container hinterland traffic. Due to regular services with small vessels, this proofs to be a feasible alternative to road and rail.

2.5.3 Ports as a part of an integrated multimodal European transport network

In an integrated multimodal European Transport network, ports in many cities proof to be the ideal location for interconnected hub terminals and starting points for city logistic, and distribution. The main reason is that most cities have developed historically around the ports, and as an result to this, ports are situated relatively in or close to the centre of the cities, mainly in not so highly populated but industrially tense areas.

As only a few industrial sites have their own port, the integration with other modes is very important. If we analyse, which modes are dominating in the different EU countries, then we see in table 13 on container hinterland traffic, that Road is by far the dominating mode. In more than half of the EU countries it accounts for over 80% of the hinterland traffic. The EU average is 73%. Especially high is its share on the Iberian peninsular with over 90%. Only in the Netherlands its share is below 50%. This is due to the good system of canals and inland waterways, which proofs to be a feasible alternative.

	Port coontainer traffic 1996	Port hinterland container traffic			
			of which:		
	1996	1996	Road	Rail	Inland water-way
	1000 TEU	1000 TEU	%	%	%
UK	5304	4549	84	46	0
NL	5078	3682	49	15	36
D	4641	2754	64	34	2
I	3731	3027	89	11	0
E	3281	1673	92	8	0
B	3207	2539	59	20	21
F	1840	1403	76	23	1
EL	814	n.a.	n.a.	n.a.	n.a.
S	758	647	54	46	0
FIN	649	567	83	17	0
IRL	761	746	89	11	0
P	512	452	93	7	0
DK	492	396	89	11	0
EU 15	**31068**	**22435**	**73**	**18**	**9**

Source: Eurostat, 1999

Table 13 Port Hinterland Traffic of Containers in the EU

Second is in most countries Rail, which holds generally a share of around 10-20%. The highest share has Rail in Sweden with 46% and in Germany with 34%. Very low is the share of Rail on the Iberian Peninsular with only 8%in Spain and 7% in Portugal, this might relate also to the fact, that the rail gauge is different to the rest of Europe and so only domestic hinterland traffic is possible, without additional costs.

Regarding waterborne hinterland transport, the situation is diversified. In 13 of the 15 EU countries, inland waterways play a minor or no role, but in the Netherlands and Belgium inland waterways have with 36% and 21% even a higher share than the railways and proof to be a feasible alternative.

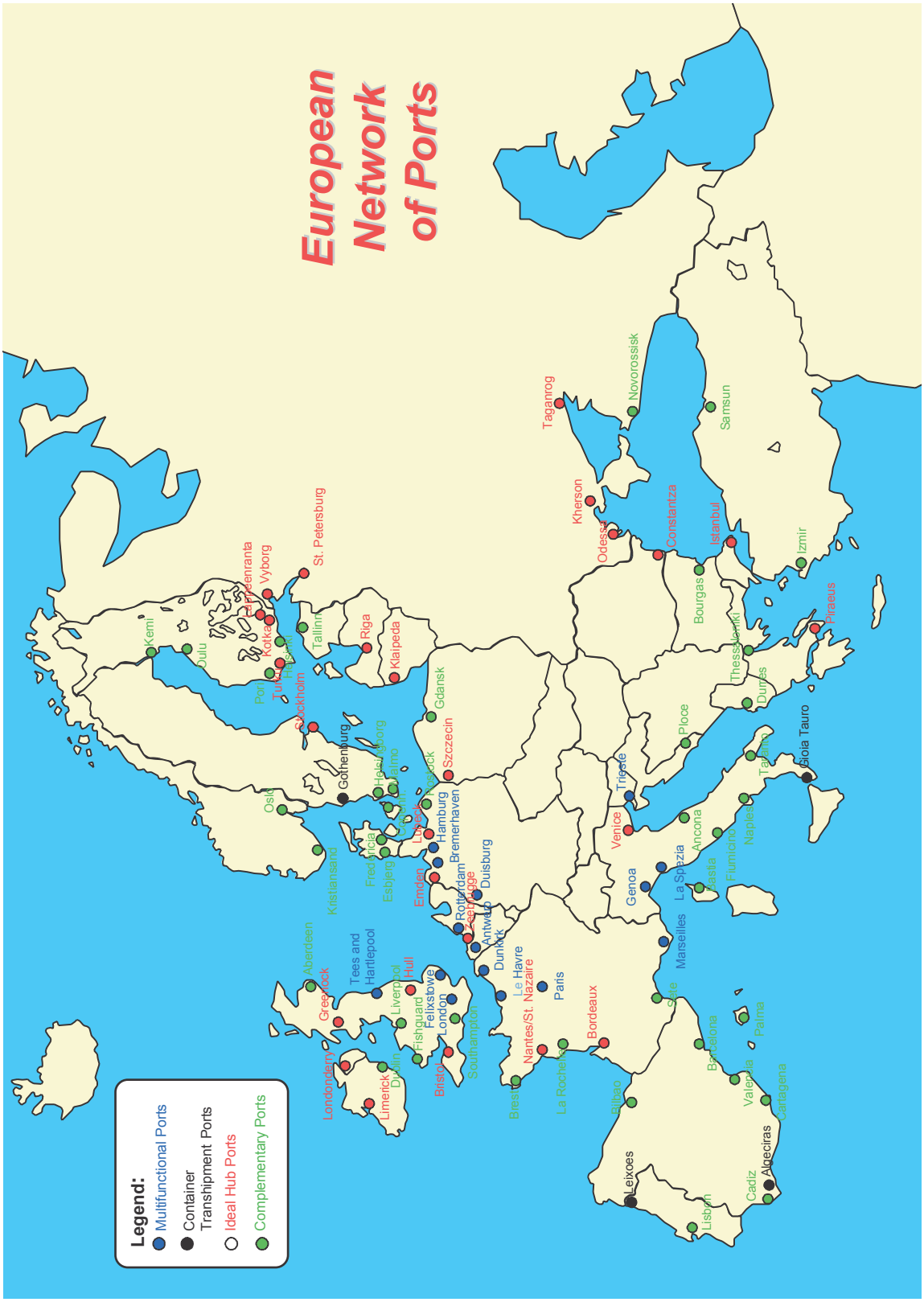
All things considered it is to say, that in order to succeed in transferring the transport of goods in Europe from road to sea, the complete logistical chain using waterborne transport as a major component must be competitive. To fulfil this requirement, an ideal organisation must be established. In this respect ideal means the port must provide multimodal interconnectivities, high frequency, schedule effectiveness and reliability. The logistical network of the hinterland infrastructure must be aligned with the port capacities and capabilities. The EU has sponsored an Study with the title "Improved Port/Ship Interface" (IPSI,1997) where it was tried to create an "Suitable Geographical Network of Ports" in Europe. On the basis of the following criteria:

- mainly excellent railway connections
- inland waterway connections
- mainly excellent road connections
- cargo volume
- cargo streams/industrial zones nearby
- reliability
- free of congestions
- space for future conceptions
- public port (no plant-operated ports)
- short sea shipping lines (regular/irregular)

At the end 83 ports were chosen from more than 1000 ports along the European coastline, and were divided into following categories:

- 15 Multifunctional Ports
- 4 Container Transhipment Ports
- 24 Ideal Hub Ports
- 40 Complementary Hub Ports

This could provide a valuable basis for a European port development program which many see as essential for the development of intermodal waterborne transport.



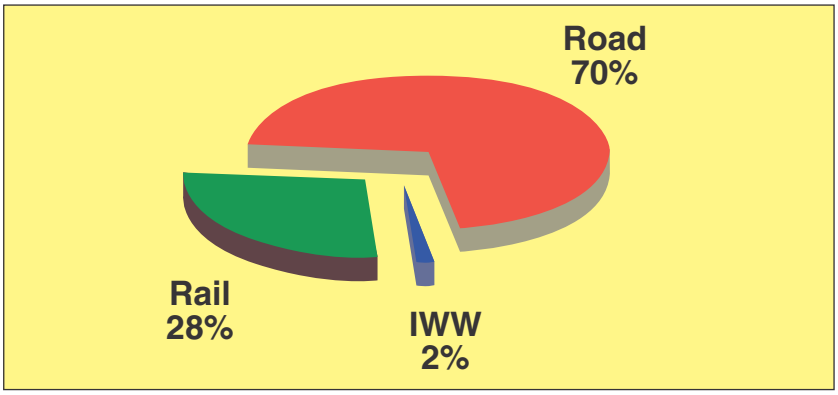
Source: EU IPSI project

Figure 14 Ports in a potential European Short Sea Shipping Network

2.5.4 Inland waterways

In the European Union we have 30.191 kilometres (1995 figure, source:Eurostat,1999) of shippable inland waterways currently in use this is only 93% of the network in use 1970, but if one compare it with 45.455 kilometres of motorways (1995 figure) it is a very impressive figure. The current length of used inland waterways equals the length of motorways in the EU in 1980.

The data in figure 15 on investments into transport infrastructure are taken as a total of all memberstates of the ECMT, which also include neighbouring CEC countries. But as inland waterways can only been looked on as a whole, not only the EU but the whole European continent, e.g. in looking at the Danube, the author has decided to include those countries in the following analysis of investments in transport infrastructure.

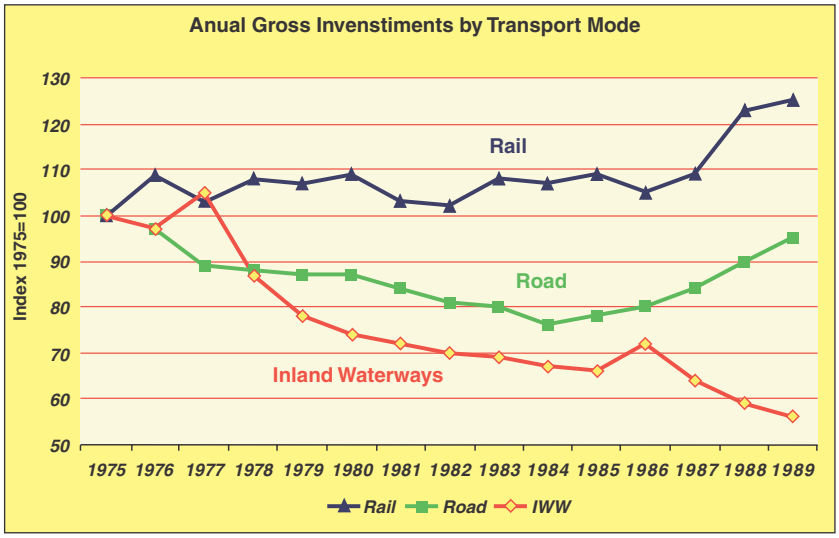


Source: EMCT, 1992 Note: IWW.....inland waterways

Figure 15 Breakdown of investments among mode of transport in 1988

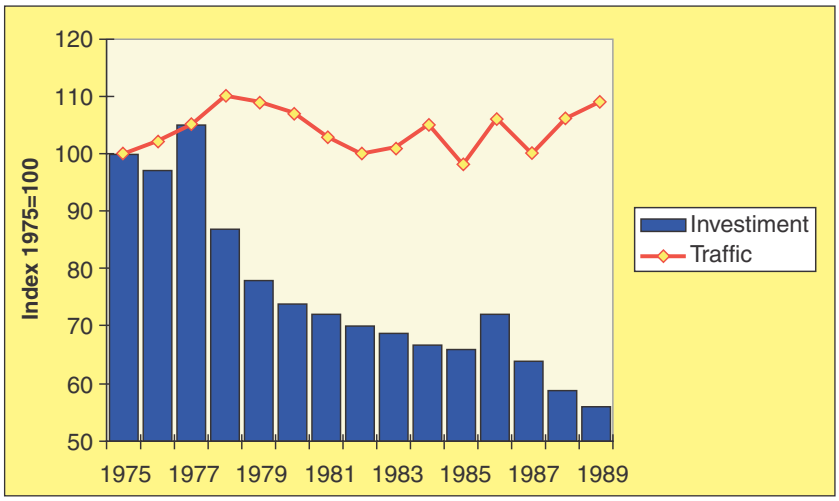
The inland waterways have been always the stepchild in infrastructure investments. Its share of total investments was always very small and has been sinking from just over 2% in 1980 to 1,7% in 1987. Although it has been always considerable small, it has been still sinking compared to other modes as one can see in the figure. 16

The amount of money invested has even sunk by almost 45% between 1975 and 1989, if one compares this with railways, whose share of total investments has risen to 27,7% that means already 14 times as much as inland waterways, its total amount has even risen by 25% compared to the 1975 investments.



Source: EMCT, 1992 Note: IWW.....inland waterways

Figure 16 Trends in annual gross investment by transport modes (based on €)



Source: ECMT, 1992

Figure 17 Trends in annual investments (€) and traffic (tkm) on inland waterways in Europe

As one can see in figure 17, the decline in the level of investment in inland waterways has continued. By 1989 it had fallen to 76% of the 1980 level and to a little more than 50% of the 1975 level. On the opposite the traffic measured,in tonnes-kilometres on inland waterways has increased by 9% from 1975 to 1989, with high annual fluctuations, but never more than 2% under the level of 1975.

The author is aware that these figures are quite old, but due to the lack of other comparable data, he has decided to use them, as they still reflect the situation of today . Once again it shows that in European transport policies lots of lip services are paid towards inland waterways, but the actual policy implications represent the opposite. Please bare in mind also the example on the Danube mentioned in chapter 2.2. . There the author also tried to show that due the lack of commitment to relatively small investments, the competitiveness of a whole mode is hindered., this would be the same with the railways or roads, if the connection for example over the Brenner pass would be blocked due to weather conditions for 96 days of the year, Road /Rail transportation on this route would be not competitive, but roads have the big advantage that it easily finds a detour on other routes. If the Danube is blocked, one can only switch to other modes, but no waterborne transport is possible e.g. from Duisburg to Vienna.

The costs to overcome such problems would be, as already mentioned before, comparable low. To double the investments into inland waterways for example, the total investments in infrastructure would only have to be raised by 2 %.

Country specific developments of waterborne transport ___ 2.6.

In this chapter the author just wants to present a short overview on the importance and development of waterborne transport in the 15 EU countries. This is of great importance as the situation differs dramatically in the different countries, and so far the study focused only on the developments in the European union as a whole. A table giving important key-data on the waterborne transport sector of the country should give a fast impression on how important the individual countries are regarding waterborne transport and they should allow easy comparison between the different EU countries.

2.6.1 Austria

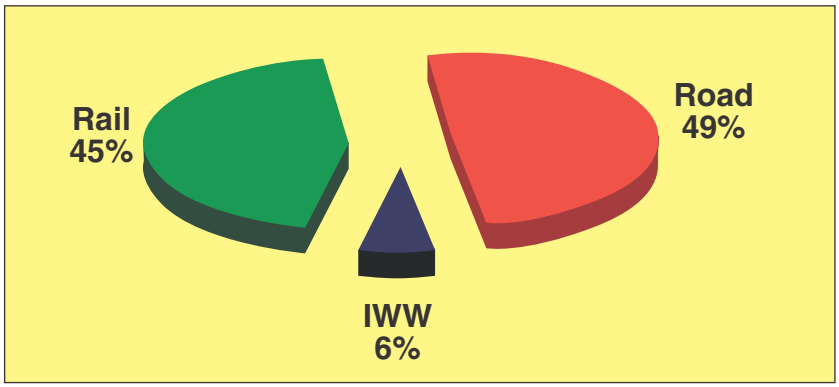
Inland waterway navigation has a long tradition in Austria. Already the Romans used the Danube, Where the ancient settlement Vindobona today's Vienna was founded. The only shippable waterway Austria has is the Danube and it provides Austria with a 350 kilometres long West-East connection which accounts for 1,2% of the total EU inland wa-

terway network. Two of the most important industrial areas and cities are situated on the Danube: Vienna and Linz. These are also the two mot important harbours. Vienna handled an annual volume of 1,7 million tonnes in 1997 and Linz had 1 million tonnes in the same year.

	Austria	EU-15	%
Length of inland waterways	350 km	30.191 km	1,2%
Merchant fleet	43 ships 0,6 Mio dwt	7.970 ships 227 Mio dwt	0,5% 0,3%
Companies in waterborne mode	110	15.767	0,7%
Employees in waterborne mode	1.200	234.900	0,5%
Turnover of waterborne mode	0,22 bill €	37,27 bill €	0,6%
Turnover per employees	183.333 €	158.663 €	115,5%
Transports on inland waterways	2.100 Mio tkm	111.400 Mio tkm	1,9%
Transports by short sea shipping (Domestic)	0 Mio tkm	156.500 Mio tkm	0%
Transports by short sea shipping (Intra-EU)	0 Mio tkm	914.000 Mio tkm	0%

Source: Eurostat, 1999

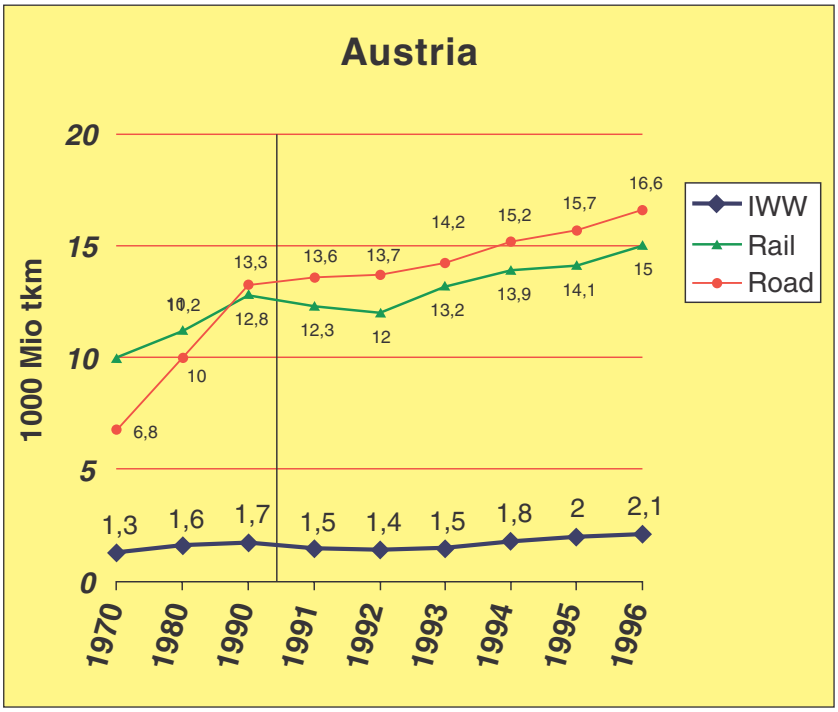
Table 14 Figures on waterborne transport in Austria



Source: Eurostat, 1999 Note: IWW.....inland waterways

Figure 18 The modal split in Austria 1996

The modal spilt in Austria is dominated by road transport with 45% followed by a very strong railways with 45%. Inland waterways only account for 6% of the total transport volume, this are 2.100 million tkm.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 19 Development of waterborne transport in Austria (1970-1996)

The development on the Austrian transport sector shows that the very strong mode rail had been overtaken by road transport in the late 1980's. Since 1992 the two modes have almost developed parallel. These two modes have accommodated most of the growth in transport volume. Inland waterways have seen a significant increase between 1993 and 1996. The total volume transported on the Danube in 1997 was around 10 million tkm (Statistische Nachrichten, 1998), Austria accommodates one fifth of this volume.

The dramatic increases in trade flows to and from the CEC countries put serious constraints on the Austrian transport infrastructure. In Austria, which is one of the main transit countries for European freight traffic, both on the north-south but also on the east west axis, there is a strong movement in the society in shifting more cargo on modes with

less environmental impact than roads. This could proof to be a big possibility for the development of the waterborne transport, if politics commit themselves to an improvement of the infrastructure. The current developments in Yugoslavia have led to a total blockade of the Danube, and it is not predictable for how long this will last. Surely this will have a significant impact on the Austrian waterborne transport.

2.6.2 Belgium

The Belgian inland waterways network is situated at the heart of the most dense navigable network in the world, it has a total length of 1513 km of inland waterways currently in use. The Belgian inland waterways network, which accounts for 5% of the EU inland waterways is divided into three axial and two transverse routes as following:

	Belgium	EU-15	%
Length of inland waterways	1513 km	30.191 km	5,0%
Merchant fleet	126 ships 3,7 Mio dwt	7.970 ships 227 Mio dwt	1,6% 1,6%
Companies in waterborne mode	2.415	15.767	15,3%
Employees in waterborne mode	8.700	234.900	3,7%
Turnover of waterborne mode	1,60 bill €	37,27 bill €	4,3%
Turnover per employees	183.908 €	158.663 €	115,9%
Transports on inland waterways	5.900 Mio tkm	111.400 Mio tkm	5,3%
Transports by short sea shipping (Domestic)	100 Mio tkm	156.500 Mio tkm	0,06%
Transports by short sea shipping (Intra-EU)	54.700 Mio tkm	914.000 Mio tkm	6,0%

Source: Eurostat, 1999

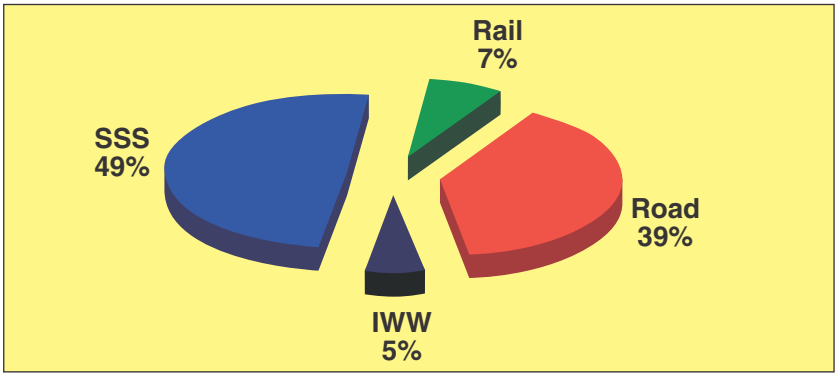
Table 15 Figures on waterborne transport in Belgium

The axial routes are:
- East: Antwerp - Liege
- Centre: Antwerp - Brussels - Tournai
- West: Antwerp - Gant - Tournai

The transverse routes are:
- The South: Dunkerque - Liege (via Lille, Tournai, Mons, Charleroi and Namur
- The North: Antwerp - Gand - Liege

The Belgian waterways are connected to other countries network as follows:
- To France by the Meuse river, Sambre, Escaut, the Lys and the canal Pommeroeul - Condé - Valenciennes;
- To The Netherlands by the Meuse River, the Juliana canal, the Zuid-Willemvaart and the Escaut-Rhine canal;
- To Germany, France, Switzerland (Basle) and Luxembourg by the Moselle river;
- To the Central European countries and Black Sea by the Rhine - Main - Danube - a mix of rivers and canals.

The majority of inland ports in Belgium are public enterprises. They enjoy the status of an autonomous port - so they are responsible for its own development, the maintenance of quays, offices, roads inside the port and the dredging of the channels in the port area. The city is responsible for the infrastructure (European Commission, 1998c). The most important inland ports are Liège (17,5 million tonnes) NV Zeekanaal (8,7 million tonnes) and Brussels (4,9 million tonnes). All three are among the top 15 EU inland ports.

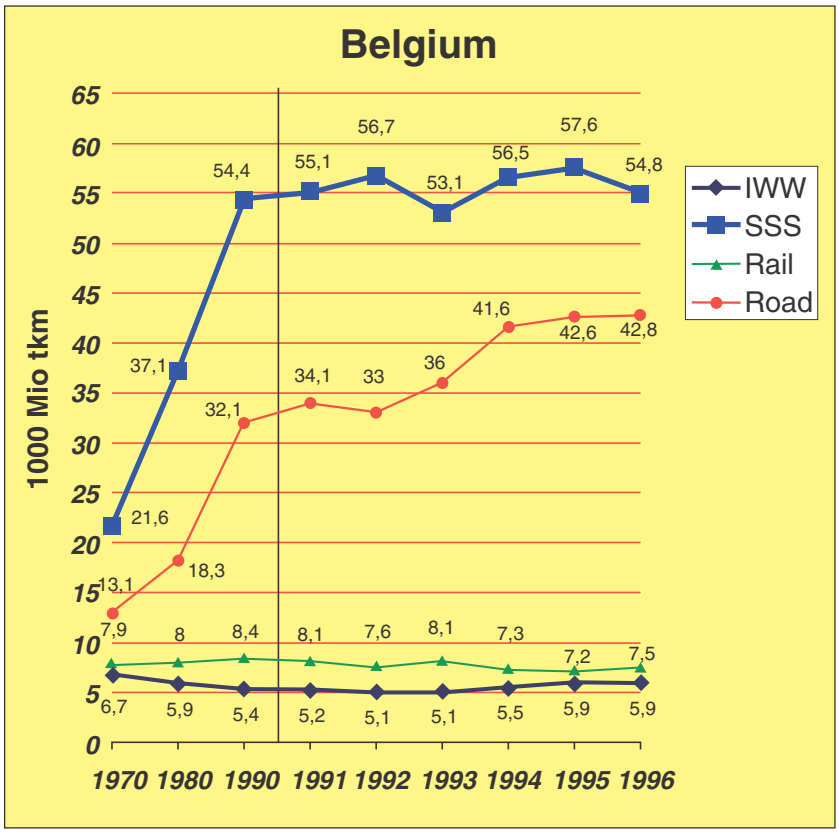


Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 20 The modal split in Belgium 1996

The modal split in Belgium is clearly dominated by waterborne transport, with short sea shipping having a share of 49% and inland waterways 5%. The race in accommodating the additional transport volumes was clearly one by short sea shipping, which could keep and even increase its

dominant position. In the last years road has managed to catch up a little. Rail and inland waterways basically remain the same.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 21 Development of waterborne transport in Belgium (1970-1996)

The shipping industry itself consist of 2.415 companies operating in the waterborne mode, which is 15% of the total number of EU shipping companies, but only has 8.700 employees, which is an indication that the industry consists of many small enterprises, which account for 4,3% of the total turnover in the waterborne mode of the EU.

2.6.3 Denmark

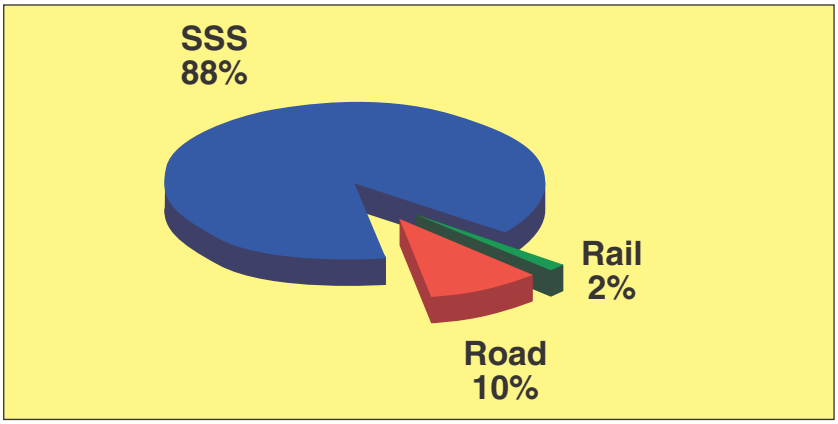
Denmark, which has no inland waterways, accounts for 11,9% of the total EU turnover in waterborne transport, annually 4,4 billion €. This is accomplished only with 13.900 employees, making Denmark accomplishing double the turnover per employee than the EU average.

	Denmark	EU-15	%
Length of inland waterways	0 km	30.191 km	0%
Merchant fleet	558 ships 12 Mio dwt	7.970 ships 227 Mio dwt	7,0% 5,3%
Companies in waterborne mode	876	15.767	5,6%
Employees in waterborne mode	13.900	234.900	5,9%
Turnover of waterborne mode	4,42 bill €	37,27 bill €	11,9%
Turnover per employees	317.986 €	158.663 €	200,4%
Transports on inland waterways	2.100 Mio tkm	111.400 Mio tkm	1,9%
Transports by short sea shipping (Domestic)	2.400 Mio tkm	156.500 Mio tkm	1,5%
Transports by short sea shipping (Intra-EU)	18.900 Mio tkm	914.000 Mio tkm	2,1%

Source: Eurostat, 1999

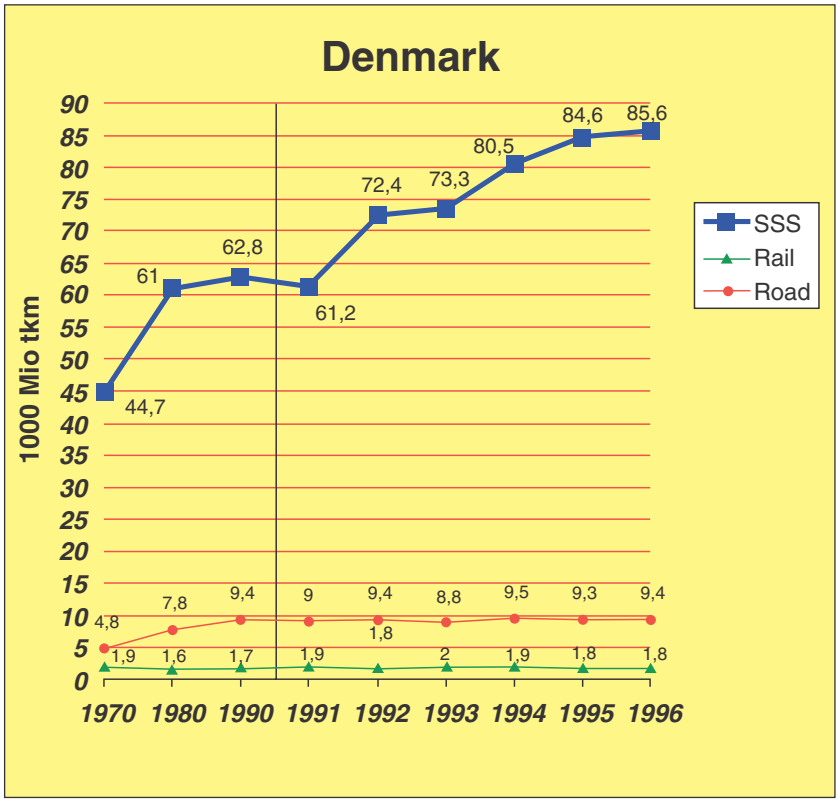
Table 16 Figures on waterborne transport in Denmark

The modal split represents also this high importance of short sea shipping (88%) in Denmark due its geographical structure consisting of many islands. Road (10% and rail (2%) play only minor roles and have stayed the same since the beginning of this decade, while short sea shipping managed to increase its share by one third.



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 22 The modal split in Denmark 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 23 Development of waterborne transport in Denmark (1970-1996)

Denmark has 4 principal types of ports: Municipal governed and self-owned ports (40), a Trust port of special character (1), State owned ports (8), private owned ports (20). The municipal ports (e.g. Aarhus, Aalborg, Odense and Fredericia) were set up by an Act of Parliament, to be self-owned public bodies directly responsible to their City Council having a Harbour Board empowered with the immediate administration of the port. The Port of Copenhagen is likewise set-up to be a self-owned public body governed by a board, the majority of which, is appointed by the Danish State (European Commission, 1998c). Copenhagen is the biggest port in Denmark (10 million tonnes).

2.6.4 Finland

Finland has a total of 6120kilometres of inland waterways which is represent over 20% of the total EU inland waterways, but only 200 Mio tkm are done on them. Generally

waterways play an important role for Finland due to the remoteness of the country. The best and fastest connection with the other EU countries is the Baltic Sea.

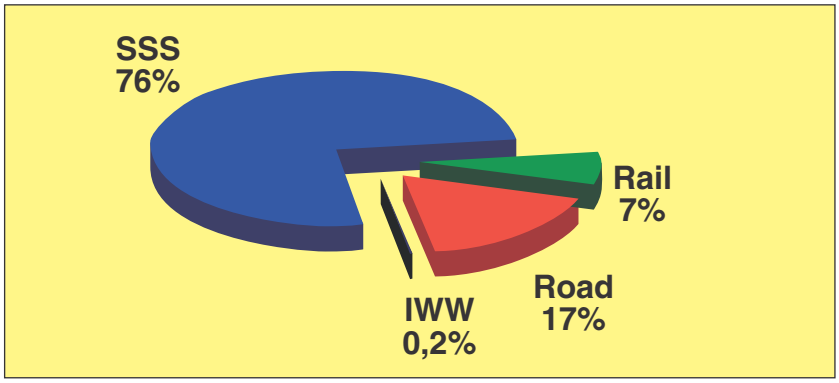
	Finland	EU-15	%
Length of inland waterways	6120 km	30.191 km	20,3%
Merchant fleet	143 ships 3,1 Mio dwt	7.970 ships 227 Mio dwt	1,8% 1,4%
Companies in waterborne mode	290	15.767	1,8%
Employees in waterborne mode	10.700	234.900	4,6%
Turnover of waterborne mode	1,69 bill €	37,27 bill €	4,5%
Turnover per employees	157.943 €	158.663 €	99,5%
Transports on inland waterways	200 Mio tkm	111.400 Mio tkm	0,2%
Transports by short sea shipping (Domestic)	2.900 Mio tkm	156.500 Mio tkm	1,9%
Transports by short sea shipping (Intra-EU)	101.300Mio tkm	914.000 Mio tkm	11,1%

Source: Eurostat, 1999

Table 17 Figures on waterborne transport in Finland

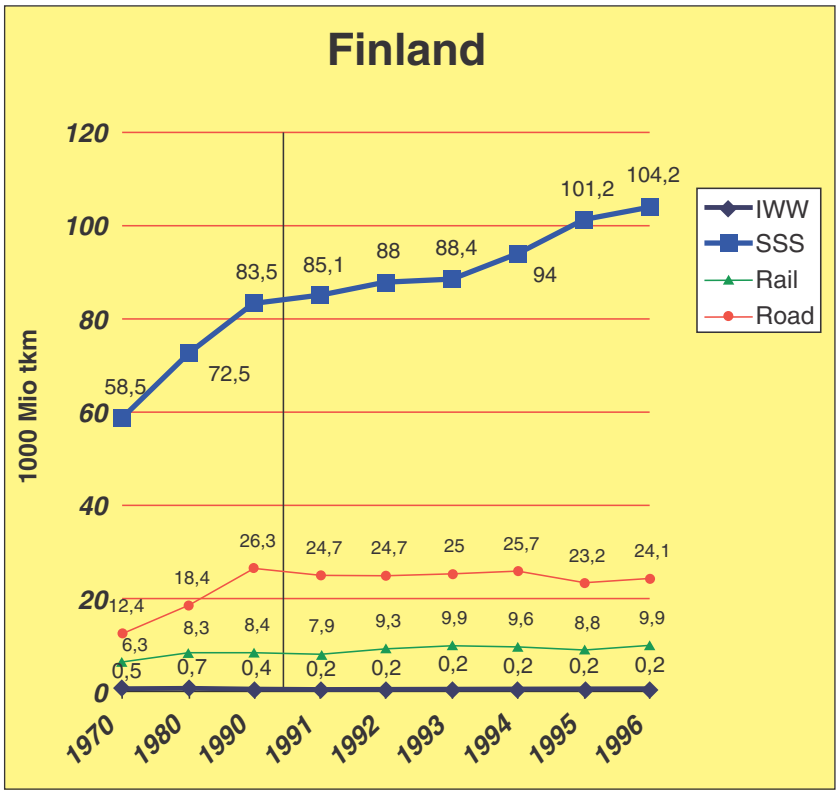
This is also represented in the modal share where short sea shipping dominates clearly with 76%. The development of the modes has been parallel between short sea shipping and road until the beginning of the 1990's then road even decreased again, while short sea shipping was increasing by almost a quarter between 1990 and 1996.

Finland's ports operate mainly as public offices. Major ports are owned by municipalities although they may delegate the task of organisation and running the stevedoring activities to the port operators/stevedoring companies. However, privatisation of some ports is now in process. The ports operate fairly independently and they are also specialised. The biggest Finnish port is Helsinki with an annual volume of 10 million tonnes.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 24 The modal split in Finland 1996



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 25 Development of waterborne transport in Finland (1970-1996)

2.6.5 France

France is bordered by four seas - North Sea, the Channel, Atlantic Ocean and Mediterranean - and has 5,500 km of coastline. It has a merchant fleet which carries some 297

million tons of goods each year, which places France fourth in Europe and eighth in the world: French ports handle 24% of Europe's sea ports global merchandise imports and exports (European Commission, 1998c).

	France	EU-15	%
Length of inland waterways	5962 km	30.191 km	19,7%
Merchant fleet	219 ships 7,4 Mio dwt	7.970 ships 227 Mio dwt	2,7% 3,3%
Companies in waterborne mode	2.010	15.767	12,7%
Employees in waterborne mode	8.000	234.900	3,4%
Turnover of waterborne mode	3,24 bill €	37,27 bill €	8,7%
Turnover per employees	405.000 €	158.663 €	255,3%
Transports on inland waterways	5.700 Mio tkm	111.400 Mio tkm	5,1%
Transports by short sea shipping (Domestic)	6.200 Mio tkm	156.500 Mio tkm	4,0%
Transports by short sea shipping (Intra-EU)	85.300 Mio tkm	914.000 Mio tkm	9,3%

Source: Eurostat, 1999

Table 18 Figures on waterborne transport in France

With 5.7 million ton/kilometres, inland navigation carries less than 4% of French domestic freight. This situation reflects three factors: the decline of the coal and steel industries, competition from the railroads, and above all the obsolescence of the system. With a network of 8500 kilometres France has the longest system of navigable waterways in Europe, but many of its canals are too small to permit large vessels to navigate between the major axes - such as the Seine, the Rhone, the Moselle and the Rhine. The total inland waterway network in use for freight transport is only 5.962 kilometres.

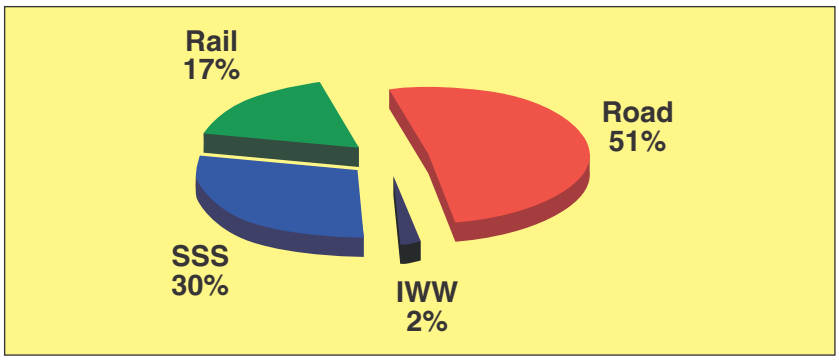
Many projects which should breathe new life into inland waterway navigation are under consideration. In addition to a Rhine-Rhone link for large vessels now in the planning stage, the state is considering the construction of a second link between the Seine and the canals of the north (Euro-

pean Commission, 1998c). Important inland ports are Paris (17million tonnes) and Strassbourg (9,3 million tonnes) ranked 3rd and 4th among EU inland ports.

There are 6 Autonomous ports (Bordeaux, Dunkirk, Le Havre, Marseilles, Nantes/St-Nazaire, Rouen) and 17 non-autonomous ports called trade ports of national interest. Marseilles, Le Havre and Dunkirk rank respectively 3rd, 5th and 7th in Europe, and Nantes/Saint-Nazaire and Rouen are also very active. Marseilles is the largest French port in volume terms (94 million tons) and Le Havre is the largest port for container traffic (1,185 million TEUs).

The port infrastructures in autonomous ports are created jointly by the port authority itself and the State. The State generally provides 80% of the operating cost, and finances 100% of the maintenance. For specialised terminals, the industries concerned participate in the cost. The superstructure and equipment are entirely financed and operated by the port authorities, and most often let to handling companies or shipping companies. Specialised equipment is usually financed and operated by private enterprises.

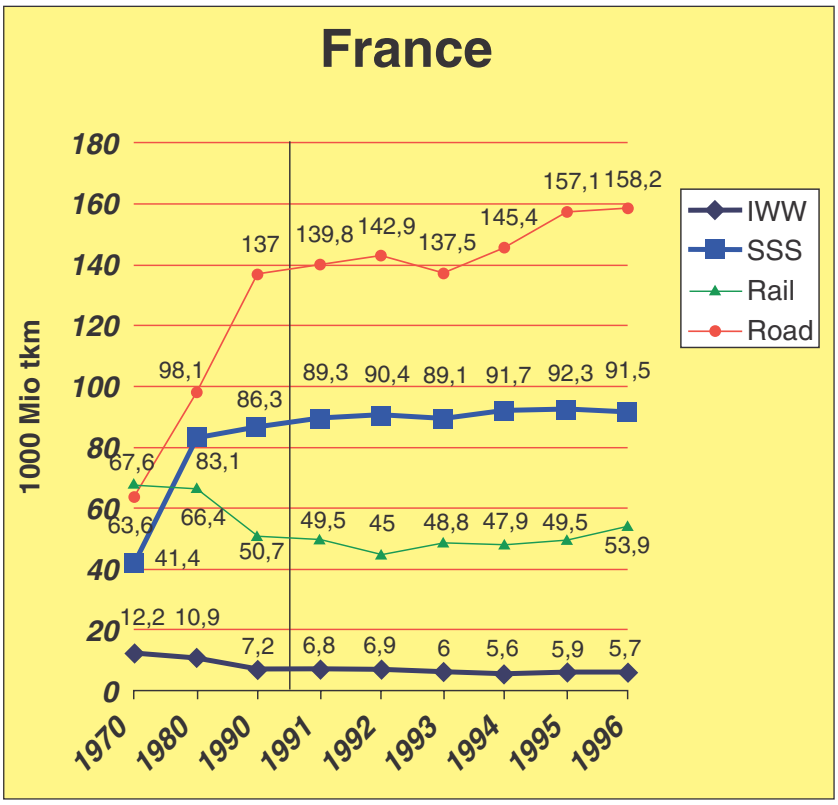
In the non Autonomous ports, the state finances 30-50% of investment costs and the chamber of commerce finances the rest. Almost, 100% of maintenance cost of the ports is provided by the state. The decisions concerning the infrastructure are made by the State after consultation with the port council. In the case of specialised terminals, the cost of infrastructure can be met by a private firm. Superstructure and port equipment are financed and operated by the Chambers of Commerce, except in the few cases where they are under the responsibility of private companies (European Commission, 1998c).



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 26 The modal split in France 1996

The modal split however shows a clear dominance of road (51%) with short sea shipping having only a share of 30% and inland waterways even only have 2%. From the beginning of the 1980's the short sea shipping has only increased by around 10%, while the road transport volume has almost doubled.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 27 Development of waterborne transport in France (1970-1996)

Railways have seen by one third between 1970 and 1992 but is now winning again back cargo. It has to be mentioned that rail is since the start of the Chunnel to Great Britain in direct competition with the short sea ferry operators across the Channel. Posing a serious threat to them. The competition is shifting regularly depending on the current freight rates by the rail and the ferry operators.

Inland waterways have seen a steady decline of its importance. The volume decreased since 1970 by more than half. There are strong initiatives and investments needed to bring this mode again back into the race. Some projects were mentioned above.

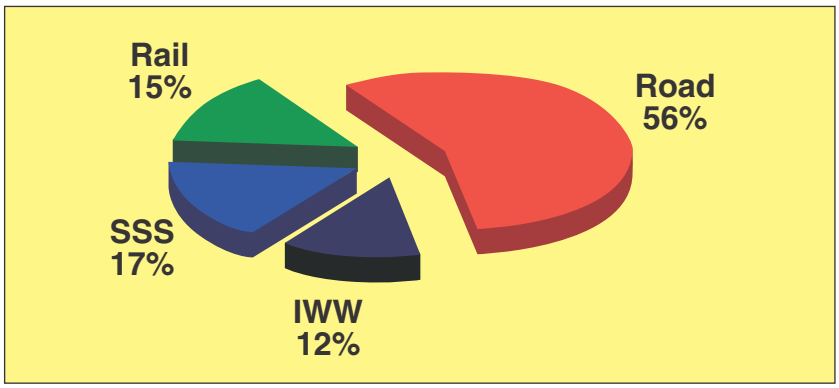
2.6.6 Germany

Germany is the "heavyweight" in inland waterway navigation, 61.300 million tkm were transported on German inland waterways in 1996, this are 55% of the of the total volume transported on inland waterways in the EU.

	Germany	EU-15	%
Length of inland waterways	7343 km	30.191 km	24,3%
Merchant fleet	1526 ships 21,2 Mio dwt	7.970 ships 227 Mio dwt	19,1% 9,3%
Companies in waterborne mode	2.413	15.767	15,3%
Employees in waterborne mode	35.000	234.900	14,9%
Turnover of waterborne mode	3,78 bill €	37,27 bill €	10,1%
Turnover per employees	108.000 €	158.663 €	68,1%
Transports on inland waterways	61.300 Mio tkm	111.400 Mio tkm	55,0%
Transports by short sea shipping (Domestic)	800 Mio tkm	156.500 Mio tkm	0,5%
Transports by short sea shipping (Intra-EU)	84.800 Mio tkm	914.000 Mio tkm	9,3%

Source: Eurostat, 1999

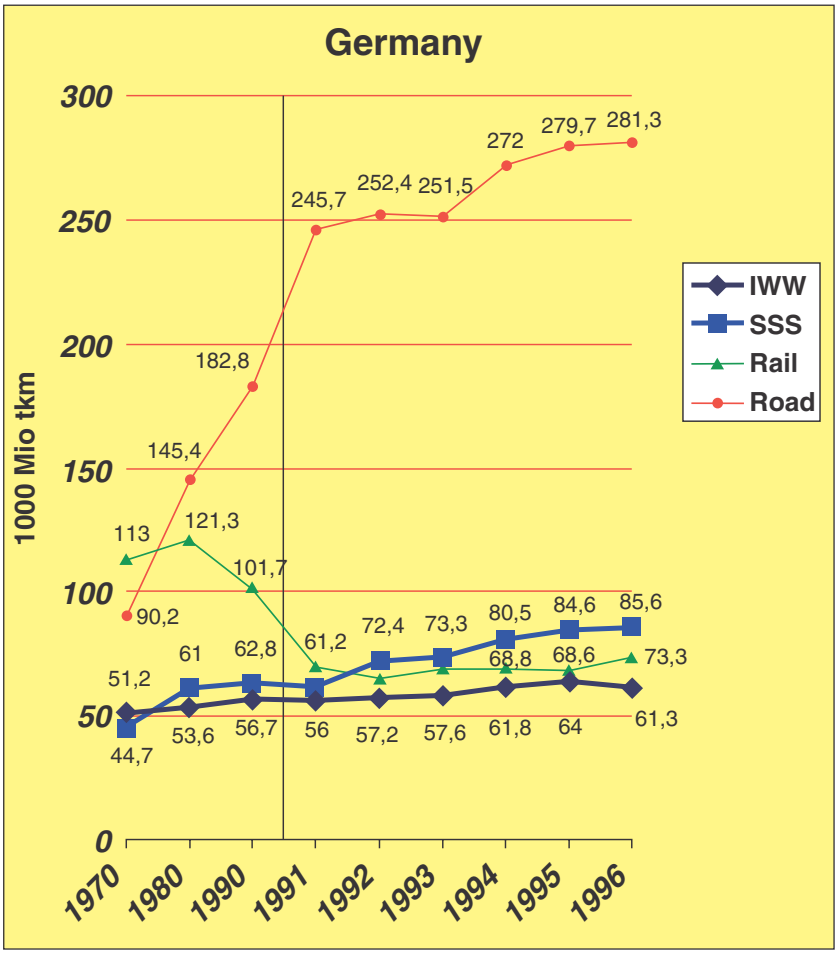
Table 19 Figures on waterborne transport in Germany



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 28 The modal split in Germany 1996

Despite this high volumes transported on inland waterways it only accounts for 12% of the total German transport volume. The modal share is dominated by road transport (56%) rail (15%) and short sea shipping (17%) have a just slightly bigger share than inland waterways.



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 29 Development of waterborne transport in Germany (1970-1996)

The development of road transport is very impressing, it more than tripled since 1970. Rail to the opposite had to take big reductions in the 1970's and 1980's and now has stabilised at almost half the level of 1970. Short sea shipping has seen a steady increase especially in the 1970's and 1990's.The shipping industry has a turnover of 3,78 billion €, 10% of the total EU, but the ratio of turnover per employee is only 68% of the EU average.

The organisational structures of sea ports are quite different in the various provinces of Germany. There is no such thing as a Port Authority exercising all public port-related functions. These are distributed among various departments of province authorities, who perform such functions as part of the general administration of the Land concerned.

Most of the maritime ports in Germany are publicly owned and operated. To give one example, there are forty-one public sea ports in the province of Lower Saxony. Port-side cargo-handling enterprises, too, are mostly owned by a public entity, often the local municipality. However, there is a tendency towards more and more private interests engaging themselves in cargo handling and other port-related services. The number of privatised cargo-handling enterprises that were formerly in public ownership continues to grow (European Commission, 1998c). The most important sea port is Hamburg (77 million tonnes) Wilhelmshaven (36 million tonnes) and Bremen (34 million tonnes).

Basically, the Federal Government has no competence in matters of inland ports. These are rather the responsibility of the provinces and/or of the local municipalities. However, the Federal Ministry of Transport is involved in the development of logistics concepts. There is reason to expect that the concepts for the development of sea ports that the Federal Government supports will also be implemented in inland ports. The biggest inland port is the biggest in the EU: Duisburg (49,3 million tonnes).

2.6.7 Greece

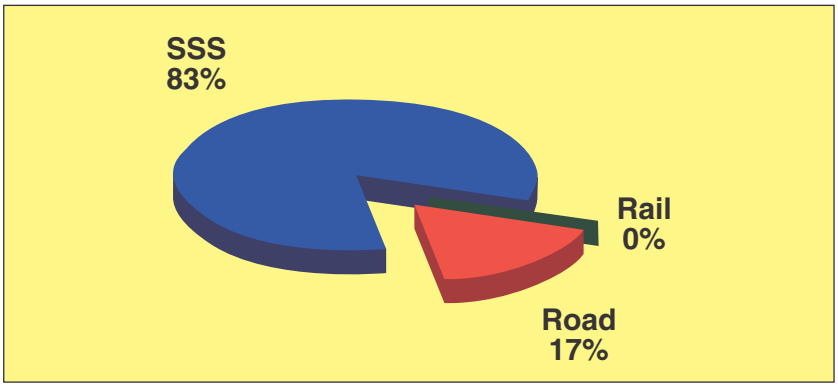
Greece has a shipping industry with comparable big companies. Only 175 shipping companies have 38.900 employees. The turnover per employee is quite low at just over 100.000 €.

Looking at the modal share the high dominance of short sea shipping with a share of 83%. Looking at the other modes rail is almost not existent and road transport has a constant volume of around 12.000 million tkm.

	Greece	EU-15	%
Length of inland waterways	0 km	30.191 km	0%
Merchant fleet	2.996 ships 121,3 Mio dwt	7.970 ships 227 Mio dwt	37,6% 53,4%
Companies in waterborne mode	175	15.767	1,1%
Employees in waterborne mode	38.900	234.900	16,6%
Turnover of waterborne mode	4,15 bill €	37,27 bill €	11,1%
Turnover per employees	106.683 €	158.663 €	67,2%
Transports on inland waterways	0 Mio tkm	111.400 Mio tkm	0%
Transports by short sea shipping (Domestic)	7.300 Mio tkm	156.500 Mio tkm	4,7%
Transports by short sea shipping (Intra-EU)	55.300 Mio tkm	914.000 Mio tkm	6,1%

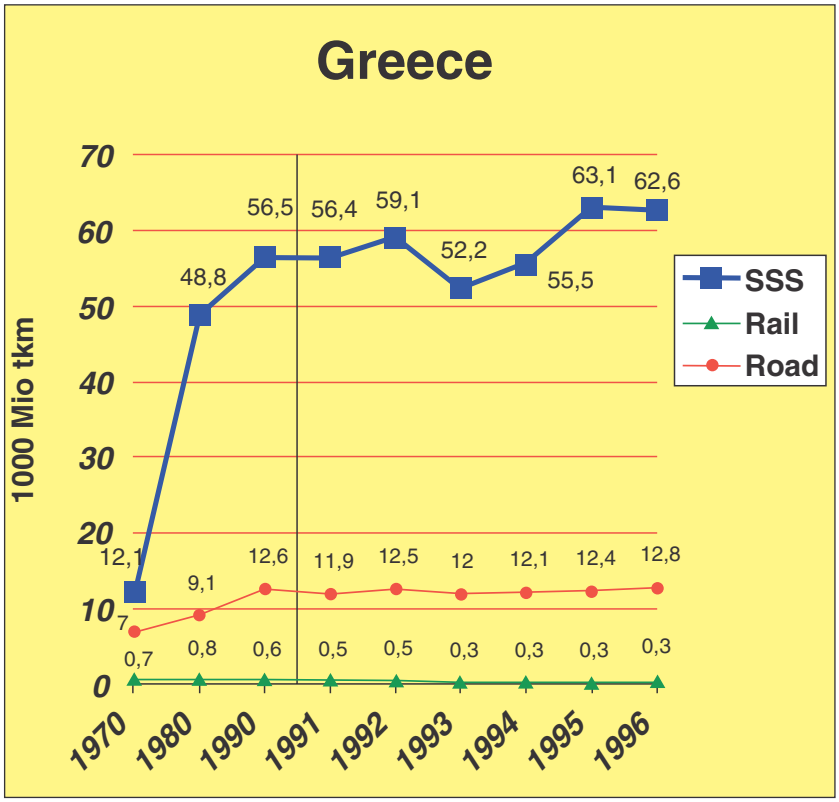
Source: Eurostat, 1999

Table 20 Figures on waterborne transport in Greece



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 30 The modal split in Greece 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 31 Development of waterborne transport in Greece (1970-1996)

Fifteen main ports handle 59% of the total Greek seaborne trade. There are two types of legal entity, which exercise delegated State authority: "Port Organisations" (Piraeus, Thessaloniki) and "Port Funds" (58 in all, of which 23 operate at a prefecture level). The two types of legal entity have different degrees of autonomy but their overall supervision and administrative control is the responsibility of the Ministry of Merchant Marine. These are basically Public ports and Private ports having dedicated port facilities serving specific industrial activities (European Commission, 1998c).

2.6.8 Ireland

Ireland is an island off an island off Europe. It is unique in Europe as it does not have a physical land connection, or a fixed link such as a bridge or tunnel, to continental Europe. Ireland is heavily dependent on international trade. GNP has been growing at rates of 6-9% for several years.

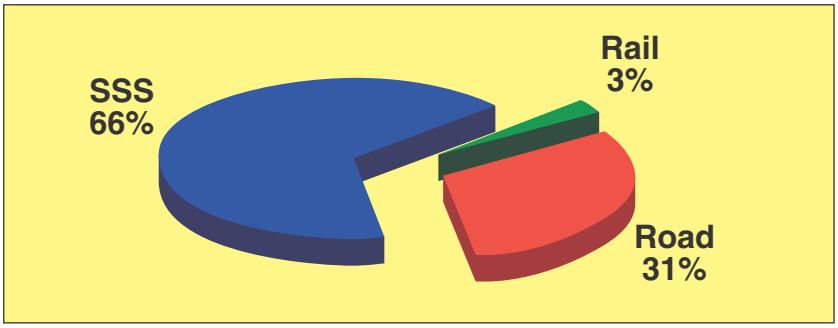
Short sea shipping is of utmost importance both for Ro/Ro trucking services, and Lo/Lo container services.

	Ireland	EU-15	%
Length of inland waterways	0 km	30.191 km	0%
Merchant fleet	41 ships 0,16 Mio dwt	7.970 ships 227 Mio dwt	0,5% 0,1%
Companies in waterborne mode	43	15.767	0,3%
Employees in waterborne mode	2.600	234.900	1,1%
Turnover of waterborne mode	0,20 bill €	37,27 bill €	0,5%
Turnover per employees	76.923 €	158.663 €	48,5%
Transports on inland waterways	0 Mio tkm	111.400 Mio tkm	0%
Transports by short sea shipping (Domestic)	300 Mio tkm	156.500 Mio tkm	0,2%
Transports by short sea shipping (Intra-EU)	11.400 Mio tkm	914.000 Mio tkm	1,2%

Source: Eurostat, 1999

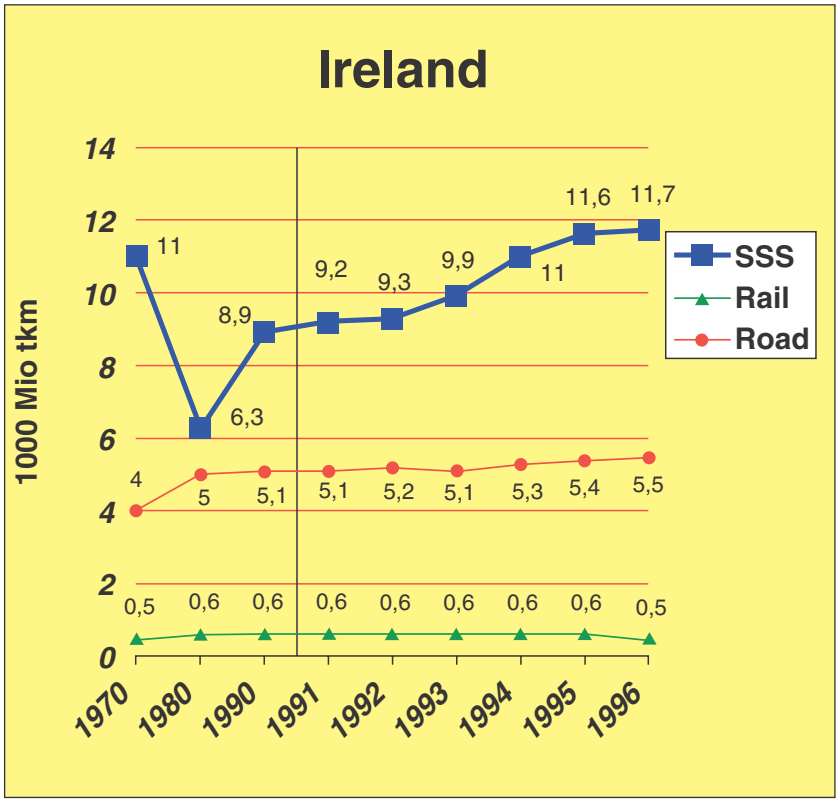
Table 21 Figures on waterborne transport in Ireland

The modal share is clearly dominated by short sea shipping (66%), which has accompanied most of the additional transport volumes, followed by road with about half the share (31%). Rail not very important and only has a share of 3%.



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 32 The modal split in Ireland 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 33 Development of waterborne transport in Ireland (1970-1996)

Over recent years there has been substantial investment, supported by EU Structural and Regional funding in the physical infrastructure in the main Irish including road access, ramps, terminals, quayside developments etc. This in turn has led to the introduction of many new shipping services, particularly short-sea ferries to support RO/RO and container operations. There has been significant increases in volume in all port through the recent years, but mostly in the two largest general cargo ports, Dublin (11 million tkm) and Cork.

2.6.9 Italy

Some Italians say that Italy has two big inland waterways the Mediterranean and the Adriatic Sea. In some ways this is true, Italy is very well geographically configured for waterborne transport as most areas of Italy are less than 100 kilometres away from sea access. Inland waterways have only very little importance. The only waterway in use is the

Po, and a canal system around it. There are initiatives planed to reactivate this mode.

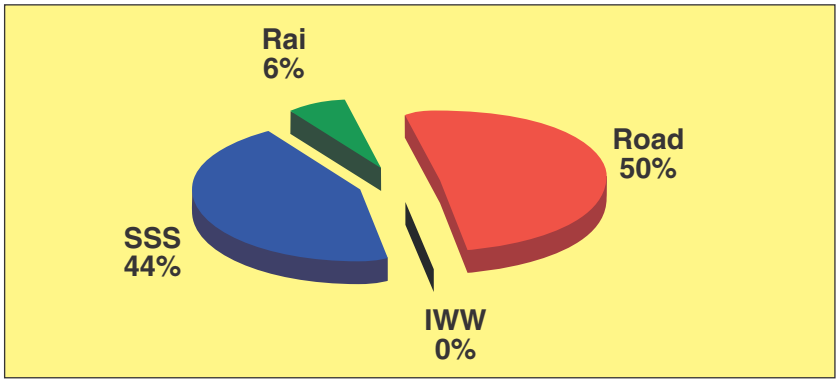
	Italy	EU-15	%
Length of inland waterways	1466 km	30.191 km	4,9%
Merchant fleet	534 ships 11,3 Mio dwt	7.970 ships 227 Mio dwt	6,7% 5,0%
Companies in waterborne mode	565	15.767	3,6%
Employees in waterborne mode	39.600	234.900	16,9%
Turnover of waterborne mode	3,46 bill €	37,27 bill €	9,3%
Turnover per employees	87.373 €	158.663 €	55,1%
Transports on inland waterways	100 Mio tkm	111.400 Mio tkm	0,1%
Transports by short sea shipping (Domestic)	37.900 Mio tkm	156.500 Mio tkm	24,2%
Transports by short sea shipping (Intra-EU)	132.900Mio tkm	914.000 Mio tkm	14,5%

Source: Eurostat, 1999

Table 22 Figures on waterborne transport in Italy

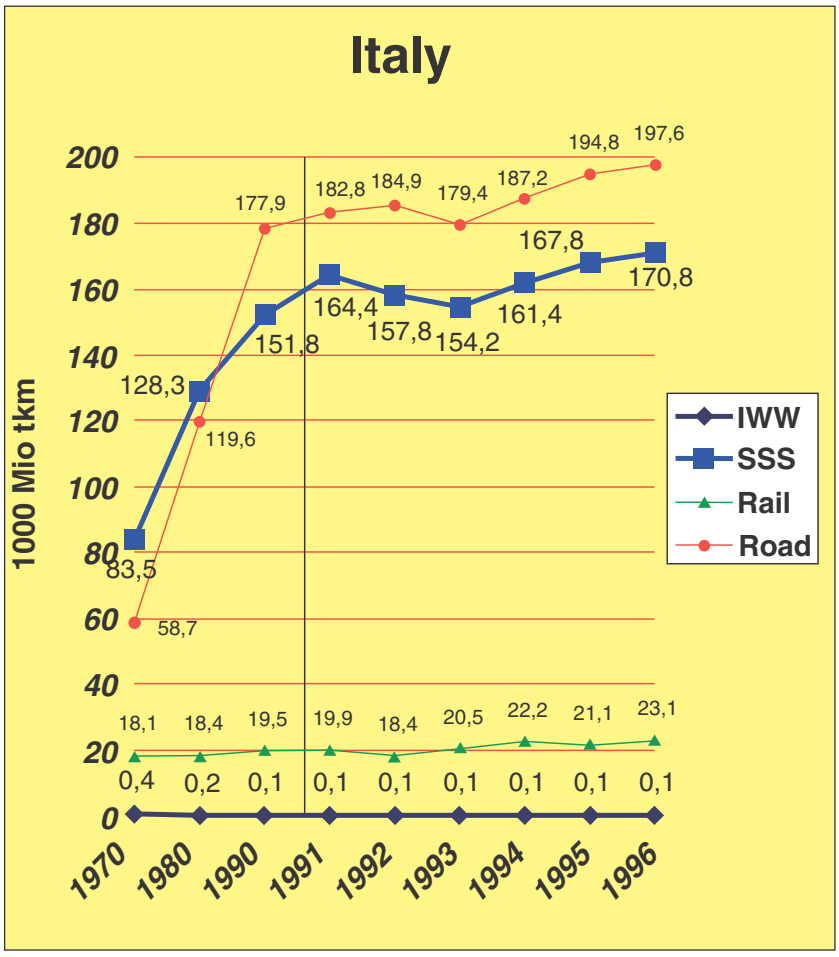
Looking at the modal share the dominance of road transport (50%) becomes clear but short sea shipping follows closely with 44%. Rail (6%) is of relative low importance. There are plans to switch road transport to short sea shipping for example on the route to Spain by using ferries between Genoa and Barcelona.

The main increase in transport volume has been accommodated by road and short sea shipping, which has lost its first position to the road in the 1980's. Inland waterways and rail transport staid basically the same.



Source: Eurostat, 1999

Figure 34 The modal split in Italy 1996



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 35 Development of waterborne transport in Italy (1970-1996)

The overall port network in Italy is characterised by a very high number of medium or small size ports (132 as classified by the national Institute of Statistics) and a limited number of major ports: only 6 carry 50% of the total international traffic and 9 carry 50% of the total national traffic.

There is a very dynamic situation of transformation from the former public management structure to a new private management structure. Ports are supervised by the Port Authority, but private Operators are fully assigned to transport operational activity. The major ports in the Mediterranean are Genoa (43 million tonnes), La Spezia and Livorno as well the important container hub port Gioia Tauro (1, 5 million TEU). The most important Adriatic port is Trieste (46 million tonnes).

2.6.10 Luxembourg

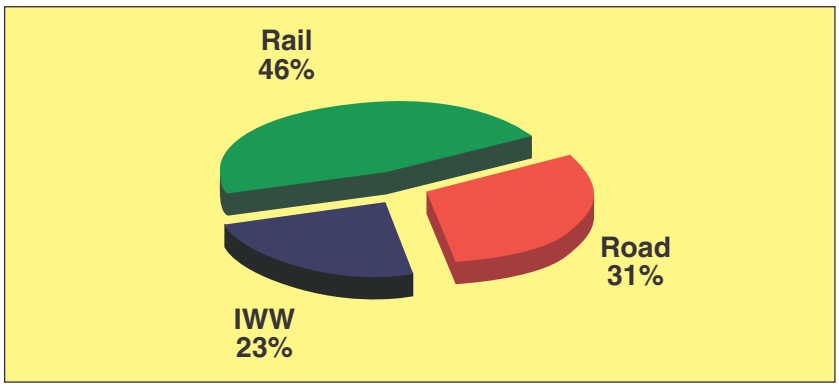
Luxembourg has a very short access to the European inland waterway network of 37 kilometres length. Impressive 300 million tkm are transported on this so short system. The industry consists of 39 companies with 100 employees and a fleet of 2 ships.

	Luxembourg	EU-15	%
Length of inland waterways	37 km	30.191 km	0,1%
Merchant fleet	2 ships 0,07 Mio dwt	7.970 ships 227 Mio dwt	0,03% 0,03%
Companies in waterborne mode	39	15.767	0,2%
Employees in waterborne mode	100	234.900	0,04%
Turnover of waterborne mode	n.a.	37,27 bill €	n.a.
Turnover per employees	n.a.	158.663 €	n.a.
Transports on inland waterways	300 Mio tkm	111.400 Mio tkm	1,9%
Transports by short sea shipping (Domestic)	0 Mio tkm	156.500 Mio tkm	0%
Transports by short sea shipping (Intra-EU)	0 Mio tkm	914.000 Mio tkm	0%

Source: Eurostat, 1999

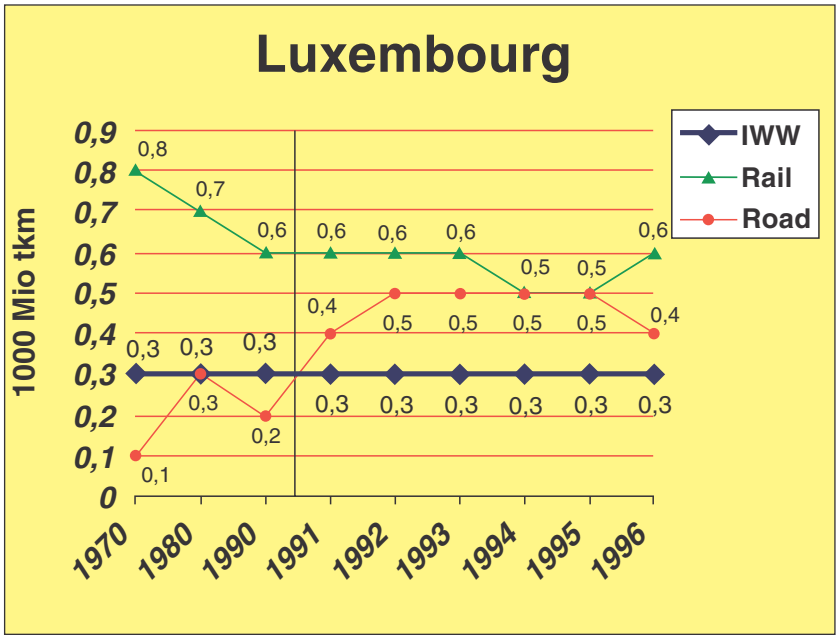
Table 23 Figures on waterborne transport in Luxembourg

Rail is the dominating mode with a share of 46% closely followed by the road transport which has increased its share dramatically since 1970 overtaking inland waterways and almost rail in the modal share.



Source: Eurostat, 1999 Note: IWW.....inland waterways

Figure 36 The modal split in Luxembourg 1996



Source: Eurostat, 1999 Note: IWW.....inland waterways

Figure 37 Development of waterborne transport in Luxembourg (1970-1996)

2.6.11 Netherlands

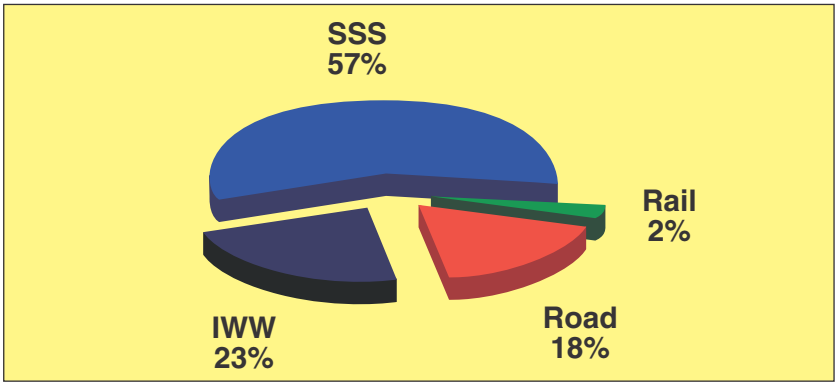
The Netherlands are the second important nation in the EU inland waterway navigation after Germany. Its 5046 kilome-

tres long inland waterways accommodate almost 32% of the total volume transported on inland waterways in the EU.

	Netherlands	EU-15	%
Length of inland waterways	5046 km	30.191 km	16,7%
Merchant fleet	521 ships 4,6 Mio dwt	7.970 ships 227 Mio dwt	6,5% 2,0%
Companies in waterborne mode	4.870	15.767	30,9%
Employees in waterborne mode	13.500	234.900	5,7%
Turnover of waterborne mode	4,05 bill €	37,27 bill €	10,9%
Turnover per employees	300.000 €	158.663 €	189,1%
Transports on inland waterways	35.500 Mio tkm	111.400 Mio tkm	31,9%
Transports by short sea shipping (Domestic)	0 Mio tkm	156.500 Mio tkm	0%
Transports by short sea shipping (Intra-EU)	89.100 Mio tkm	914.000 Mio tkm	9,7%

Source: Eurostat, 1999

Table 24 Figures on waterborne transport in the Netherlands

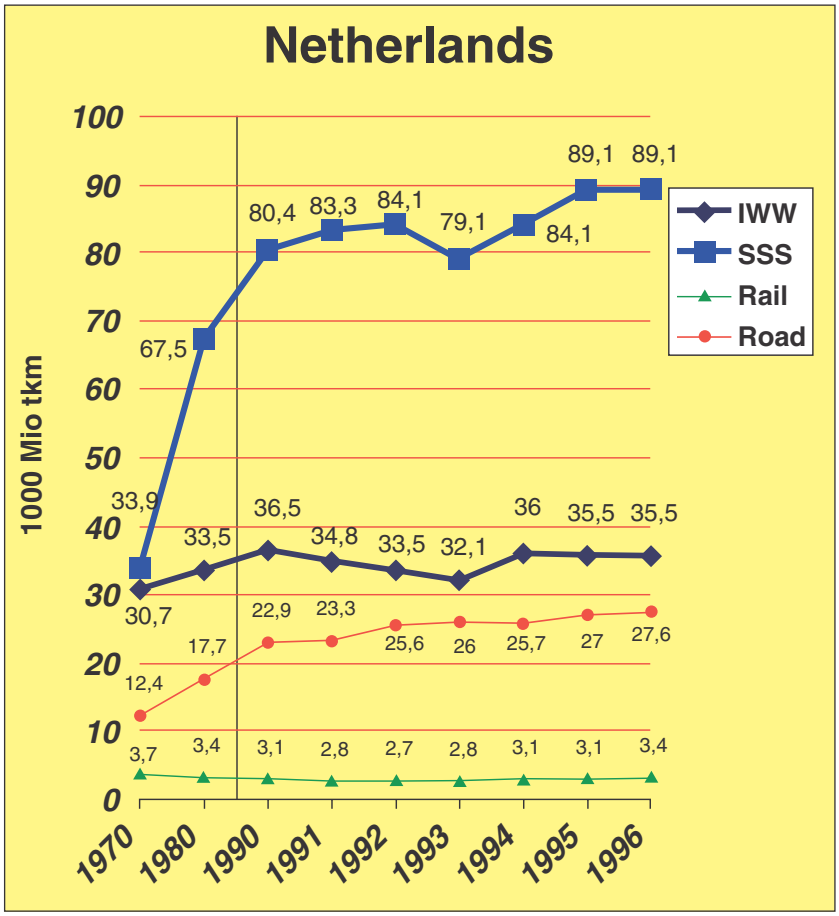


Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 38 The modal split in the Netherlands 1996

But short sea shipping has a even bigger share thanks to the by far biggest sea port in the EU: Rotterdam (303 million tonnes). Waterborne transport in total accounts for 80% of the modal share. Followed by road with 18%. The share of

rail is very low at 2%. The biggest inland port is Arnhem (1,7 million tonnes)



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 39 Development of waterborne transport in the Netherlands (1970-1996)

Most of the additional increase in transport volume has been absorbed by short sea shipping and road transport, also inland waterways could increase its volume slightly. Rail has remained on a constant level over the last decades.

2.6.12 Portugal

Portugal has traditionally been a nation of sailors. The nation which ones ruled the seas has currently a fleet of only 45 ships with a capacity of less than a million dwt. However the 70 shipping companies have an annual turnover of 1,3 billion €.

	Portugal	EU-15	%
Length of inland waterways	0 km	30.191 km	0%
Merchant fleet	45 ships 0,9 Mio dwt	7.970 ships 227 Mio dwt	0,6% 0,4%
Companies in waterborne mode	70	15.767	0,4%
Employees in waterborne mode	8.300	234.900	3,5%
Turnover of waterborne mode	1,30 bill €	37,27 bill €	3,5%
Turnover per employees	156.627 €	158.663 €	98,7%
Transports on inland waterways	0 Mio tkm	111.400 Mio tkm	0%
Transports by short sea shipping (Domestic)	1.300 Mio tkm	156.500 Mio tkm	0,8%
Transports by short sea shipping (Intra-EU)	24.600 Mio tkm	914.000 Mio tkm	2,7%

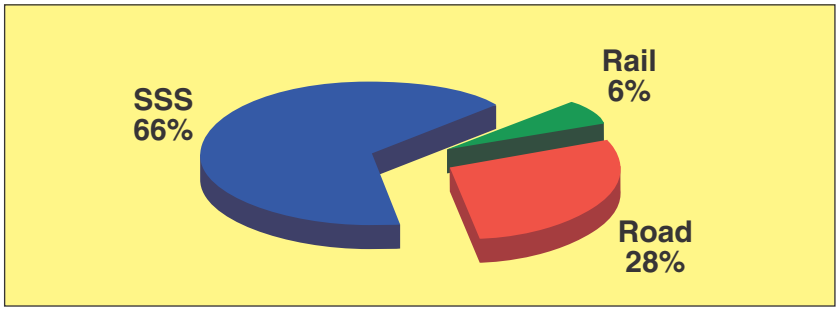
Source: Eurostat, 1999

Table 25 Figures on waterborne transport in Portugal

The big additional transport volumes, of the positive economic development in the 1980's and 1990's have been mainly absorbed by short sea shipping, which has a modal share of 66%.

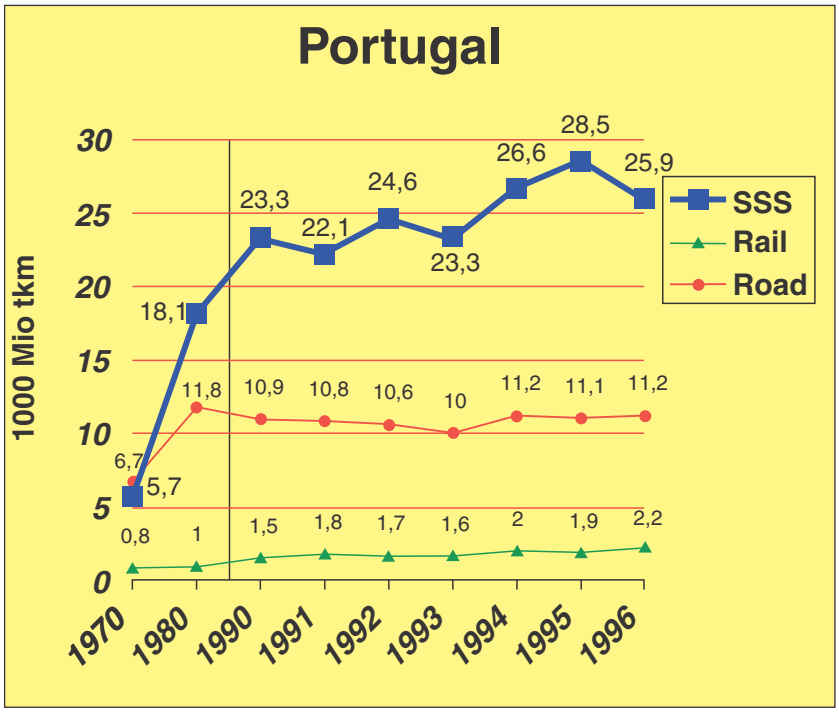
Ports in Portugal are State-owned and the State alone is responsible for their operation, although in some cases operational services are provided by private companies on the basis of concession contracts. Ports in the Autonomous Regions of the Azores and Madeira come under the jurisdiction of the respective regional governments. Either port authorities or autonomous councils administer the ports.

The four main ports of Lisbon (13 million tonnes), Leixões, Sines and Setúbal come into the port authority category. The port authorities are public institutions possessing a legal identity and administrative financial and patrimonial autonomy, and are subject to government control through the Ministry for Social Equipment, Planning and Territory Administration. These ports are administered by government-appointed management boards and enjoy a high degree of independence (European Commission, 1998c).



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 40 The modal split in Portugal 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 41 Development of waterborne transport in Portugal (1970-1996)

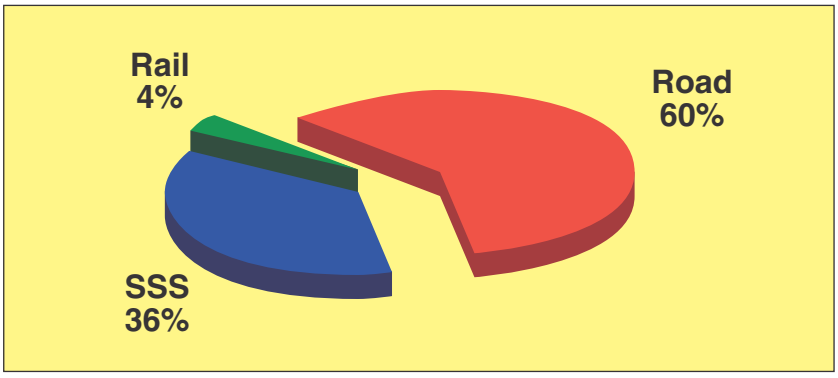
2.6.13 Spain

Spain is another traditional shipping nation. Currently the fleet still consists of 214 ships and the shipping industry has turnover of 2 billion €. However the modal share is dominated by road transport (60%) and short sea shipping has only a share of 36%.

	Spain	EU-15	%
Length of inland waterways	0 km	30.191 km	0%
Merchant fleet	214 ships 3,2 Mio dwt	7.970 ships 227 Mio dwt	2,7% 1,4%
Companies in waterborne mode	379	15.767	2,4%
Employees in waterborne mode	14.100	234.900	6,0%
Turnover of waterborne mode	2,00 bill €	37,27 bill €	5,4%
Turnover per employees	141.844 €	158.663 €	89,4%
Transports on inland waterways	0 Mio tkm	111.400 Mio tkm	0%
Transports by short sea shipping (Domestic)	36.300 Mio tkm	156.500 Mio tkm	23,2%
Transports by short sea shipping (Intra-EU)	73.900 Mio tkm	914.000 Mio tkm	8,1%

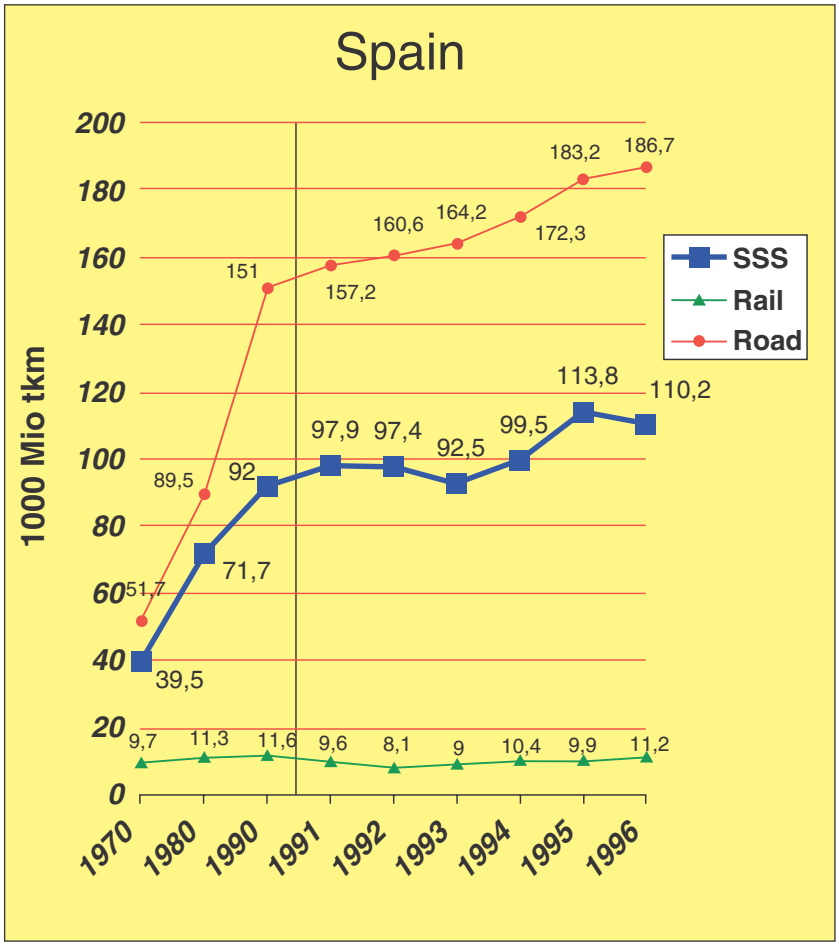
Source: Eurostat, 1999

Table 26 Figures on waterborne transport in Spain



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 42 The modal split in Spain 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 43 Development of waterborne transport in Spain (1970-1996)

Rail has a very small constant share, which is also related to the different gauge in Spain compared to the rest of the EU which causes technical problems and additional costs and hinders a proper connection to the international rail network. The main additional transport volumes, also related to the exceptional good economic developments, have been mainly absorbed by the road mode.

In Spain there are some 245 ports, 41 of which are State-run and the remaining 204 run by Regional Governments. The State-run ports are grouped under 26 Port Authorities. Commercial ports are, in general, State owned. Their size is small or medium when compared to major European ports, their hinterlands are relatively small and, with few exceptions, included within Spanish territory (European Commission,

1998c). The main ports are Algeciras (40 million tonnes), Tarragona (31 million tonnes), Barcelona and Valencia.

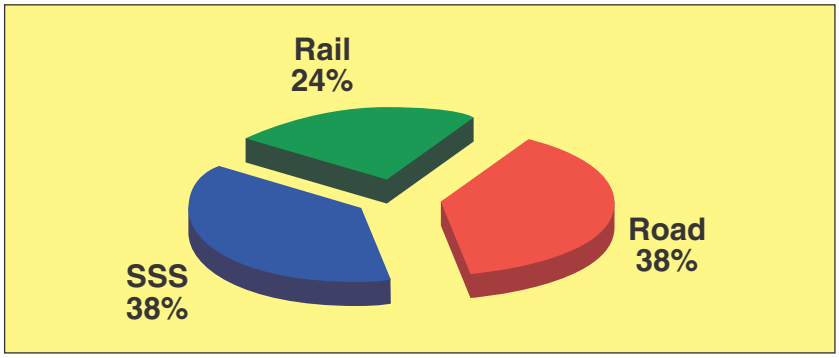
2.6.14 Sweden

For Sweden short sea shipping is the only direct like to the other EU countries and so forth of great importance. In the modal share it has the same share as road transport: 38%. Rail is also relatively important with 24% especially in linking the remote north with the south of Sweden.

	Sweden	EU-15	%
Length of inland waterways	n.a.	30.191 km	n.a.
Merchant fleet	345 ships 16,3 Mio dwt	7.970 ships 227 Mio dwt	4,3% 7,2%
Companies in waterborne mode	318	15.767	2,0%
Employees in waterborne mode	13.000	234.900	5,5%
Turnover of waterborne mode	2,72 bill €	37,27 bill €	7,3%
Turnover per employees	209.230 €	158.663 €	131,9%
Transports on inland waterways	0 Mio tkm	111.400 Mio tkm	0%
Transports by short sea shipping (Domestic)	8.000 Mio tkm	156.500 Mio tkm	5,1%
Transports by short sea shipping (Intra-EU)	22.200 Mio tkm	914.000 Mio tkm	2,4%

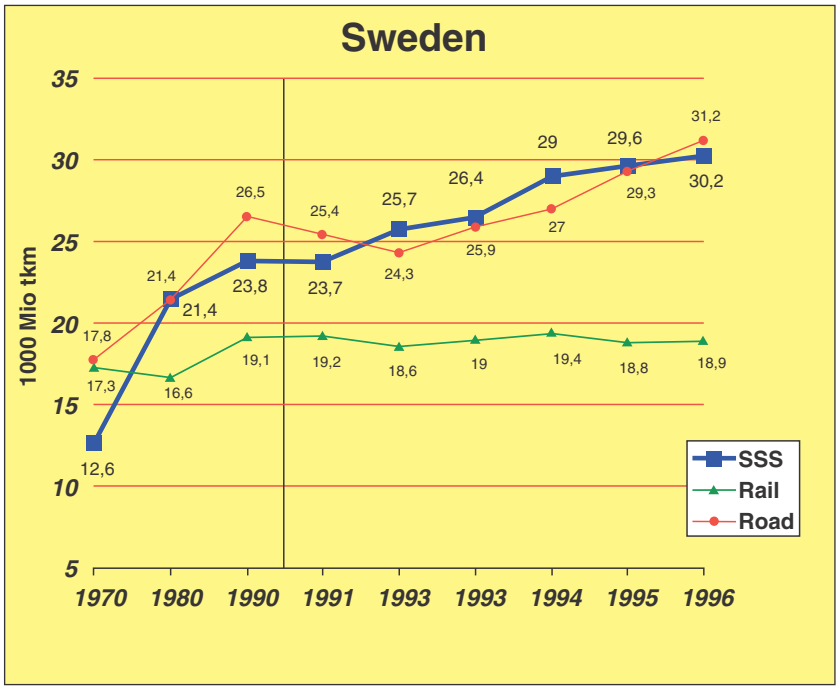
Source: Eurostat, 1999

Table 27 Figures on waterborne transport in Sweden



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 44 The modal split in Sweden 1996



Source: Eurostat, 1999 Note: SSS.....short sea shipping

Figure 45 Development of waterborne transport in Sweden (1970-1996)

In the 1970's short sea shipping managed to overtake the rail mode. Since then it is constantly competing with road transport for the dominating position. These two modes have absorbed most of the additional transport volume, while rail has stayed the same.

The Swedish fleet accounts for over 7% of the capacity of the EU fleet. The 318 shipping companies have a turnover

of 2,7 billion € and 13.000 employees. The biggest ports are Gothenburg (30 million tonnes) in the south and Stockholm.

2.6.15 United Kingdom

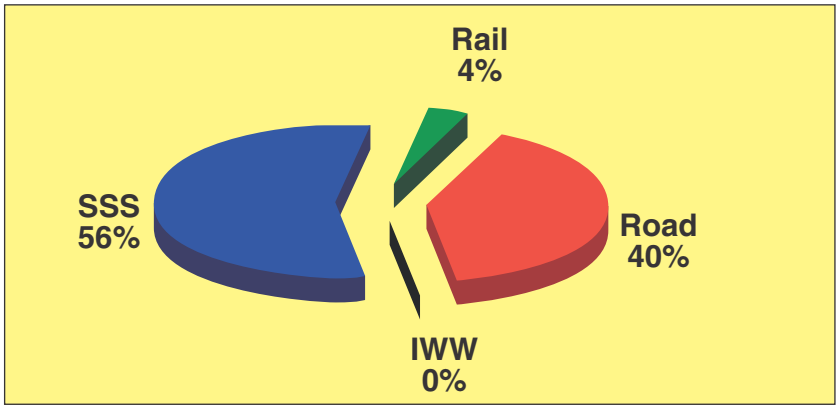
As Great Britain is an island short sea shipping is of vital importance. Only recently exists another link to the continent via the Chunnel. This importance is also reflected by the modal share: 56% for short sea shipping followed by road with 40%.

The United Kingdom has the biggest share of domestic short sea shipping in the EU with 33,9% of the total domestic EU transport. Short sea shipping has managed the biggest increases since 1970 as it more than doubled the volume, but also road transport has managed substantial increases.

	U.K.	EU-15	%
Length of inland waterways	2351 km	30.191 km	7,8%
Merchant fleet	657 ships 21,2 Mio dwt	7.970 ships 227 Mio dwt	8,2% 9,3%
Companies in waterborne mode	1.194	15.767	7,6%
Employees in waterborne mode	27.300	234.900	11,6%
Turnover of waterborne mode	4,44 bill €	37,27 bill €	11,9%
Turnover per employees	162.637 €	158.663 €	102,5%
Transports on inland waterways	200 Mio tkm	111.400 Mio tkm	0,2%
Transports by short sea shipping (Domestic)	53.000 Mio tkm	156.500 Mio tkm	33,9%
Transports by short sea shipping (Intra-EU)	159.600Mio tkm	914.000 Mio tkm	17,5%

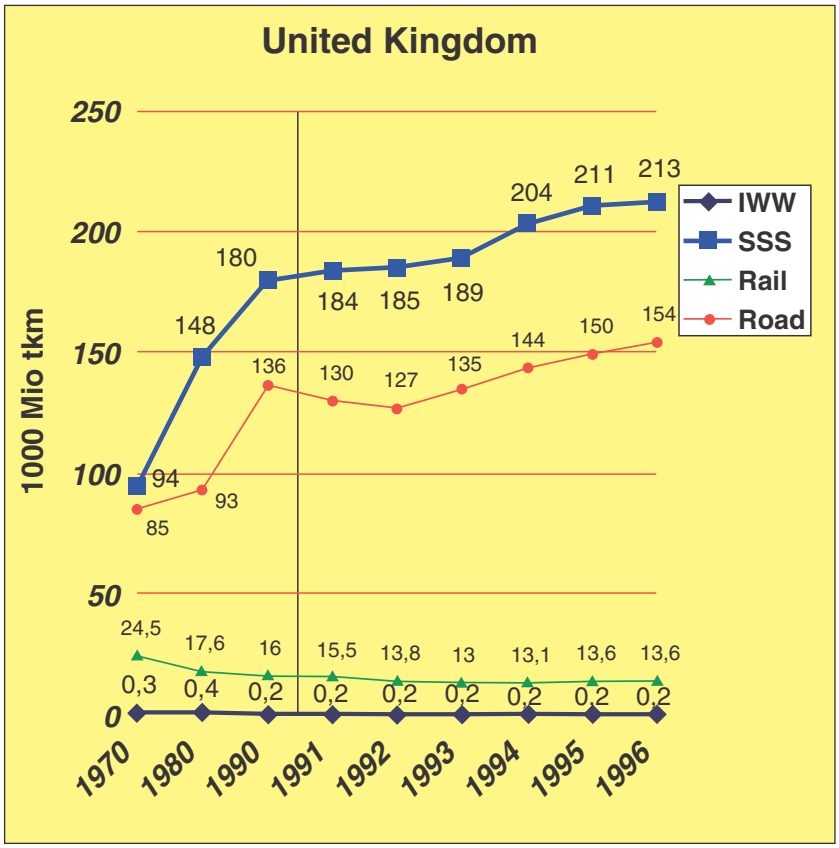
Source: Eurostat, 1999

Table 28 Figures on waterborne transport in the United Kingdom



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 46 The modal split in the United Kingdom 1996



Source: Eurostat, 1999 Note: IWW.....inland waterways, SSS.....short sea shipping

Figure 47 Development of waterborne transport in the United Kingdom (1970-1996)

Ports are essential to the economy of the UK - around 97% of all goods pass through the ports - about half a billion

tons each year - which represents some 80% of the total value of the UK trade. There are about 650 'ports' supporting diverse interests. It has been suggested there may be one port per 20 kilometres of coastline, though only about 100 ports can be said of commercial significance, with about half of all the UK tonnage passing through five major port authorities.

About three quarters of all ports (in terms of tonnage handled) are owned by private companies, some are trust ports, the smaller ports and harbours may be owned by Local Authorities and only four remain in the nationalised sector.

The UK ports are fully commercial - they receive no State subsidies and derive their revenue from ship handling and cargo handling charges. Some ports also receive income from renting or leasing part of their estate or developing surplus land as property ventures (European Commission, 1998c).

The most important seaports in the UK are London (56 million tonnes), Tees & Hartleport (51 million tonnes), Forth ports (43 million tonnes), Milford Haven (35 million tonnes), Southampton (33 million tonnes) and Liverpool (31 million tonnes). All of them are among the top 20 seaports in the EU.

3 Waterborne transportation in the European Union from the viewpoint of the four actors involved

In starting to collect information on waterborne transport, the author noticed that the views on waterborne transport differed a lot from who one ask. It occurred often even contradicting information and lots of prejudices regarding the potential, the current situation and the problems of waterborne transport. For an improvement of the situation of waterborne transport in the EU all four major players : Shippers, Operators, Port and Infrastructure as well as government are needed.

In this chapter the author tries to point out differences in assessing the situation of waterborne transport depending on the actor. This should provide a basis for better understanding, and help to improve the communication between the different actor groups. The data presented in the following chapter consists mainly of data from the empirical study undertaken by the author in the course of this research. The methodology of this survey was already described in detail in the introduction. 51 experts of the above mentioned players where interviewed, each expert answered a general set of questions as well as questions specifically related to the actors group the expert is from. The results of the general questions is described in chapter 3.1, the other chapters deal with each separate actors group.

Furthermore the author tries to point out the possible Challenges and Obstacles, which waterborne transport faces in Europe, and in whose responsibility possible solutions could fall. This very subjective views of the 51 experts interviewed in the course of this study, could maybe provide a valuable base of discussion for finding solutions to this problems.

3.1. Views on general questions on waterborne transport in the European Union by the four actors involved

The first part of the questionnaires for each group of actors include a set of 11 general questions regarding waterborne transport. In this section the author wants to present the results of this part of the study, answered by all 51 experts asked, comparing also the different position depending on the group of actors.

3.1.1 The current situation of waterborne transport and its potential

Asked on how they see the current situation of waterborne transport now, the experts gave a whole range of answers.

There were some very positive opinions like: "waterborne transport is an essential mode of transport for Europe's economy", "It is getting stronger every day especially in the north-west" or "It has an important market share in bulk/general cargo, as well as combined transport, although not promoted enough by politics".

However, a more critical opinion dominated, saying that there would be a good potential, but the services available are not fully exploited, because of various reasons and because they are not competitive enough yet. A higher potential was seen for short sea shipping and containerised waterborne transport, even with the current services available. More critical was the view on bulk transport and inland waterways except the Rhine and the hinterland of the north sea ports.

One of the main hindering factor of waterborne transport was said to be the dramatic decrease in road transport prices, which reduced the price-gap between road and water, so the advantage of low prices doesn't outweigh the disadvantages of waterborne transport anymore. Another negative aspect was named, that the traditional market for waterborne transport, where it was most effective, like the heavy or building material industry, are in a slump and often moved out of the EU to low wage countries, which reduces the EU internal waterborne transport. Furthermore, an argument against waterborne transport, which was made by most experts was its unreliability due to its dependence on the weather (especially inland waterways).

Especially the missing services for combined transport were criticised, as well as the missing and too old equipment for such services. Most experts also saw a change in the trend and predicted a good potential for the future, due to the congestion of roads and inefficient services of railways, as well as the growing environmental concerns.

Even the biggest sceptics admit that waterborne transport remains the cheapest mode for high volume, low value goods. This will get even more importance as the total quality management gets more important.

In the assessment of the current services available, there is a clear trend visible, 3/4 of the experts believe that the current availability of services would allow an increase of

cargo transported on waterways. More sceptical are those actors which don't have direct contact with waterborne transport in practice, especially shippers, and there those, who currently don't use this mode. Transport operators (94%) and ports (78%) who have direct contact with this mode, believe that an increasing share by the waterborne mode can be reached with the current services.

	Government	Ports	Shippers	Operators	Total
Yes	5	7	10	16	38
% Yes	*63%*	*78%*	*59%*	*94%*	*75%*
No	3	2	7	1	13
% No	*38%*	*22%*	*41%*	*6%*	*25%*

Source: Survey by Andreas Kubek sample: n=51

Table 29 Do you think the current availability of services would allow an increase of cargo transported on waterways?

On the question for the reason of their answer, the ones who answered YES, say mainly that there are existing overcapacities and if especially the shippers would be aware of this and review their requirements towards a transport service, from short transit times to low cost it would be easily possible to shift more cargo on this mode.

The ones who answered NO argue that the relation of cost and service is not competitive enough to compete effectively with road and rail, that the mode is not well enough integrated with other modes to allow more cargo being shifted on this mean of transport, and that the equipment they use is too old.

3.1.2 The future of waterborne transport in Europe

Looking at the future of waterborne transport, the situation is viewed more positive by all four groups of actors. 48 of the 51 experts asked see a future for the waterborne transport mode. Most of them predict a positive future of waterborne transport, due to the further integration of the different modes into the Trans European Networks (TEN), especially by using containers. Other arguments for a positive future are an increasing environmental consciousness together with new taxation models, which include the full social and environmental costs of the modes in the transport prices.

	Government	Ports	Shippers	Operators	Total
Yes	7	8	16	17	48
% Yes	*88%*	*89%*	*94%*	*100%*	*94%*
No	1	1	1	0	3
% No	*13%*	*11%*	*6%*	*0%*	*6%*

Source: Survey by Andreas Kubek sample: n=51

Table 30 Do you see a future for waterborne transport in Europe?

Others see it more pragmatic: There will be no other possibility than to use the waterborne mode more frequently, because of the limited capacities of road networks and resulting congestion, which cause substantial additional costs. The second reason is that most of the experts asked are sceptical, that the railways will be soon efficient enough to provide the additional capacities needed. Also the fact was pointed out, that the European geography to a certain extent dictates the use of waterborne transport as a necessity.

When asked for a concrete prediction of the future development, this positive impression continues, 80% predict an increase of the share of waterborne transport in the European modal split. 7 experts (14%) predict that the volume will increase, but the share will stay the same. Only 3 of the questioned experts (6%) predict a decrease. This views are the same among all the 4 actor groups.

	Government	Ports	Shippers	Operators	Total
Increase	6	7	13	15	41
% Increase	*75%*	*78%*	*76%*	*88%*	*80%*
Decrease	1	0	1	1	3
% Decrease	*13%*	*0%*	*6%*	*6%*	*6%*
Stay the same	1	2	3	1	7
% Stay same	*13%*	*22%*	*18%*	*6%*	*14%*

Source: Survey by Andreas Kubek sample: n=51

Table 31 How will the share of waterborne transport develop in the future?

This results can raise new hopes for the development of the waterborne mode. The official studies, for example one undertaken for the EU by the NEA only predict that the share of waterborne transport will stay the same (NEA, 1995a).

3.1.3 Time and value of the transported goods as factors for the modal choice

In this section the author tries to analyse the importance of time and value of goods for the modal choice. Time, because it is often seen as the main "disadvantage" of waterborne transport and value, as it can restrict the potential market for waterborne transport services to only a limited segment. Time and value of transported goods also have a direct connection: the higher the value is the more important time becomes, as value represents tied up capital and causes additional costs in interests, which increases in connection with the time.

Time also plays an important additional cost factor regarding loading units in intermodal transport, as a slower mode allows only a lower number of journeys, a higher number of loading units is needed and substantially higher costs arise. This can lead to an avoidance of waterborne transport by inter modal operators.

Asking if the value of goods is important for the modal choice there was an interesting phenomena noticeable. A majority (88%) of the shippers, which actually make the modal choice, said that value is important for the modal choice. Also ports and operators, which are directly involved in the transport process were in the majority aware of this fact. However, the majority, 6 against 2 of the experts from governments and organisations, providing the policy, the framework for the transportation, did not agree with this statement.

This could be viewed as an deficit of practical knowledge by policymakers, regarding how decisions are made within the transport sector. If so this would undermine the need for an increased communication and better under standing among the different actors, to be able to achieve optimal results.

	Government	Ports	Shippers	Operators	Total
Yes	2	7	15	12	36
% Yes	*25%*	*78%*	*88%*	*71%*	*71%*
No	6	2	2	5	15
% No	*75%*	*22%*	*12%*	*29%*	*29%*

Source: Survey by Andreas Kubek sample: n=51

Table 32 Is value of the transported goods of importance for the modal choice ?

The reason for the importance of value is not only the tied up capital and its costs, but also another: If one has high value goods, the share of transport costs is a very low one, and a slight decrease doesn't make a big difference, that is why there is a higher tendency towards the more expensive modes, which are also often viewed as more secure due to less handling needed. On the other hand with low value goods, transport costs represent a big share of total costs and its level is decisive, for the product profit.

The value of goods can sometimes also be used as an indicator for the quantity of goods transported, as low value goods are often transported in big volumes, e.g. raw materials, building material or agricultural products, all typical goods transported on water. But actually the waterborne mode would be well suitable for high value goods, taking the risk and security into account. The accident statistics show that waterborne transport is much safer than road transportation and the risk through the multiple handling has been also reduced drastically by the increased use of containers. Nowadays waterborne transport is suitable for all kind of goods.

The results to the question if time is important for the modal choice were more clear. The majority of all 4 actor groups (88%) said that time is an important factor. But this doesn't necessary mean that the time has to be minimised. Many experts expressed their regrets, that still too much emphasis is put on how fast a mode is. This should be changed to how predictable and reliable the transport time of an mode is.

Due to new organisational concepts like just in time, the on time delivery is sometimes more important than the fastest delivery. Goods transported on the waterway could be viewed as floating stock, which allows to reduce the number of actual stocks kept, as it arrives when it is needed. Further more, some experts expressed the view, that the planning process of the transport needs by the shippers are too short notice, and little advanced planing would allow more time between the order and delivery.

These change in attitude from the fastest to the most predictable and reliable transit time, could proof to be a possibility for the waterborne mode to compete even in the factor time. However, one should not forget, that reliability is a big weakness of waterborne transport, especially on inland waterways. This is caused by its dependence on the weather. If a road is not passable the truck easily finds a detour, for a inland waterway vessel this is not possible.

	Government	Ports	Shippers	Operators	Total
Yes	7	8	14	16	45
% Yes	*88%*	*89%*	*82%*	*94%*	*88%*
No	1	1	3	1	6
% No	*13%*	*11%*	*18%*	*6%*	*12%*

Source: Survey by Andreas Kubek sample: n=51

Table 33 Is time an important factor for the modal choice?

Another weak point regarding the predictability of waterborne transport are the ports. Their services are still difficult to calculate, this could be improved by more efficient port organisation, and an increased communication between ports and operators with the help of modern communication technology. If the operator transmits already all the data needed before the ship arrives via EDI, the port can already finish all the necessary formalities upon arrival of the vessel.

3.1.4 Current transport costs a competitive disadvantage for waterborne transport?

Another problem today's transport policy is confronted with, is the call for a fair and efficient pricing, which includes the full social and environmental costs. More details on the concept of internalising the external cost of transportation, were already given above in chapter 1.3.2. .
An interesting question regarding waterborne transport, which is said to have an comparative advantage towards the landborne modes, because it is more environmental friendly and less infrastructure (especially short sea shipping) and maintenance is needed, is if the experts think that the lack of such a pricing structure leads to a clear distortion of the competitive situation of waterborne transport.

	Government	Ports	Shippers	Operators	Total
Yes	5	2	7	13	27
% Yes	*63%*	*22%*	*41%*	*76%*	*53%*
No	3	7	10	4	24
% No	*38%*	*78%*	*59%*	*24%*	*47%*

Source: Survey by Andreas Kubek sample: n=51

Table 34 Do you think current transport costs, which do not reflect the full social and environmental costs, have lead to a clear distortion of the competitive situation of waterborne transportation?

To this answer no clear pattern was visible In total 27 experts agreed that this leads to a distortion of the competitive situation, 24 said it does not. Most of those who agreed said that including the external costs in the prices would lead to an advantage of waterborne transport, only one said it would lead to a disadvantage for shipping on inland waterways as these are heavily subsidised by the state.

Regarding groups of actors, Government and Operators tended to agree more, while the majority of Ports and Shippers tended to disagree. For disagreement no clear explanations were given. This maybe could be explained by the fact that governments, who currently have to come up for the costs caused by externalities, and operators who are in direct competition with the other (now too cheap) modes, are confronted with this problems directly, and a greater awareness exists, whereas shippers and ports are not so directly confronted and the awareness is not yet so high.

3.1.5 Key problems for the acceptance of waterborne transport

One of the key parts of this study was to find out, were the different actors see the key problems for the acceptance of waterborne transport. To evaluate this, all questioned experts were given a list of 16 pre-listed problems and the possibility to add more, then they had to rank these problems in the order of their importance. To make it comparable, each rank was associated with a number points[7] which decreased over-proportional to the rank and the sum of each actors group was divided by the number of actors, to receive the average points given by expert and allow a direct comparison between actor group.

		Government	Ports	Shippers	Operators	Total
1.	Time	6,88	4,22	9,12	8,35	7,65
	% of total points	*10%*	*6%*	*13%*	*13%*	*11%*
2.	Pre- and on-carriage costs	6,75	8,44	7,82	6,82	7,43
	% of total points	*10%*	*11%*	*11%*	*11%*	*11%*
3.	Flexibility	6,50	3,89	8,88	7,12	7,04
	% of total points	*9%*	*5%*	*13%*	*11%*	*10%*

7 the most important was 20Pts, 2nd 15Pts, 3rd 12Pts, 4th 10Pts,....,7th 4Pts,8th 3Pts, 9th 2Pts ...

	Government	Ports	Shippers	Operators	Total
4. Mentality and attitude of shippers towards waterborne modes (Image)	11,50	6,22	3,41	8,53	6,88
% of total points	*16%*	*8%*	*5%*	*14%*	*10%*
5. Port handling costs	6,25	4,33	8,12	5,59	6,31
% of total points	*9%*	*6%*	*12%*	*9%*	*9%*
6. Lack of inter-connectivity at the ports (e.g. lack of railway connections)	1,50	8,11	8,41	3,00	5,47
% of total points	*2%*	*11%*	*12%*	*5%*	*8%*
7. Mentality and attitude of operators	4,88	10,56	3,41	2,24	4,51
% of total points	*7%*	*14%*	*5%*	*4%*	*7%*
8. Availability	3,63	3,22	4,59	3,24	3,75
% of total points	*5%*	*4%*	*7%*	*5%*	*5%*
9. Structure of the shipping industry	6,75	1,11	1,82	4,94	3,51
% of total points	10%	1%	3%	8%	5%
10. Discrimination vs. land transportation regarding taxation and other legislation	0,75	5,44	2,29	2,88	2,80
% of total points	*1%*	*7%*	*3%*	*5%*	*4%*
11. Customs procedures	1,38	7,56	1,41	1,53	2,53
% of total points	*2%*	*10%*	*2%*	*2%*	*4%*
12. Port working hours	2,00	2,33	1,71	2,35	2,08
% of total points	*3%*	*3%*	*2%*	*4%*	*3%*
13. Administrative barriers	4,63	1,33	0,00	1,53	1,47
% of total points	*7%*	*2%*	*0%*	*2%*	*2%*
14. Too expensive and inadequate pilot services	0,63	1,78	1,41	0,76	1,14
% of total points	*1%*	*2%*	*2%*	*1%*	*2%*

	Government	Ports	Shippers	Operators	Total
15. Quality of equipment used	0,00	0,89	1,59	2,00	1,35
% of total points	*0%*	*1%*	*2%*	*3%*	*2%*
16. Waterlevel	2,50	2,22	0,00	0,88	1,08
% of total points	*4%*	*3%*	*0%*	*1%*	*2%*

Source: Survey by Andreas Kubek sample: n=51

Table 35 Key Problems of waterborne transport ranked in importance (average points given by experts)

Time as a problem of waterborne transport has been already described in chapter 3.1. The majority of experts asked in this survey sees there the key problem for shipping, especially shippers and operators. However, well-planned and co-ordinated operations can overcome this problem if transit stock is included in the overall planning process. On a corporate level, lead times are under constant monitoring.

The main focus is the time during which the goods remain in warehouses. By looking further, one will find that the goods are efficiently, quickly, and expensively transported to the warehouses, which act as distribution centres. There, the goods may remain for weeks or months. Hence, the speed and efficiency of the transport is in vain(F&L, 1998).

Overall planning and operations control can be used to overcome this unbalanced situation. One way of doing this is to regard goods in transit as if it would be staying in the warehouse, lets say as "Floating Stock". The time spent in transport would then become part of the lead-time. Such planning should allow for slower and more economical transport, opening up the possibilities for increased use of inland waterways and short sea shipping. Urgent call-off orders could use the "old" quick transport method, while the bulk of the orders would arrive in transit stock.

The second in this ranking of key problems are ***Pre- and on-carriage costs*** which have received almost the same number of points as Time. Pre- and on-carriage cost to/from ports can represent a major share in the total transportation cost due to minimum tariffs which are applied in certain countries, i.e. local legislation can penalise efficiency. These minimum freight tariffs can represent an important share in the overall transportation cost, as they are often time-based and inefficient port operations slow down the process.

This generally is one of the key problems of intermodal transport. Hopefully, now as legislation is committing itself towards intermodal transport, also the national laws are changed to support this new trend in transportation. Also as more and more intermodal operators are entering the market this situation hopefully improves, as they undertake the pre- and on carriage services themselves. Hopefully also ports move from a unimodal to a multimodal approach in transportation and adjust their services according to the new transport needs.

Slightly behind those two problems is ***Flexibility***, which itself received 10% of the total points. Trucks are not dependent upon specific routes and the drivers may adapt to varying traffic conditions as they occur. Further, the capacity supplied can easily be adapted to demand. This problem has also already been targeted more in detail above.

Another key problem which also has received 10% of the total points is the ***Mentality and attitude of shippers towards waterborne modes (Image)***. This is probably the most unnecessary and theoretically easy to solve problem. One of the targets of this research is to substantially contribute to solving this problem, by drawing an objective picture of the current situation in shipping. This will hopefully allow shippers to assess the potential of waterborne transport better and improve its acceptance.

The general belief is that shippers have cargo control, as shown also later in this survey, and therefore can select the transport mode in line with their own requirements and preferences. However, the degree to which a shipper can take influence on the transportation mode also largely depends on the extent to which a company values and includes transportation in its total supply chain.

Political, strategic decisions of concentrating a company's activities on core functions such as research, manufacturing and sales, generally lead to a change in cargo control, i.e. either the customer arranges transportation (sales terms: ex factory or FOB) or the transportation function as a whole is outsourced. In both cases, someone else - but no longer the shipper -will decide on the transportation mode. This will make co-ordination more difficult and the current transport patterns will, most likely, be maintained (F&L, 1998).

Another phenomenon with an impact on the selection of

the transportation mode and which has considerably gained in importance in the last years, is the general reduction in working capital. Stock levels are reduced to the strict minimum at both ends and any disturbance (e.g. planning errors, misunderstandings, strikes etc.) in the supply chain leads to urgent deliveries. Considering that much higher cost would result from an interruption of the supply chain and/or to satisfy the customer, the fastest transport method (even at higher cost) is selected and environmental considerations get low priority, if any.

Rationalisation of corporate organisation structures which have been very frequent in the past years have lead to absolute minimum staffing of transport departments at factories or head offices. The head count in transport departments is frequently determined by a historic number of orders handled and is just sufficient to cover the basic needs within routine functions. Time pressure to cope with the current workload, combined with the natural human reluctance to change, result in another important element, which hinders the possible shift to alternative transportation methods.

Nevertheless, as the problems in these traditional transport chains increase, and the transport costs will be more under review, the need for new transport solutions will become more obvious and pressure to change will mount. Then with the help of better marketing by the shipping industry itself, this problem could be solved, and waterborne transport could become an interesting alternative.

As mentioned already in the chapters before, ***Port handling costs*** are a substantial burden on waterborne transport. Also the experts have seen this as one of the key problems, ranking it 5th with 10% of the total points. Especially shippers criticised this fact.

Port handling cost is excessively high in a number of seaports in comparison with the services provided. This can be applicable on the vessel operating side but has been noticed in container handling. Lack of transparency in the structure of port dues is frequent and does not encourage the development of short sea operations. It should be noted that when a vessel calls upon a port to discharge only a fraction of its cargo, port dues are frequently calculated on the basis of the vessel's total cargo volume, not limited to the volume to be discharged.

Port costs may vary significantly with geography. A Norwegian study, made by the Institute for Transport Economics, shows a difference in port cost such that the highest level was twice that of the lowest.(F&L,1998)

The ***Lack of interconnectivity at the ports (e.g. lack of railway connections)*** plays an sufficient role in the opinion of many experts. This is one of the key problems of waterborne transport, and has received 9% of the total points. It is interesting that Ports and Shippers give this a very high priority, while Operators and Governments don't seem to so such a great problem.

As one can see in this survey, in the following chapter, ports are generally connected to several modes. Most ports have road and rail access. However, the pure availability of a rail access is not enough. If the railway has no direct access to the mole, but the goods have to be loaded from the vessel onto a truck and brought to the rail terminal, the connection is not sufficient, because the costs become much higher and the time factor increases dramatically.

Generally the argument was given, that the current port structure in Europe is still very much focused on unimodal waterborne transport, but the additional needs which arise out of intermodal transport, are not being able to be satisfied by the current infrastructure, equipment and procedures.

The ***Mentality and attitude of operators*** was ranked by the ports as main problem of waterborne transport . In total it only reached 7th place. Some of the arguments given for this choice, were too individualistic, no interest in modern management techniques and very bad marketing. Some experts went so far to say, that it is just very difficult and tiring to deal with them. One of the major problems is that this industry has a very low lobbying level and, as a consequence, public funds made available to optimise the infrastructure are completely insufficient. Regional initiatives find it difficult to get the necessary support at the decision level.

Furthermore, many shippers are focusing on keeping the cost of waterborne transport (from quay to quay) to a minimum. Consequently, the commercial strength of the individual operators has become limited. As a result, a significant part of the European fleet for short sea shipping has

grown to be quite old. In some areas the average fleet is above 35, making the vessels unfit for modern, intermodal transport. The current state of economic affairs with the operators also indicates inability to renew the fleet, unless new business opportunities emerge from the shippers. The apparent lack of willingness to co-operate does not help to improve this situation. However, here also is to mention that a high number of the Operators interviewed in this survey are co-operating with other Operators.

As far as marketing of services is concerned, the operators face specific individual problems (F&L, 1998):

- *Barging, Inland waterways:* In particular barging and inland waterways do have an old fashioned image and are generally viewed as the transportation mode for mass cargo only. Each operator markets his services individually and can reach a limited number of potential customers only; i.e. the actual impact is very limited and largely depends on the initiative of the individual operator. Marketing of services appears also to be concentrated on forwarders and a few direct customers (mainly for mass/bulk cargo) but very, very little is done to reach major shippers directly.

- *Short sea:* The until recently National restrictions on Domestic cabotage traffics, which have just disappeared for EU/EEA flags, have made it so far difficult to fully utilise the capacities that are actually available. A certain improvement can be now be expected - although foreign flag carriers, even if they would have sufficient volumes to fill own feeder vessels, will continue to be obliged to seek either alliances with their EU competitors or use specialised EU operators. This protection of EU operators, although it has certainly its merits, limits competition and results in a lack of interest on the deep-sea operator's side to efficiently operate, sell and develop services further.

Availability is seen by most of the experts a serious, but not the most important problem of waterborne transport today. It receives 5% of the total points. The problem has already been mentioned and explained in the previous chapters. Basically it is a competitive disadvantage towards the truck, which may arrive and leave at any time, is easy accessible and offers door-to-door logistics, waterborne transport often cannot offer.

The ***Structure of the shipping industry*** is also seen a an important, but not one of the most important problems and like Availability, it has received 5% of the total points. This result came a little surprising, as the author would have reckoned that especially the Shippers would have seen a bigger issue in this problem, which is the following:

The European industry is very fragmented an consists out of many little companies. This results in the problem, that each company alone only offers a very limited service. To be attractive, it would be better to have a bigger organisation controlling and co-ordinating the different small companies. It was suggested that national combined transport platforms, like they exist for the railways(Kombiverkehr, Ökombi...) should be formed. The concentration tendencies also in the shipping industry will also help to improve the situation.

Discrimination vs. land transportation regarding taxation and other legislation has received 4% of the total points and is of different importance in the different countries of the EU:

In some countries, waterborne cargo is taxed differently than land transportation modes. These additional fees unnecessarily increase the cost of short sea operations. Here an example: Waterborne transport has to pay cargo-, quay, and port dues based on the volume and frequency of traffic in order to utilise public ports, while road transporters are limited to paying road tax and toll. (F&L, 1998)

National legislation treats waterborne cargo often very differently from the other transport modes. Whereas land transportation formalities are becoming more and more simplified, cargo leaving a country by sea undergoes full export formalities and the related complications. E.g. T3 tax in Spain. Here also an example: There is a difference between ADR and HAZMAT (IMO) regarding transport of dangerous goods. The rules for waterborne transport are stricter than for road transport, enabling transport of such goods in cities and populated areas. (F&L, 1998)

Customs procedures were mainly seen by Ports as an important key problem, but in total also only received 4% of the points. Basically the problem is as follows: Trucks moving from one EU country to another have to comply with very simple customs procedures, if they have to clear cus-

toms at all. Ships, however, moving from one EU port to another, have to comply with full customs procedures as if it came from an intercontinental port. (F&L, 1998)

The EU Commission has taken the initiative to develop what may be called a "cargo black box" (CBB). The CBB is similar to the voyage recorders used in aeroplanes in that it records every movement of the ship while at sea. When a vessel carrying a CBB arrives at a port, the customs authorities will inspect the CBB to verify if the vessel really arrives from another EU port and that she has not made any improper stops on route. If this inspection is satisfactory, the intention is that only simplified customs procedures should apply. This is a very important initiative on behalf of the EU Commission, to make it easier for waterborne transport to compete with trucks on equal terms.

Here some of the other problems, which are only seen to have secondary importance, compared to the ones mentioned before:

Port working hours: Differences in National labour rules/working hours often lead to considerable waiting times, which the operator has to include in its schedules and cost. Here again, the operational efficiency is being penalised.

Example: In Nordic ports, there are practically no night- or weekend shifts. Furthermore, operators are to pay for full shifts in port, even if the loading or unloading operations are stopped due to weather conditions (F&L, 1998).

Too expensive and inadequate pilot services: Pilot services are often inadequate and overprotected in a number of EU countries. The corresponding taxes are high, set locally and are not in line with actual services provided.

Here an example: The lake Saimaa area and its canal system provide a very important waterway system for Finnish industry. The total length of fairways (deeper than 4.2 m) is 778 km. For navigation in the Saimaa region, pilotage is compulsory. The average pilot distance in the region is 280 km, while the average distance of harbour pilotage (in coastal waters) is approximately 33 km. The pilotage fee is paid per kilometre. From 1988 the pilotage fee has been increased annually. In 1997 it was more than doubled compared to 1988. This hits very hard on the inland water-

way transportation, where pilotage fees comprises approximately 2/3 of the overall port disbursements (F&L, 1998).

Waterlevel: Seen by all operators on inland waterways and of inland ports as the key problem for waterborne transport on inland waterways. The problem has been already discussed in detail before, it is only to mention again, that the unreliability of waterborne transport on inland waterways resulting out of this problem is of such importance that it keeps many shippers from using inland waterway navigation at all.

Other problems mentioned were the ***Quality of equipment used, Administrative barriers, Marketing skills, Quality of service, Missing services in combined transport, and Availability of pre- and on-carriage equipment.***

These were the results of the total survey among all the actor group. It is also to bare in mind that the results of the total are of course strongly depending on the size of the sample. The author has the decided as stated already in the chapter on Methodology before, to give Operators and Shippers a significant greater importance than Ports and Governments, representing their importance within the whole process of waterborne transport.

So the results of the total survey are influenced stronger by the Operators and Shippers. In the following section the author want to compare the different viewpoints regarding the key problems of each actor group which shows significant differences.

	Shippers	Total
1. Time (1.)	9,12	7,65
2. Flexibility (3.)	8,88	7,04
3. Lack of interconnectivity at the ports (e.g. lack of railway connections) (6.)	8,41	5,47
4. Port handling costs (5.)	8,12	6,31
5. Pre- and on-carriage costs (2.)	7,82	7,43

Source: Survey by Andreas Kubek sample: n=17

Table 36 The top 5 problems of waterborne transport from the viewpoint of Shippers (average points given per expert)

Shippers see time and flexibility as the two most important problems of waterborne transport. This corresponds almost with the results of the total sample. Interesting is that the lack of interconnectivity at the ports comes already 3rd while in the total sample it is only ranked 6th. Then shippers are still concerned about Port handling costs and pre-and on carriage costs, which was ranked in the total sample 2nd but among Shippers is only the 5th important.

Generally it is to say that the results correspond with the criteria for modal choice, which are described in detail in the next chapter. Also there, quality of service, time and cost as well as flexibility play an important role. The key problems identified by the Shippers point out were waterborne transport cannot meet their criteria for modal choice.

It is also interesting that the self-criticism by the Shippers was quite low as the mentality and attitude of shippers towards waterborne transport was seen as an very unimportant problem, totally in contradiction to the results of the other actor group, which see there the main issue. This could be an incentive for Shippers to rethink their position, and maybe analyse if there current mindset towards transport modes is still appropriated or might be driven by prejudices.

	Operators	Total
1. Mentality and attitude of shippers towards waterborne modes (Image) (4.)	8,53	6,88
2. Time (1.)	8,35	7,65
3. Flexibility (3.)	7,12	7,04
4. Pre- and on-carriage costs (2.)	6,82	7,43
5. Port handling costs (5.)	5,59	6,31

Source: Survey by Andreas Kubek sample: n=17

Table 37 The top 5 problems of waterborne transport from the viewpoint of Operators (average points given per expert)

Operators see the main problem in the attitude of the Shippers. Otherwise they results more less reflect the results of the total sample. Although it can be said that time an flexibility, the traditional disadvantages of waterborne transport are a little overestimated, while problems concerning the potential of intermodal transport are a little under estimated. The reason for this, might be, that Operators, are

still a little too focused on the unimodal, not the intermodal approach of their service. They should maybe try to focus more on making waterborne transport more suitable for intermodal transportation and not compare it to other modes.

	Government	Total
1. Mentality and attitude of shippers towards waterborne modes (Image) (4.)	11,50	6,88
2. Time (1.)	6,88	7,65
3. Pre- and on-carriage costs (2.)	6,75	7,43
4. Structure of the shipping industry (9.)	6,75	3,51
5. Flexibility (3.)	6,50	7,04

Source: Survey by Andreas Kubek sample: n=8

Table 38 The top 5 problems of waterborne transport from the viewpoint of Governments and other organisations (average points given per expert)

The most interesting result of the survey among governments compared to the total sample, is the high importance which is given to the problem "structure of the shipping industry". This is probably due to the fact that they analyse the industry as a whole, while the other three actors only see a smaller sample of the industry, they are confronted with. That is why this problem should be given again more consideration by the other actors.

	Ports	Total
1. Mentality and attitude of operators (7.)	10,56	4,51
2. Pre- and on-carriage costs (2.)	8,44	7,43
3. Lack of interconnectivity at the ports (e.g. lack of railway connections) (6.)	8,11	5,47
4. Port handling costs (5.)	4,33	6,31
5. Mentality and attitude of shippers towards waterborne modes (Image) (4.)	6,22	6,88

Source: Survey by Andreas Kubek sample: n=9

Table 39 The top 5 problems of waterborne transport from the viewpoint of Ports (average points given per expert)

The results of the Ports actors group, was the most different one compared to the total sample. Only pre-and on carriage costs and the mentality of the shippers are also under the top 5 of the sample. The mentality and attitude of Operators was given an amazingly high importance with an average of over 10,5 points by each expert. Compared to an average of 4,5 points by the total sample. This might be a result of daily confrontation with this actors group, and day to day problems, but which give them also a very good insight into the shipping industry. This result also has to be taken seriously by Operators and could lead to a little more self-criticism.

The Ports had been quite critical on themselves, identifying the port handling costs and port interconnectivity, which lie partly in their responsibility as two of the main problems of waterborne transport today. This awareness is already a big step in the right direction.

3.1.6 Who could do most to improve the competitive situation of waterborne transport?

Another interesting point of this study, was to find out who in the eyes of the different actors could do most to improve the situation of waterborne transport in Europe. Multiple nominations where possible:

	Government	Ports	Shippers	Operators	Total
Operators	6	6	9	10	31
%	*75%*	*67%*	*53%*	*59%*	*61%*
Shippers	1	6	8	9	24
%	*13%*	*67%*	*47%*	*53%*	*47%*
Infrastructure providers	6	2	13	7	28
%	*75%*	*22%*	*76%*	*41%*	*55%*
Legislative bodies or other organisations	6	8	6	6	26
%	*75%*	*89%*	*35%*	*35%*	*51%*

Source: Survey by Andreas Kubek sample: n=51

Table 40 Who could do most to improve the competitive situation of waterborne transport?

Looking at the total results one can see that each actors group was held equally responsible, operators the most(61%), but also all other have been nominated by around 50% of the experts. However, in analysing the pattern of responses by each actors group individually, interesting differences can be found: Governments held Ports, Governments and Operators equally important, but shippers where only nominated by one expert. To the opposite, Operators held themselves and the Shippers for more important and in ports and especially governments they saw only secondary importance, in their comments it was made clear, that Governments and ports have to provide the important framework for their operations, which has to be efficient, but the to be competitive, the operators have to work most efficient and the shippers have to be willing to use the waterborne mode.

Interesting is also, that the shippers saw most room for improvement in the hands of the ports and other infrastructure providers. Also they only want government intervention as a secondary measure, whereas Ports saw an important responsibility with the legislative bodies. But most of the experts also stated that an improvement can only be reached if all 4 actors work efficiently together and come up with well co-ordinated measures.

The author also asked the experts of what measures would be needed to improve the current situation. Most of the experts of all four actor group asked for a joined initiatives, which involve all four actors. More details on what should be done by each actor group is showed in the next chapters.

3.2. Waterborne transport from the viewpoint of the Shippers

In this part the author was looking for important facts on the shipper side, which can be of importance to understand its part in the transport chain (see also questionnaire for shippers in the Annex). A better understanding of the shippers part and its needs can be of importance for all the three other actor groups, especially for the operators, as it allows them to provide the shipper with a better transport service more suitable for the shippers need. This section should be a small contribution to this better understanding.

3.2.1 The structure of the sample

For the group of the shippers 17 companies were chosen from different industries and different parts of Europe, although most of the act globally or at least Europe wide. The industries range as far as from steel, wood and paper as well as building material and chemical industries to electronics, automotive, food and consumer goods. All of the companies are big players in Europe and account for a substantial part of the European cargo.

Of course a special emphasis was made on industries, which have high volume of transported goods and on those who to a substantial part are using already waterborne transport (approx. 2/3 of the sample), like the for example the chemical industry. However also companies producing goods not "typically" transported on the water like electronics, food and consumer products are included in the sample.

The exact list of the companies included in the sample can be found in the Annex.

3.2.2 Overview of the transport services shippers are using and what criteria are used for the modal choice

The goal of this section was to find out how the transport services shippers are using are structured:

- What modes do the companies currently use?
- What are their criteria for modal selection?
- Does the demand for transport services have seasonal fluctuations?
- And what transport units are shippers currently using and what are their preferences?

The analysis showed that all asked shippers are currently using road transport, at least in combination with other modes in combined transport. Regarding waterborne transport it was interesting that 71% of the questioned shippers are already using waterborne transport, the same share as railways. This high result for water and rail might also be explained by the choice of the sample, as 2/3 of the sample are industries typically using waterborne transport due to the type of cargo needed.

		Nr.	%
Road transport		17	*100%*
Railways		12	*71%*
Waterborne transport		12	*71%*
Airborne transport		3	*18%*
Pipeline		4	*24%*
Combined transport:		11	*65%*
Which modes?	Road & Rail	8	*73% of combined*
	Water & Road	9	*82% of combined*
	Water & Rail	3	*18% of combined*

Source: Survey by Andreas Kubek sample: n=17

Table 41 What are the main means of transport you are using?

Another result, verifying the statements made in the chapter1.3.1., is the high use of combined transport. 2/3 of the questioned shippers use a combination of different modes to fulfil their transport needs.

Naturally the combination of road & rail has a big share, mainly intermodal transport, this is due to strong support by government initiatives and national organisations for combined transport, which are all part of UIRR like Kombiverkehr (Germany), Cemat (Italy) or Ökombi (Austria) except Intercontainer. They are helping to increase the competitive situation of combined transport by road and rail as they are joined companies of rail and road operators and freight forwarders. The majority of this transport is done by swap bodies, in 1997 a share of 71% (Eurostat,1999).

The interesting finding of this survey is, that among shippers combined transport by water and road has an even slightly bigger share than rail-road. 8 out of 11 shipper using combined transport use a combination of water and road. Mainly these are containerised goods or bulk cargo. The survey also proofs that road is the most effective mode for the initial and/or final leg. A combination of rail and water is only used by 3 companies, mainly containers.

After having assessed the current situation of the modal share, the author wanted to find out what are the main criteria for the modal selection. This is essential for being able to asses the transport needs of shippers and to improve the competitive situation of waterborne transport.

	Nr.	%
Cost	132	29%
quality of service	111	24%
Time	75	16%
Flexibility	59	13%
Availability	50	11%
value of goods	16	4%
environment friendly	9	2%
door to door	4	1%

Source: Survey by Andreas Kubek sample: n=17

Table 42 What are the main criteria for your selection of a transport mode (rank in importance by number of points[8])

As the main criteria Cost was chosen, it received 29% of the possible points. This would be an important competitive advantage, as waterborne transport is the cheapest transport mode. The problem as mentioned already before is that waterborne transport often has to be operated as combined transport, and that the relatively high pre- and on-carriage costs as well as the port handling costs cannibalise this advantage. The main goal probably must be to reduce this cost and so effectively establish this competitive advantage.

Just after cost with 24% of the total points comes ***Quality of service*** as the second important criteria. Here waterborne transportation has still some deficits, but it is no as bad as its reputation. One of the main problems is that waterborne transport has many uncertainty factors, like weather, port handling time..., which make it more unreliable than e.g. road transport and so reduce the quality of service.

The third important factor is ***Time*** with 16% of the points. This, as mentioned also before, is one of the big disadvantages of waterborne transport. Also here waterborne transport is better than its image, on some routes it can be even faster than road or rail. Most of the time in waterborne transportation gets lost in the ports, an European study (European Commission, 1995a) found that European short sea vessels spend only 40% of the time sailing and 60% of the time in ports. Asked in this survey most of the experts

8 the most important was 10Pts., 2nd 7Pts., 3rd 5Pts., 4th 4Pts.,5th 3Pts., 6th 2Pts. and the 7th 1Pt.

among operators and ports agreed with this findings and stated that there is room for improvement. On the other hand, many shippers also stated, that it is getting not so important how fast a mode is, but that it arrives in time. When waterborne transport manages to speed up its reliability than it can be competitive.

These three points accounted for almost 70% of the total points given. As secondary, but still reasonable important are ***Flexibility*** (13%) and ***Availability*** (11%). Flexibility is compared to the road, a bigger problem for waterborne transportation. Geographically it is limited on waterways and relies on other modes to cover the distance from the waterway to the customer. Also time wise it has its limitations regarding flexibility. As waterborne transport is carrying high volumes of goods it is often serving not only one but more customers with the same vessel, that makes it more inflexible towards specific needs of a single customer.

Regarding ***Availability*** waterborne transport is much better than its reputation. As already shown in the chapters above there exists a big number of connections. A study by the European Freight and Logistics Leaders Club (F&L, 1998) identified more than 650 short sea shipping links and 700 ferry links in Europe. Also the author has demonstrated in the Chapters before, that big over capacities exist, especially on inland waterways.

Other criteria for modal selection are ***value of goods, environmental friendliness*** and ***door-to-door service***. How waterborne transport can meet these criteria was already demonstrated above.

Asked to what extend the shippers have influence on the modal selection, most of them said they had total control on the selection, or were only influenced by the corporate vision. Some said that also the customer receiving the goods has an important part in the decision.

As one can see in the table 43 most of the shippers have no seasonal differences regarding the demand for transport service, except the holiday period in summer where some companies are closed and the Christmas holidays.

	Nr.	%
Yes	2	13%
No	13	87%

Source: Survey by Andreas Kubek sample: n=17

Table 43 Are there seasonal differences regarding the demand for transport service?

Factor which the study was analysing, is which transport units the shippers are currently using and which ones they would prefer to use. This is especially of importance for intermodal transportation. The author also asked operators which transport units they are able and which the prefer to carry. A comparison of this results should give some indications, if waterborne transport operators can fit the transport needs of the shippers.

	Nr.	%
bulk	8	47%
container	12	71%
swap-body	8	47%
tank	4	24%
trailer	8	47%
other	1	6%

Source: Survey by Andreas Kubek sample: n=17

Table 44 What kind of transport unit do you normally use?

	Nr.	%
bulk	5	29%
container	13	76%
swap-body	9	53%
tank	2	12%
trailer	5	29%
other	3	18%

Source: Survey by Andreas Kubek sample: n=17

Table 45 What kind of transport unit would you prefer to use?

The result show that containers are the most utilised and also the preferred transport unit, followed by swap-bodies, trailers and bulk. There were no clear differences between used and preferred transport units visible, except a trend

towards transport units which are compatible for intermodal transport: containers and swap-bodies. Swap-bodies have the advantage over containers, that they can be loaded also from top or the side, while containers only can be loaded from the front. The disadvantage of swap-bodies for waterborne transport is, that they cannot be stored on top of each other, that is why it is mainly utilised in railroad transport.

Another important issue that has to be mentioned regarding transport units is the standardisation of its dimensions not only in Europe, but also globally. The American ISO norm and the European DIN norm have different dimension inside. In the European container two rows of Euro-pallets fit, in the American ones not. Most deep sea containers are ISO norm. Standardisation is very important to ensure compatibility of all elements in the intermodal transport chain. It is a prerequisite for a competitive intermodal transport.

3.2.3 The shippers attitude towards waterborne transport

In this section the author wanted to find out to what extent and how waterborne transport was used by the shippers or their competitors in the same type of industries. Further more he wanted to find out which of the above mentioned criteria for modal selection waterborne transport cannot meet in the eyes of the shippers. For the future the author also tried to find out, when and how, as well as for what type of cargo and on which routes waterborne transport could be of interest for the shippers.

To start with the current usage of waterborne transport by the questioned shippers: The 12 shippers (out of 17) who are currently using waterborne transport use it mainly for inbound transportation of materials used for the production process, here bulk and liquid are frequently found forms. On the other hand also intermodal transportation is used frequently, mainly containerised. This traffic can be in- as well as outbound, often it is also used for feedering containers to the big deep sea ports for final destinations overseas. However, the attitude of most of the shippers is that waterborne transport is insufficient for outbound destinations to the customers, as the volumes to each destination are not being enough, some exceptions to this rule could be found among,especially the wood and paper industry.

	Nr.	%
Only on demand	2	22%
On a regular basis	7	78%

Source: Survey by Andreas Kubek sample: n=17

Table 46 Do you use waterborne transport on a regular basis or only on demand?

Most shippers, who use waterborne transport, stated that they use it on a regular basis, as one can see in the table 46. The routes they use waterborne transport are various all over Europe, both short sea and on inland waterways. No clear pattern could be established, except that naturally the traffic to the Northern deep sea ports is higher.

The important criteria for modal choice, which waterborne transport doesn't meet were:
- quality of service
- time
- flexibility

but also - cost

3.2.4 What could Shippers do to improve the situation of waterborne transport?

Time is seen as the key problem of waterborne transport, but if one looks at it in detail it is not as bad as it seems. Shippers could do a lot to improve this situation, as most experts, even Shippers, agreed:

Of course transit time for inland waterways and short sea shipments is longer than for trucking (see advantages towards road transportation chapter 2.2.6.). However, well-planned and co-ordinated operations can overcome this problem if transit stock is included in the overall planning process. On a corporate level, lead times are under constant monitoring. The main focus is the time during which the goods remain in warehouses. By looking further, one will find that the goods are efficiently, quickly, and expensively transported to the warehouses, which act as distribution centres. There, the goods may remain for weeks or months. Hence, the speed and efficiency of the transport is in vain. (F&L, 1998)

Overall planning and operations control can be used to overcome this unbalanced situation. One way of doing

this is to regard goods in transit as if it was staying in the warehouse. The time spent in transport would then become part of the lead-time. Such planning should allow for slower and more economical transport, opening up the possibilities for increased use of inland waterways and short sea shipping. Urgent call-off orders could use the "old" quick transport method, while the bulk of the orders would arrive in transit stock.

Generally it was said that Shippers should be more open and flexible towards waterborne transport and get rid of their personal sentiments against using shipping. They question the currently in use transport systems, and consider all available modes. This could be done by continues tendering between the different modes and analysing the true potential of cargo able to shift onto other modes. Operators said that if they would calculate more the would see that waterborne transport is an economically feasible and interesting alternative.

Shippers suggested, that one way the of starting an active participation in chancing the process and structure of transportation today, could be in starting pilot projects for one or two lanes using waterborne transport. They could support terminal and shipping operators in the first years by guaranteeing minimum volumes.

Another way Shippers could help is by using their high lobbying power to but stronger pressure on governments to improve the situation of waterborne transport and undertake the necessary investments.

3.3. Waterborne transport from the viewpoint of the Operators

This section should provide additional information on the Operator's part of waterborne transport. This might help together with the previous parts of the study to reduce some prejudices which exist towards waterborne transport, mainly from the shipper's side.

3.3.1 The structure of the sample

The sample of operator consists of 17 important European transport operators, mainly shipping companies, both inland and short sea, as well as freight forwarders who sell waterborne transport space to shippers, but also companies who are big players in intermodal combined transport.

4 of these are currently not using waterborne transport but consider it in combination with another mode. The author thought that it was important to include them to be able to assess the capacity of waterborne transport in an intermodal transport chain.

Generally the author tried to reflect with the sample the current situation on the European transport market regarding waterborne transport, which is currently a mix of specialised pure shipping companies, but also companies which operate in various modes. This tendency is getting stronger due the mentioned concentration tendencies and as a result we find big transport companies, which do not offer anymore a specific mode, but a specialised transport system.

The full list of Operators included in the sample can be found in the Annex.

3.3.2 Overview on the transport services offered by the Operators

When looking at the customer portfolio, it was interesting to find that the clients regarding size are equally spread, between big multinationals, big national companies and small and medium enterprises. One might have expected a dominance of the big companies due to the high volumes involved.

	Nr.	%
Big multinationals companies	13	33%
Big national companies	13	33%
Small and medium enterprises	13	33%

Source: Survey by Andreas Kubek sample: n=17

Table 47 Who are your main clients?

Also in type of industry the dominance of the traditional types using waterborne transport is shrinking, as containerisation allows almost all type of commodities being transported on the water. Their services most of the operators offer on a regular basis having scheduled services on various destination. Depending on the destination the it varies from daily services to once a week.

The advantage of regular services is that it is easier to serve several customers together, and it allows better planning

for both shippers and operators, but it also poses constraints on the operators to have a large enough customer base for each destination to be able achieve a continues flow of cargo to ensure capacity utilisation. The service only on demand is mainly only serving one customer.

	Nr.	%
On a regular basis	10	77%
Only on demand	3	23%

Source: Survey by Andreas Kubek sample: n=17

Table 48 Do you offer a regular service on this routes or just on demand of your client?

The operators mainly noticed seasonal differences in demand for their transport services, especially in the "traditional" goods transported on the water, like building materials, agricultural products have strong seasonal differences, from the viewpoint of the operator. The discrepancy of the results among the shippers and operators might be interpreted as an inconsistency of the shippers sample, although almost all industries named by the operators, were included in the sample. So the differences could also be explained by differences among companies within the industries.

	Nr.	%
Yes	8	57%
No	6	43%

Source: Survey by Andreas Kubek sample: n=17

Table 49 Are there seasonal differences regarding the demand for your service?

Also in the questions to the Operators the current situation and possibilities regarding transport units was an issue. In the current intermodal waterborne transport there is a clear dominance of containers, swap bodies have compared to the Shippers a considerable low share. Swap bodies are mainly used by operators who operate in several modes. This is explainable, as swap bodies are better suitable for road-rail intermodal transportation, but they are also used in the combination with the waterborne mode.

Among the "pure" shipping operators, bulk still has a considerable high share especially concerning volume. The

second most used transport unit among the questioned Operators is the trailer. This unit is transported in accompanied transport together with the truck and its driver, or it can be just the trailer alone, which then is picked up by a truck at the port of destination.

Most of the fleet of the operators interviewed is able to carry Containers (82%) and trailers (82%) as well as swap bodies (71%). Being aware that this survey is not representative, still as many "big players" are involved, this can be viewed as a trend that the demand and supply regarding the transport unit is very compatible. Transport units are of big importance, as they represent the basic system used for intermodal transport, which has to be compatible throughout the whole intermodal transport chain.

	Nr.	%
bulk	9	53%
container	13	76%
swap-body	7	41%
tank	9	53%
trailer	10	59%
other	7	41%

Source: Survey by Andreas Kubek sample: n=17

Table 50 What kind of transport unit do you normally transport?

	Nr.	%
Bulk	9	53%
container	14	82%
swap-body	12	71%
tank	10	59%
trailer	14	82%
other	8	47%

Source: Survey by Andreas Kubek sample: n=17

Table 51 What kind of transport unit is your fleet able to carry?

Another often mentioned prejudice is that waterborne transport is a very old fashioned mode, with old fashioned equipment and management. A part of this prejudice is also the lack of integration in the EDI system (European Commission, 1995a), a data exchange system frequently used in the transport sector. Modern communication tech-

nology plays an important part within an integrated intermodal transport system, as these systems need to be efficient an increased and more effective communication among all four actors involved is needed. These technology have to be, like the transport equipment, compatible.

This is the reason why the author in this survey also wanted to explore if the communication tools of the Operators are on a up-to-date standard or if the prejudice mentioned before is true. The results which one can see in table 52 proof impressively that these prejudice cannot be true, at least for the operators interviewed. Of course all Operators are using fax, but also 16 out of 17 use the Internet and 14 out of 17 are using EDI, even high tech system like satellite tracking systems, Intranet and satellite telephones are used.

	Nr.	%
EDI	14	82%
Internet	16	94%
Fax	17	100%
Telex	7	41%
Mobile GSM telephone	13	76%
Satellite telephone	5	29%
Intranet	2	12%
Satellite tracking system	2	12%

Source: Survey by Andreas Kubek sample: n=17

Table 52 What means of communication do you use?

This proofs that all Operators questioned can meet all requirements for an efficient interaction among the actors by far. Of course one has to bare in mind that the interviewed Operators are mainly very successful top players within the European transport sector, and that the overall structure of the industry consisting of many small independent operators for sure in some cases leaves room for improvement concerning the communication and management techniques.

3.3.3 Operators and competition

Another important part of the survey among Operators, was who they see as their main competitors, and how they deal with it. A transition in the competitive situation is typical for the new trend towards multimodal transportation,

where there is a need to move from a competition of transport modes to a competition of transport systems. The strong competition between modes especially inland waterways and rail has lead to some of today's key problems. As railways had no too strong interest to be connected efficiently with the other modes as it would have led to a transfer of cargo from rail to waterways, that is why today's interconnectivity of many ports is not as sufficient as needed.

Also the fragmented structure of the shipping industry with many small shipping operators competing is a hindering factor for a further development of waterborne transport. Many single operators don't posses the resources to offer a full and frequent service, as shippers would demand to be able to use waterborne transport. That is why it will be essential that former competitive operators will form strategic alliances and offer also joint services on certain routes, which then could become interesting for shippers.

Most of the "pure" shipping operators as well as 53% of all operators asked see other shipping operators as their main competitors but also road transport is seen as important competition with 47% of the asked operators naming it as main competitor. Railways only are seen by 4 of 17 operators, as main competitors. These are mainly operators of inland waterway navigation. Most of the other operators named also the lack of efficiency, too much state influence, and rivalry between various national railway companies in Europe as reasons why railways are not their main competitors.

	Nr.	%
Road transports	8	47%
Railways	4	24%
Other shipping operators	9	53%
other	0	0%

Source: Survey by Andreas Kubek sample: n=17

Table 53 Who do You see as your main competitors?

Looking at the before mentioned importance of co-operation between modes, as well as between shipping operators, the results of the survey are very promising as 3/4 of the questioned Operators say they are currently co-operating with other operators, almost all of them offer Joint services in one way or another. Only one operator is adjusting its schedules with other operators.

	Nr.	%
No	4	25%
Yes	12	75%
if yes:		
Joint services	11	92%
Adjusting schedules	1	8%
Lobbying	2	17%
Other	1	8%

Source: Survey by Andreas Kubek sample: n=17

Table 54 Do You co-operate with other operators?

Another important and desperately needed form of co-operation is joint lobbying of the shipping industry both towards the governments and legislative bodies as well as towards the shippers. Throughout the whole process of this study the author encountered always the complains that the European shipping industry, doesn't have the important lobbying power like other industries, and this could be one of the reasons for the relative low and slow investments in waterborne infrastructure shown in chapter 2.5.4 But also a lot of lobbying would be needed towards the Shippers to boost the image of waterborne transport and help to get ride of widespread negative prejudice . Looking at the results of the survey regarding lobbying among operators the lack of such activities is confirmed. Only 2 of 17 Operators are engaged in joint lobbying.

3.3.4 Views of operators on current issues in European waterborne transport affecting its competitiveness

An EU survey found that in short sea shipping the vessels spend 60% of the time in ports and only 40% sailing. The author asked the Operators participating in the survey for their comments, and found out that a clear majority (~75%) agreed with this statement. They explained it by the fact that short sea shipping generally is done over a comparable short distance compared to deep sea shipping and with a high frequency, but they also admitted that there is still substantial room for improvement, on which we will concentrate in the following chapter on Ports.

In the literature on waterborne transport by the EU one can find that the lack of statistical is seen by the EU to be a hindering factor for the competitiveness of waterborne trans-

port. Asking the operators if they agree with this statement, most of them 14 out of 17 said they don't agree. First of all there is enough statistical data available, and secondly they said also a plus in statistical data would need more effort to extract necessary information which would not be worth the additional information won.

	Nr.	%
Yes	2	12%
No	14	88%

Source: Survey by Andreas Kubek sample: n=17

Table 55 Does the lack of statistical economic data on shipping hinder your competitive position?

An important issue for the competitive situation of inland waterways is the scrapping programme of the European Union, which is in detail described in chapter 2.4.5 . Five of the 7 who answered the question said that it was successful. Two who are primarily rail operators said it was not as it is hampering competitiveness by state subvention of the waterborne transport. This a clear indication of the strong competition among those two modes.

	Nr.	%
Yes	5	71%
No	2	29%

Source: Survey by Andreas Kubek sample: n=17

Table 56 Was the scrapping policy of the EU successful?

Another disputed topic in European policy is the abolishing of Tax Free shopping within the European Union which accounts for a substantial part of the revenues of ferry operators, especially in Scandinavia and Great Britain. The author asked the questioned operators if they think that this will threaten the competitive position of ferry operators.

	Nr.	%
Yes	11	73%
No	4	27%

Source: Survey by Andreas Kubek sample: n=17

Table 57 Does the abolishing of Tax Free shopping within the EU threaten the competitive position of ferry operators?

73% of those who answered said that it will. Four Operators which represent 27% of the Operators who answered this question said, that it will not and that is positive for the whole short sea shipping industry, as the competitive situation among them becomes more even. As so far only ferry operators benefited from this sales, which where also transporting passengers, other short sea shipping operators didn't have this opportunities, which gave the a competitive disadvantage, which will be abolished on July 1st 1999 .

	Nr.	%
Yes	11	73%
No	4	27%

Source: Survey by Andreas Kubek sample: n=17

Table 58 Do you think this will result in a rise of ferry prices?

The same amount of operators ho answered that this law will threaten the competitive position of ferries also foresaw a rise in ferry prices. This result has to be compared with the answers representatives of governments, who were asked the same question and came to difference results. (see chapter 3.5.2)

The way how ferry operators will deal with the problem is different in the regions. For ferries over the British channel there are no alternative solutions and they also cannot raise the prices as the now face stiff competition by the Chunnel . On the other hand some ferry operators between Sweden and Finland have found easier solution. They just make a port call in a Baltic state or Russia on the way to Finland so they are no longer intra-European routes and so forth are allowed to have tax free shopping on board.

3.3.5 What could operators do to improve the situation of waterborne transport?

Generally it was said that Operators have to co-operate more with others Operators, especially with multimodal Operators, but also ports and terminal operators. Only together they can improve the package of waterborne transport service the customer asks for.

Many experts criticised that the Operators of waterborne transport are still too much focused on a unimodal ap-

proach in their service. To change that to a multimodal one, they have to undertake a great deal of standardisation, and increase the interconnectivity with other modes. The service also has to become more flexible and the cost-advantage has to be increased, in order to be able to switch cargo onto the waterborne mode.

Operators should also become more customer focused, and not offer just a standard transport service, but a service needed by its customers. This goal could be reached by better quality control, Door to door service, improved frequency and regularity in service as well as improve transit times. These were the things many Shippers asked for to be improved by Operators to better satisfy their transportation needs.

Hand in hand with this more customer focused approach, the Operators should also improve their Marketing and other modern management skills. This is urgently needed in order to be able to understand the customer needs and to be able to provide them with a transport service package fitting their quality standards. This also would make it easier to communicate and sell the advantages of waterborne transport better towards Shippers but also Governments. Subsequently, maybe together with the help of the Shippers, the lobbying power towards governments could be increased.

3.4. Waterborne transport from the viewpoint of the Ports & Infrastructure Providers

Ports and Terminals are the crucial points in the intermodal transport chain as they represent the interfaces between the various modes, but also between the waterborne mode and the final destination of the cargo, the customer. Waterborne transport without ports would be impossible. Its speed and costs are decisive for the competitiveness of an intermodal transport service.

3.4.1 The structure of the sample

The sample tried to include the most important ports or port terminals in the different regions, which are totally different in structure. It also tried to include representatives of inland waterway ports. All ports account together for a annual volume of 650 million tons which is a substantial part of the total port turnover within the EU.

Of course the two biggest ports in Europe Rotterdam and Antwerp are included as well as the North Sea region ports Hamburg and Bremen. In the Mediterranean Barcelona is included as well as the Adriatic port Trieste. Copenhagen is included for the Nordic region. Duisburg is the biggest inland port and Vienna is included to represent the Danubian ports. Of course there would be some more ports to add to be able to create a representative sample, but author only had limited resources, and some ports refused to participate in this survey.

3.4.2 Overview on the services offered by the ports

The first point the author tried to analyse was how well the questioned ports were connected to other modes. The importance of this connections for waterborne transport, especially regarding intermodal transport, was already mentioned above. Furthermore were the interconnectivity in ports vote as one of the key problems for waterborne transport.

	Nr.	%
Road	9	100%
Rail	9	100%
Inland shipping	6	67%
Deep sea shipping	7	78%
Airborne transport	7	78%
Pipeline	6	67%
Short sea shipping	7	78%

Source: Survey by Andreas Kubek sample: n=9

Table 59 What modes are connected?

The results of the survey draw a somewhat different picture as all ports are connected to rail and road as well as all seaports have also deep sea shipping as well as short sea shipping. 7 of the 9 ports have an airborne connection and 6 out of 9 are connected to pipelines. So the integration of the questioned ports into the TEN's can be viewed as very sufficient.

However, one has to be careful to draw conclusions on the overall port system from this sample, as they represent some of the biggest, best and most efficient ports in Europe, whereas probably the vast majority of European ports is tiny and maybe not so well integrated. Most of the port experts told the author that the ports are better than

their reputation as one can see in this sample a well connected network of ports exists in the EU.

Also the times of services of the sample, 8 out of 9 offer a 24 hour service 7 days a week, can be apparently seen as exceptional. The operating times of the Port of Vienna Monday to Thursday 7.30-16.30 and Friday 7.30-13.30 might be reflecting more the situation in the many small ports across Europe.

	Nr.	%
No	7	88%
Yes	1	12%

Source: Survey by Andreas Kubek sample: n=9

Table 60 Are there seasonal differences regarding the demand for your service?

Most of the questioned port operators - 7 out of 9 - say that they see no seasonal differences regarding the demand for their service. This corresponds more to the result of the survey among the shippers and less to the results of the survey among operators on the same question. The possible reasons for this were already stated in the sections above.

	Nr.	%
State/community	5	63%
Private	3	38%

Source: Survey by Andreas Kubek sample: n=9

Table 61 Who is the owner of your organisation?

2/3 of the questioned ports or terminals are owned by the state or the community, only 3 are privately run. As we can see in the answers in the following government section there are no plans to privatise ports or terminals in the questioned countries. The situation is very different from each country: in some, most of the ports are privatised, and in others, all are state owned. In the country specific section one can find additional detail on this matter.

3.4.3 What could Ports and other infrastructure providers do to improve the situation of waterborne transport?

Also from Ports, a switch from a unimodal to a multimodal approach was requested. To assure this, investments in in-

termodal connections and compatibility as well as interconnectivity of the equipment and modes is needed. The ports are believed to have a vital role in the development of intermodal transport, as they represent the multimodal knots connecting the different modes. To ensure that these connections work effectively, R&D on intermodal platforms is needed, which is believed to be in the responsibility of the Ports in co-operation with the Governments.

But the even more urgent call, was for an improvement of cost efficiency of the port infrastructure and faster handling. This is seen by many experts the most important problem in making waterborne transport competitive, as all other competitive factors of the waterborne mode, like time, quality of service, flexibility and reliability as well a the most important cost, are strongly influenced if not even determined by the efficiency of Ports.

Like Operators, also ports are often seen to lack the customer orientation and modern management techniques to assure the quality of service needed. This and additional investments in the equipment is seen to bee critical to comply with the needs of a new integrated approach in waterborne transport. Labour issues, like night and weekend work are seen as another important factor to be able to satisfy the customers needs in waterborne transport and port services. They not only should be made available in a high number of ports, but also at a reasonable price. Extremely high additional fees would make the whole thing again unattractive. The best would be to offer it at the same price as during weekdays.

3.5. Waterborne transport from the viewpoint of Governments & Institutions

Governments play an important role in waterborne transport, not only providing the legal and policy framework, but often participating also as players in the "game". They control a substantial part of the port infrastructure as well as the inland waterways in Europe, and they act also as operators, within the shipping industry(mainly inland waterways) but also in competitive modes mainly railways. Furthermore, governments are also shippers who demand transport services. In the following section the author is concentrating only on the legal and policy aspects and role of governments and other legislative organisation.

3.5.1 The structure of the sample

For this sample the author was targeting on the European level the European Commission DGVII and the ECTM. On national level he tried to contact all national representatives of the EU working group on waterways and short sea shipping as well as the different national transport ministries. It is to mention here that there was disappointingly very limited willingness to participate in this survey, except those who participated in the study, who were very positive and helpful exceptions. The author is aware of the fact that the sample of this actors group is very inconsistent, but thinks this is compensated as the views of the governments are reflected in many studies included in this study.

The questioned institutions where both ministries, as well as public institutions which in reality are responsible for preparing the policies regarding waterborne transport as they have the expertise, but have no direct legislative power.

3.5.2 Governments and other legislative organisations and waterborne transport

Analysing how important waterborne transport is within their policies there was a clear picture drawn: Except in those agencies, which are only dealing with waterborne transport, it is given only marginal importance and for sure less importance than other modes, but most of the government agencies questioned, say that they plan measures to promote the image of waterborne transport (75%).

	Nr.	%
No	2	25%
Yes	6	75%

Source: Survey by Andreas Kubek sample: n=8

Table 62 Do you plan measures to promote the image of waterborne transport?

Regarding the question of abolishing Tax Free shopping in the EU here a majority (2/3) see no threat to the competitive situation of ferry operators, in total opposite to the results of the survey among Operators. Even clearer was the answer, and the contrast, to the question, if they think that this will result in a rise in ferry prices. 7 out of 8 said they don't think this will result in a rise in ferry prices.

	Nr.	%
Yes	3	38%
No	5	63%

Source: Survey by Andreas Kubek sample: n=8

Table 63 Does the abolishing of Tax Free shopping within the EU threaten the competitive position of ferry operators?

	Nr.	%
Yes	1	13%
No	7	88%

Source: Survey by Andreas Kubek sample: n=8

Table 64 Do you think this will result in a rise of ferry prices?

Only on the European level there are initiatives planned to improve the transparency of port tariffs, on national level port tariffs are no issue.

	Nr.	%
No	7	88%
Yes	1	13%

Source: Survey by Andreas Kubek sample: n=8

Table 65 Do you plan measures to improve the transparency of port tariffs?

The majority of governments also agrees that the scrapping policy was successful, the French representative said that in the rest of the EU especially in the Netherlands it was, but in France it was not.

	Nr.	%
Yes	5	71%
No	2	29%

Source: Survey by Andreas Kubek sample: n=8

Table 66 Was the scrapping policy of the EU successful ?

Most of the questioned government representatives said no further privatisation in the sector of waterborne transport was planed, except in the Dutch short sea shipping sector, but no concrete remarks were made. The reasons

differ from country to country. In some countries the whole sector is already privatised, in others the status quo wants to be preserved.

	Nr.	%
No	7	88%
Yes	1	13%

Source: Survey by Andreas Kubek sample: n=8

Table 67 Are there plans for privatisation in the sector of waterborne transport?

3.5.3 What could governments and other organisations do to improve the situation of waterborne transport?

Also here we find the calls for a better framework suitable for intermodal transport. The Governments could provide this by investing more in intermodal transport, also financing R&D for the optimal solution and equipment. All this measures have to be coordinated at least at an European level or even better globally. Here the Governments are asked to provide binding standardisation for intermodal equipment and systems, in co-operation with the other actors, to make an effective intermodal transport possible.

Furthermore the Governments are asked to act more in their responsibilities regarding the infrastructure. It is essential that the waterways are maintained properly and improved to avoid bottlenecks which are currently widespread on Europe's inland waterways. There were also calls for assistance in financing new port and operators equipment to help them to meet the standards needed in modern intermodal transport. This could be via subsidise or by cheap loans to the industry. The reduction of the fiscal burden on waterborne transport would also be very useful in improving the competitiveness of this mode.

Legislative measures are also asked for, especially reducing the bureaucratic burden on the industry, by providing better and more flexible solutions regarding customs clearance as well as night and weekend labour. There were also substantial calls for more privatisation in the sector to ensure fair competition. Cancelling the ban of tax-free shopping was also an issue for ferry operators, but looking at the current developments this is very unrealistic.

In addition there were many detailed requests of local importance, like a better development of the Danube for shipping or subsidise icebreakers in Finland. At this place one should not forget the responsibilities of Governments in their role as Shippers, Operators and Ports, this would give them an additional chance to start pilot projects to proof that waterborne transport can be a feasible alternative.

4 Summary and Conclusions

The European transport sector is currently undergoing many important changes. Among the most important are the trend towards internalising the external costs, which should increase the cost truth of transport prices, and the trend from singlemodal to multimodal transport. These trends are also reflected by new structures within companies. The industry is currently witnessing a wave of mergers and acquisitions and the development of true multimodal transport companies, which offer multimodal transport services. Competition is shifting from existing between various modes towards competition among entire transport systems.

The reasons for this development include the dramatic increase in transport volume and the resulting congestion of the current transport infrastructure and fundamental forces such as new social values, like environmental consciousness; new business structures; and new management techniques. Generally, the need for efficient transport and logistic systems is increasing in importance within most companies, as the competition becomes tougher and the profit margins tighter.

Waterborne transport could potentially play an important role in this new transport system. It was just in this century that waterborne transport lost its importance in comparison to other means of transport. In the last few decades, road transport has absorbed most of the additional transport volume and has become the dominant mode of transport within the EU. Waterborne transportation, meanwhile, has become a "stepchild" of European transport policy and its public interest has diminished. Only recently, when the railways could not live up to the expected level of performance as an alternative to road transport, shipping has become involved in new intermodal transport concepts, which before were only focused on rail-road combinations.

The public has widely forgotten that waterborne transport still accounts for a substantial part of the freight transportation within the EU. The combination of short sea shipping and inland waterways mode still transports more cargo than road transport. This research tries to point out the importance of this "forgotten" transport mode and give a short, objective overview of the current situation. It consists out of two main parts. The first part is giving an overview on facts and figures regarding waterborne transport in the EU,

the second part presents the results of an empirical survey undertaken by the author, which illustrates the different views among the four actor groups involved.

The main reasons for waterborne transport in Europe are the following:

- The *geographical configuration* of Europe, which provides natural infrastructure favourable to the waterborne mode.
- The *excellent energy and environmental performance*, which creates a competitive advantage towards other modes, as external costs are lower.
- The comparable *low costs*, which, however, are hampered by the high friction costs if used in combined transport.
- The *high capacities* compared to other modes.
- The immense *room for expansion* with the need for only low investments.
- The *positive effects* it has on the development of other sectors and remote regions.

Basically, waterborne transport within the EU can be divided into short sea shipping and inland waterway navigation. Short sea shipping can be subdivided into two general categories depending on whether or not an independent loading unit is used. Short sea shipping using loading units is further subdivided into two categories differentiated by the loading technique, RO/RO or LO/LO. There are significant differences within each category

A study co-financed by the European Commission identified eight important corridors for short sea shipping and showed that on some corridors short sea shipping already has a share of up to 93 percent (Portugal -UK). The study also tried to analyse the potential of shifting additional cargo to short sea shipping and arrived at the following conclusions:

- Trade can be shifted from land modes to short sea shipping. This, however, will only be possible if short sea shipping improves the efficiency of its operations and is integrated into multimodal transport chains.
- The cargo transfer potential is sufficient to justify sub-

stantial new investments in short sea shipping within the next few years.

- The cargo transfer potential is such that, if realised in practice, could substantially reduce the growth of land traffic on congested corridors.
- The use of inland waterway ports by short sea vessels could provide efficient new transport services between certain major European industrial centres.

Generally, short sea shipping already has an important share in European transport. Also, intermodal waterborne transport via short sea shipping already has a substantial share of the cargo flow, mainly container shipping and ferries. The industry, however, is still too oriented on unimodal transportation. Substantial investments and reorganisation is needed to ensure efficient intermodal service and integration into the intermodal chain. The abolishing of cabotage restriction is an important positive development for further growth of short sea shipping.

Inland waterway navigation is much more dependent on infrastructure than short sea shipping, which in some cases is far from being sufficient to create an efficient and fully competitive transport service. The most notable problem is the insufficient minimum depth of some parts of the inland waterway network. An important example is the Danube. In contrast to the Rhine, the Danube remains an underdeveloped waterway.

Service on inland waterways in Europe has to be divided between the tense northern waterway system, including the Rhine, and underdeveloped waterways, like the Danube, which have great potential after the opening of Eastern Europe. This service division cannot be fully exploited today due to various reasons. The construction of the Rhine-Main-Danube canal has opened new possibilities by linking the highly developed waterway network and large seaports of the north with the comparable underdeveloped Danube, thus creating a waterway connection that stretches throughout Central Europe to the Black Sea.

The EU has implemented an inland vessel scraping scheme to remove the structural imbalance between supply and demand in the inland waterway transport sector that threatened the survival of the European inland shipping industry due to a duping price war. The aim of this program

was to reduce the capacity of the European inland fleet, by paying scraping premiums and making it unattractive to bring new capacities into service without reducing existing ones. The scheme is viewed as being successful by many although it has not significantly reduced the capacity, rather it has changed the structure by reducing the number of ships, but increased the number of modern ships with higher capacities.

Regarding intermodal transportation, inland waterways face the same problems as short sea shipping, which is also true for the ports, as too much focus is placed on a unimodal approach. An important issue to enable integration in the modal chain is the standardisation of equipment, which must be pursued on a European level, but even better on a global level.

The European port network basically can be divided into four regions: the Mediterranean, the Atlantic, the North Sea, and the Baltic. The North Sea ports are significantly larger than other region, as they are the most important ones in Europe. The efficiency of ports as measured in time, cost, and quality of service remains generally insufficient and accounts for a substantial share of the friction costs in Europe's waterborne intermodal traffic. In comparison to other modes, infrastructural investments in waterborne transport have been dramatically discriminated against, which partly is also responsible for the current situation.

It is also important to look at the member states individually when discussing waterborne transport in the EU, as the situation in each state is different and the problems it faces may be of a local nature. Nevertheless, without an European solution, these local problems cannot be efficiently addressed. Waterborne transport is truly a European issue, not a national one.

An important step toward such a solution is understanding the views of each and clarifying existing misunderstanding, which is one of the main goals of this study. In a survey, undertaken by the author in the course of this research, among 51 leading experts in the transport sector, these different views were sometimes clearly located. The sample of this survey was split up among 4 different actor groups:

- ***Shippers:*** Industries which are demanding the transport service and who are deciding how their goods are transported.

- ***Operators:*** The companies who produce the transport service.
- ***Governments*** and other policy influencing institutions: These are the organisations influencing the transport policies of national and international governments. They provide the necessary legal framework as well as a substantial part of the necessary investments into the infrastructure.
- ***Ports*** and infrastructure providers: They operate the infrastructure necessary for waterborne transport.

The questions asked were divided into two parts: A general part which was the same for the all experts and a second part with specific questions for each actor group.

Generally, most of the experts view the future of waterborne transport positively. A clear majority (80 percent) sees a significant increase of waterborne transport in the future. The majority also thinks the current availability of services would allow such an increase. Basically, all four assign the same level of importance to improving the current situation, with Operators and Ports assigning a slightly higher level of importance.

The key problems of waterborne transport are defined as time, high ***pre-and on-carriage costs*** and ***flexibility, the mentality and attitude of Shippers towards waterborne transport modes, and port handling costs.*** Other important problems, as identified by the survey results, are the lack of interconnectivity at ports, the mentality and attitude of Operators, and the availability and the structure of the shipping industry.

Answers differed significantly across the different actor groups. Survey results generally indicated that Operators and Governments view the main problem as the mentality and attitude of Shippers while the Shippers do not see this as an issue. Ports, on the other hand, see the largest problem as the mentality and attitude of Operators.

When responding to the question of whether current transport costs, excluding external costs, lead to a distortion of the competitive situation, the opinions differed widely with 53 percent responding 'yes' and 47 percent 'no'. Governments and Operators responded more favourably to this position, than Ports and Shippers.

Currently, over 2/3 of the Shippers interviewed already use waterborne transport, most of them also in combination with other modes. The main criteria for their modal choice are ***cost and quality of service***, followed by ***time*** and ***flexibility***. These elements, however, were not viewed as being met by waterborne transport.

Other studies concluding that shipping Operators are not well equipped with modern communication technology and that they are not co-operating with other Operators, could not be verified in this survey. Also, bad port connections were often mentioned, but it could not be proved in this sample. Indication that waterborne transport is not as important in the transport policies was found.

Improving the situation of waterborne transport could be addresses through the following findings: *Shippers* should review their attitudes towards waterborne transport and change their concepts in valuing transit time of a mode. They also could help boost waterborne transport by getting involved in pilot projects and helping Operators and Ports, by guaranteeing them a minimum volume over a starting period.

Operators are still seen as lacking customer focus and orientation towards intermodal transport. The service package they offer should be reviewed to more closely fit the customers' needs, including more than only the pure waterborne transport service from A to B.

Ports are also seen as lacking the intermodal approach to transport and customer orientation. Furthermore, there is an urgent need for Ports to improve the cost and time efficiency, two main competitive factors.

Governments need to improve the framework for intermodal transport by financing R&D for optimal intermodal platforms and pushing equipment standardisation. In addition, Governments must improve the flexibility of legal frameworks, regarding labour issues and customs procedures as well as taxation.

All things considered, the future of waterborne transport looks promising and a European transport concept will have to include short sea shipping and inland waterways. Short and medium term, the author sees, the potential in short sea shipping because it is less dependent on govern-

ment intervention and investments.

In the long term, once a real commitment toward the improvement of the European waterway system has been reached, inland waterway navigation will become a feasible alternative in areas besides in the north and on the Rhine. This, together with the true liberalisation, not only within the EU, of the inland waterways, will provide greater potential and could lead to a real competitive advantage over the railways. Liberalisation is formally already being undertaken, but it is far from implementation reality and will require much more time.

A solution for waterborne transport in Europe can only be found if all four actors work co-operatively and begin to understand each other's differences. Only like this can the spiral of not having enough customers and not offering a competitive service be overcome and turned around. If the Shippers switch more cargo to the waterborne modes, their service can become better, due to better equipment, cost efficiency, and higher frequencies. Operators, however, must offer a level of acceptable service to the Shippers. Governments could help finance new equipment and technologies and act as pioneers in their role as Shippers and Operators. Ports and Operators could improve their service levels if more cargo is switched to waterborne modes. From such a development, all four actors would profit, and the problems of environmental pollution and congestion would improve.

Overall, there is a need and demand for efficient waterborne transport modes and there is also a substantial amount of services available to meet this need. With the commitment of all four actors, the potential could easily be increased with only comparably low investments. The whole structure has to be adapted efficiently to the new needs, which a multimodal transport system addresses..

An efficient intermodal system has to be as well suitable for waterborne transport as including waterborne transport and then we could see a much more positive development of waterborne transport than expected.

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Abbreviations and Definitions

CEC: Central and Eastern European Countries
CEC-10: The ten potential candidates for an eastern enlargement of the EU: Bulgaria, Czechoslovakia, Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovenia, Slovak Republic.
Chunnel: *Channel-Tunnel* linking France and Great Britain by rail.
EDI: *Electronic Data Interchange*
EMCT: *European Conference of Ministers of Transport*
F&L: *European Freight and Logistic Leaders Club*
IWW: *Inland waterways*
LO/LO: *Lift On/Lift Off:* The facility for a road vehicle to be driven or and off a ship or, as in the case of rolling road, a train.
RO/RO: *Roll On/Roll Off:* Loading and unloading of ITU using lifting equipment
SSS: *Short sea shipping*
TEN: *Trans European Networks*
TEQ: *Tons equivalent*
TEU: *Twenty-foot Equivalent Unit* (6.10 m). A standard unit for counting containers of various lengths and for describing the capacities of container ships or terminals. One standard 40' ISO Series 1 container equals 2 TEUs.
TKM: *Tonnes kilometres*

Annex

Annex 1 : List of interviewed experts

Organisation	Name	Type	Country
BMWV Oberste Schiffahrtsbehörde	Dr. Siegl	G	Austria
Industiellevereinigung	Mag. Beatrix Pieber	G	Austria
Wirtschaftskammer	Dr. Peter Tschirner	G	Austria
European Commission DGVII		G	Belgium
Voies Navigables de France	Jean-Raymond Le Moine	G	France
Dutsch Promotion for Inland Shipping	H. Van Laap	G	Netherlands
Information Bureau Shortsea Shipping	S. Van `t Verlaat	G	Netherlands
Ministery of transport NL	A.C. van Holk	G	Netherlands
LKW Walter	Dr. Horst Kubek	O	Austria
Schenker-BLT Vienna	Helfried Schilder	O	Austria
DFDS Transport	Tim Dalskov	O	Denmark
Silja Line Cargo	Heikki Pesola	O	Finnland
SNCF	Armand Toubol	O	France
DB Cargo	Dr. Friedrich	O	Germany
Deutsche Binnenreederei	Michael Büchtmann	O	Germany
Hoyer	A. Radlowsky	O	Germany
Rhenania Intermodal	Dr. W. Schumacher	O	Germany
DANZAS	Franz von Planta	O	Italy
Ignazio Messina&C SPA	Ignazio Messina	O	Italy
Royal Nedlloyd N.V.	Hub Van Gorb	O	Netherlands
Verbrugge terminals	Dick van der Endt	O	Netherlands
Andreas Ugland & Sons AS	Andreas Ugland	O	Norway
Contenemar	Rosa Esteller	O	Spain
Navicon	Federico Barreras	O	Spain
Intercontainer-Interfrigo	K. Ziereisen	O	Switzerland
Wiener Hafen	Mag. Edinger	P	Austria
Port of Antwerp	Susan Van Lommel	P	Belgium
Port of Copenhagen	Gert Nørgaard	P	Denmark
BLG Bremen	Dr. Bernt Mester	P	Germany
Hafen Hamburg	Dr. Pochlatko	P	Germany
P.A.D. Port Agency Duisburg	B. Schmitz/K.Smitcale	P	Germany
Trieste Port Authority	Oskar Bullo	P	Italy
ECT Rotterdam	R. Stenvert	P	Netherlands

Organisation	Name	Type	Country
Port of Barcelona	Martha Martin	P	Spain
Lafarge Perlmooser	Dkfm. Franz Schmid	S	Austria
VOEST	Manfred Sollman	S	Austria
EXXON Chemical Europe	René van Laecken	S	Belgium
Procter&Gamble	Riccardo Vitale	S	Belgium
JIT-Trans	Petri Mastowa	S	Finnland
StoraEnso	Antti Vehviläinen	S	Finnland
Norsk Hydro	Bernd Terschüren	S	Germany
Sony Europe	Juan Fernandez	S	Germany
Volkswagen Transport	Walter Garbade	S	Germany
Polimeri Europa	F. Castagnetti	S	Italy
DSM	Frank Otten	S	Netherlands
Philips international	Henriette Fredress	S	Netherlands
Unilever	Eric J.H. Willemse	S	Netherlands
Kvaerner	Jan Tore Pedersen	S	Norway
Volvo	K.A. Andersson	S	Sweden
Dow Europe S.A.	R. Giebers	S	Switzerland
Lever	Petri Jarvinen	S	U.K.

G....Government
O....Operator
S.....Shipper
P.....Ports

Annex 2: Questionnaires

Shipper

1. *How do you see the situation of waterborne transport now?*

   _____

   _____

2. *Do you think the current availability of services would allow an increase of cargo transported on waterways?*

   ☐ Yes

   ☐ No

   Why? _____

   _____

3. *Do you see a future for waterborne transport in Europe?*

   ☐ Yes

   ☐ No

   if yes, what does it look like?

   _____

   _____

4. *How would you judge the potential of waterborne transport in Europe? Do You think its share will*

   ☐ increase

   ☐ decrease

   ☐ stay the same?

   Why? _____

   _____

5. *Is value of the transported goods is of importance for the modal choice ?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

6. *Is time an important factor for the modal choice ?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

7. *In what way does time and value of goods effect the choice for waterborne transport?*

_____

_____

8. *Current transport costs (especially for road transport) do not reflect the full social and environmental costs. Do you think this has lead to a clear distortion of the competitive situation of waterborne transportation?*

☐ Yes

☐ No

9. *Where do you see the key problems regarding the acceptance of waterborne transport in Europe? Please put in order of importance from 1 to 10 (1st important, 2nd ....10th)*

☐ Port policies

☐ Port working hours

☐ Port handling costs

☐ Customs procedures

☐ Discrimination vs. land transportation regarding taxation and other legislation

☐ Lack of interconnectivity at the ports (e.g. lack of railway connections)

☐ Time

☐ Mentality and attitude of shippers towards waterborne modes (Image)

☐ Structure of the shipping industry

☐ Mentality and attitude of operators

☐ Pre- and on-carriage costs

☐ Too expensive and inadequate pilot services

☐ Quality of equipment used

☐ Flexibility

☐ Availability

☐ Administrative barriers

☐ _____

Please explain why You chose the 3 most important problems?

1st most important: _____

2nd most important: _____

3rd most important: _____

How could they be solved?

_____

10. *Who could do most to improve the competitive situation of waterborne transport ?*
    - ☐ Operators
    - ☐ Shippers
    - ☐ Infrastructure providers (Ports, terminals...)
    - ☐ Legislative bodies or other organisations
    - ☐ Others: _____

11. *What has do be done to improve the competitive situation of waterborne transport ?*

_____

_____

12. *What are the main means of transport you are using?*
    - ☐ Road transport
    - ☐ Railways
    - ☐ Waterborne transport
    - ☐ Airborne transport
    - ☐ Pipeline
    - ☐ Combined transport: Which modes: ☐ Road &Rail ☐ Water & Roa ☐ Water & Rail

13. *To what extend do you use waterborne transport? How about your competitors?*

_____

_____

_____

14. *Do you use waterborne transport on a regular basis or only on demand?*
    - ☐ On a regular basis, approx. _____ times every _____ weeks
    - ☐ Only on demand

15. *Why and when would waterborne transport be attractive to you?*

_____

_____

_____

16. *What type of cargo would you be interested in transporting on waterways?*

_____

_____

17. *On what routes are you using waterborne transport and where could it be an interesting alternative?*

_____

_____

18. *What are the main criteria for your selection of a transport mode (rank in importance)*

- ☐ cost
- ☐ time
- ☐ value of goods
- ☐ quality of service
- ☐ flexibility
- ☐ availability
- ☐ others: _____

to what extend have you influence on this selection?

_____

_____

19. *Which of these criteria waterborne transport cannot meet?*

_____

_____

20. *Are there seasonal differences regarding the demand for transport service?*

- ☐ Yes, the main seasons are:
- ☐ No

21. *What kind of transport unit do you normally use?*

- ☐ bulk
- ☐ container
- ☐ swap-body
- ☐ tank
- ☐ trailer
- ☐ other: _____

22. *What kind of transport unit would you prefer to use?*
    - ☐ bulk
    - ☐ container
    - ☐ swap-body
    - ☐ tank
    - ☐ trailer
    - ☐ other: _____

23. *What should be done to improve the situation?*
    - by the operators :

      _____

      _____
    - by the governments (+EU):

      _____

      _____
    - by port-operators and other infrastructure providers:

      _____

      _____

24. *What could be done by shippers like You to improve the competitiveness of the waterborne transportation with other modes?*

    _____

    _____

25. *How do you see the future of your transportation needs and what are your plans and goals for the future?*

    _____

    _____

26. *Some personal comments to waterborne transportation in the EU:*

    _____

    _____

    _____

    _____

Operator

1. *How do you see the situation of waterborne transport now?*

   _____

   _____

2. *Do you think the current availability of services would allow an increase of cargo transported on waterways?*

   ☐ Yes

   ☐ No

   Why? _____

   _____

3. *Do you see a future for waterborne transport in Europe?*

   ☐ Yes

   ☐ No

   if yes, what does it look like?

   _____

   _____

4. *How would you judge the potential of waterborne transport in Europe? Do You think its share will*

   ☐ increase

   ☐ decrease

   ☐ stay the same?

   Why? _____

   _____

5. *Is value of the transported goods is of importance for the modal choice?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

6. *Is time an important factor for the modal choice ?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

7. *In what way does time and value of goods effect the choice for waterborne transport?*

_____

_____

8. *Current transport costs (especially for road transport) do not reflect the full social and environmental costs. Do you think this has lead to a clear distortion of the competitive situation of waterborne transportation?*

☐ No

☐ Yes

9. *Where do you see the key problems regarding the acceptance of waterborne transport in Europe? Please put in order of importance from 1 to 10 (1st important, 2nd ....10th)*

☐ Port policies

☐ Port working hours

☐ Port handling costs

☐ Customs procedures

☐ Discrimination vs. land transportation regarding taxation and other legislation

☐ Lack of interconnectivity at the ports (e.g. lack of railway connections)

☐ Time

☐ Mentality and attitude of shippers towards waterborne modes (Image)

☐ Structure of the shipping industry

☐ Mentality and attitude of operators

☐ Pre- and on-carriage costs

☐ Too expensive and inadequate pilot services

☐ Quality of equipment used

☐ Flexibility

☐ Availability

☐ Administrative barriers

☐ _____

Please explain why You chose the 3 most important problems?

1st most important: _____

2nd most important: _____

3rd most important: _____

How could they be solved?

_____

10. *Who could do most to improve the competitive situation of waterborne transport ?*
    - ☐ Operators
    - ☐ Shippers
    - ☐ Infrastructure providers (Ports, terminals...)
    - ☐ Legislative bodies or other organisations
    - ☐ Others: _____

11. *What has do be done to improve the competitive situation of waterborne transport ?*

    _____

    _____

12. *How do you see your position in the market?*

    _____

    _____

13. *To what extent is your business increasing and why?*

    _____

    _____

14. *What kind of cargo are you mainly transporting?*

    _____

    _____

15. *What type of cargo would you be interested in transporting, where do you see the potential?*

    _____

    _____

16. *Who are your main clients?*

    Type of industry/products:

    Size: ☐ Big multinationals companies
    ☐ Big national companies
    ☐ Small and medium enterprises

17. *What are the main routes you are operating?*

    _____

    _____

18. *Why do your clients use waterborne means of transport for these routes?*

_____

_____

19. *Do you offer a regular service on this routes or just on demand of your client?*

☐ On a regular basis, approx. _____ times every _____ weeks

☐ Only on demand

20. *Are there seasonal differences regarding the demand for your service?*

☐ Yes, the main seasons are: _____

☐ No

21. *Who do You see as your main competitors?*

☐ Road transports

☐ Railways

☐ Other shipping operators

☐ other: _____

22. *Do You co-operate with other operators?*

☐ No

☐ Yes: ☐ Joint services

Adjusting schedules

Lobbying

Other: _____

23. *What kind of transport unit do you normally transport?*

☐ bulk

☐ container

☐ swap-body

☐ tank

☐ trailer

☐ other: _____

24. *What kind of transport unit is your fleet able to carry?*
    - ☐ bulk
    - ☐ container
    - ☐ swap-body
    - ☐ tank
    - ☐ trailer
    - ☐ other: _____

25. *For Inland shipping operators: Was the scrapping policy of the EU successful ?*
    - ☐ Yes
    - ☐ No

    What would you have changed?

    _____

    _____

26. *Does the lack of statistical economic data on shipping hinder your competitive position?*
    - ☐ Yes How: _____
    - ☐ No

27. *Does the abolishing of Tax Free shopping within the EU threaten the competitive position of ferry operators?*
    - ☐ Yes
    - ☐ No

28. *Do you think this will result in a rise of ferry prices?*
    - ☐ Yes
    - ☐ No

29. *What is your comment to the result of a EU-study, that ships operating within the EU spend 40% of the time sailing and 60% in the ports?*

    _____

    _____

    _____

    _____

30. *What means of communication do you use?*

- ☐ EDI
- ☐ Internet
- ☐ Fax
- ☐ Telex
- ☐ Mobile GSM telephone
- ☐ Satellite telephone
- ☐ Other: _____

31. *What should be done to improve the situation?*

- by the shippers:

_____

_____

- by the governments (+EU):

_____

_____

- by port-operators and other infrastructure providers:

_____

_____

32. *What could be done by operators like You to improve the competitiveness of the waterborne transportation with other modes?*

_____

_____

33. *How do you see the future for your business and what are your plans?*

_____

_____

34. *Some personal comments to waterborne transportation in the EU:*

_____

_____

_____

_____

Port-operators and other Infrastructure providers

1. *How do you see the situation of waterborne transport now?*

   _____

   _____

2. *Do you think the current availability of services would allow an increase of cargo transported on waterways?*

   ☐ Yes

   ☐ No

   Why? _____

   _____

3. *Do you see a future for waterborne transport in Europe ?*

   ☐ Yes

   ☐ No

   if yes, what does it look like?

   _____

   _____

4. *How would you judge the potential of waterborne transport in Europe? Do You think its share will*

   ☐ increase

   ☐ decrease

   ☐ stay the same?

   Why? _____

   _____

5. *Is value of the transported goods is of importance for the modal choice ?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

6. *Is time an important factor for the modal choice ?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

7. *In what way does time and value of goods effect the choice for waterborne transport?*

_____

_____

8. *Current transport costs (especially for road transport) do not reflect the full social and environmental costs. Do you think this has lead to a clear distortion of the competitive situation of waterborne transportation?*

☐ No

☐ Yes

9. *Where do you see the key problems regarding the acceptance of waterborne transport in Europe? Please put in order of importance from 1 to 10 (1st important, 2nd ....10th)*

☐ Port policies

☐ Port working hours

☐ Port handling costs

☐ Customs procedures

☐ Discrimination vs. land transportation regarding taxation and other legislation

☐ Lack of interconnectivity at the ports (e.g. lack of railway connections)

☐ Time

☐ Mentality and attitude of shippers towards waterborne modes (Image)

☐ Structure of the shipping industry

☐ Mentality and attitude of operators

☐ Pre- and on-carriage costs

☐ Too expensive and inadequate pilot services

☐ Quality of equipment used

☐ Flexibility

☐ Availability

☐ Administrative barriers

☐ _____

Please explain why You chose the 3 most important problems?

1st most important: _____

2nd most important: _____

3rd most important: _____

How could they be solved?

_____

10. *Who could do most to improve the competitive situation of waterborne transport ?*
    - ☐ Operators
    - ☐ Shippers
    - ☐ Infrastructure providers (Ports, terminals...)
    - ☐ Legislative bodies or other organisations
    - ☐ Others: _____

11. *What has do be done to improve the competitive situation of waterborne transport?*

    _____

    _____

12. *What destinations are served from your port?*

    _____

    _____

13. *What quantity of cargo handled by you annually?*

    _____ tons

14. *How are you integrated in a European Transport Network (Interconnectivity with other transport modes)?*

    _____

    _____

15. *What modes are connected?*
    - ☐ Road
    - ☐ Rail
    - ☐ Inland shipping
    - ☐ High shipping
    - ☐ Airborne transport
    - ☐ Pipeline

16. *When do you offer your services?*
    - ☐ Only weekdays
    - ☐ Weekdays and Saturday
    - ☐ 7 days a week
    - ☐ From _____ to _____ o'clock & from _____ to _____ o'clock
    - ☐ 24 hours

17. *How long does the handling take?*

    _____ days _____ hours

18. *What is your comment to the result of a EU-study, that ships operating within the EU spend 40% of the time sailing and 60% in the ports?*

_____

_____

19. *Are there seasonal differences regarding the demand for your service?*

☐ Yes, the main seasons are: _____

☐ No

20. *Who is the owner of your organisation?*

☐ State/community

☐ Private, who?: _____

21. *Who do You see as your main competitors?*

_____

_____

22. *How do you see the future transport systems and what new demands will arise regarding your services?*

_____

_____

23. *What should be done to improve the situation?*

- by the operators:

_____

_____

- by the governments (+EU):

_____

_____

- by shippers:

_____

_____

24. *What are your plans and goals for the future?*

_____

_____

25. *Some personal comments to waterborne transportation in the EU:*

_____

_____

Government & Institutions

1. *How do you see the situation of waterborne transport now?*

   _____

   _____

2. *Do you think the current availability of services would allow an increase of cargo transported on waterways?*

   ☐ Yes

   ☐ No

   Why? _____

   _____

3. *Do you see a future for waterborne transport in Europe ?*

   ☐ Yes

   ☐ No

   if yes, what does it look like?

   _____

   _____

4. *How would you judge the potential of waterborne transport in Europe? Do You think its share will*

   ☐ increase

   ☐ decrease

   ☐ stay the same?

   Why? _____

   _____

5. *Is value of the transported goods is of importance for the modal choice?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

6. *Is time an important factor for the modal choice?*

   ☐ Yes

   ☐ No

   Why/why not? _____

   _____

7. *In what way does time and value of goods effect the choice for waterborne transport?*

_____

_____

8. *Current transport costs (especially for road transport) do not reflect the full social and environmental costs. Do you think this has lead to a clear distortion of the competitive situation of waterborne transportation?*

☐ No

☐ Yes

9. *Where do you see the key problems regarding the acceptance of waterborne transport in Europe? Please put in order of importance from 1 to 10 (1st important, 2nd ....10th)*

☐ Port policies

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☐ Structure of the shipping industry

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☐ Quality of equipment used

☐ Flexibility

☐ Availability

☐ Administrative barriers

☐ _____

Please explain why You chose the 3 most important problems?

1st most important: _____

2nd most important: _____

3rd most important: _____

How could they be solved?

_____

10. *Who could do most to improve the competitive situation of waterborne transport ?*
    - ☐ Operators
    - ☐ Shippers
    - ☐ Infrastructure providers (Ports, terminals...)
    - ☐ Legislative bodies or other organisations
    - ☐ Others: _____

11. *What has do be done to improve the competitive situation of waterborne transport ?*

    _____

    _____

12. *How important is waterborne transport in your policies?*
    - ☐ top priority
    - ☐ important, but not the most important part
    - ☐ not so important as than other modes
    - ☐ not very important, only marginal measures
    - ☐ not part of our policies

13. *To what extent are these initiatives on a national or an European level?*

    Title /topic

    _____ % national level _____ , _____

    _____ % EU level _____ , _____

14. *Do you plan measures to promote the image of waterborne transport?*
    - ☐ No
    - ☐ Yes

    If Yes, which ones?

    _____

    _____

15. *Does the abolishing of Tax Free shopping within the EU threaten the competitive position of ferry operators?*
    - ☐ Yes
    - ☐ No

16. *Do you think this will result in a rise of ferry prices?*
    - ☐ Yes
    - ☐ No

17. *Do you plan measures to improve the transparency of port tariffs?*
    - ☐ No
    - ☐ Yes

    If Yes, which ones?

    _____

    _____

18. *Was the scrapping policy of the EU successful?*
    - ☐ Yes
    - ☐ No

19. *What would you do different?*

    _____

    _____

20. *What investments are planed for the near future?*

    _____

    _____

21. *How are they financed?*

    _____ % EU

    _____ % National

22. *Are there plans for privatisation in the sector of waterborne transport?*
    - ☐ No
    - ☐ Yes

    If Yes, which ones?
    - ☐ Terminals
    - ☐ Ports
    - Shipping lines
    - Others: _____

23. *What should be done to improve the situation?*
    - by the operators:

      _____

      _____
    - by shippers:

      _____

      _____
    - by port-operators and other infrastructure providers:

      _____

      _____

24. *What are your plans and goals for the future regarding waterborne transport?*

    _____

    _____

25. *Some personal comments to waterborne transportation in the EU:*

    _____

    _____

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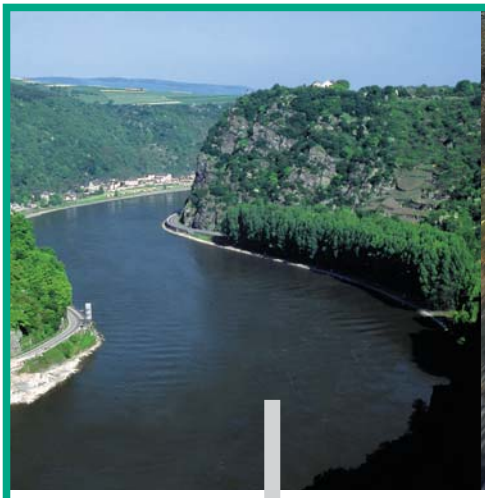
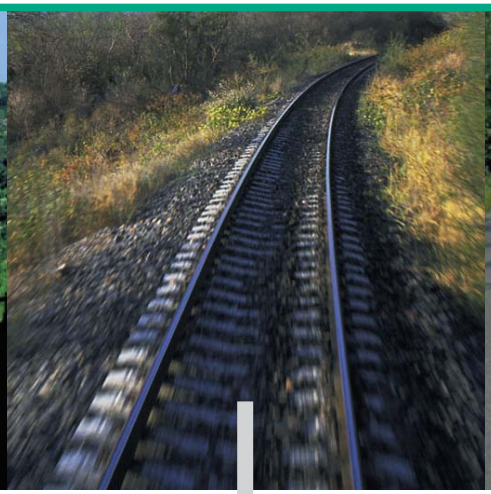


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Rhenania Intermodal Transport GmbH

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