Inland Water Transport as a Factor Influencing Mega-Ports and Seaport Cities Development (from the European North Sea Perspective)

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Inland water transport has played a significant role in the development of port cities and seaports all over the world for ages. As a dominant mode of inland transport until the rail and road have begun to prevail in the European transport systems, it has at first created and then shaped seaport hinterland in the majority of the European ports. However, its impact on these organisms, i.e. seaports and port cities has changed in many European countries in recent decades, due to the fact that it was getting weaker (logistics time constraints) and less competitive on the transport market. Consequently, in many European countries it has lost its impact on seaports hinterland and has been replaced by other less environmentally friendly modes of transport. This tendency is, however, not observed in the North Sea mega-ports as well as in many world biggest ports in Asia and North America, where inland shipping still maintains significant share in the port total turnover modal split. The reasons for such situation are analyzed in this article.

The main objective of the article is to analyze the development of inland water transport in the EU in recent years and indicate its active role as a still important factor influencing the prosperity of seaport cities as well as the creation and expansion of mega-ports in the North Sea Region. Admittedly, this mode of transportation has lost its absolutely dominant position in the European transport systems since the mid 30s in the 20th century in favor of rail transport and later on, partially, even road transport; however, in some EU countries, especially those situated along the main European inland waterways, it still holds significant market shares.

Nowadays, however, on the open highly competitive EU transport market, under the pressure of growing logistics constraints, its position against other modes of transportation is getting weaker. Its traditional competitive advantages such as low costs per ton and low freight rates as well as ability to transfer large quantities of bulk cargos on long distances have not been attractive enough for shippers and logistics supply chain operators who require transport services of the highest quality in terms of costs and time. Fortunately, in such case the ongoing pressure of transport market forces is mitigated by the gradually imposed EU public regulatory measures which, undoubtedly, will positively affect this mode of transport in the long run. The EU sustainable transport policy launched two decades ago, oriented on the external costs reduction, strongly supports this environmentally friendly mode of transport, favoring its development in many ways. In the EU strategy of combined transport development along with TEN-T projects of priority transport axles including motorways of the sea, short sea shipping program as well as the concept of boosting co-modality, inland water transport besides rail transport is regarded as the key instrument facilitating the implementation of the main EU transport policy goals established in the first (1992) and the second (2001) EC White Paper on the EU transport policy. [1]

[1] Logistics: keeping freight moving. EC. DG for Energy and Transport. Memo. Brussels 2008, p.2.

Supported by the EU transport policy measures the development of inland water transport within the EU transport system ought to strengthen directly and indirectly the EU seaport sector and especially those ports where their role in servicing their hinterland is still considerable. Hence, analyzing the relations between the seaports and inland water transport development, from the European North Sea perspective, in recent years might, on the one hand, smooth over better recognition of its potential as a driving force for gaining new market shares on port hinterland and, on the other, draw the line for better planning of these relations in the framework of the European transport system in the next decades and cooperation between these links of the transport chain (co-modality and intermodality).

1. EU NORTH SEA MEGA-PORTS ON THE GLOBAL AND EUROPEAN SCALE

In the contemporary global economy international trade determines the worldwide flow of goods. The absolutely dominant position belongs to international seaborne trade (8,2 billion tons in 2009). Maritime transport share in servicing the global trade, nowadays, accounts for more than 90 percent (in ton-miles) and 82 percent in terms of volume, and it is still growing. [2] Increases in the volume of commodities carried out by the maritime transport sector have been induced by growing globalization accompanied by the international economic integration. However, such tendencies facilitating free unconstrained flow of capital, goods and services among the countries, strongly stimulate competition on a worldwide scale. As a result, cooperation in the form of vertical and horizontal concentration has been intensified, and relatively low transport fees, especially in the maritime sector, are maintained. With such low freight rates the question of where in the world the goods are manufactured has become subsidiary.

Consequently, as a result of developing asymmetric trade pattern in the world – spatial concentration of main production and consumption center, more than half of the largest ports (mega-ports) are situated in Asia. Chinese ports in particular are remarkable. On the list of top twenty world seaports (see tab. 1) there are ten Chinese ports altogether and among them two which handle more than 550 million tons a year (2009). 3 What is characteristic for both of them (Shanghai and Ningbo & Zhoushan is that they are situated at the estuaries of great rivers and well connected by inland waterways with the main Chinese manufacturing and consumption centers. On that list there are only two European seaports, namely Rotterdam and Antwerp with similar localization. Each of them belongs to the group of the largest global seaports and enjoys the status of the mega-port (see tab. 1). It is because of the fact that both seaports are well situated relative to the main EU economic centers of production and consumption, and themselves are strongly supported by the Dutch and Belgian economies, which significantly contribute to the world trade (see tab. 2).

Tab. 1. The word largest mega-ports in terms of cargo handled in 2009 (in million tones)

		2009
Shanghai [1)]	China	590.0
Ningbo & Zhoushan [*)]	China	570.0
Singapore [2)]	Singapore	472.3
Rotterdam	**Netherlands**	**387.0**
Tianjin	China	380.0
Guangzhou	China	375.0
Qingdao	China	315.5
Qinhuangdao	China	243.8
Hong Kong [1)]	China	243.0
Busan [2)]	South Korea	226.2
Dalian	China	203.7
Nagoya [2)]	Japan	200.0
Shenzhen	China	194.0
Rizhao	China	181.3
Port Hedland	Australia	159.4
Antwerp	Belgium	157.6
Los Angeles	United States of America	157.5
Houston	United States of America	155.5
Chiba [2)]	Japan	150.0
South Louisiana [3)]	United States of America	115.6

[2] Review of maritime transport, 2009. Report by the UNCTAD secretariat. UN New York and Geneva 2009, p. 11-14.

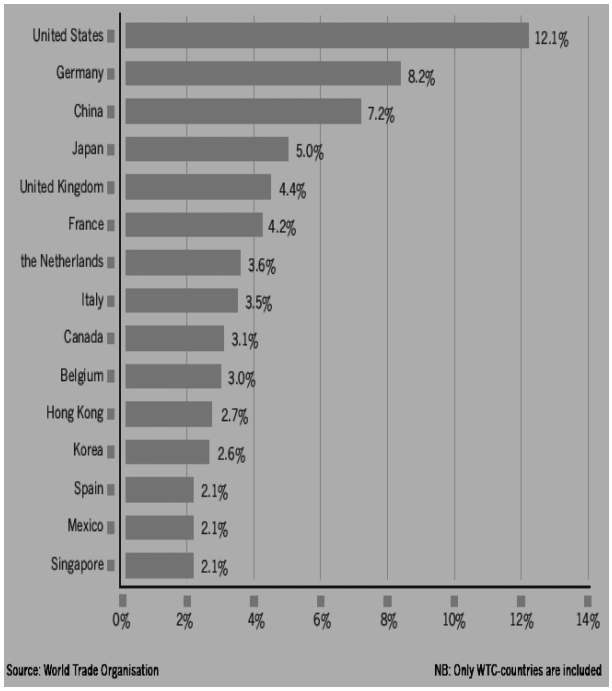
[3] Port statistics. Port of Rotterdam Authority. Department of Business Analysis. OBT (bv) Rotterdam, May 2010, p. 5

Source: Port statistics. Port of Rotterdam Authority. Department of Business Analysis. OBT (bv) Rotterdam, May 2010, p. 5

Among the top ten trading countries in the world there are seven European countries which together account for 27 percent of the total global trade. Though, large countries like Germany, France and the United Kingdom dominate the European trade, a number of smaller countries like Belgium and the Netherlands also show relatively large trade volumes and intensively use their seaports in overseas trade relations (see tab. 2).

Furthermore, both North Sea countries have always been strongly oriented to smooth development of waterborne transport and its interconnection on the European scale. As it turned out, it counts in the long term. Because of its favorable position in that area and its good hinterland transport connections, the Netherlands, Belgium and Germany have become important choice locations for many large global European distributors and logistics operators interested in the development logistic supply chains.

Tab. 2. The main global trading countries; their contribution to the global trade in 2008



Source: WTO International Trade Statistics 2008. WTO. New York 2009 and United Nations Commodity Trade. Statistics Database 2009. Statistics Division New York 2009

It is worth mentioning that Germany, the Netherlands and Belgium belong to the group of top 10 countries in the world which have the highest score as far as logistics performance index (LPI) is concerned.[4] LPI as a yearly report prepared by the World Bank evaluates the logistical achievements in 155 countries all over the world. [5] It takes into account such factors (criteria) influencing the logistics performance as: customs, infrastructure, international shipments, logistics competition, tracking & tracing and timeliness. The LPI is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance.

The logistical performance index 2010, based on global research, favors the European North Sea countries. Germany is the leading country (rank 1) in the world in terms of efficiency and effectiveness of customs and other procedures at its borders, the quality of transport and the ICT infrastructure permeating logistics. Other European North Sea countries like the Netherlands and Belgium are classified at the top of the international 2010 LPI ranking too, taking 4th and 9th position respectively.

Owing to their transport potential and real achievements in trade and logistics, seaports of those countries attain the leading position among European seaports (tab. 3)

There are eight Dutch, German and Belgian seaports among the top twenty European ports with cargo handling of more than 30 million tones (see tab. 3). The five biggest European seaports with the total throughput of more than 90 million tones on a yearly basis, apart from Novorossiysk, include Rotterdam, Antwerp, Hamburg and Amsterdam. They are the real global mega-ports in terms of

[4] The Logistics Performance Index is based on a worldwide survey of operators on the ground (global freight forwarders and express carriers), providing feedback on the logistics "friendliness" of the countries in which they operate and those with which they trade. They combine in-depth knowledge of the countries in which they operate with informed qualitative assessments of other countries with which they trade, and experience of global logistics environment. See: *Trade and Logistics Facilitation. International LPI ranking.* www.worldbank.org (30.08.2010)

[5] In cross-country comparison Poland is being ranked 30th. on the LPI list in 2010

transport and logistics requirements which constitute the highest forth generation seaport class in Europe (so-called log-ports). [6]

Tab. 3. Top twenty European seaports in terms of volume handled (million tons) 2009-2008

		2009	2008
Rotterdam	**Netherlands**	**387.0**	**421.1**
Antwerp	Belgium	157.6	189.4
Novorossiysk *)	Russia	112.8	122.6
Hamburg	Germany	110.4	140.4
Amsterdam	Netherlands	86.7	94.7
Marseilles	France	83.1	96.0
Primorsk	Russia	79.1	75.6
Le Havre	France	73.7	80.5
Algeciras	Spain	69.9	74.8
Bremen	Germany	63.0	74.6
Valencia	Spain	57.2	59.8
St. Petersburg	Russia	50.4	59.9
Genoa	Italy	47.5	54.2
London	United Kingdom	45.4	53.0
Dunkirk	France	45.0	57.7
Zeebrugge	Belgium	44.9	42.0
Constantza	Romania	42.0	61.8
Barcelona	Spain	41.8	50.5
Wilhelmshaven	Germany	33.6	40.2
Zeeland Seaports	Netherlands	29.0	33.3

Source: *Like in tab. 1*, p. 2

The absolute leading position among the European mega-ports belongs to Rotterdam. The great advantage of the port of Rotterdam as well as Antwerp and Hamburg (so-called A-R-A ports) lies in the possibility to handle the deepest maritime vessels used in the world fleet. Therefore, the majority of maritime vessels opt for ports on the North Sea for distributing goods throughout Europe. Rotterdam, Antwerp, Hamburg and Amsterdam are capable of penetrating beyond their national borders deep into their European hinterland, while the other smaller seaports primarily fulfill the national or even only regional functions. Subsequently, they have reached the leading position in the container seaborne transport passing European seaports.

Among the top ten European container ports there are five seaports of the A-R-A range, i.e. Rotterdam, Antwerp, Hamburg, Bremen and Zeebrugge. They are ranked as follows (tab. 4)

Tab. 4. The top European container ports 2009 and 2008 (number x 1000 TEU's)

		2009	2008
Rotterdam	**Netherlands**	**9,743**	**10,784**
Antwerp	Belgium	7,310	8,663
Hamburg	Germany	7,008	9,737
Bremen	Germany	4,565	5,529

Source: Port Statistics. *Port of Rotterdam Authority. Op.cit.,* p. 2

The port of Rotterdam has obtained the absolute dominant position on the European container market handling yearly ca. 10 million TEU's. It is ranked first in Europe but scarcely tenth among the world biggest container seaports. The next three biggest container ports and fierce competitors of Rotterdam include predominantly Hamburg, which lost in 2009 its second position, and then Antwerp and Bremen (see tab. 4). All these mega-ports and simultaneously global container hubs, with a number of container terminals each, not only serve one of the richest and most prosperous regions in Europe constituting their hinterland but also themselves are an integral part of vigorous economic centers of trade as well as manufacturing and consumption areas. These are surrounded by great seaport cities or even constitute an integral part of them. They export and import plenty of goods for the city dwellers as well as for manufacturing and processing centers located close to the port-cities. As a result, *transport loco* plays relatively important role for the dynamic development of the North Sea container hubs.

Statistical data suggest unequivocally that more than half of the container goods consist of products destined for daily usage. In April 2007 more than 200 thousand containers deposited on Dutch quays were examined as for their exact contents. Over 14 percent of the containers were filled with consumer electronics, furniture and other home products. In addition, containers were mostly filled with odd stuff like fruit, vegetables, meat, fish, dairy and grains. Another large part of container goods

[6] A. S. Grzelakowski, *Rozwój logistyki i logistycznych łańcuchów dostaw oraz ich wpływ na systemy zarządzania portami morskimi. Part 1. " Logistyka" No. 6, 2009*, p. 18-20

consisted of clothing, footwear and small utility goods.[7]

2. INLAND WATER TRANSPORT AND ITS ROLE IN THE EUROPEAN TRANSPORT SYSTEM

More than fifty countries around the world have navigable waterways networks of more than 1,000 kilometers. On most of these waterways, the inland shipping sector is underdeveloped. It experiences many barriers and obstacles not only of technical and technological nature. They sometimes seriously limit smooth access of inland shipping to the transport system and reduce automatically its potential role in the domestic and international trade. China takes the lead, with more than 110,000 navigable kilometers. It is remarkable that in China the incoming and outgoing flow of goods across water plays a comparable role to that of northwest Europe. Outside Europe there are more than 30 countries in the world which have opportunities to utilize inland shipping on a much larger scale for the transshipments and carriage of cargo for long distances.

The European inland shipping sector appears to be able to deliver export products to the rest of the world in a growing number of cases and consign to the European seaports imported raw materials and semi-finished products to the manufacturing centers. The waterways network in the European Union amounts to 5,668 kilometers of canals, rivers and lakes, around 20,000 kilometers of which are concentrated primarily in the zone with the busiest waterways, i.e. the Netherlands, France, Germany, Belgium and Austria. Consequently, the share of inland water transport in each of these countries modal split is very impressive compared to other EU countries. For instance, performance of freight transport in inland shipping sector expressed in tone-kilometers (thousand ml t-km) in 2008 amounted to: Germany 64.4, Netherlands 45.30, Belgium 8.75 and France 8.90. [8]

Via the Rhine and its adjacent rivers and canals the industrial areas of north and south Germany, north Switzerland and northeast France are in fact fully accessible to large vessels (see fig, 1). Via the Maas and adjacent navigable waterways in Belgium, Luxembourg and north France they are opened up to larger vessels. The other industrial areas in France can be reached with smaller vessels. However, the French government, with the European support, intends to construct a new canal for large vessels directly between Paris and Antwerp. [9] It is scheduled to be so-called the Seine-north connection which may constitute a new important water transport axle in that part of Europe.

Directly from the Rhine ships can reach the Danube via the Main-Danube channel. This means that also the larger industrial areas in Austria, Czech Republic, Hungary, Croatia, Serbia, Romania and Bulgaria can be reached with larger vessels across water. Via the Elbe and the Oder the industrial areas in Austria, Germany, Poland and Czech Republic are practically accessible, too. With respect to the existing EC plan it is envisaged to connect the Elbe and Oder via a new canal with the Danube in order to create a new trans-European shipping corridor. Other countries in Europe which try to use inland shipping most effectively are Italy, Finland, Sweden, Russia and Ukraine. However, there are serious barriers in these countries connected with the isolated national waterways networks. They are practically separated (except maritime relations) from the main European water infrastructure network.

Canals link the Rhine with the Maas, Rhône-Saône, Marne, and Danube (via the Main) valleys. The Rhine is connected to the Mediterranean Sea by the Rhine-Rhone canal and is joined to the Black Sea by the Rhine-Danube canals. This makes it possible for barges and passenger boats to travel from the North Sea to the Black Sea. The Rhine is the busiest waterway in the world and cargo is transported all over Europe using these two canals. Coal, coke, grain, timber, and iron ore are the principal cargoes carried on the river.

Nowhere else in the world there are freight flows concentrated as massively as on the Rhine. This made it possible for the Netherlands to become the gateway to Europe. The Rhine reserve capacity (700%) and that of the other waterways (100%)

7 Inland shipping. An outstanding choice. The Power of Inland Navigation. May 2009, p. 27. www.inlandshipping.com (23.07.2010)

8 Comp. *EU Energy and transport in figures. Statistical Pocketbook 2010. Brussels. EC 2010*, p. 121

9 *Inland shipping. An outstanding choice. The Power of Inland Navigation. Op. cit., p.28*

ensures that a significant increase in transport volumes over waterways network can be handled without difficulty for many years to come. It is significant driving force especially for Rotterdam as the chief outlet to the North Sea and simultaneously one of the world's largest seaports.

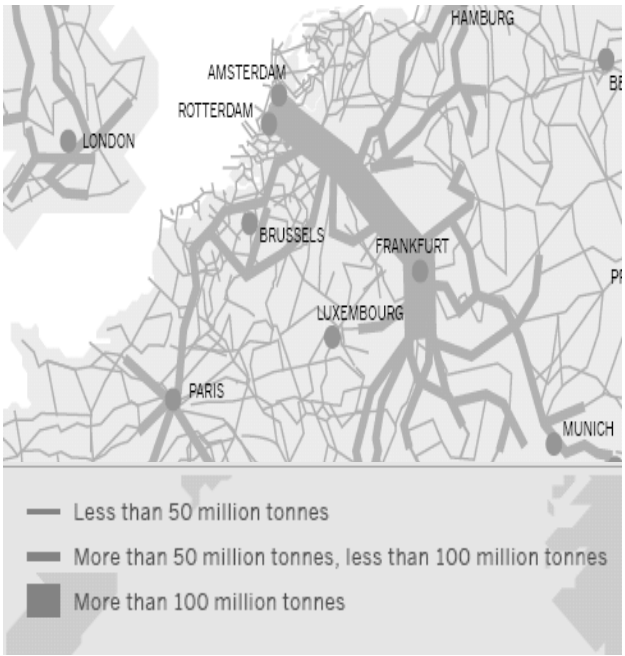


Fig. 1. The Rhine as the central European waterway and its transport connection to the main North Sea ports and their hinterland.

Source: *Inland shipping. An outstanding choice. The Power of Inland Navigation. Op. cit*., p. 20

Among many requirements, the Rhine needs to fulfill both transport and logistics functions of its well developed river ports. Amongst them a primary position is taken by Duisburg. Duisburg, the outlet for the Ruhr industrial region, is the world's largest river port. The port of Duisburg is handling over 50 million tons of goods carried by more than 20 thousand ships each year.[10] The port of Duisburg covers a total of more than 1.3 thousand hectares and contains 21 port basins with a total water area of 182 hectares. The port has six container terminals with 14 gantry cranes with capacity of up to 55 tons. Two of the terminals are equipped with 700 meters of parallel tracks for simultaneous loading/unloading to and from the trains. The port of Duisburg contains nine covered ship loading/unloading facilities. It has a coal blending and loading facility and five coal unloading terminals. The port has six steel service centers that process steel products and two roll-on/roll-off facilities, and contains 150 hectares of storage areas, including 60 hectares of warehouse area for logistics services that include the Logport site.

Public facilities in the port of Duisburg cover an area of 740 hectares and include 40 kilometers of wharf and 21 docks that cover the area of 180 hectares. The Logport Logistic Center-Duisburg covers 265 hectares. Several companies operate their own private docks in the port of Duisburg, bringing the total cargo volume passing through the port to 70 million tons a year.

The Port of Duisburg lies at the junction of the Ruhr and Rhine rivers, about 190 kilometers from the North Sea in western Germany, just 37 kilometers east of the country's border with the Netherlands, about 160 kilometers southeast of the port of Amsterdam and 16 kilometers north of Germany's port of Dusseldorf. As the world's biggest inland port with connections to the North Sea ports through the Rhine-Herne Canal and the Dortmund-Ems Canal it links perfectly these seaports through other inland ports with their very competitive hinterland. The port has convenient access to Europe's rail, road, air, and water transport networks.

In 2008, over 520 thousand people lived in the area of the port of Duisburg. Located in the heart of the European market, the port of Duisburg serves the area of more than 30 million consumers. However, the current population of the Rhine basin is approximately 50 million. The major cities are all situated on the Rhine or on its larger tributaries, and the development of these cities is strongly dependent on water. Similarly, the activities undertaken within these cities influence the waters

[10] In the 2007-2008 shipping season, just before the global and the EU economic slowdown, the Port of Duisburg handled a total of 54.5 million tons of cargo including 28.3 million tons of bulk and general cargo, 15 million tons of general cargo, and 9.8 million tons of containerized cargo in over one million TEUs. Cargoes included 5.2 million tons of iron and steel and non-ferrous metals, 6.2 million tons of coal, 4.6 million tons of oil and chemical products, 1.5 million tons of scrap, and one million tons of building materials. World Port Source – Port of Duisburg. www.worldportsource.com (01.09,2010)

of the Rhine and its tributaries. In this sense, the Rhine basin could be regarded as some kind of "mega-city".

The problems and issues that have affected the development of the Rhine basin are similar to those currently affecting water resources managers in large cities. Specific issues include water supply, flooding, water quality, energy production, transport and institutional arrangements. The demand on water for a range of purposes has increased significantly with time. Population growth, industry, agriculture, hydropower generation and other users can be either cooperative or competing users.

3. INLAND WATER TRANSPORT AS A DRIVING FORCE OF THE EUROPEAN NORTH SEA MEGA-PORTS

The contemporary development of the EU transport system is characterized by the still growing road transport subsystem. Road transport takes the biggest share of transport performance in all European countries. In Germany, the Netherlands, Belgium and France however, as it was mentioned earlier, inland shipping accounts for a considerable share of transport performance. Nevertheless, its role and functions in a modern transport system and especially its sustainable development is to some extent still neglected. Indeed, the European Commission tries to support such environmentally friendly mode of transport by promoting its development (NAIADES), but its previous efforts are rather miserable.

Recently, several models have come up with growth projections in the European freight transport. Where they tend to differ is in how this growth will translate across different modalities (see fig. 2). Expectations are that the European inland shipping will grow by at least 38% versus current transport performance until 2030. [11]

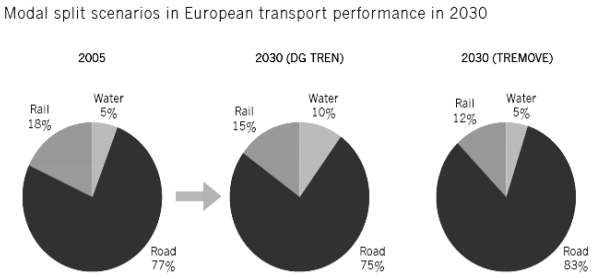


Fig. 2. Scenarios of modal split in European transport performance by 2030.

Source: *Inland shipping. An outstanding choice. The Power of Inland Navigation. Op. cit.,* p. 22

The outlook for the inland water transport compared to other modes of transport, especially road transport, in the perspective of the next twenty years is moderate (DG TREN 10 % and TREMOVE – 5 %). It could influence to some extent its position among the other modes of transport on the North Sea ports hinterlands but it should not hamper it in any way.

It is remarkable that nowadays at almost every European seaport, especially within general cargo and container segments, road transport plays a primary role in servicing their hinterland. In German seaports, the focus is also on rail, in addition to road transport. In Rotterdam, however, as well as in Antwerp and Amsterdam the emphasis lies on inland shipping. Its outstanding position in ingoing and outgoing container traffic is evident in the port of Rotterdam (see tab. 5).

Tab. 5. Modal split in container throughput via port of Rotterdam 2009 - 2008

MODAL SPLIT CONTAINER THROUGHPUT			
	2009	%	2008
Barge	1,371	33.2	1,413
Rail	452	10.9	596
Road	2,309	55.9	2,676
Total	**4,132**	**100.0**	**4,685**

Unit: Number of containers (‘moves’) x 1,000
Source: Port Statistics. Port of Rotterdam Authority. Op.cit., p. 10

In the port of Rotterdam inland navigation took a larger share (33.2%, up from 30%) of the hinterland transport of containers in crisis year 2009. Previously such a large gain was recorded in

[11] See more: *Inland shipping. An outstanding choice. The Power of Inland Navigation. Op. cit.,* p. 21-22.

the preceding century. Rail transport declined from 13% to 11% in 2009 and is back to the 2006 level. Road transport slipped slightly from 57% to 56% (tab. 5).

The total volume of hinterland transport decreased by 12%, from 7.8 million TEU in 2008 to 6.9 million TEU in 2009. Rail transported 755,000 TEU, a drop of 25% compared to 1 million TEU in 2008. Barges carried 2.3 million TEU, 3% less than in 2008 (2.23 million TEU). Truck volumes fell by 14%, from 4.5 to 3.8 million TEU.

The explanation of such fact given by the port of Rotterdam is that rail was not quick enough to adapt to the declining volumes caused by the crisis, while inland waterway transport was able to be more flexible in its pricing – adapting to the surplus transport capacity (overcapacity). Inland waterways also benefited from the elimination of restrictions in handling capacity at the sea terminals. The road sector was relatively more exposed to the crisis because it has a high proportion of around 70% in intra-European ('short sea') services. This was relatively hard hit by the economic downturn, especially in the United Kingdom, Ireland and Spain.

In accordance to the EU sustainable transport policy, the Dutch government and the Port of Rotterdam pursue a policy aimed at decreasing the share of road haulage accomplished through modal shift. Since 1993, the truck share has, according to the "old" method, declined from 66% to some 50%. In 1993 the total volume was 4.2 million and in 2009, 9.7 million TEU. [12]

It has been already emphasized that the great advantage of the port of Rotterdam as well as Antwerp and Hamburg (so called A-R-A ports) lies in the possibility not only to handle the deepest maritime vessels but also to carry out the hinterland transport owing to its exceptional geographic location at the mouth of the large European rivers Rhine, Meuse and Elbe. As a result, Rotterdam but also Antwerp, Amsterdam and Hamburg, can therefore have unlimited access possibilities for transport by water, such as across the river Rhine. If, for example, the Rhine had been absorbed by the sea within the area up to Hamburg, then Hamburg would have been the largest port in Europe. It would simply be impossible to transport the annual volume of goods from the Rhine (300 million tones) as it is today via railways or the road, via one of the other ports within the Hamburg - Le Havre range. [13]

4. NORTH SEA MEGA-PORTS AND PORT CITIES – IRREVERSIBLE INTERCONNECTION

The North Sea mega-ports are characteristic of not only their close inland waterways connections to hinterland and their role in creating competitive advantages for them but also specific spatial, economic and social relations to the coastal regions and port cities. In fact, all these seaports have been closely connected to the surrounding agglomerations for ages or even incorporated into them. These seaports have constituted an integral part of port city organism since medieval times. It is necessary to mention free ports, free port zones or areas as well as entrepots as the main institutions typical of North Sea ports merging both organisms.

Seaports as vital transport nodes and significant components of the domestic transport system, integrating it with other transport systems of the neighboring countries, have always played very important economic, social as well as political role in many ambitious and independent cities in this part of Europe. Owing to their position in the transport system and usually well developed widespread areas of activity connected with their transport, industrial and commercial functions, strongly influencing the well-being of the port cities, seaside regions and the whole economy, they have been regarded as a *public good* of special national interest and strategic importance. As a result, seaports were and are still treated and perceived within the overwhelmingly practiced economic doctrine as a public *domain*. Consequently, being a part of the important country border territory, usually owned by the state or any other public entity (city, autonomous province, etc.), seaports are subject to strict public control and intervention.

The dominant public form of intervention into the port sector is the establishment of the port administration and management system or model. It is set up by law, usually a special parliamentary

[12] www.transportjournal.com, NAIADES – European IWT News. www.naiades.info/page/nl, and www.portofrotterdam.com,

[13] *Inland shipping. An outstanding choice. The Power of Inland Navigation. May 2009*. www.inlandshipping.com (23.07.2010)

harbor act which, based on the type of port area and infrastructure ownership, determines the overall legal and administrative relations between the public bodies (city) and the port. Such harbor act constitutes usually port administration and management entity, providing it with precisely defined operational and strategic goals as well as economic and financial tasks and responsibilities. Taking into account the above mentioned factors, based on ownership, and influencing the most important attitude of the central and regional public entities towards the main seaports as well as relations between the established management entity and the port businesses, four worldwide existing types of seaport administration and management can be distinguished:

1. State model.
2. Autonomous model.
3. Municipal model.
4. Private model which is straggled in Europe.

The state model of port administration varies nowadays from direct political and economic states supervision, strongly limiting the legal and economic status of the assigned port administration entity to its indirect involvement in the form of establishing a quasi-autonomous port entity acting as a public utility company (PLC), where the state owns the shares or possesses the majority shares and is only indirectly involved in the port administration and management sphere. This model of port management, however, is not typical of North Sea ports.

Another seaport administration and management model is the autonomous model, with non-profit body set up by law in the form of port trust or port authority, which currently dominates not only in Europe but also in many parts of the world. It is the most developed form of sovereignty in legal and economic as well as financial terms of the port management entity, which also enjoys wide spectrum of autonomy in the strategic decision making process. The autonomous model tends to separate clearly the sphere of port management and administration from the operational (exploitation) one, which is usually not the case in the state model.

The municipal model is characterized by direct engagement of the local, mainly city or province authorities or self-government in the direct process of port administration and management. That model, which strongly prefers the unconstrained expansion of private sector in the operational sphere, and promotes there the development of fair competition, is very efficient and popular especially in northern Europe, in the North Sea ports where even large ports like Rotterdam, Antwerp, Hamburg and Amsterdam are managed in such manner. It was typical of North Sea ports. It has many advantages thanks to good cooperation between the port and its surrounding neighborhood – port cities, which enables eliminating many conflicts, e.g. spatial ones, and barriers usually existing between these areas, organizations and systems. [14] However, that model has some constraints too, which might to some extent hamper the port development and its adjustment to the dynamically changing environment. The local municipal authorities can not afford to fund sufficiently the development of port infrastructure, and the port development plans and strategies are sometimes not fully applied to the national plans. What is more, sometimes the local and national interests differ in kind, limiting the necessary area of cooperation to the detriment of the seaport development.

The existing obstacles and barriers to the development of the North Sea mega-ports which were managed and administrated as typical municipal ports have caused significant changes in their management model. In the middle of this decade most of them were partially autonomous in economic and legal sense. Quasi-autonomous port authorities have been established there and new functional task division between municipality and the state has been set up. That new model and concept of port management was implemented in Rotterdam. In accordance thereto the port of Rotterdam Authority is the manager, operator and developer of Rotterdam port and industrial area. The Port of Rotterdam Authority is a public corporation (N.V.) with two shareholders: the municipality of Rotterdam and the State. As it is revealed by the statutory objectives, this entity operates in two domains: shipping and the port area.

Its statutory objectives include:

[14] A. S. Grzelakowski, *Rozwój logistyki i logistycznych łańcuchów dostaw oraz ich wpływ na systemy zarządzania portami morskimi. P{art. 2. „Logistyka" No. 2/2010,* p. 31-32

1. the promotion of the effective, safe and efficient handling of shipping in the port of Rotterdam and the approach area off the coast,
2. the development, construction, management and operation of the port area.

The port authority also works closely with the State, the municipality of Rotterdam, local authorities and interest groups. As a public entity it will enforce a sustainable strategy towards the hinterland, promoting without doubt inland water transport and rail. The same attitude towards the inland waterways and inland navigation is provided by the other quasi-autonomous ports, .i.e. Hamburg and Antwerp.

5. SUMMARY

As far as the North Sea ports are concerned, the beneficial geographic situation at the coast and the combination with transport via the Rhine provide Rotterdam, Amsterdam and Antwerp with a great natural advantage compared with other seaports in this European region. Within other matters (road and rail connections) many services and opportunities are equal in the European seaports. In the nearest future this means little or none physical obstacles to let transport via European rivers grow even faster. As for the Rhine, according to research, less than a quarter of the available capacity will be utilized. Therefore, many decades of sustainable growth of transport via northwest Europe is possible, without the need to invest in extra road infrastructure which is capital-intensive.

It means that the inland water transport will play a significant role in the development of North Sea ports giving them a kind of competitive advantage against other European seaports were this mode of transport is underdeveloped. Among beneficiaries of this tendency there are port cities which will consume a significant part of added value generated by inland shipping connecting seaports to their hinterland. The economic, financial, social and environmental relations between these organisms will be strengthened by providing them with unique opportunity to create long term real spatial order, and in the end by eliminating still existing barriers to harmonized cooperation and development.

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