



Structure of Port Goods and Transport Flows

Ana Radulović¹

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Port;
Combined cargo;
Cargo-transport port centers



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Abstract: *Maritime transport plays a very important role in connecting European ports and their hinterlands. According to recent data (ISL, 2017), approximately 400 million tons of combined short-haul freight transport (containers and ro-ro) are transhipped between ports within the EU or between ports in the EU and neighboring countries.*

The network of European short sea shipping services is large and diverse. Most ferry services bridge short distances, e.G. Via the English channel, the Fehmarn belt, or the strait of Gibraltar.

At longer sea distances, trailers and containers are often shipped by combining transport with inland or rail transport inland. Most of these connections, which were developed only a few decades ago, operate successfully under the management of mostly private liner or container operators. For offshore traffic, competition is mainly between line operators and ports, but not between (except tunnels/bridges) economically viable alternatives. Improving the efficiency and expanding the capacity of such links makes transport cheaper and helps promote the single market.

1. TRAFFIC BRANCHES AND NETWORKS IN TRANSPORT CHAINS

On coastal routes, where modal diversions from road or rail to sea are possible, there is direct competition with land modes of transport.

The commercial operation of coastal short sea routes depends much more on the competitiveness of maritime transport compared to other modes of transport. Generally speaking, the greater the distance, the more attractive the short sea transport is, because the price per kilometer and unit of cargo is extremely low. Supporting the efficiency of short sea shipping can, therefore, promote the transition to maritime modal traffic (European Commission, 2018, p. 11)

In addition to increasing efficiency, improving the environmental performance of shipping is certainly a comprehensive goal for all types of maritime, and especially short-distance maritime transport. The Fast and Short Sea Distance program can support shipowners to go beyond stricter regulations and piloting services, alternative fuels, propulsion types and other solutions that help the shipping sector improve its reputation on more environmentally friendly transport models.

In order to fulfill their role as intermediaries within European transport, ports must provide the necessary infrastructure to guarantee unhindered traffic between maritime and land transport. The analysis of the adequacy of ports in terms of their role in combined transport operations therefore cannot be limited to the analysis of coastal and port facilities, but should also take into account the link with other modes of transport, i.e. by rail and inland waterways.

When it comes to promoting “green shipping”, the focus is naturally on maritime transport trade in European seas. However, many potential measures regarding ships also have an impact on ports, e.g. LNG-powered ships (Liquefied natural gas) that must have an economically viable supply of LNG in ports or closed railway stations with adequate reception and dispatch equipment.

¹ Maritime Faculty, Kotor, Montenegro

The requirements set by 331 European ports differ essentially from one another in different types of cargo and the size of ships at the observed distances. Setting meaningful common European standards in terms of ship size is still impossible.

Despite the importance of a modal shift from truck to rail, many ports do not need a rail link, as intermodal services are not sustainable, especially not for ports located in smaller to medium-sized islands. Accordingly, compliance with European standards is not a useful concept when analyzing overseas road requirements. Instead, the analysis of the needs of each port, and the integration of the hinterland of that port into maritime and transport chains is a prerequisite for more efficient development of both the network of maritime roads and ports. (European Commission, 2017, p. 13)

2. CONCEPTUAL SOLUTIONS FOR THE ORGANIZATION OF CARGO AND TRANSPORT PORT CENTERS

Access to the interior/hinterland of the port as well as the connection between the port and the main transport network is a problem for many European ports, especially those located in densely populated areas.

In many cases, the connecting infrastructure is used for different types of cargo, and in some cases for passenger traffic. Wherever bottlenecks hinder the smooth connection of seaports with land transport infrastructure, solutions should be developed and included in the program of communication by sea, going as deep as possible into the hinterland of the countries.

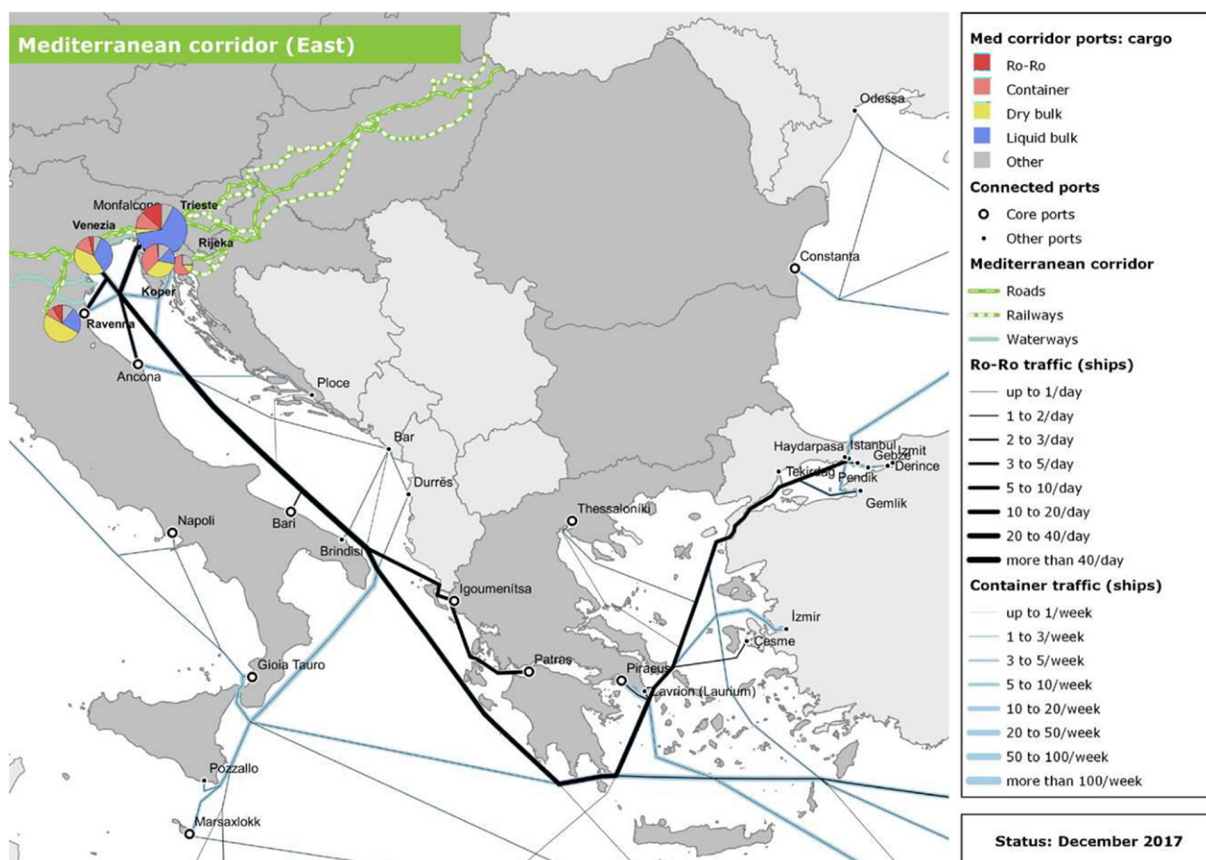


Figure 1. Mediterranean Eastern Port Corridor

Source: European Commission (2018)

Research regarding relevant bottlenecks in the Adriatic Sea (eastern countries - Figure 1) e.g. between port and hinterland research plans should include:

- railway infrastructure towards the port area (railway connection with the main network, construction or expansion of railway terminals and marshalling yards); This measure is applicable to the “Port of Bar”, which is connected to Belgrade by rail, regardless of the fact that it is a relatively old and poorly maintained railway infrastructure dating back to 1974.
- modern road infrastructure in the port area and access to the port area (construction of new roads, bridges and tunnels), at the beginning of the construction of the road Bar - Boljare;
- road traffic management (including driver information systems, parking in front of the entrance, etc.);
- railway operations and related processes (e.g. maneuvering) in the port area (mainly in relation to large target network corridors).

Where short sea shipping competes with direct land transport, congestion on the roads to the port area makes it difficult to cross from road to sea, as time is wasted and the costs of the short sea transport chain increase. Solutions to congestion issues need to be developed in ports and should include infrastructure modernization, but also changes to incentive modal infrastructure and measures for inland port traffic or intelligent road traffic management. (European Commission, 2017, pp. 43-44)

3. SPATIAL-TEMPORAL CHARACTERISTICS OF MICRO-LOCATIONS AND GRAVITATIONAL ZONES OF GOODS TRANSPORT CENTERS

The new role of “Port of Bar” and its integration into the supply chain has attracted special attention in the last two decades. Today, the “Port of Bar” is no longer seen only in the traditional regional gates, but as a place where it is possible to create more important added value and logistics activities.

Ports today are not only logistics centers that affect spatial, but also temporal processes and forms of supply chains, thus becoming part of more complex forms of supply chains.

Spatial-temporal integration of the “Port of Bar” with the hinterland is relevant because the productivity and performance of the port are related to the efficiency of the entire supply chain.

As the European Union expands to the east, there is a possibility that the Adriatic ports, as well as the “Port of Bar” will occupy an increasingly important market position and become more competitive compared to other European ports.

This can be achieved by applying the practice of integrating “Port of Bar” into supply chains.

Although “Port of Bar” is still not highly integrated into the supply chain with its hinterland, according to the latest research, ports of developing countries and smaller ports are improving their facilities, the connection between the port and the hinterland, and especially the application of ICT systems can achieve significant results of spatial and temporal integration of the port into the supply chain.

Significant changes are taking place every day in terms of relevant infrastructures, development of maritime logistics, transport and development of ports throughout Europe, including the area of the “Port of Bar”. Although smaller ports, such as the Port of Bar, are introducing new

connection projects, much remains to be done to integrate the Port of Bar into existing supply chains and to connect more effectively with the hinterland.

Neither the Port of Bar, nor other ports on the Adriatic can integrate themselves, if the conditions are not met that most actors are involved in port activities, transport activities as a common system, integrating as important factors in creating transport policies: port operators, shipping line, freight forwarders and other stakeholders.

4. THE MOST IMPORTANT ELEMENTS OF THE PORT'S INFLUENCE ON THE DEVELOPMENT OF MICRO-LOCATIONS AND GRAVITY ZONES OF COMMODITY TRANSPORT CENTERS

Port operations around the world are currently hit by competition more than ever before. In the past, such competition was usually recorded between individual ports that were approximately the same size. More recently, however, competition has evolved according to different geographical and functional ranges.

Competition is further enhanced by the operation of land transport facilities by making it an alternative to maritime transport. Furthermore, competition almost always covers all logistics chains, where ports and maritime transport are only integral elements, which can be the difference between accepting and rejecting the choice of a particular transport chain. Different actors are present in these transport chains. For ports, there are not only port authorities, but also cargo handling companies, shipping companies and many other service providers. Each of these services testifies to the course of events in the organization of transport, either in terms of multiplying the number of service providers, the concentration of cargo and/or entities, and on the other hand, confirms the vertical integration of the transport chain.

All these movements abruptly reversed the traditional view of competition between ports. Ports are faced with a multitude of actors, who together with the port must constantly adapt. In this context, decision-making takes place in a different rhythm and framework than in the past. By considering this evolution of adaptation, other elements that are not comparable to those that were important in the past become crucial. For example, for infrastructure investments, the port administration could generally expect the burden to be borne by the government of the country to which the port belonged. Today that is no longer possible.

Generally speaking, public budgets are shrinking, and there is strong competition with other consumer budget items in the governments of certain countries, where the public is resisting the allocation of funds to port infrastructure, especially because port operations may jeopardize the spatial environment or lead to environmental pollution. In this context, new types of tasks are set before ports. In order to grow and improve its market position, the port management is required to obtain financial resources, most often in partnership with the private sector.

The basic elements of the development of micro-locations and gravity zones of freight transport centers (located mainly in the hinterland of the port) outline the priorities for the future development of maritime transport, with the main pillars of development:

- preservation and maintenance of the environment;
- integration of maritime transport into logistics chains with the hinterland;
- safety, traffic management and human element.

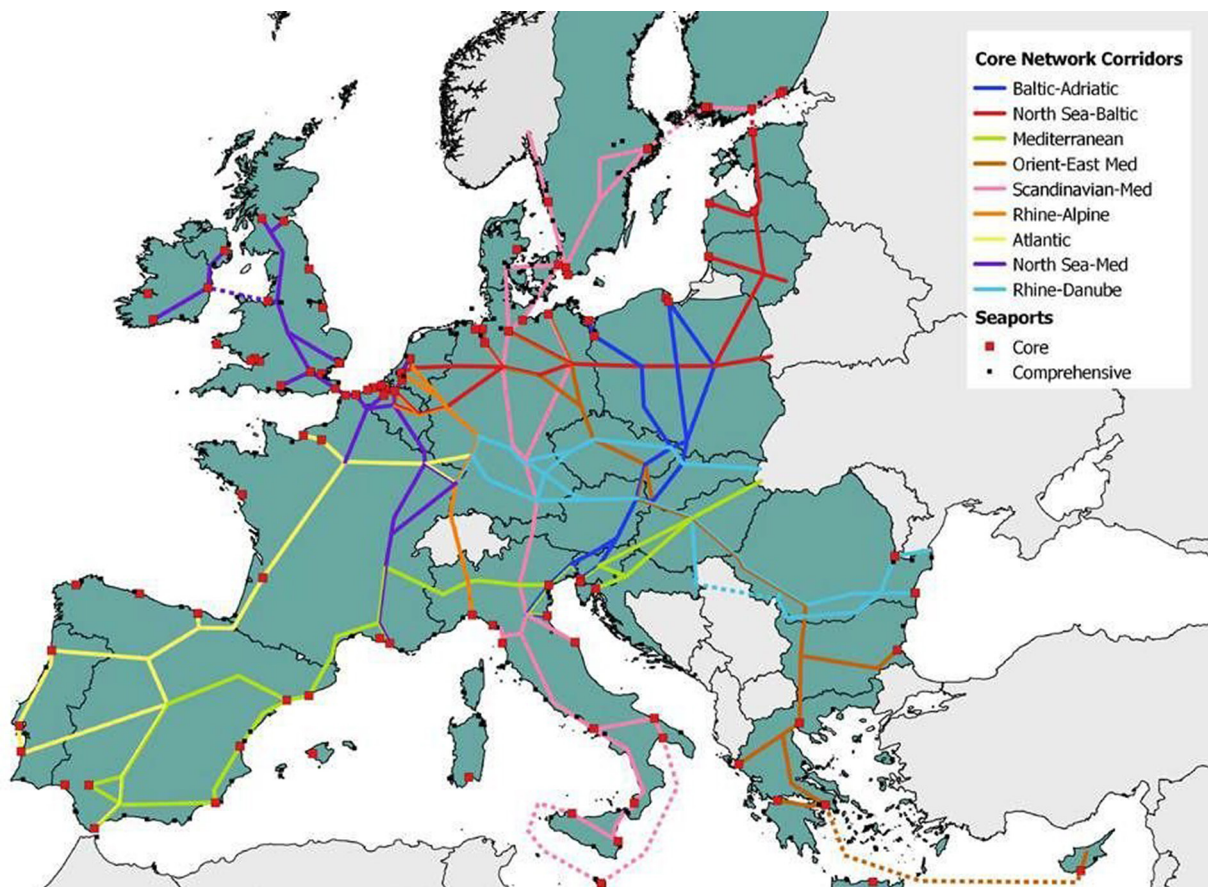


Figure 2. Overview of the network of ports of European corridors and their connections with the hinterland

Source: ISL based on Eurostat

Surveys of the existing navy and regular ro-ro services, as well as container services in Europe, connect nine basic network corridors (Figure 2).

The importance of all network corridors is evident in the comprehensive network of European maritime routes, including connections with neighboring countries. The obvious perceived limitations of the analyzed characteristics of the European fleet and relevant ports can identify shortcomings in terms of certain objectives, such as the insufficient number of network points for refueling LNG-powered ships throughout the EU or the need to simplify administrative procedures for maritime transport.

Also, by analyzing the shortcomings in terms of fleet, number of ships, and/or ports using available services to the hinterland of Europe, it is possible to identify the overall investment needs in ports and the organization of sea lanes to the hinterland.

The analysis showed that the total investment needs related to sea routes in Europe by 2050 are estimated at around 5 billion euros. Compared to the needs of investments in ports, according to the European Sea Ports Organization (ESPO), this need for investments is much more modest, because many of the expensive infrastructure projects are aimed at large ships used on certain sea lanes.

For maritime routes, environmental investments account for by far the largest share. Approximately 3.7 billion euros are related to investment needs that belong to the environmental protection sector of maritime roads and ports.

Costs related to the integration of maritime transport into logistics chains and connections with the hinterlands of the countries amount to around 1 billion euros, while measures related to safety, traffic management and the human element contribute another 300 million euros. (European Commission, 2017, p. 44)

Understanding the impact of transport links (ports) on the hinterland of a particular country is important from several perspectives. First, a better assessment can be made of the consequences of major changes in the country's hinterland, due to changes in maritime transport, and in particular the introduction of mega-ships or changes in the frequencies of access to these ports.

Second, the impact of intermodal links on hinterland expansion for different types of shipping companies can be assessed. This could be useful for those who plan and make decisions in order to assess the impact of infrastructure improvements to the hinterland on certain industries or for certain regions. From the perspective of regions that rely on remote suppliers or customers, providing access to one or more ports, at a reasonable cost, is a key issue for their economic development.

In the specific context of Montenegro, this is especially important for the supply of retail and manufacturing that depend heavily on remote inputs. Access to ports can also be a big problem for manufacturing companies that plan to market their products abroad (and geographically gravitate to "Port of Bar", as a point through which they have the most economical long-distance transportation options).

Containerization has called into question the hypothesis that everything is spatially concentrated around the port. New types of liner shipping services, such as those organized as a network of hubs, include an increased concentration of freight flows. In fact, the overall efficiency of the shipping network increasingly relies on the individual efficiency of a small number of nodes, mostly a few in each region of the world.

For the Port of Bar, as well as other ports on the Adriatic, efficiency simply relies on transshipment activities at sea, but for the vast majority of ports a connection to the hinterland of the country needs to be achieved.

The idea of connecting ports with the hinterland is well summarized by the concept of regionalization of ports, which implies strong integration of ports with land and sea segments. Ports are viewed as nodes of intermodal networks, and competition takes place between transport chains, not between ports.

Land terminals are used to alleviate congestion and lack of space in ports, by developing high-capacity intermodal connections organized by rail and/or by barge.

Attracted by lower land costs and high levels of accessibility, logistics zones appear around these inland (land) terminals located mainly in the hinterland, offering services such as completing customs formalities, empty container depots, cargo consolidation, inventory management or pre-assembly components, etc. Although the process of regionalization is essentially driven by market forces, public actors also play an active role in the internal expansion (towards the hinterland) of port systems.

Directions of regionalization are not systematically initiated by ports, but can be implemented through intermodal operators, public organizations and the like. (Monios, 2012, pp. 1551-1561) while sometimes both directions can be implemented simultaneously.

Despite stronger integration in the context of port regionalization, important barriers still exist for port expansion and impact on the hinterland. The latest research works emphasize the importance of borders and distances, i.e. configurations of almost the entire European hinterland, showing their unequal effects depending on the geographical position of the countries: coastal or land. The former is more limited by internal distance than the latter. While coastal countries are connected to their national logistics networks, those that are on land have historically expanded their logistics networks further to have better access to the sea.

Influence of boundaries on flows in the interior, i.e. the hinterland would also be more or less strong depending on the position of a particular port.

This asymmetry would result not only from different levels of service in ports but also from unequal skill levels of actors involved in inland connectivity on both sides of the border. (Acciario et al., 2017)

These latter differences are not limited to language skills, but also to commercial skills and the ability to cope with different cultures.

5. CONCLUSION

The network of regular shipping services to and from EU ports is large and very diverse. The issue of port competitiveness, especially in the context of container cargo, is more important than ever. In addition to researching port capacity, cargo volume, number of shipping lines and ships accessing a particular port, the quality of port hinterland connectivity is the second most important criterion of port competitiveness, after the criterion related to cost factors. However, most European seaports, both large and small, are often affected by congestion of these connections in the hinterland and/or the absence of connections with the hinterland at all.

At the beginning of 2017, 408 container transport services and 450 ro-ro services were identified in Europe. Container services included 150 services and 15 operations for each Member State. The remaining 243 operations connected at least two Member States or one Member State with a neighboring country. In terms of volume, about half of the port's container traffic includes a transport network on short sea routes, while the other half relates to longer routes (European Commission, 2017, p. 8),

Longer overseas container traffic is concentrated in numerous European ports. Only 36 of the 331 European ports transshipped more than a million tons of container cargo that arrived directly or went to ports outside Europe. The first and largest 10 European ports handled about 80% of this cargo. Short sea shipping is much more widespread: so that 63 ports serve more than a million tons, and the first 10 largest ports make up just over half of the total volume of container transport over short sea distances. In total, almost half of the 331 ports perform container transport. In 161 ports in which container transport was performed, and in 70 ports the transport of one million tons per year was exceeded (European Commission, 2017, p. 8).

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