

FRAUNHOFER CENTER FOR MARITIME LOGISTICS AND SERVICES CML

PORT COOPERATION BETWEEN EUROPEAN SEAPORTS - FUNDAMENTALS, CHALLENGES AND GOOD PRACTICES

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PORT COOPERATION BETWEEN EUROPEAN SEAPORTS - FUNDAMENTALS, CHALLENGES AND GOOD PRACTICES

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List of abbreviations

ABP	Associated British Ports
AE1	Asia to Europe 1
CML	Center for Maritime Logistics and Services
CMP	Copenhagen Malmö Port
CPH	Copenhagen
ECT	Euromax Container Terminal
EFIP	European federation of inland ports
EP	European Parliament
ESPO	European Sea Ports Organisation
EU	European Union
GUE/NGL	Confederal Group of the European United Left/Nordic Green Left
GVO	Group exemption regulation
HPA	Hamburg Port Authority
IAPH	International Association of Ports and Harbors
IT	Information technology
LHG	Lübecker Hafengesellschaft
LNG	Liquified Natural Gas
MoU	Memorandum of Understanding
OECD	Organisation for Economic Co-operation and Development
PA	Port Authority
PdeIE	National Port Authority of Spain
RoRo	Roll on Roll off
RTD	Research and technology development
TEN-T	Trans-European Transport Network
TEU	Twenty-foot equivalent unit
TFEU	Treaty on the Functioning of the European Union
UK	United Kingdom
USA	United States of America

Management summary

This study on port cooperation between European seaports elaborates opportunities, challenges and limits of port cooperation in Europe.

Port governance and main actors:

- Port governance is related to the ownership of a port area and operation of a port terminal. Port facilities are distinguished into infrastructure and suprastructure. Moving from public service and tool ports to governance structures favoring private investments in port assets, the landlord port model is the dominant structure today.
- The port authority as public or private body, commonly a municipal port authority, is responsible for construction, maintenance and administration. Main role is either to act as landlord for a private terminal operator or as owner but also operator of terminal handling and storage. Port terminals owned or leased by the operator are responsible for all handling and storage activities.

Types of port cooperation:

- Popular basic cooperative commitment between port authorities is a signed Memorandum of Understanding. Cooperation between neighboring competing ports is referred to as coepetition. Port integration comes with foundation of joint venture companies between port authorities and terminal operators or even the full disposal of port property rights, duties and obligations to private sector organizations (privatization). Cooperation between seaports and inland ports has the intention to enlarge the hinterland region of the seaport to and from the customer.
- Hub and feeder port networks contain close business relationships between liner carriers and terminal operators. Cooperation between port authorities and/or terminal operators is not directly applicable.

Good practices of port cooperation:

- Five German river Elbe seaports cooperate as "Elbe Seaports". The seaports' authorities, business development organizations and a private terminal operator cooperate in marketing, sourcing of services and land space, and infrastructure planning. In the cross-border cooperation "RheinPorts" founded between three upper Rhine inland ports, the ports cooperate in marketing of services and information exchange, transshipment of goods, customs, and container repairing. Representing seaport and inland port cooperation the port authority of Antwerp, Belgium and the owner and operator of the inland port in Duisburg cooperate through a rail hinterland shuttle.
- The ports of Malmö, Sweden and Copenhagen, Denmark agreed to the closest possible form of cooperation - a joint venture company responsible for cargo handling and storage. The company acts as port and terminal operator in both cities and leases the necessary infrastructure from the authorities. An example of port privatization is "Peel ports" acting as owner and operator of several UK ports.

Limitations of port cooperation:

- Port cooperation seems not to be a major issue in the EU Commission's policy. On national level, e.g. in Germany, any horizontal port cooperation among seaports has never been a priority within the national port development program or other federal government decisions.
- Legal restrictions on port cooperation start with the discussion on sovereign tasks of the authority and economical tasks of the operating actor. Classification of the activities proves difficult since ports are organized differently. The public funding of infrastructure investment projects may be subject to EU state aid rules. For cartel law restrictions coming into force, the cooperative arrangements, especially terminal operation activities, have to affect the trade between Member States in a noticeable way.

Potential synergies of port cooperation:

- Port authorities and terminal operators profit from cooperation to different extents. Authorities' intentions have a strong link to public welfare generation and social benefit maximization. Terminal operators' intentions are company specific but are highly correlated with revenue generation and profit maximization.
- A "Hierarchy of port cooperation" is proposed. The "Marketing+" initiative represents an extendable basis pursued by port authorities acting as independent commercial entities and is possible without bigger structural changes. The impact of cooperation on public infrastructure investments is low. Cargo handling and storage remains in the hand of private terminal operators, and therewith, the decision on most tariffs and charges. Opportunity is to gain access to large infrastructure funds or to appropriate research funding as joint partners. Potential synergies arise through cooperative tasks in the functional areas dealing with strategy development, marketing and PR, port and investment planning, commercial activities, engineering, human resources, environmental protection and IT.
- The final form of port cooperation ("Joint venture") takes place between port authorities operating in a commercially oriented manner and one/several private port terminal operators by foundation of a joint venture company responsible for cargo handling and storage. It requires fundamental structural changes of the port governance and is not easy to accomplish without a strong economic and societal necessity. Sovereign tasks are supplemented by commercial tasks with clear financial goals. Revenues of cargo handling and storage are shared. The impact on public infrastructure investment savings is considered to be considerably large as investment projects could be better coordinated between locations. Possible benefits for the joint venture partners are efficiency increases in port handling and increase of international competitiveness.

Finally, it is anticipated that the future of port cooperation lies with initiatives at regional level rather than national level/EU level; and with cooperation of port authorities fulfilling their sovereign tasks by agreeing on joint supporting activities. Cooperation of terminal operating companies in proximity refers to a joint venture company improving services for the port's main customers - the liner carriers active in global alliances. The joint venture does not overtake the key port services of cargo handling and storage; instead division of other tasks is more likely referring to traffic management or standardization of information exchange processes.

1 Introduction

Seaports and their closely linked logistic sector, the industrial clusters and the maritime industry have a significant economic importance for the coastal countries of the European Union. High efforts of the public sector and the private sector are required to maintain the operation and expansion of maritime transport infrastructure. This is especially the case due to changes in the shipping sector such as increasing vessel dimensions. While the adaption of sea port facilities for larger vessels is often associated with ultra large container carriers only, this development can also be observed in market segments like feeder vessels and car carriers.

The financial crisis of 2007/2008 had a big impact on international seaborne trade. In 2009 total volumes declined for the first time after strong growth rates since 1985 by -4.5% from 8 229 millions of tons loaded in 2008 to 7 858 millions of tons loaded in 2009 (UNCTAD, 2015). Container shipping used to be a major driver of past seaborne trade volumes with common global growth rates of more than 10%. The sudden collapse of container shipping volumes confronted the market with new challenges. Some terminal investment projects initiated prior to the market downturn were finalized in a situation where capacity increases were no longer demanded in the anticipated extent. Examples of recent capacity expansion projects are the construction of the new deep sea container port in Wilhelmhaven or Maasvlakte 2 as the expansion of the port of Rotterdam. At present, the markets seem to stabilize with container terminal throughput increases in the European top ports from 2014/2013 by 5.8% in Rotterdam, by 5.1% in Hamburg and by 4.7% in Antwerp (UNCTAD, 2015).

The halt in throughput volumes favors the discussion of alternative port development strategies, especially, the concept of cooperation. Cooperation possibilities of ports have been in the public debate for decades. Reasons why this discussion is initiated include considerations that public investment needs and environmental interventions could be mitigated. Ports compete on regional, national and international level. Financial resources to invest in up-to-date ship-to-shore cranes as well as storage capacity of terminals are limited. Due to traffic peaks difficulties occur in efficient operations, such as congestion in port areas and on critical infrastructure links.

To support appropriate policy priorities, in particular to ensure public investment requirements into maritime infrastructure and into land infrastructure access, cooperation schemes between seaports seem a possible solution in order to take advantage of potential synergy effects rather than to invest public money in numerous seaport locations which compete with each other. Some anticipated positive effects of port cooperation include:

- Reduction of investment needs;
- More efficient usage of port infra- and suprastructures;
- Better utilization of hinterland transport modes through increasing rail and barge transport frequency;
- Better streamline of traffic peaks;
- Reduction of costs for maintenance;
- Increased flexibility regarding workforce through personnel exchanges.

Considerations on streamlining actions often go beyond cooperation between port authorities as far as a steering of traffic and goods flows, often fail to recognize that both port authorities and terminal operators have already begun to build alliances and forms of cooperation which hold a number of advantages for the parties involved. The call for more cooperation of ports might be addressed to business actors, who already have established in one way or the other a cooperating scheme as a long term business practice. In political and public debate "The port" is referred to as if it was only one business unit, which is only rarely the case. It is essential to distinguish between the various actors in the port, most likely a public port authority, which holds the infrastructure and leases land and the public, part-public or private terminal and transshipment companies who carry out the basic logistic functions such as transport, transshipment and storage. These actors have completely different business goals and are therefore more or less willing or able to cooperate in varying degrees.

The parliamentary group European United Left/Nordic Green Left (GUE/NGL) in the European Parliament contracted Fraunhofer CML to elaborate opportunities, challenges and limits of port cooperation in Europe linked to European Union port policy.

Attention is drawn to the main port actors, namely, port authority and terminal operator. The underlying port governance structure such as the landlord port model is explained complemented by different types of cooperation. Good practices of port cooperation are highlighted. These European examples demonstrate which types of cooperation are already in place but also which types remain conceptual so far or are even not possible embedded in the given market structure. The legal environment and present EU port policy are limitations for cooperation initiatives. Finally, discussion on synergies for terminal operators and port authorities results in an outline of possibilities for port cooperation in Europe.

Port cooperation has different starting points as the port organizational structure in Europe follows a wide range of governance models. An initial distinction of the main cooperation partners is of benefit to determine who can actually cooperate with which impact. The port itself is central hub for activities of a variety of different actors. The broad term “Actors” stands for organizations, authorities, or individuals that either work directly in the port, or are indirectly affected by the port’s businesses. Direct port actors are the port authority (often representing the local and regional government), shipping companies, terminal operators, shippers, logistics service providers, and other parties in maritime supply chains from related manufacturing and trading industries. Indirect actors are the general public and other business areas that are somehow affected by the port businesses, for instance, through competition for the same land area, qualified staff or financial resources. All in all, the two main actors within the gates of the port are the port authority and the port terminal operator.

2.1 Port governance

The term port governance is in essence related to the ownership of a port area and operation of a port terminal. The owner of a port can but must not be the port authority. In this context, port facilities are distinguished into infrastructure and suprastructure. Port infrastructure comprises the physical and fixed technical structures which enable seaside transport, ship handling, cargo storage and hinterland transport. The port infrastructure provider is responsible for investment and maintenance of, especially, navigational channel, locks, quay walls, terminal sites, rail tracks and road connections in the port area. Responsibilities might differ due to contractual terms between port owner and operator.

In contrast, port suprastructure comprises surface equipment which supports the operation of port services. Examples are ship-to-shore cranes, terminal handling equipment, and hinterland transport vehicles. The suprastructure provider usually overtakes investment and maintenance but also operation of these mobile assets. Mixed forms are possible.

A recent study by the European Sea Ports Organisation (ESPO) monitors port governance and organization in Europe and its evolution over time (ESPO, 2016). The figures of the publication are based on a web-based survey with responses from 86 port authorities from 19 EU Member States, Norway and Iceland, representing 200 ports and more than 57% of the overall cargo handling volume in the EU. With this background the study can be regarded as comprehensive and provides latest facts on port governance. According to ESPO (2016) 87% of the surveyed port authorities in Europe remain mainly publicly state owned or to a lesser extent municipality owned. Port authorities listed in the stock exchange remain the exception. Full private ownership is only a characteristic of some ports in the UK. Examples of mixed public and private ownership exist in Piraeus and Thessaloniki, Koper, Copenhagen and Malmö, or Constanza. As a new development China’s Cosco group acquired 67% of the shares of the listed company “Piraeus Port Authority” (only 7% will be owned by the Greek State).

The report highlights that more than half of the port authorities are structured as independent commercial entities (both, listed or not listed) and operate in a commercially-oriented manner. 51% of port authorities are limited companies, 44% are independent public bodies with their own legal personality and different degrees of

functional and financial dependency from the public administration. These two dominant categories operate under different legal forms and already comply with normal commercial law but only 41% of port authorities are fully subject to commercial law, 37% are partially subject and 22% not subject to commercial law. E.g. the port of Amsterdam was officially corporatized into a limited liability company of which the City of Amsterdam is the main shareholder. Finnish ports are limited liability companies. The port of Antwerp just became a corporation under public law.

ESPO (2016) prove that main port services provided to ships are in private hands with the exception of pilotage, which is still under considerable public influence. Cargo handling ship-to-shore services are in the hands of private operators (74%) who are generally granted the use of port land through lease agreements or public domain concessions. Integrated ports where port authorities provide a full range of services and other mixed cases are the exception. For instance in Stockholm or Piraeus, port authorities still operate cargo handling terminals next to private operators. Some port authorities, in Koper or Felixstowe, provide all cargo handling services in their ports.

Summarizing latest developments into established port governance structures the following five different port governance types exist:

- 1) **Public service port** - Concentrates on the public interest with public infrastructure, suprastructure, and port operations management. A public authority owns and operates the port. The number of service ports in Europe declined in favor of the popular landlord port model. Still, examples are the small German ports of Husum, Büsum, Tönning, or Friedrichstadt.
- 2) **Tool port** – Relies on public infrastructure, public suprastructure, and private port operations management. A public authority owns both the infrastructure and suprastructure but a private company operates the port. This governance type overtakes a central position between public service port and landlord port. Example is the “Ports Autonomes” in France.
- 3) **Landlord port** - This governance model is widespread. Characteristics are public infrastructure, private suprastructure, and private port operations management. A public authority owns the infrastructure. The suprastructure is owned by a private company or another legal organization with public-private ownership mixtures which also operates the port. Examples are the big container ports of Rotterdam, Antwerp and Hamburg.
- 4) **Corporate port** - Represents ports which are almost entirely privatized but ownership remains public. The port authority acts as private enterprise. Ownership and control are separated. Examples are the ports of Kiel and Amsterdam.
- 5) **Private service port** – Concentrates on private interest with private infrastructure, private suprastructure, and private port operations management. A private company owns and operates the port. Examples are London, Liverpool, Dover, or Brunsbüttel.

Moving from public service and tool ports to governance structures favoring private investments in port assets, the landlord port model is the dominant structure today. The biggest port in Europe, the port of Rotterdam, represents an example of this. The port of Rotterdam Authority is an unlisted public limited company with two shareholders - the Municipality of Rotterdam with a share of approx. 70% and the Dutch government with a share of approx. 30% (Port of Rotterdam Authority, n.d.). The port authority is the owner of the port infrastructure and leases its terminal areas

to private terminal operating companies, e.g. to APM Terminals who operates a global terminal network of 72 operating port and terminal facilities worldwide (APM Terminals, 2016). These private terminal operators are responsible for suprastructure investment and terminal handling. Another example is the Europort Holding which is owned by a consortium of institutional investors. Europort is with 23 terminals one of the largest general cargo and dry bulk port operators in Europe, e.g. in the ports of Antwerp and Le Havre (Euroports, n.d.).

In contrast, private service port examples can be found in the UK. After the adoption of the UK Transport Act in 1981 the boundaries were shifted between public and private sectors with the reconstitution of British Transport Docks Board to a holding company named Associated British Ports (ABP) (The National Archives, n.d.). Port infrastructure and suprastructure were sold to ABP which today owns and also operates 21 terminals, e.g. in the ports of Cardiff, Southampton and Plymouth (Associated British Ports, 2016).

A mix of public and private service in a single port is in operation in Lübeck. The port authority owns the port area only in parts and a company branch named "Lübecker Hafengesellschaft LHG" acts as terminal operator on this areas. Other areas within the port belong to the private company "Hans Lehmann KG" acting as owner and also terminal operator as a private service port.

2.2 Port authority

The port authority also named as "Port management" or "Port administration" is a public or private body which is responsible for the tasks or parts of the tasks of construction, administration, and operation of ports. Port authorities may be established on federal, provincial, or municipal level. Common is the municipal port authority responsible for one local port area with the power to invest in infrastructure, to set financial objectives, to regulate some port tariffs, to inform on port activity, or to issue terminal licenses as landlord port. The main role of port authorities is either to act as landlord for a private terminal operator or to act itself as operator of terminal handling and storage. Income is then generated either by charging rent for terminal infrastructure from the terminal operator or by charging handling and storage fees directly from shipping companies. The port authority also sets environmental standards in the port area, for instance, restrictions on greenhouse gas emissions through ship engines. Other roles of the port authority are:

- Facilitator of hinterland transport by providing inland infrastructure, e.g. road connections to terminals or rail tracks in the port area;
- Operator of nautical services, e.g. tug boats;
- Port infrastructure investment controller, financier, and manager;
- Port planner;
- Promoter of port services;
- Regulator of marine access, port performance, port safety and security.

2.3 Port terminal operator

The port terminal operator's main occupations are cargo loading and unloading from ship to shore, from shore to the hinterland transport modes and vice versa as well as cargo storage and handling on the terminal area. Port terminal operators strive for fast and reliable cargo throughput and generate their income through terminal handling charges. Customers are shipping lines. Revenue is further generated by other services, especially cargo storage, hinterland transport and value added logistics services. The terminal area can be owned or leased by the terminal operator from the port authority. Sea and landside access is usually provided by the port authority. Private terminal operators who rent port infrastructure overtake the responsibility from the port authority to invest in ship-to-shore cranes and yard handling equipment. National and international terminal operators have competencies in different sectors and adopt diverse strategies and business models, such as pure terminal handling and storage (also named as pure stevedores), financial holding or integrations with ocean carriers leading to the introduction of line specific dedicated container terminals.

The market of terminal operation can be distinguished into:

- 1) Global terminal operators as worldwide businesses. Main players in the container handling industry are PSA International, Hutchison Port Holdings, APM Terminals, DP World, or China Merchant Holdings International. Examples for other commodities are Euroports or Impala Terminals.
- 2) Regional or local terminal operators with focus on one or several regional ports or cargo niches. Examples are Eurogate with more than ten terminals in Europe, Buss Port Logistics with terminals in Central Europe and Turkey, Waalhaven Group with terminals in the Netherlands, Bolloré Logistics with terminals in (amongst others) Dunkirk, Rouen, La Rochelle and Montoir, or HHLA with terminals solely in Hamburg; and
- 3) Shipping lines who invest in terminals, e.g. Maersk Line's "NTB North Sea Terminal Bremerhaven", MSC's "MSC Gate Bremerhaven", or the dedicated terminals in Antwerp of PSA and MSC.

In sum, the port terminals are responsible for the operation of terminal handling and storage. An additional function of the port terminal operator is the provision of hinterland transport services, by offering regular rail shuttles, or by managing own truck fleets. Main customers are the shipping lines but also shippers and logistics service providers acquiring storage, hinterland transport or value added logistics services.

3 Types of port cooperation

Types of port cooperation differ not only between involvement of port authorities and/or terminal operators but also between trade corridor, port function, and port location. A Memorandum of Understanding (MoU) is one basic cooperative commitment between two or more port authorities on a single trade lane as Shanghai-Hamburg or Rotterdam-New York. Ports in close geographical distance are faced with the choice to compete in a cooperative manner; referred to as coopeitition; or they might even decide to integrate by agreeing on a joint venture company. In addition, inland ports are also potential cooperation partners of seaports, in order to guarantee frequent and reliable hinterland transports. Further cooperation concepts deal with seaports overtaking hub roles on major trade lanes.

3.1 Memorandum of Understanding

Port authorities cooperate with each other with the main intention to facilitate and intensify trade links in order to increase port throughput. Regular delegation visits of political and private representatives are a way to foster these trade relationships. One popular cooperative commitment between port authorities is a signed MoU during delegation visits of port representatives:

- Karachi, Pakistan and Guangdong, China in 2015;
- Los Angeles, USA, Auckland, New Zealand and Ghangzhou, China in 2015;
- Shanghai, China and Antwerp, Belgium in 2014;
- Los Angeles, USA and Hamburg, Germany in 2013.

These strategic statements refer especially to facilitating import, export and transshipment of goods, faster customs clearance, sharing hinterland information, joint marketing actions, environmental and security issues, and training of personnel. In addition, loose cooperation through regular information exchange is organized through port authorities' participation in (among others) the International Association of Ports and Harbors (IAPH) or the ESPO. Also bilateral or multilateral cooperation between two or more port authorities through regular delegation visits is common.

3.2 Coopetition of ports in proximity

Cooperation between neighboring competing ports is referred to as coopetition. The concept of coopetition attained popularity in game theory and was picked up in strategic management by Brandenburger and Nalebuff (1996) who suggested that managers overcome traditional competitive thinking by cooperating with competitors in order to create value. Five pillars of coopetition are (1) the nature of the partnership, (2) coopetition governance, (3) output of the partnership, (4) actor characteristics, and (5) environmental characteristics (Dorn, 2016). Or in other words scope, rules, added values, players, and tactics (Fritsch, 2014). Transferred to the port industry, Song (2002) analyzed the rivalry between the ports of Hong Kong and Yantian and highlights a joint venture of terminal operators as main coopetitive strategy.

In coopetition the ports focus on their individual strengths and weaknesses and segment their service offerings in order to attract new customers. An underlying threat is that one of the cooperating ports is strengthened on cost of the other without

sharing revenues. In contrast a big opportunity is to generate competitive advantage against other rival ports. Common ways of action are cooperative marketing and sourcing, sharing of personal and equipment but also investment in terminal facilities. Present examples of cooperation are the two initiatives "Elbe Seaports" at the river Elbe and "RheinPorts" at the river Rhine. Neighboring ports have the advantage to enlarge their services through sharing resources, especially, land infrastructure, equipment and personal. Cooperation between port authorities is more widespread than competition between port authorities and terminal operators. One example of cooperation between two terminal operators is the "HVCC Hamburg Vessel Coordination Center" in the port of Hamburg. The two container terminal operators HHLA and Eurogate Container Terminal Hamburg GmbH coordinate in vessel traffic management for arrivals, routes around the port and departures of vessels in the port of Hamburg.

3.3 Port integration

A more stringent term for the closest form of cooperation is integration. Revenues generated by cargo handling are jointly distributed according to the underlying legal arrangement. One example of port integration is the joint venture of the ports of Malmö, Sweden and Copenhagen, Denmark or the ports of Kotka, Finland and Hamina, Finland. Full integration examples of several inland ports represented by one port authority are the port of Liège, the Flemish waterway managers, the ports of Paris, and the ports of Neuss-Duesseldorf.

Only in the UK port privatization and deregulation is fully implemented. The policy has been towards disposal of port property rights, duties and obligations to private sector organizations. Major port authorities are no longer public agencies or government departments but private companies. Ownership structures changed from national ports governed by the British Transport Commission, named as "Trust-ports" and run by local boards, and ports owned and controlled by local Authorities, to ports owned and run by private companies. One of the biggest private companies acting as port owner and operator is the Peel Ports Group Limited. Other commercial ports in the UK are Associated British Ports, Belfast Harbour Commissioners, the Bristol Port Company, DP World London Gateway, Forth Ports, Hutchison Ports UK, PD Ports, or the Port of London Authority.

3.4 Seaports and inland ports

Cooperation between seaports and inland ports has the intention to enlarge the hinterland region of the seaport to and from the customer. The final customers of transport services are the industrial or trading companies situated in the hinterland region; merchants are liner carriers and seafreight forwarders. The company "Europe container terminal" operates seaport terminals in Rotterdam (ECT Delta Terminal, Euromax Terminal Rotterdam) but also an inland port terminal in Duisburg (DeCeTe Duisburg) (ECT, n.d.). Next to barge services regular rail transports connect the two port locations.

The biggest inland port in Europe, the port of Duisburg at the river Rhine in Germany offers a direct rail connection departing three times per week to the port of Rotterdam (Port of Rotterdam, 2014). Or the inland port of Liège at the river Meuse in Belgium offers a daily rail container shuttle to the ports of Antwerp, Rotterdam, and Zeebrugge (EFIP, n.d.). Another strategy of seaport terminal operators is to engage in hinterland transport companies with own subsidiaries. Exemplary, the port of Rotterdam and the inland port of Neuss-Duesseldorf-Cologne are connected via the river Rhine and offer regular joint barge services (RP Online, 2012).

3.5 Hub port cooperation

Hub and feeder port networks contain close business relationships between liner carriers and terminal operators. If liner carriers as customers of terminal operators invest in terminals an indirect form of port cooperation takes place. Concentrating on the hub ports' transshipment function, a scenario for container port cooperation between the ports of Hamburg, Bremerhaven and Wilhelmshaven in Germany has been developed by Ordemann (2013). Another idea of hub port cooperation remains theoretical in nature by discussing the relationship of an exporting departure seaport and an importing arrival seaport.

3.5.1 Hub and feeder port system

Hub and feeder port networks are very common in container transport, although, also in bulk shipping hub ports attract calls from larger ship classes than feeder ports. Large European hub ports with high transshipment volumes are Rotterdam, Hamburg, Antwerp, and Bremen/Bremerhaven in the North Range and Tanger and Valencia in the Mediterranean Sea. Regions of high feeder transport densities in Europe are the Baltic Sea and the Mediterranean Sea.

Hub-and-spoke systems connect large hub ports and small feeder ports on the East-West trade lane from Asia to Europe or the North-South trade lane from Europe to North and South America. A hub port attracts ship calls of large deep-sea vessels with considerable unloading and loading volumes with high shares of transshipment. In 2016 the world's biggest carrier Maersk Line offers an East-West network consisting out of six regular services from Asia to Europe (westbound) and from Europe to Asia (eastbound) (Maersk Line, n.d.). Service "Asia to Europe 1 (AE1)" starts in Kobe, Japan, and passes several ports in Asia before heading from Colombo, Sri Lanka to the first port of call in Europe Felixstowe. After calling at Rotterdam and Hamburg the final hub port in Europe is Bremerhaven.

A container feeder port handles ship calls from smaller feeder vessels only, which are often not fit for the high seas, running between one hub and several feeder ports. Through transshipment of containers from the deep-sea vessel to the terminal and from the terminal to a smaller feeder vessel cargo from exporters is distributed to the smaller feeder ports and their highly fragmented hinterland regions. As one European feeder port service the carrier CMA CGM offers a new container service loop with six small container ships of 1750 and 1850 TEU from North Europe (Russian Baltic ports, Hamburg, Rotterdam, Antwerpen, Le Havre) to the Mediterranean ports (Malta, Alexandria, Beirut, Mersin, Aliaga, Valencia, Cartagena, Tanger) and back to North Europe (Tilbury) with transshipment in Tanger and Valencia (DVZ, 2016).

The roles of hub and feeder port are usually fixed due to the carriers' timetables and liner service offerings on a yearly basis with monthly or weekly adaptations due to unexpected transport delays or changes in shipper recommendations. In this context, the possibilities of ports to cooperate are limited as the market power lies with the carriers. Authorities may indeed facilitate trade volumes between the locations; and terminal operators may profit from the regularity of ship calls by sharing loading and arrival information to increase handling and hinterland transport efficiency.

Port locations, especially but not only, handling container transport volumes are confronted with an increased market power of large liner shipping companies organized to a great extent in shipping alliances. Relationships between port actors and their customers are challenged with the threat of losing the hub functions role by immediate and long-lasting changes of the terminal calling sequences in global shipping networks. Operators responsible for cargo handling and throughput are under

fierce competitive pressure in regard to throughput performance rates and supply chain costs. In this light, investments in infrastructure and suprastructure are a mandatory requirement to remain competitive enough for providing logistics services confronted with increased or changed shipping sizes but also with other ship types and cargo structure changes.

Figure 1 highlights strategies of a container hub port towards the indirect relationship with sea freight and container ships considering the role of liner carrier alliances and cargo generation. The origin and destination of sea freight lies in the ports hinterland. In addition local production and trade in the port area generates sea freight. Ships are owned or chartered by liner carriers who are active in global alliances. Usually, each alliance partner has a home port and all alliance partners consider this port in their call sequence. By this, global alliances generate higher throughput volumes for the home ports. Cooperation between port authorities and terminal operators is not directly applicable. Although, indirect cooperation initiatives concern the emergence of container terminals dedicated for single shipping lines. Improvement of the hinterland connection and availability of development area are further points of reference.

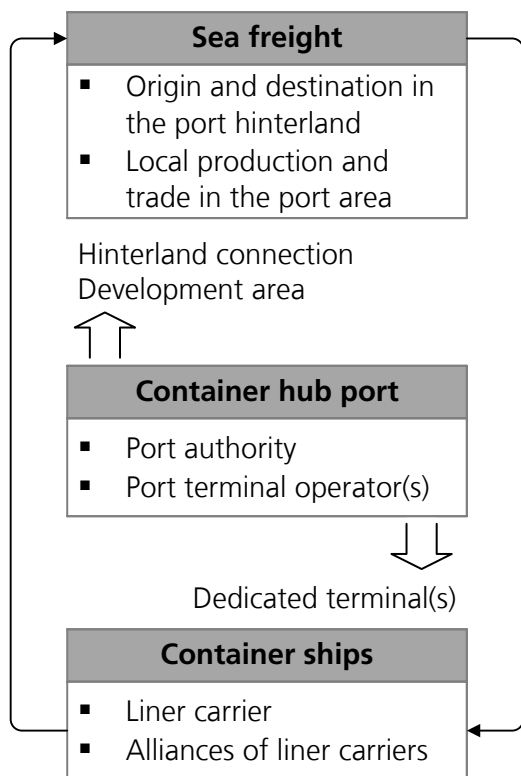


Figure 1: Strategies of a container hub port

Hub ports foster relationships with the big liner carriers individually and consider their participation in alliances which are at present or upcoming:

- "2M" of Maersk Line and MSC with a market share of 31.9% (E.R. Schifffahrt, 2016);
- "Ocean Alliance" of CMA CGM, China Cosco Shipping, Evergreen and OOCL (planned start April 2017) with a market share of 30.1%;
- "THE alliance" of Hanjin Shipping, K-Line, MOL, NYK, Yang Ming, and Hapag-Lloyd (planned start April 2017) with a market share of 19.4%; and

- Only 18.6% market share for the non-allied companies such as Hamburg Süd, PIL, HMM or ZIM.

Through dedicated terminals the indirect role of container ports is changed. Recent example of closer ties through strategic partnerships of a hub port with liner carriers is the participation of the terminal operator Cosco Pacific in the Port of Rotterdam who acquired 35% of shares of Rotterdam's Euromax Container Terminal (ECT) (DVZ, 2016). Goal of this dedicated terminal structure is to better serve the liner carrier China Cosco Shipping and the other Ocean Alliance partners.

Next to liner carriers other big players in maritime supply chains are the seafreight forwarders who organize the door-to-door transports on behalf of the shippers. Forwarders purchase large container slot capacity from liner carriers and the decision which port to call is heavily influenced by the ability of the port to attract appropriate hinterland transport volumes. Here especially hinterland connection and logistical area availability is a key asset for the port location when it comes to efficient and reliable cargo throughput.

3.5.2 Container import and transshipment port

Ordemann (2013) proposed the idea that Wilhelmshaven would become a sole hub for transshipment containers to and from the Baltic region and the UK. Hamburg and Bremerhaven would both concentrate on imports which remain in the local port area or are transported to the hinterland by rail, truck and barge. If ships call at Wilhelmshaven first and then at Hamburg or Bremerhaven the shipper may profit from faster hinterland transport time compared to the ports of Rotterdam and Antwerp. Goal of this port cooperation concept would be to change the call sequence of ultra large container ships arriving from Asia, explicitly; the ships call at the German ports instead of Rotterdam and Antwerp first. In addition, cargo loading and unloading in Wilhelmshaven would be restricted to transshipment containers only.¹ In peak situation also other containers are distributed to the hinterland (Ordemann, 2015). It is stressed by the author that this type of cooperation would result in an obsolete deepening of the river Elbe and Weser as the ultra large container ships which pass the navigational channels are not fully loaded.

In the past, this concept of Ordemann (2013) has been criticized. It is argued that the author does not consider the actual market situation in the container shipping business where the liner company decides which port to call in which sequence instead of policy makers. In addition, the shipper influences port choice and main decision attribute is low container freight rates. Hinterland transport time and cost are only subsequent choice factors. The study postulates closer cooperation of terminal operators in their hinterland processes, whereas, it has again been stressed that this cooperation is already in place (Unternehmensverband Hafen Hamburg, 2013).

Nevertheless, the idea behind this type of cooperation is to steer transport flows according to origin and destination of the container considering advantages of individual ports in terms of nautical accessibility, hinterland distance and local consumption rate. In practice, again, hinterland transport freight rates are only part of the total freight costs and a re-routing of hinterland transport flows and liner carrier services takes only place if valuable in monetary terms. Additionally, separation of

¹ Transshipment containers are containers which are unloaded from a deep sea ship to the terminal and then loaded to a feeder ship without further hinterland transport or unloading.

transshipment and import containers would have to start in the exporting port, e.g. in Asia on the liner carriers' demands requiring additional handling effort and handling costs. Container shipping services are organized in loops and not as single port-to-port transports. As liner carriers opt for a mix of transshipment containers and import/export containers on their ships a separation of cargo would reduce the flexibility of ship calls considerably.

3.5.3 Exporting departure and importing arrival container port

Another conceptual idea is cooperation of exporting departure and importing arrival container port. Both ports are located on an international trade lane which is served by one or many regular container liner services. The service spans different port locations with sequential ship calls in a loop. Cooperation would include the fit of throughput volumes of port pairs to avoid container re-handling and to increase terminal productivity. Exporting and importing throughput volumes in equilibrium enable consistent capacity utilization of departure and arrival terminals. It needs to be stressed that different liner carriers all operate different service networks. Cooperating port terminals need to adapt to flexible changes of port calls. As in hub and feeder networks, the possibilities of ports to cooperate are limited as the market power lies with the carriers. Authorities may indeed facilitate trade volumes between the locations; and terminal operators may profit from the regularity of ship calls by sharing loading and arrival information to increase handling and hinterland transport efficiency. One additional idea is cooperation between hub and feeder ports under the premise of flexible port roles. If ship call strategies have the chance to react flexibly on hinterland transport capacity and adjusted hinterland tariffs, hub and feeder port roles would change flexibly. Liner carrier loops and port sequence would change regularly due to hinterland operation efficiency.

4 Good practices of port cooperation in Europe

The previous groundwork supports evaluation and separation of good practices of port cooperation in Europe. Whereas, a MoU is only a very basic form of cooperation not considered to represent a comprehensive good practice example. Ideas on comprehensive hub port cooperation remain theoretical, thus, good practice examples deal with:

- 1) Coopetition between seaports;
- 2) Coopetition between inland ports;
- 3) Cooperation between seaport and inland port;
- 4) Integration of seaports;
- 5) Privatization of seaports.

Goal of the comparison is to estimate synergies of port cooperation and to discuss possibilities but also limitations thereof in the upcoming chapter.

4.1 Elbe Seaports



Figure 2: Elbe Seaports

Since 2009 the five German river Elbe seaports cooperate as “Elbe Seaports” (see Figure 2 and Table 1). Partners are the ports of Cuxhaven, Brunsbüttel, Glückstadt, Stade, and Hamburg. Cuxhaven at the Elbe estuary concentrates on short sea traffic and the offshore wind energy supply. Brunsbüttel is the gate to the Kiel Canal and acts as universal port. Glückstadt handles bulk, heavy and project load cargo. Stade focusses on chemicals, dangerous goods and bauxite. Hamburg is one of the biggest universal ports in Europe and the second largest container port.

The ports have different port governance structures. Cuxhaven, Stade, and Hamburg are landlord ports with public infrastructure, private suprastructure, and private port

operations management. Brunsbüttel and Glücksstadt are private service ports. Corresponding representative bodies of the ports are authorities or business development organizations - Niedersachsen Ports GmbH & Co. KG as port authority of Cuxhaven and Stade, Brunsbüttel Ports GmbH as port authority and terminal operator of Brunsbüttel and Glücksstadt, egeb Entwicklungsgesellschaft Brunsbüttel mbH as business development organisation for Brunsbüttel and Glücksstadt, HPA Hamburg Port Authority as port authority of Hamburg, and Süderelbe AG as business development organization for northern German federal state Niedersachsen.

Port cooperation takes place between two port authorities, two business development organizations and one private terminal operator who is also the port's authority. The seaports from three different German federal states cooperate in marketing, sourcing of services and land space, and infrastructure planning.

Table 1: Elbe Seaports

Characteristics	Description
Number of ports	5
Locations/cities	<ul style="list-style-type: none"> ▪ Cuxhaven ▪ Brunsbüttel ▪ Glückstadt ▪ Stade ▪ Hamburg
Country	Germany (at the river Elbe)
Type of ports	Seaports
Type of cooperation	Coopetition of ports in proximity
Governance	Landlord ports <ul style="list-style-type: none"> ▪ Cuxhaven ▪ Stade ▪ Hamburg Private service ports <ul style="list-style-type: none"> ▪ Brunsbüttel ▪ Glücksstadt
Actors	Port authorities <ul style="list-style-type: none"> ▪ Niedersachsen Ports GmbH & Co. KG ▪ Brunsbüttel Ports GmbH (also terminal operator) ▪ HPA Hamburg Port Authority Business development organisations <ul style="list-style-type: none"> ▪ egeb Entwicklungsgesellschaft Brunsbüttel mbH ▪ Süderelbe AG Private terminal operator <ul style="list-style-type: none"> ▪ Brunsbüttel Ports GmbH (also port authority)
Main tasks	<ul style="list-style-type: none"> ▪ Marketing of services ▪ Sourcing of services

4.2 RheinPorts

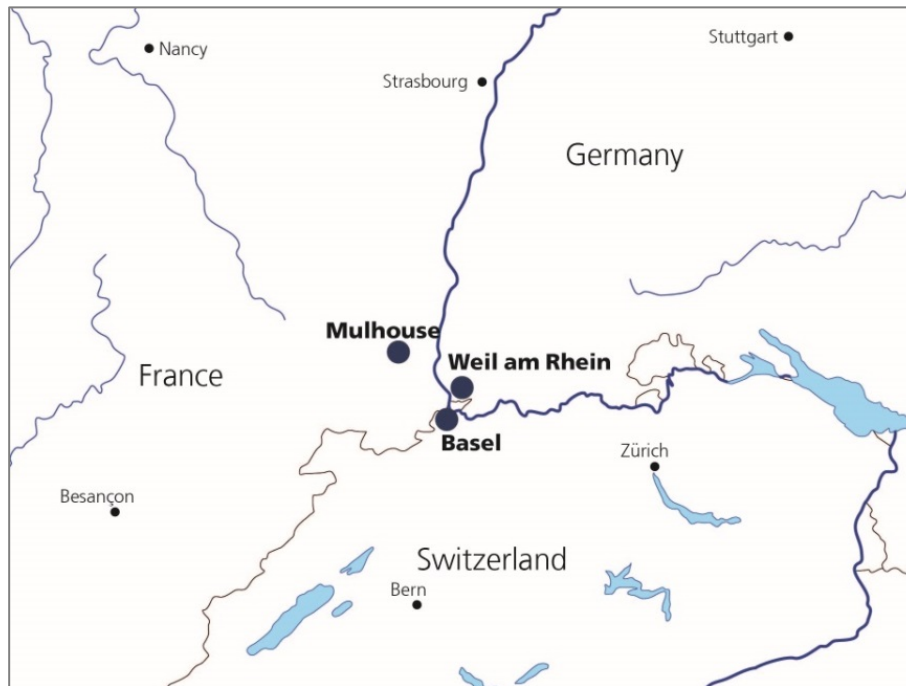


Figure 3: RheinPorts

The cross-border cooperation “RheinPorts” founded between the upper Rhine inland ports Basel in Switzerland, Mulhouse in France, and Weil am Rhein in Germany started in 2007 (see Figure 3 and Table 2). The three-border region RheinPorts is part of the industrial and logistic region around Basel. As a cross-border logistics hub in the center of the north-south corridors the inland port offers multimodal connections to the North Sea ports and via the Alps to the Mediterranean region. Main cargo handled is containers, dry and liquid bulk goods, and heavy freight.

The ports are operated by their port authorities who are also responsible for administration, infrastructure, and suprastructure. Schweizerische Rheinhäfen is a public-law institution owned by two Swiss regions (cantons). Ports de Mulhouse-Rhin is publicly owned. Rheinhafengesellschaft Weil am Rhein mbH is a limited company with two cities as main shareholders.

Main cooperative tasks of the ports in proximity in three countries involve marketing of services and information exchange, but also transshipment of goods, customs, or container repairing. Since 2016 a joint traffic management system is in place. The information system provides details on ship arrivals and connects different port actors such as terminal operators, locks, and transport companies.

Table 2: RheinPorts

Characteristics	Description
Number of ports	3
Locations/cities	<ul style="list-style-type: none"> ▪ Basel ▪ Mulhouse ▪ Weil am Rhein
Countries	<ul style="list-style-type: none"> ▪ Switzerland (at the river Rhine) ▪ France (at the river Rhine) ▪ Germany (at the river Rhine)
Type of ports	Inland ports
Type	Cooperation of ports in proximity
Governance	Public service port/Corporate port
Actors	Port authorities and terminal operators <ul style="list-style-type: none"> ▪ Schweizerische Rheinhäfen ▪ Ports de Mulhouse-Rhin ▪ Rheinhafengesellschaft Weil am Rhein mbH
Main tasks	<ul style="list-style-type: none"> ▪ Traffic management for efficient use of resources ▪ Joint IT system incl. traffic information exchange ▪ Marketing ▪ Area allocation

 Good practices of port
 cooperation in Europe

4.3 Antwerp – Duisburg



Figure 4: Antwerp - Duisburg

The port authority of the seaport in Antwerp, Belgium and the Duisport agency GmbH, a subsidiary of Duisburger Hafen AG, Germany the owner and operator of the inland port in Duisburg cooperate since 2006 through a rail hinterland shuttle to/from the North Rhine-Westphalia region in Germany (see Figure 4 and Table 3). The port of Antwerp is the second biggest seaport in Europe. High cargo volumes are achieved through liquid cargo, dry cargo, RoRo and containers. The inland port of Duisburg is Europe’s largest inland port located at the river Rhine.

The Antwerp port authority participates since 2015 in a daily rail shuttle service between the Deurganck dock in Antwerp and Logport I in Duisburg. Previously, a MoU has been signed in 1999 which was renewed and extended in 2013. Strategic goal is to secure frequent and reliable access to the seaport for a significant hinterland region at least for the period of five years.

Table 3: Antwerp – Duisburg

Characteristics	Description
Number of ports	2
Name of ports	<ul style="list-style-type: none"> ▪ Antwerp ▪ Duisburg
Location of ports	<ul style="list-style-type: none"> ▪ Belgium ▪ Germany
Type of ports	<ul style="list-style-type: none"> ▪ Seaport ▪ Inland port
Type	Cooperation of seaports and inland ports
Governance	Landlord ports
Actors	Port authority <ul style="list-style-type: none"> ▪ Antwerp Port Authority Port authority and terminal operator <ul style="list-style-type: none"> ▪ Duisport agency GmbH
Main tasks	Rail hinterland transport

4.4 Malmö – Copenhagen



Figure 5: Malmö - Copenhagen

In 2001 the ports of Malmö, Sweden and Copenhagen, Denmark agreed to the closest possible form of cooperation - a joint venture company responsible for cargo handling and storage (see Figure 5 and Table 4). The ports are located in geographical proximity and profit from direct and joint navigational access to the Oresund area. The joint venture company named "Copenhagen Malmö Port CMP" is registered in Sweden. The company acts as port and terminal operator in both cities and leases the necessary infrastructure from the authorities. Owners are the CPH City and Port Development, the City of Malmö and private shareholders. CPH is owned by the Danish state and the City of Copenhagen. Goals of the cooperation are to focus on different transport segments and manage traffic flows in close distance. The Port of Copenhagen concentrates on imports and cruise shipping. The Port of Malmö acts especially as trimodal goods transit hub including RoRo, combined and container transport.

All port services are provided in cooperation, whereas, services are connected to the terminals' type and location into services for cars, containers, cruise passengers, dry bulk, liquid bulk, and RoRo.

Table 4: Malmö - Copenhagen

Characteristics	Description
Number of ports	2
Locations/cities	<ul style="list-style-type: none"> ▪ Malmö ▪ Copenhagen
Countries	<ul style="list-style-type: none"> ▪ Sweden ▪ Denmark
Type of ports	Seaports
Type	Integration of ports in proximity
Governance	Landlord ports
Actors	Joint port authority and terminal operator: <ul style="list-style-type: none"> ▪ City & Port Development I/S (50%) ▪ City of Malmö (27%) ▪ Private shareholders (23%) (CMP, 2016)
Main tasks	All port services

4.5 Peel ports



Figure 6: Peel ports

In 2004 Peel ports became a private undertaking (Peelports, n.d.). In 2005 it acquired the Mersey Docks and Harbour Company bringing together the Port of Liverpool and the Manchester Ship Canal with Clydeport and Medway Ports. In 2016 Peel ports is the second largest ports group in the UK and is the owner and operator of the privatized ports of Dublin, Clydeport, Heysham, Liverpool, Manchester, Sheerness, and Great Yarmouth (see Figure 6 and Table 5). Outside the port business Peel group with its diverse subsidiaries is also active as an infrastructure, transport and real estate company. All kinds of goods from containers, automotive, RoRo, and liquid bulks to dry bulks, cruises and project cargo are handled.

Table 5: Peel ports

Characteristics	Description
Number of ports	7
Locations/cities	<ul style="list-style-type: none"> ▪ Dublin ▪ Clydeport ▪ Heysham ▪ Liverpool ▪ Manchester ▪ Sheerness ▪ Great Yarmouth
Countries	UK and Ireland
Type of ports	Seaports, canal port
Type	Integration (privatization)
Governance	Private service port
Actors	Port authority and port terminal is the Peel Ports Group Limited
Main tasks	All task of an integrated port authority and port terminal

5 Limitations of port cooperation

This chapter concentrates on limitations of port cooperation reflected to existing and planned European ports policy, for instance, possible technical effects of the planned legislative framework for ports just having been discussed in the EP, the Commission's paper "Ports, an engine for growth" as well as the TEN-T core network plans. Legal frameworks referring to state aid law and cartel law are further discussed limits and have different impacts on port authorities and terminal operators.

5.1 European Union port policy

On political level, different strategies of leading and opposing parties with corresponding party programs and conflict between national state governments and federal state/municipal governments hinder accordance to support cooperative initiatives. Ports have been in the focus of EU policy since decades and have been subject to quite a number of policy interventions in the field of infrastructure investment, transparent financing and market access conditions. The policy of the EU regarding ports is characterized by these main assumptions and goals:

- Ports are acknowledged as major contributors to economic growth and stability as well as prerequisites for Europe's competitiveness, thus enablers towards better life conditions and welfare of the citizens (2011 White Paper);
- Ports as nodal points in the transport network are important to achieve the envisaged modal shift from road to sea. Investment needs into infrastructure are supported by the core and comprehensive TEN-T port network plans;
- Ports as nodal points for information exchange and administrative procedures, such as customs, are supported e.g. through the Blue Belt initiative and the National Single windows as IT-interfaces for ship reporting with the aim to ease maritime traffic within the EU common market;
- Ports are acknowledged as important creators of jobs and as working places; a committee for a social dialogue was created in June 2013. Goal is the implementation of the social agenda for maritime transport, including social dialogue and training of port workers;
- Ports have got into focus as an issue to competition policy resulted in the so called port packages, in which the EU Commission aimed at creating financial transparency regarding state aids to ports and the opening of port services in order to make port service provision more competitive and more efficient. Port Package I (2001) as well as Port Package II (2004) have not been approved by the European Parliament (2005 and 2007). In the most recent legislative proposal from 2013 which has not been discussed in the EP yet, the main issue remaining is the financial transparency, whereas the much disputed regulation regarding concessions and service provision in ports has been redrafted in order to avoid any "one solution fits all settings".

The EU Commission aims at monitoring the performance of ports better and initiated RTD projects like PortPrism (PPRISM, 2010) and Portopia (Portopia, 2014-2016). While the importance of ports and port terminals as nodal points in global and European transport chains is undisputed, many EU research and innovation initiatives seem to overemphasize alleged critical issues like "an urgent need for modernization"(European

Commission, 2016: 57-59), *“an inefficient allocation of the limited resource available for port infrastructures and poorly performing ports”* (European Commission, 2012) or in a more recent document from 2014 *“[some] ports continually underperform or are in structural decline”* (European Commission, 2014).

Within the strategy paper *“Ports 2030, Gateways for the Trans-European Network”*, the nowadays questioned terminology of *“competitiveness”* is used. What is meant however is the overall economic competitiveness of Europe versus other world regions and not the competitiveness of ports against each other. While the Commission states that *“an absence of a fair level playing field ensuring consistency with the principles of the internal market in the port sector is at the core of the structural performance gap between ports”* (European Commission, 2014)², at the same time however the diversity of governance models and ownership structures is described as *“an important feature of the European port system”* (European Commission, 2014). Neither it is clear how this suspected gap could be a reason for any weak performances of ports nor how the different ownership structures can be understood as a feature which is of some kind of importance.

Port Cooperation seems not to be a major issue in the EU Commission’s policy. There is a lack of addressing this issue. Also on national level, e.g. in Germany, any horizontal port cooperation among seaports has never been a priority within the national port development program or other federal government decisions. It is rather competition among the ports than cooperation which is stated as a corrective market regulator.

With the evidence of the above mentioned examples of port cooperation, it can be concluded:

- That port cooperation is often initiated on a regional level;
- That port actors seem to be less concerned with a suspected incompatibility of competition and cooperation and rather try a *“coopetition”* for the benefit of the involved ports;
- That on regional level there are more port cooperation opportunities than on a national level or EU level.

Motivations towards port cooperation of the policy makers on the regional and local level include the aim to ease of exogenous constraints within a (federal) state and to reducing the problems of competition between neighboring locations.

In Europe, two port operator member organizations exist; ESPO for the sea ports and EFIP for the inland ports. Both member organizations have given the issue of cooperation much attention. ESPO has dealt with the issue of port cooperation making it the theme of its yearly conference in 2013. EFIP has done that in 2011.

5.2 Legal frameworks

First and foremost, national and European legal frameworks, such as cartel law, procurements law and rules regarding subsidiaries may limit port cooperation. Alongside market abuse and merger control law, European cartel law is part of the company directed European competition law which is characterized by prohibiting

² DG Move 2014; Ports 2030, Gateways for the Trans-European Network

certain cooperative behavior. State aid law and procurement law are further restricting frameworks. With this legal background cooperation between port terminal operating companies is only feasible if the benefit is not only of commercial nature but also of relevance for the general public through e.g. saving of environmental and financial resources.

Considering the legal environment, the study by Ordemann (2013) postulating cooperation of the German ports of Bremerhaven, Hamburg and Wilhelmshaven has been evaluated as a benchmark analysis by the German parliament recently (see Deutscher Bundestag, 2016). It was concluded that neither European Commission nor European Court of Justice have decided on similar cases so far. In addition, it is stressed that the study by Ordemann (2013) remains too rudimentary to provide a legal evaluation of proposed measures. But next to cooperation on company level, cooperation on authority level is evaluated to be not bound to cartel law. Federal states are primarily self-responsible for when and how to invest in ports. Cartel law would only restrict the decree of a national directive which imposes restriction on competition between port operators (Deutscher Bundestag, 2016).

Starting point for any analysis of legal restrictions on port cooperation would be to clarify if cooperative tasks are either classified as sovereign tasks of the authority - which indeed might also have commercial ambitions - and economical tasks of the operating actor. Sovereign tasks deal with environmental, safety and security, and regulatory issues in ports, commercial issues are solely focusing on increasing the economic performance.

The legal commitment needs to be negotiated, for instance, the foundation of a private limited company. The legal framework is dependent on the type of private participation in ports. On the one hand, the use of infrastructure or suprastructure by a private port operator is fixed in concession agreements. Ownership of port infrastructure remains with the public port authority; or in case of a joint venture of a new independent company with at least two parties the parties join forces e.g. through sharing of know-how and equipment. On the other hand, non-exclusive use of infrastructure or suprastructure refers to the port authority who only rents port assets or provides licenses for special port services to private operators.

5.2.1 State aid law

Port infrastructure investments require public funding regularly but are restricted by EU state aid rules. The public funding of infrastructure investment projects is subject to EU state aid rules when the infrastructure is to be operated commercially (see judgment of the EU General Court of March 2011 in Joined Cases T-443/08 and T-455/08) (European Commission, 2015). Such projects must be notified to the European Commission for prior approval (European Commission, 2015).

One example of the topic's interpretability and single case evaluation process refers to a public investment in Calais. In 2015 the European Commission has found that public funding of EUR270 million to build a new terminal in the Port of Calais is in line with EU state aid rules as the new infrastructure promotes EU transport policy objectives (*Connecting Europe Facility*) and does not distort competition in the internal market (European Commission, 2015). The French authorities could prove that the terminal operator's income EUR from the use of the infrastructure would be insufficient to cover the investment costs over a period of 50 years. Therefore, the project could not have been carried out without public funding (European Commission, 2015). The project complies with Article 107(3)(c) of the Treaty on the Functioning of the European Union (TFEU), which allows State aid for the development of certain economic activities,

provided that it does not unduly affect trade and competition in the Single Market (European Commission, 2015).

5.2.2 Cartel law

Article 101 und 102 of the Treaty on the Functioning of the European Union (TFEU) provide the basis for cartel questioning. The group exemption regulation (GVO) and interpretation of article 101 of TFEU of the European Union can be used as well (Zentrale zur Bekämpfung unlauteren Wettbewerbs Frankfurt am Main e. V., n.d.). According to article 101 TFEU "all agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object or effect the prevention, restriction or distortion of competition within the internal market"(European Union, 2012) are prohibited. In the treaty price agreements, restrictions on competition as well as the allocation of customers are separately highlighted, because these points do not conform to cartel law (European Union, 2012). In regard to the interpretation of article 101 of TFEU of the European Union arrangements have to affect the trade between Member States in a noticeable way to conflict with cartel law (European Commission, 2004).

5.2.3 Legal impact on port authorities

Tasks of port authorities are structured into sovereign and economical activities. The latter characterize a port authority as a company with the result that the port authority is governed by cartel law (European Union, 2012). In contrast, sovereign activities do not need to be proven by cartel law. However, this classification of the activities proves difficult since ports are organized differently. The European Court of Justice as well as the European Commission classifies activities that are relevant to system and safety at the port as sovereign as there is no market for these tasks. Whereas leasing of an area in the port is characterized as an economic activity. The newest jurisdiction of the European Court of Justice implies that building, maintenance as well as the operation of infrastructure could no longer be classified obviously. The European Commission classifies measures for safety and entry infrastructure as sovereign while providing of a docking site is characterized as economic (Deutscher Bundestag, 2016). The German Government as well as the European Commission come to the conclusion that there is no obvious classification for the activities of the port authorities (Deutscher Bundestag, 2016).

A restriction on competition between port authorities could only appear if they compete currently or in the future. For this purpose port authorities have to offer the same goods and services. However, port authorities can influence the ship owners' decision for a port call just partially since their decision depends on a variety of aspects (for example the connection to the hinterland). To claim an offence against the cartel law it has to be proven if these port authorities compete (European Union, 2012).

In regard to article 101 TFEU agreements are prohibited whenever the involved companies restrict the competition or reduce risks. These arrangements need to tend to the economic activities to be considered as a cartel. Article 101 paragraph 3 TFEU includes some exceptions. These exceptions could only be claimed as the arrangements are needed for the results, they have a positive effect as well as the majority of the goods remains in competition (European Union, 2012).

Arrangements between companies need to stop or restrict the trade between member states in a noticeable way. The following activities could be clearly classified as a cartel: rate fixing, determination of trading conditions, allocation of customers, the transfer of information, and the restriction of investments or technical development (European

Union, 2012). An agreement is only noticeable when the involved companies grab a market share that is higher than five percent and the yearly turnover exceed 40 million euro (European Commission, 2004).

5.2.4 Legal impact on terminal operators

Regarding to article 101 TFEU a terminal operator has to be classified as a company and need to compete with other terminal operators currently or in the future to be prosecuted by cartel law (European Union, 2012). As handling of cargo is classified as an economic activity terminal operators can be characterized as companies. In addition, it is possible to declare terminal operators as competitors since their goods and services are comparable. As a consequence, terminal operators can be governed by cartel law.

Terminal operators tend to establish cooperation between each other through maintaining close ties fixed in legal commitment from basic agreements up to founding joint venture companies. Cooperation forms which rely on legal commitments between private terminal operators include contractual and equity cooperative agreements. Different specifications are partially owned subsidiaries, 50/50 joint ventures or minority shareholdings, equity consortia, alliances and mergers, horizontal and vertical partnerships and other inter-firm cooperative ventures. Exemplary in 2016, the largest terminal operating company worldwide "PSA International" (formerly "Port of Singapore Authority") with a global share of 8,1% set a joint venture with Cosco Pacific to invest in new container berths in Singapore. In Europe, PSA operates terminals in Antwerp, Zeebrugge, Genoa, and Venice. One joint venture between PSA and the TIL Group (representing the Mediterranean Shipping Company S.A.) is the largest container terminal "MSC PSA European Terminal" in Antwerp.

6 Potential synergies of port cooperation

Port cooperation has the vision to increase the competitiveness of individual ports in joint effort and offers the potential to manage public and private infrastructure and suprastructure investments in parallel to mitigating the investment risk. Port overcapacities and redundancies shall be avoided, production resources – capital, land space, personal, buildings, know-how, IT infrastructure – spared and pooled. Cooperating ports might acquire a stronger negotiation position when confronted with other actors in the supply chain, whereas, liner carriers overtake the most important and strongest actor role. In addition, service improvements in intermodal transport and an increased service portfolio of local value added logistics services increase the attractiveness of ports in supply chains. Port authorities and planners have the chance to increase the attractiveness of the port location not only for new port businesses and cargo but also for the local, regional and national community. One measure next to generating jobs is the flexible reaction on environmental aspects (e.g. the decision to build LNG-bunker facilities to serve alternative ship engine technology or cold ironing).

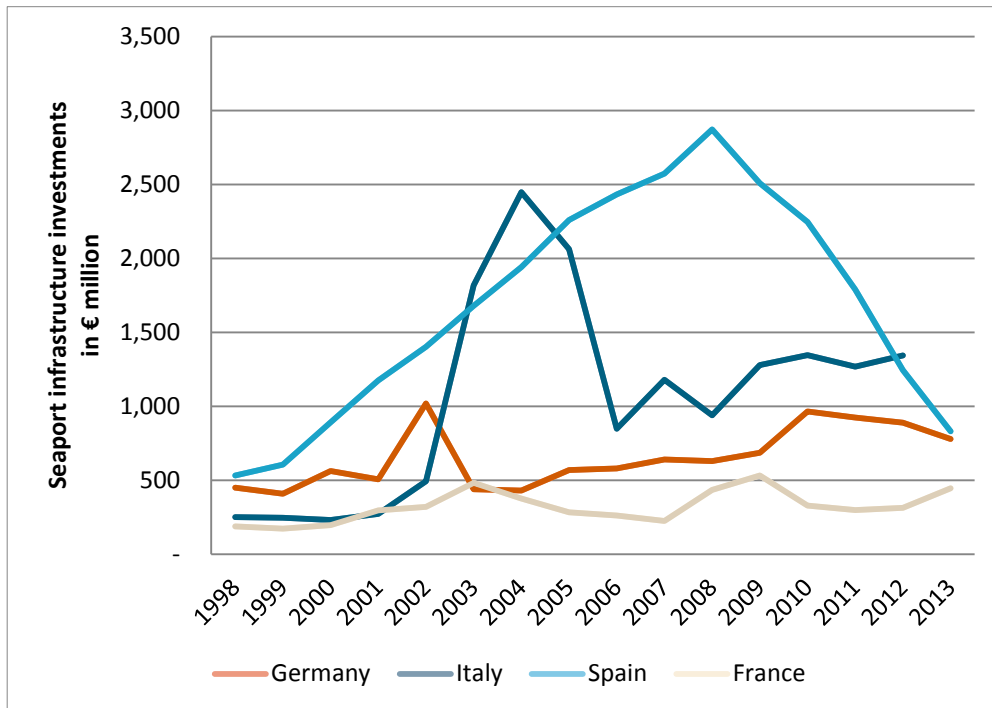
Infrastructure investment savings are considered as potential synergy effect to be exploited by port cooperation. It is anticipated that port policy makers are enabled to better coordinate investment projects, or that public investments benefit from higher private terminal operator involvement. An overview of port infrastructure investment volumes is provided first. Then, a hierarchy of port cooperation is introduced which leads to a final discussion on two realistic options for port cooperation representing the lowest common denominator (marketing) and the most comprehensive undertaking (joint venture). Attributes to consider in analysis of potential synergies of both options in respect to all issues discussed so far are:

- 1) Main port actors involved and their cooperative tasks;
- 2) Good practices in place;
- 3) Possible limitations; and
- 4) Impact on infrastructure savings.

6.1 Overview of port infrastructure investments

Port and terminals finance in Europe is divided into public, public-private and private infrastructure investment. The degree of private sector participation depends on the member state and the regional governance which makes it difficult to assess who finances what in the port sector and how to separate public investments, private investments and public-private partnerships. Investment rely either on public investment through federal state, regional budgets or on investments by private port organizations on the basis of their own revenues.

OECD provides time series on country level (see Figure 7). Especially, Spain invested heavily in port infrastructure representing a European peak in 2008 with EUR 2.9 billion and a total of EUR 27 billion between 1998 and 2013. Italy spent a total of EUR 16 billion followed by Germany with EUR 10.5 billion and France with EUR 5.2 billion. On average Spain spent per year EUR 1.7 billion in port infrastructure, Italy EUR 1.1 billion, Germany EUR 0.7 billion, and France EUR 0.3 billion.



Potential synergies of port cooperation

Figure 7: Highest total investments in seaport infrastructure between 1998 – 2013 per country in Europe

Reference: OECD, 2016a; OECD, 2016c

Infrastructure maintenance costs in European ports, the spending on preservation of the existing transport network, is also provided by the OECD (OECD, 2016b). Italy's expenditure financed by public administrations showed to be exceptional high compared to other European ports varying between EUR 0.9 billion in 1999 and EUR 3.1 billion in 2004; followed by the Belgian public port administrations' spending of about EUR 0.1 billion per year. These figures of public investment do neither represent quality nor performance of the transport system. They are an indication of the relevance of the port sector in a special country at a certain point in time. Investment volumes show the need to search for alternative finance options which are not necessarily coupled to revenue but to public services. In order to at least evaluate a snapshot of public and private investments (incl. potential savings) and to demonstrate the financial and legal frameworks, the Port of Hamburg may guide the analysis. Hamburg Port Authority (HPA), a German public law institution, is a representative of the common landlord port model. In 2014 according to the HPA's financial report (HPA, 2014) revenue of some EUR 176 million was generated mainly by:

- Rental incomes for port areas (37%; EUR 66 million), port dues (29%; EUR 51 million),
- Port railway income (12%; EUR 21 million), and rental income for quays (10%; EUR 17 million).

On the opposite, major expenditures of the HPA in 2014 were:

- Port expansion measures (EUR -188 million) (HPA, 2015),
- Material cost (EUR -158 million), and Personnel cost (EUR -109 million) (HPA, 2014).

In 2015 a total of about EUR 227 million (Mercator Media, 2016) was spent for port infrastructure development and maintenance, thereof, 2/3 for publicly financed general infrastructure and 1/3 for user-specific infrastructure (HPA, 2014). Till 2009 the port authority relied on public funds for infrastructure investments and for maintenance projects. From 2009 to 2015 revenues generated from the initial public offering in 2007 were exploited. After this private money budget is depleted and again public funds are required to fill the gap between revenues and costs.

Next, infrastructure investment volumes are selectively compared to suprastructure investment in the port of Hamburg with its' 21 cargo terminals – 4 container, 6 multi-purpose, 11 bulk - with about 15 different terminal operators and supplemented by 3 cruise centers offering services to shipping lines or other customers.³ HHLA is one major (container) terminal operator in Hamburg. The companies' shareholders are the Free and Hanseatic City Hamburg (68%), and institutional and retail investors. In comparison to the total port expansion measures of the port authority in 2014 of some EUR 188 million, HHLA's capital expenditure of EUR 138 million in 2014 focused on extending the Hamburg container terminals, expanding intermodal transport capacity and developing existing properties (HHLA, 2015). This shows that investment volumes in port suprastructure overtaken by only one public-private institution can already be similar in scale to the authority's expenditures in total port infrastructure development.

Other recent examples which provide a "Feeling" of the financial scope and funding structures in the port infrastructure environment are:

- The Kieldrecht Lock in Antwerp with an investment of EUR 382 million opened in June 2016 relying on an investment of both the Government of Flanders (~75% of investment volume) and the Port Authority of Antwerp (Kable, 2016). Through the TEN-T program the European Commission also granted a subsidy of EUR 5 million. The European Investment Bank and KBC Bank provided EUR 161 million and EUR 71 million respectively (Kable, 2016).
- The National Port Authority of Spain (PdeIE) published plans to invest a total of EUR 864 million in port development in the country in 2015 to improve security installations, buildings, IT, telecommunications, port access and infrastructure (Port Finance International, 2015).
- The private company PD Ports' invested until 2016 £ 35 million (~ EUR 46 million) in the newly redeveloped quay at Teesport (Port Finance International, 2016).

All in all, in Europe port infrastructure investment volumes vary in a range between about EUR 40 million to EUR 900 million, and spending of EUR 200 million for a single project is not uncommon.

³ 4 container terminals: HHLA Container Terminal Burchardkai, HHLA Container Terminal Tollerort, HHLA Container Terminal Altenwerder, EUROGATE. 6 multi-purpose terminals: Wallmann & Co., O'Swaldkai operated by UNIKAI, HHLA Frucht- und Kühlzentrum, C. Steinweg (Süd-West Terminal), Buss Hansa Terminal (until 2016), Dradenau Terminal operated by Rhenus Midgard Hamburg. 11 bulk cargo terminals: Vattenfall Kraftwerk Moorburg, Kalikai operated by K+S Transport, G.T.H. Getreide Terminal Hamburg, Tank farm of Oiltanking Deutschland, Rhenus Midgard Hamburg, Vopak Dupeg Terminal, Louis Hagel, Buss Ross Terminal, Silo P. Kruse, ADM Silo Hamburg, Hansaport.

6.2 Hierarchy of port cooperation

Learning from already existing port cooperation initiatives, especially from the good practices in Malmö-Copenhagen, from Rheinports or Elbe Seaports, but also conceptualizing future cooperative scenarios a “Hierarchy of port cooperation” is proposed. According to this classification scheme the extent of cooperative tasks spans from marketing to joint ventures (see Figure 8).

The first basic commitment to cooperate is a cargo-oriented approach which includes joint marketing efforts, for instance, tasks include joint online presence and service promotion at trade fairs. Other cooperative tasks more comprehensive than this are maintenance of waterways and dredging of berths and sourcing of materials. Human resources departments work together in peak situations or to qualify the staff pool. Process planning and management including setting up supporting IT platforms foster a closer type of cooperation. The final and strongest type of port cooperation is a merger of two or several port authorities and the formation of a joint venture company with clear distribution of tasks and (eventually) revenues from cargo handling and storage. Other common tasks of a new joint venture company apart from cargo handling and storage are traffic management, port planning or infrastructure investment. These supporting activities generate a less comprehensive final form of cooperation.

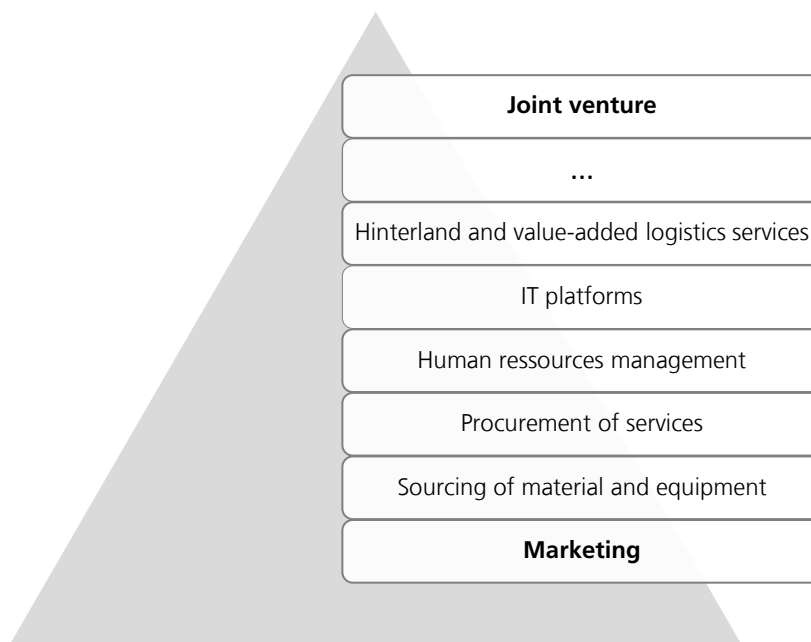


Figure 8: Hierarchy of port cooperation

6.3 Synergies of cooperation types

Synergies of port cooperation range from increasing the attractiveness for cargo throughput to strengthening the negotiation power confronted with carriers, politicians, or investors. Actors consider port cooperation as a valuable option to strengthen their individual competitive position if synergies are outperforming threats of opening up their business relationships. To save financial resources, cooperation offers the potential to speak with one voice in approaching investors and to reduce their investment risk by offering future oriented service concept.

During the process of considering possible cooperative tasks the role of ports in maritime supply chains always considers the fixed location. It is the shipping line or their customers who choose the port but not the port who chooses the carriers. Terminal operators as private companies are more flexible in their business outline by expanding to other locations through acquiring terminal concessions and foundation of terminal joint ventures. Therefore, port authorities and terminal operators profit from cooperation to different extents. Authorities' intentions have a strong link to public welfare generation and social benefit maximization, demonstrated by cooperative tasks which facilitate trade, but also reduce the environmental impact of shipping and port operation, and increase safety and security of port processes. Terminal operators' intentions are company specific but highly correlated with revenue generation and profit maximization by increasing the number of liner carrier services calling and the total throughput volumes.

The two options representing possible port cooperation scenarios show an interest in highlighting advantages for both port authorities and terminal operators. "Marketing+" represents an extendable basis pursued mainly by port authorities. Joint marketing efforts could be adjusted to more common tasks, such as joint purchasing or IT platforms up to a point were foundation of a "Joint venture" company is the ultimate possibility form of cooperation bringing together several terminal operating companies.

6.3.1 Marketing+

Port cooperation takes place between ports acting as independent commercial entities. This is possible without bigger structural changes. Port authorities represent one or just a few port locations. Their geographical position is considered as fixed. The authority is responsible for sovereign tasks and public welfare generation with financial but also non-financial goals. Main customers are the terminal operating companies renting land space or hinterland operating companies using the port's rail infrastructure. Indirect customers are liner carriers with ships calling at the port. Business relationships are long-term and port authorities do not compete directly with each other. In its basic form, the impact of cooperation is low but after a fundamental agreement on partnering could be reached joint marketing tasks are relatively easy to accomplish.

If the joint undertaking proofs to be beneficial cooperative actions are enlarged by other joint tasks. No longer only port authorities but also terminal operating companies may be involved. Therewith, requirements on extent and effort of additional tasks considerably increase, such as joint IT platform provision and maintenance. Exemplary, the process of fostering port cooperation between the commercial entities of the RheinPorts partner ports and acquisition of funds across for the joint IT system spanned several years. Or the commitment of the two terminal operating companies in Hamburg to cooperate in vessel traffic management went through several stages. First, a loose project was initiated in 2004 to coordinate feeder traffic. In 2015 the previous types of cooperation were replaced by the formation of a joint venture company between the terminal operators HHLA (67%) and Eurogate (33%) leading to the "HVCC Hamburg Vessel Coordination Center GmbH" responsible for comprehensive vessel traffic management on the river Elbe and within the port area (HVCC, 2016).

6.3.1.1 Main port actors involved and their cooperative tasks

As a start, cooperative agreements promote the attractiveness for cargo throughput and intensify trade links as well as personnel relations. Strategic commitments not necessarily on an international but also local level are operationalized by regular bilateral meetings and agreements on information exchange. Strategy development but also an outline of communication plans supports informing market players and the

public about the port authorities' activities. Besides, the negotiation power for local port interests confronted with politicians and investors increases as two (or more) different port locations represent their joint assets, for instance, independently and functionally managed land usage is of benefit for sustainable port development by offering available compensation areas. An overview of possible cooperative tasks is provided by Figure 9 and demonstrates the sovereign but also commercial tasks of the participating ports comprising the functional areas strategy development activities, marketing and PR, port and investment planning, commercial department, engineering, human resources, environmental protection and IT.

<p>Strategy development</p> <ul style="list-style-type: none"> ▪ Undertake strategy workshops ▪ Develop strategy plans 	<p>Marketing and PR</p> <ul style="list-style-type: none"> ▪ Communication strategy development ▪ Locational marketing ▪ Website maintenance ▪ Organize fairs ▪ Delegation visits 	<p>Port and investment planning</p> <ul style="list-style-type: none"> ▪ Lobbying ▪ Application for funds
<p>Commercial department</p> <ul style="list-style-type: none"> ▪ Sourcing ▪ Controlling 	<p>Engineering</p> <ul style="list-style-type: none"> ▪ Construction ▪ Port development 	<p>Human resources</p> <ul style="list-style-type: none"> ▪ Know-how/personal transfer ▪ Education ▪ Participation in call for proposals/in research projects
<p>Environmental protection</p> <ul style="list-style-type: none"> ▪ Offer compensation areas ▪ Public information 	<p>IT</p> <ul style="list-style-type: none"> ▪ Dedicated software development ▪ Establish information exchange platforms 	<p>Traffic management</p> <ul style="list-style-type: none"> ▪ Sharing data on ship arrivals/departures ▪ Coordination of nautical accessibility

Figure 9: Possible cooperative tasks of Marketing+

6.3.1.2 Good practices in place

Elbe Seaports and RheinPorts are examples of coopetition of ports in proximity in Europe. Port authorities, business development organizations and a private terminal operator agreed on marketing of services enriched by sourcing of services communicated by Elbe Seaports, and traffic management for efficient use of resources, joint IT system incl. traffic information exchange, and area allocation pursued by RheinPorts.

6.3.1.3 Possible limitations

Cargo handling and storage remains in the hand of private terminal operators, and therewith, the decision on most tariffs and charges. As long as port dues remain individually negotiable or individually publicized this economic activity of the port authority is not governed by cartel law. Cooperative tasks only cover the sovereign activities of the port authorities that are relevant to the infrastructure system and safety at the port. Attention needs to be drawn if activities refer to building, maintenance as well as the operation of infrastructure and if the provision of goods and services at different port locations becomes similar instead of competitive. RheinPorts

demonstrates a special case as terminal operating companies in three different countries (with one of them outside of the EU) are involved.

6.3.1.4 Impact on infrastructure investment savings

The impact of infrastructure savings is driven by the extent of possible know-how transfer in engineering and education supported by pooling of equipment and personnel in construction and maintenance projects. Compared to the overall investment costs, joint activities have only a marginal impact. One major opportunity is the chance to gain access to large infrastructure funds as joint partners. The European Commission launched the new "Connecting Europe Facility" a program dedicated to infrastructure funding for the period 2014-2020. Previously, the European Commission provided EUR 485 million in grants to port projects since 2007 (European Commission, 2014a). 89 port projects in 17 countries were supported leading to an average of EUR 5.5 million per project. Example for successful funding is the Kieldrecht Lock in Antwerp where the European Commission granted a subsidy of EUR 5 million.

Additional opportunity of cooperative tasks is the chance to gain access to appropriate funding through joint participation in research projects. Research projects enable the participating companies to acquire knowledge for technological improvement of available and planned infrastructure. The current EU research and innovation program "Horizon 2020" with funding available over 7 years (2014 to 2020) took over the "7th Framework Program" (2007 to 2013) which provided a total of EUR 757 million for transport research projects (European Commission, 2015a). Especially, on the basis of the annual and multiannual work programs, the European Commission launches calls for proposals for project applications for EU grant support where port cooperation initiatives could step in. Starting in 2017 the new call for Horizon 2020 dealing with port innovations named "The port of the future" offers chances for cooperating consortium partners. The EU considers that proposals will be funded which request a contribution of between EUR 3 to 5 million each for research and innovation actions, and up to EUR 1 million for coordination and support actions (European Commission, 2016). Based on previous EU project experience, anticipated funding volume per project and partner is ranging between EUR 100,000 to EUR 150,000.

6.3.2 Joint venture

Supported by the conclusions of Song (2002) - who highlights a joint venture of terminal operators as main cooperative strategy for the ports of Hong Kong and Yantian - it is recommended that ports focus on their individual strengths and weaknesses and segment their service offerings in order to attract new customers. Port cooperation takes place between publicly state or municipality owned port authorities operating in a commercially oriented manner and complying with normal commercial law and one or several private port terminal operators by foundation of a joint venture company. This is the closest form of cooperation and it can be argued the term "Integration" describes the concept adequately. Revenues generated by cargo handling are jointly distributed according to the underlying legal arrangement. This type of cooperation requires fundamental structural changes of the port governance and is not easy to accomplish without a strong economic and societal necessity. Sovereign tasks are supplemented by commercial tasks with clear financial goals. If the joint venture company engages in cargo handling activities revenues are shared and cooperating partners both bear the risk of infrastructure and suprastructure investments. Main customers (or beneficiaries in terms of traffic management) are the liner carriers and commercial tenants and competition between other port locations is fierce. The impact of cooperation is very high. Cooperative tasks span from cargo handling and storage, renting of terminal area, infrastructure and suprastructure investment to traffic management, marketing and strategic port planning. Possible benefits for the joint

venture partners are efficiency increases in port handling and increase of international competitiveness. Exemplary, a terminal joint venture company has been established in 2016 in Japan to run the Yokohama container operations (Masaki, 2016).

6.3.2.1 Main port actors involved and their cooperative tasks

In the final form, the joint venture company overtaking cargo handling and storage represents two (or more) publicly state or municipality owned port authorities operating in a commercially oriented manner and one or several private port terminal operators. All port governance functions are merged in the new organization. Then, cooperative tasks are comprehensive and center on shared revenues, decisions on tariffs and charges, improvement of service and productivity rates, or increase of attractiveness for cargo throughput. All commercial departments fulfil the sovereign and commercial tasks. Especially, coordination of hinterland transport flows and improvement of interfaces to the terminal processes are of increased relevance. Value added logistics services enlarge the ports' service portfolio. Figure 10 provides an overview of possible cooperative tasks, whereas, the previously stated functional areas of the marketing+ option are enlarged by cargo handling and storage, hinterland transport, and all other commercial departments.

<p>Cargo handling and storage</p> <ul style="list-style-type: none"> ▪ Shared revenues ▪ Decision on tariffs and charges ▪ Increase attractiveness for cargo throughput ▪ Increase influence on global logistics chains 	<p>Traffic management</p> <ul style="list-style-type: none"> ▪ Sharing data on ship arrivals/departures ▪ Coordination of nautical accessibility 	
<p>Port and investment planning</p> <ul style="list-style-type: none"> ▪ Lobbying ▪ Application for funds ▪ Shared investment risk ▪ Shared investments in infrastructure ▪ Shared investment in suprastructure 	<p>Strategy development</p> <ul style="list-style-type: none"> ▪ Undertake strategy workshops ▪ Develop strategy plans ▪ International expansion ▪ Lobbying 	<p>Hinterland transport</p> <ul style="list-style-type: none"> ▪ Coordination of transport flows ▪ Improvement of hinterland process efficiency ▪ Offering value added logistics services
<p>Marketing and PR</p> <ul style="list-style-type: none"> ▪ Communication strategy development ▪ Locational marketing ▪ Website maintenance ▪ Organize fairs ▪ Delegation visits 	<p>All commercial departments</p> <ul style="list-style-type: none"> ▪ Sourcing ▪ Controlling ▪ ... 	<p>Engineering</p> <ul style="list-style-type: none"> ▪ Construction ▪ Port development
<p>Human resources</p> <ul style="list-style-type: none"> ▪ Know-how/personal transfer ▪ Education ▪ Participation in call for proposals/in research projects 	<p>IT</p> <ul style="list-style-type: none"> ▪ Dedicated software development ▪ Establish information exchange platforms 	<p>Environmental protection</p> <ul style="list-style-type: none"> ▪ Offer compensation areas ▪ Public information

Figure 10: Possible cooperative tasks of a Joint venture

6.3.2.2 Good practices in place

Malmö-Copenhagen and the ports of Kotka and Hamina are comparably rare examples of the final form of cooperation between seaport locations in Europe. Port authorities and terminal operators integrate two ports into one joint venture company overtaking all port services. Next to the port authorities and terminal operators private shareholders participate in the new company structure. In the reference cases in Denmark, Sweden and Finland, especially, close geographical distance enables coordination of port areas and services. Another joint venture company overtaking fewer cooperative tasks is the previously introduced vessel traffic management joint venture between the two terminal operators in the port of Hamburg.

6.3.2.3 Possible limitations

The joint venture company is classified as commercial company and needs to compete with other terminal operators in cargo handling. Therewith, the joint venture is governed by cartel law. Although, sovereign activities do not need to be proven by this legal base, classification of the activities might prove difficult. Benchmark projects in Europe are rare hindering a precise specification of beneficial cooperative arrangements that fulfil the requirement of not restricting the trade between member states in a noticeable way. High uncertainties towards possible benefits as well as unclear legal restrictions dealing with a precise distinction of port activities and responsible actors deter this type of cooperation. Prior to coming into force present legal frameworks are open for interpretation. Considerable planning effort has to be undertaken by future joint venture partners first and only then, final assessment of the joint undertaking is possible.

6.3.2.4 Impact on infrastructure investment savings

The impact on public infrastructure investment savings is considered to be considerably large. Investment projects could be better coordinated between locations. But acquiring public funding is strongly regulated by legal frameworks. Differentiating between sovereign and commercial tasks requests profound explanation. Private infrastructure investments in ports as demonstrated by the example of PD Ports' who invested ~ EUR 46 million in the redeveloped quay at Teesport (Port Finance International, 2016) are usually not supported by grants from the European Commission's infrastructure funds. The joint venture company may indeed, like other European terminal operating companies, apply for research funds supporting technical and processual improvement projects. Generally, the current EU research and innovation program Horizon 2020 and additional national funding programs are available – usually with a clear technological or social-economical background.

7 Conclusion

Heterogeneity of EU ports' governance structures and different understanding of port cooperation initiatives favor a lively discussion on the issue which does not necessarily consider true relationships between actors in the shipping business and responsibilities of port actors. Especially, a functional concentration on a hub and feeder port role or cooperation of export and import seaport and therewith, steering of transport flows according to origin and destination, is not only hindered by liner carriers responsibilities and their operating processes but it is also a legally restricted cooperative concept in the European port environment.

In the actual market situation the liner company decides which port to call in which sequence instead of policy makers, authorities and operating companies. Hinterland transport volumes generated by worldwide trade and economic prosperity of the member states heavily impact this choice. Authorities may indeed facilitate trade volumes between the locations and terminal operators are already active in projects dealing with improved utilization of seaside and landside infrastructure.

In this context, opportunities, challenges and limits of port cooperation linked to legal restrictions and to the European Union port policy have been elaborated. Discussion of differences between port governance structures, port actors' roles, and types of cooperation supported the final assessment of the proposed basic (marketing) and a more advanced form of port cooperation (joint venture). The study provides a comprehensive framework for port cooperation between European seaports. Finally, it is anticipated that the future lies with:

- 1) Port cooperation initiatives at regional level rather than on national level or EU level striving for mitigation of regional port competition. Policy makers' aims are to ease exogenous constraints within a (federal) state and to reducing the problems of competition between neighboring locations. Considerations on streamlining public investment contain functional and geographical advantages of port locations. Environmental interventions correspond to either technical know-how exchange and procurement in the process of infrastructure building and maintenance, surface equipment usage and on sensible solutions for the provision of land areas;
- 2) Cooperation of port authorities fulfilling their sovereign tasks by particularly agreeing on joint marketing of services and areas for the settlement of logistical activities. The basic cooperative tasks can be rapidly realized and enlarged on a mid-term scale. Anticipated positive effects include amongst others small-scale reduction of infrastructure planning, building and maintenance costs.
- 3) Cooperation of two (or more) terminal operating companies in proximity to maintain or improve services for the main customers - the liner carrier active in global alliances. Cooperation is a reaction on the threat of losing competitive advantage towards international locations which is higher than the risk of not generating direct financial benefits through foundation of a joint venture company. The new company does not overtake the key port services of cargo handling and storage. Instead it is considered as more likely that competing terminal operators engage in supporting activities such as traffic management or standardization of information exchange processes. Anticipated positive effects comprise a more efficient usage of existing port infra- and

suprastructures through sharing of equipment and flexible workforce allocation, and better streamline of traffic peaks through adapted performance rates seaside but also landside.

Conclusion

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- Figures on port locations base on maps provided by <http://d-maps.com>