



# Hinterland transportation in Europe: Combined transport versus road transport

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## ABSTRACT

The dominance of road for hinterland services could be challenged by using rail-road or waterway-road transport because of costs, congestion and growing environmental constraints. A common dynamic that is very favorable to the development of combined transport is shared among the actors of the transport chain but with different starting positions considering the ports of the Northern Range.

But combined transport must still demonstrate that it can compete with road transport. Road transport and combined transport are not directly comparable because they do not offer the same physical transport service. The organizational patterns of road and combined transport are investigated. The example of hinterland services to and from the port of Le Havre to the Paris region is a particularly interesting case because of the very short distance. It is shown that the competitiveness of combined transport in terms of price varies greatly according to the way road transport it competes with is organized and that the commercial policy of combined transport operators plays a key role for explaining this competitiveness. Additional services such as additional dwelling times and specific custom advantages are paramount of importance to encourage the shift from road transport to combined transport.

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## 1. Introduction

Containerization is one of the main backbones of globalization. In 50 years, it has totally transformed international freight distribution chains. A virtuous circle has been set up in which the use of ever-larger vessels, with its consequent large economies of scale and reduction in the cost per transported TEU, goes hand in hand with an increase in transported volumes (Cullinane and Khanna, 2000; Brooks, 2000).

Port hinterland services mostly rely on road transport in Europe. However, the enduring growth in port traffic is challenging the dominance of road for hinterland services because of costs, congestion and growing environmental constraints. For hinterland transportation high volumes are achieved by using rail-road or waterway-road transport. The ability of transport operators to attract freight from the hinterland at the lowest possible cost and with reliable and regular services is an essential condition for them to gain or maintain an advantage in a competitive environment. Consequently, ports that manage to be called by the largest container vessels and that are offering high volume inland services will reach the status of the major loading centre of their maritime

range; they are able to control a large hinterland (Hayuth, 1992; Heaver, 2002; Robinson, 2002; Panayides and Cullinane, 2002; Notteboom, 2004). The major ports could also be the result of a very strong local hinterland.

However, combined transport must still demonstrate that it can compete with road transport. The combined transport is an intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final legs carried out by road or as short as possible<sup>1</sup> (ECE, 2001). Certain conditions must be met for combined transport to be set up, such as the setting of waterway or rail infrastructure, sufficient volumes of geographically concentrated flows and the presence of transport integrators providing door-to-door services to shippers. In addition to these conditions, the intermodal option might be successful because of reliability and the possibility to massify flows. However, it can be argued that the price remains, quite often, the critical factor. These conditions will be looked over for the ports in the Northern European Range, with a particular focus on river services from the port of Le Havre to the Paris region. This case study, for which pricing data has been collected, is of particular interest as the position of Le Havre is much less favorable for the development of combined transport than for the other main ports along the Hamburg–Le Havre range. In fact, the port of Le Havre does not trigger

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<sup>1</sup> In comparison, intermodal transport is the movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes.

high volumes as Antwerp, Rotterdam or Hamburg. It is quite far from most of European dynamics regions. Only the Paris region leads important flows of containers. In this condition, barge-road and rail-road combined transport encounter difficulties to deliver frequent and cost effective services. In addition, the rail-road combined transport often lack at meeting the reliability standards of the customer.

In the first part of this paper, it is shown that a large number of actors in the different ports of the Northern European Range share a dynamic that is very favorable to the development of combined transport. However, conditions are very different from one port to the other, which means that the development of combined transport varies substantially. The organizational patterns of road and combined transport are then investigated. There are, in fact, two different transport services which are not immediately comparable. The example of inland shipping between the port of Le Havre and the Paris region will then be used to highlight the extent to which combined transport is competitive in terms of price and services compared with different organizational patterns of road transport.

## 2. A shared dynamic, different starting positions

### 2.1. Common issues

A shared dynamic, which is the outcome of several factors, leads to the use of combined waterway-road or rail-road transport for hinterland services from maritime ports. Although the benefits they derive differ, the various port stakeholders are all concerned about three issues promoting the use of combined transport: cost, traffic flow and the environment.

Three types of port stakeholders can be found. The first are economic agents, which are directly involved in organizing transport operations, including shippers, shipping lines, forwarders and freight handlers. The second are public authorities, which mainly consist of port management and various regional levels of decision-making from the State to the municipalities and including the regions. The third concerns community groups, which is most often expressed through the media or lobbying groups, in particular environmental associations, which represent social demands.

#### 2.1.1. Costs

Organizing a door-to-door combined transport chain requires freight handling at the maritime and inland terminals, rail or barge transport between those terminals and a pre- or post-haulage between the inland terminal and the shipper or logistics supplier. Combined transport partially extends inland the economies of scale that are achieved on the sea by very large vessels. Therefore, even if the organizational complexity of combined transport is greater than the one of road transport, the volumes handled by combined transport reduce costs on the inland transport leg. Double-stack unit trains in North America with a capacity of 400 TEUs are a salient example. In Europe, economies of scale are smaller as the largest block trains only have a capacity of 80–95 TEUs. On waterways the capacity of larger convoys partly depends on the quality of the infrastructure but it may take up to 500 TEUs on the Rhine. The costs of combined transport also depends on the length of rail or barge haul, pre- and post-road distance, balance of traffics, location of inland terminal (Niérat, 1997).

The costs of combined transport are only a part of broader logistics costs which include warehousing, stuffing/un-stuffing of containers, customs clearance and a forecast cost taking into account transit time and reliability. However, for FCL containers, shippers require services focused especially on door-to-door transport and thus, the inland transport, particularly combined transport, takes an important part of the door-to-door costs.

Consequently, the issue of inland transport costs primarily involves the economic agents such as shippers since they have a direct impact on their operations. Shippers are therefore interested in the development of combined transport as it can result in lower supply chain costs. It is also obviously in the interest of the transport organizers, like shipping lines or freight forwarders to provide their clients with transport services that are cheaper than the road, particularly because of the competition that exists between them. For a shipping line, lower costs on the inland transport leg should provide higher volumes, resulting in consolidation and higher margins on the inland transport leg. Organizing efficient combined transport services help shipping lines to attract volumes and to fill the vessels rather than to increase profits on the inland leg (Franc, 2007). In addition, with the emergence of global trade imbalance (Rodrigue and Notteboom, 2009b), the repositioning of empty containers has become a key challenge for liners owning or leasing containers. In these conditions combined transport is more than just a full container transport service.

Promoting combined transport is also in the interests of the port management as a means not only of extending port hinterland but also to secure its customer base from possible competition from other ports along the same maritime range. Combined transport can extend a port's hinterland, enabling it to compete with another port's immediate hinterland. The neighboring port will therefore respond by also promoting combined transport in its hinterland in order to protect its catchment area. Public opinion is sensitive to these arguments as preserving or increasing port activity means jobs.

#### 2.1.2. Traffic flow

Traffic flow refers not only to the congestion-free flow of containers within the port and the hinterland, but also added-value operations such as customs clearance that can be performed on the freight with minimal delay. Even if the port traffics tend to drop in 2009 due to the economic slowdown, most large ports have experienced a strong increase in container traffic during many years. Therefore, there is a risk for those ports to suffer from congestion problems, which threaten the reliability of the international transport chains within which they operate. There is danger risk for these ports that some of the traffic will be transferred to less congested secondary ports, as a result of what is known as the peripheral port challenge (Hayuth, 1981). By offering diversified transport supply and higher volumes than is possible by road, combined transport is one possible way of improving traffic volumes between the port and its hinterland (ECMT, 2006b). The issue of traffic flow is thus decisive not only for port managers but also for the public authorities as traffic flow is directly responsible for a share of a port's competitiveness (Notteboom and Winkelmanns, 2001).

Using combined transport can therefore be in the interest of shippers if it is more reliable, particularly for meeting the requirements of just-in-time transport operations. Traffic flow is also an important issue for carriers as the reliability of the services they provide to their clients depends on it.

The increasing container transport volumes handled in main seaports have put the issues of sea terminal and hinterland transport capacities and performances on the agenda of terminal operators. They have to deal with the storage of containers at the deep-sea terminal and they also need barge and train services to evacuate huge containers and reduce dwelling times. This explains why some port terminal operators are involved in developing "extended gates" (Slack, 1999; Rodrigue and Notteboom, 2009a,b).

#### 2.1.3. The environment

Transport is the only major sector of the economy that is responsible for an ever growing percentage of total CO<sub>2</sub> emissions

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