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Benchmarking of rail-port intermodal models of reference in Europe

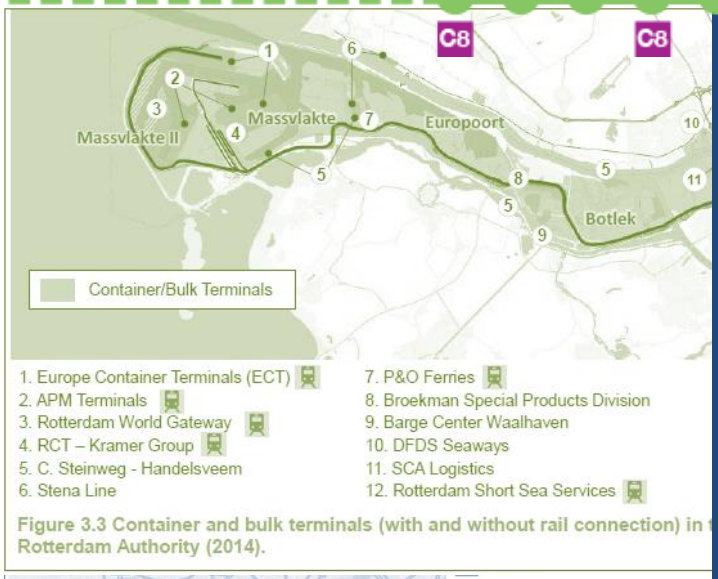


Figure 3.3 Container and bulk terminals (with and without rail connection) in t
Rotterdam Authority (2014).

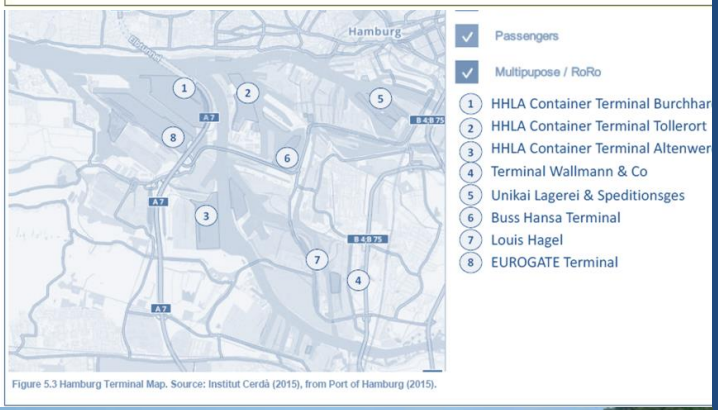


Figure 5.3 Hamburg Terminal Map. Source: Institut Cerdà (2015), from Port of Hamburg (2015).

EXECUTIVE SUMMARY

The objectives of this study are twofold: first, a benchmarking of how rail-port interfaces are managed in different European ports; and second, an analysis of experiences in which a mixed exploitation of high-speed lines has been proposed.

STUDY ELABORATED BY:
Institut Cerdà (2014)

CLYMA
THE GREEN LINE

DEVELOPMENT OF THE
CONNECTION
LYON-MADRID
ON THE MEDITERRANEAN
CORRIDOR

Co-financed by the European Union
Trans-European Transport Network (TEN-T)

1. Rail-Port intermodality business models

The aim of this section of the study is to offer an **overview of European rail-port models**, in order to extract relevant information about existing practices for rail transport management.

For this purpose, **the intermodal model of 8 ports of reference in Europe has been analysed**: Genoa and La Spezia, in Italy; Rotterdam and Amsterdam, in the Netherlands; Hamburg and Bremen, in Germany; and Antwerp and Zeebrugge in Belgium.

Two main objectives were pursued: the analysis of the business model (agents, rail traffic and ancillary services provided) and the study of the rules and regulations in rail-port operations.

The information **for each port has been gathered with the following main sections and content:**

General facts

Port traffic, terminal characteristics

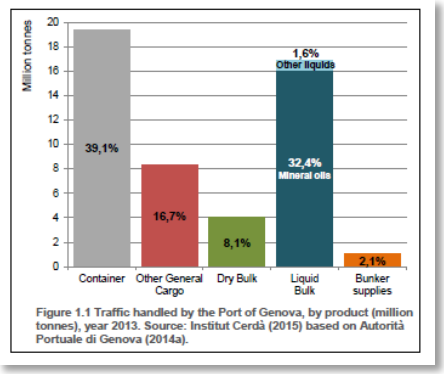


Figure 1.1 Traffic handled by the Port of Genova, by product (million tonnes), year 2013. Source: Institut Cerdà (2015) based on Autorità Portuale di Genova (2014a).

Port of Genova

The port of Genova is the **first Italian seaport in terms of total freight throughput** (49.5 Mt in 2013) and **the second in terms of container traffic in Italy** (1,988,013 TEU), after the port of Gioa Tauro.

The railway transport in the port of Genoa corresponds to a **14% of the modal share of the port traffic** with an average value of 37 daily couple trains arriving/departing to/from the port facilities . The **rail share for containerized cargo was 23.9%** in 2010

Port of Rotterdam

The Port of Rotterdam is the busiest port in Europe, with a total throughput of more than **12 MTEU**, 88 Mt of dry bulk and more than 200 Mt of liquid bulk in 2014, representing 444 Mt altogether and around 29,000 sea-going vessels arriving to the Port in 2014.

The modal split for containerized cargo is **35.7% inland waterways, 10.9% rail transport and 53.4% road transport.**

Port of Amsterdam

Amsterdam, Ijmuiden, Velsen, Beverwijk and Zaanstad are the 5 ports operated and managed by the Port of Amsterdam Authority. In 2013 they had **total throughput traffic of 95 Mt.** It is remarkable that **87 Mt** (91% of the total goods) **were bulk cargo**, 69% of which were refined products and coal, which defines the port strategy in this type of freight**.**

The rail modal share in all cargo is about 2-3%

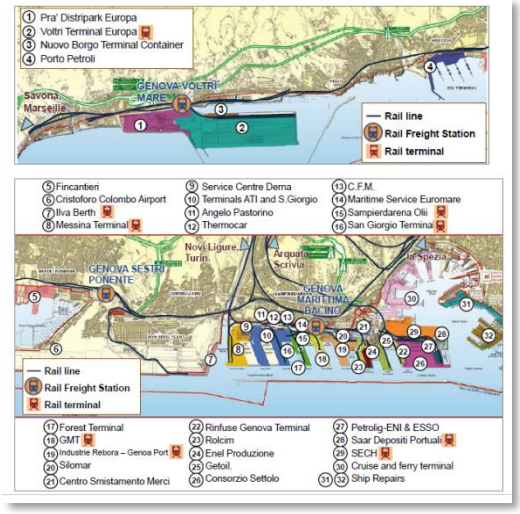
Port of Bremen

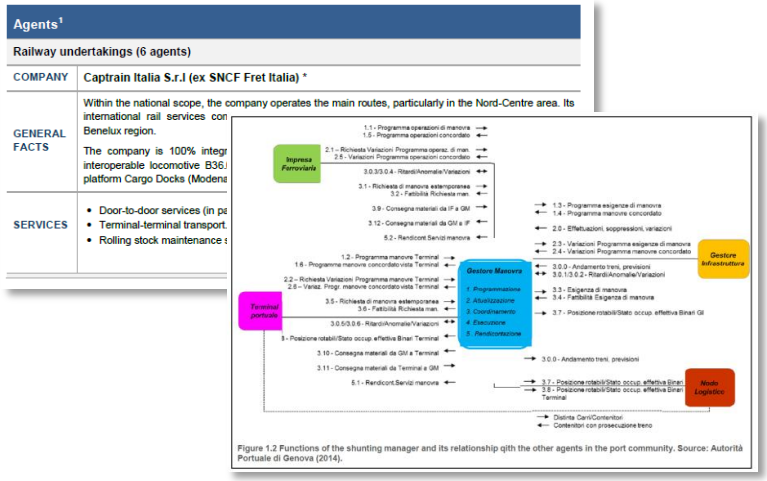
Consisting of two individual ports**, Bremerhaven and the port of Bremen are the fourth largest container port area in Europe**. Container traffic accounts for 76% of total traffic of Bremen ports in 2014, with almost 60 Mt transported. Bulk cargo (13%) and general cargo (10%) complete the traffic.

Regarding container hinterland traffic **the modal share of rail has risen constantly in the last ten years and amounted in 2013 to almost 47%** (1.05 M TEU)

Railway and port Intermodality

Rail terminals, railway infrastructure, agents and rail port regulations





Agents[1]

Railway undertakings (6 agents)

COMPANY	Captrain Italia S.r.l (ex SNCF Fret Italia) *
GENERAL FACTS	Within the national scope, the company operates the main routes, particularly in the Nord-Centre area. Its international rail services con Benelux region. The company is 100% integr interoperable locomotive B36 platform Cargo Docks (Modena
SERVICES	• Door-to-door services (in pa • Terminal-terminal transport. • Rolling stock maintenance s

Figure 1.2 Functions of the shunting manager and its relationship qith the other agents in the port community. Source: Autorità Portuale di Genova (2014).

Port of Hamburg

The Port of Hamburg is **the second largest container port in Europe and the third largest inland port in Germany**. In 2014, the **total cargo volume** in the Port of Hamburg amounted to **145.7M tn.** That included around **9.7M TEU.**

The Port of Hamburg leads the ranking of intermodal rail traffic development in the Northern Range ports, with about 2 M TEU transported in 2012, 36% of rail market share.

Port of Antwerp

The port of Antwerp is **the second European seaport in terms of international maritime freight volume (199 Mt in 2014),** and home of the largest integrated petrochemicals cluster in Europe. Container traffic accounts for the most important cargo type handled (54.4%)

Regarding the **modal split** in 2014 rail share accounted for **11% related to maritime cargo** (with a total volume of 191 Mt), for **7% related to container transport** (with a total volume of 8.6 million TEU) and for 2% related to industrial goods transport (with a total volume of 106 Mt)

Port of La Sapieza

The port of La Spezia consolidates as **the third Italian container port after Gioa Tauro and Genova**. The overall cargo traffic in the port of La Spezia was **15.7 Mt in 2014**, including the **handling of 1,303,017 TEU**.

The rail traffic in La Spezia accounts approximately 7.000 trains per year and currently **La Spezia Port presents the highest rail modal share among all Italian ports**, **matching a ratio of 35%**. In 2013, an overall volume of 295,663 TEU were transported via the rail mode, which meant a **22.7%** of the container traffic of the port.

Port of Zeebrugge

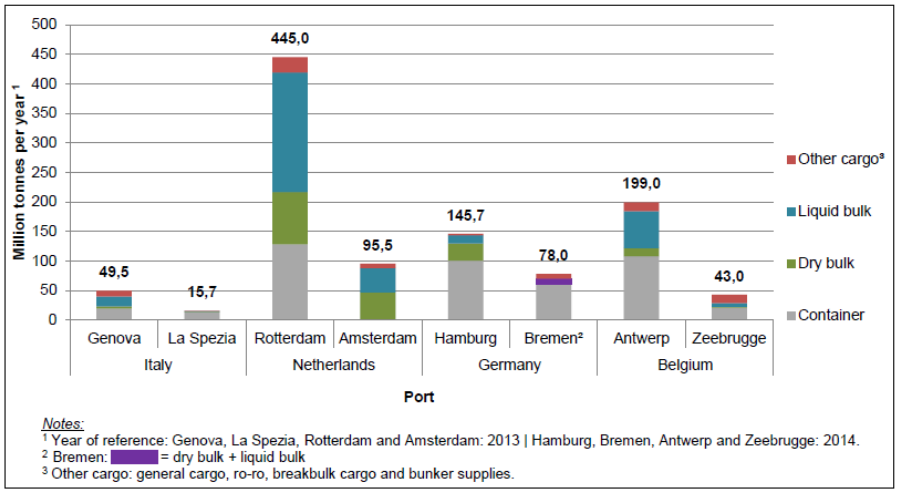
Zeebrugge is mainly a port for the **handling of unit loads (containers, trailers and new cars).** After a rise from 32 Mt since 2004 to a peak volume of 50 Mt in 2010 maritime traffic went down to **42 Mt in 2014. Main goods categories are containers amounting 48% in 2014.**

About 13% of goods were transported by rail

Conclusions

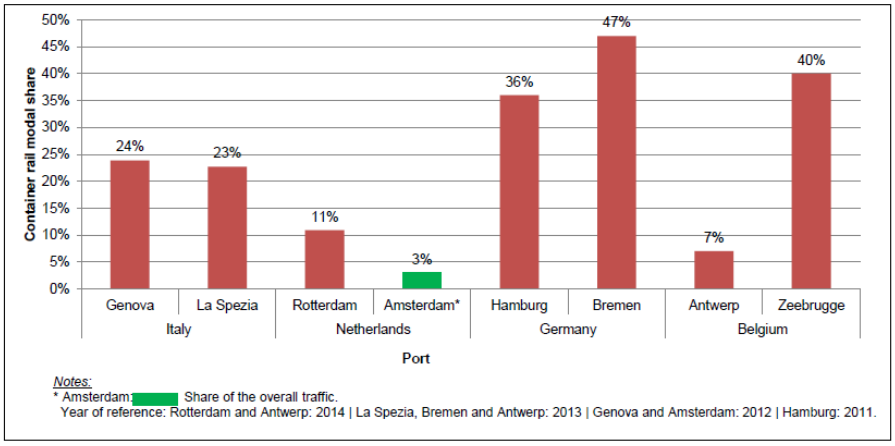
As a global conclusion, **it can be noted that the results of the analysis are diverse as it is the nature of traffic in the different ports**. Hamburg, Bremen and Rotterdam are the ports for which the most extensive information about internal procedure rules for rail operations has been found; Italian ports, although not having written regulations for the rail operations management, have a unique designated body responsible for rail services within the port domain, what makes that potential incidences or capacity problems are internalized by them. Thus, as can be observed in the following figures, there is not always a clear association between the ports' levels of traffic and the existence of a detailed set of regulations.

Figure 1 Port traffic overview for the 8 ports analysed in the present study, by type of product. Source: Institut Cerdà (2015) based on the respective port authorities' data.



Notes:
[1] Year of reference: Genova, La Spezia, Rotterdam and Amsterdam: 2013 | Hamburg, Bremen, Antwerp and Zeebrugge: 2014.
[2] Bremen: = dry bulk + liquid bulk
[3] Other cargo: general cargo, ro-ro, breakbulk cargo and bunker supplies.

Figure 2 Share of container rail traffic in the ports studied. Source: Institut Cerdà (2015) based on the respective port authorities' data.



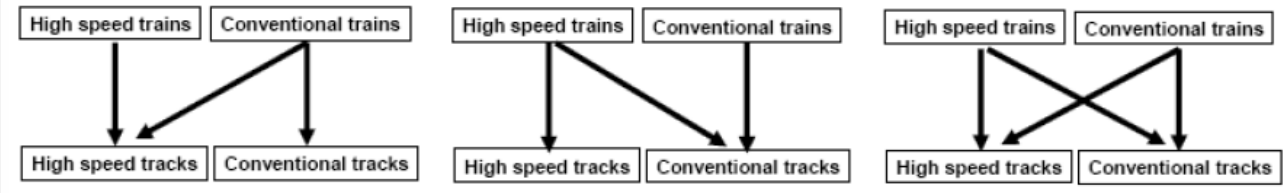
Notes:
* Amsterdam: Share of the overall traffic.
Year of reference: Rotterdam and Antwerp: 2014 | La Spezia, Bremen and Antwerp: 2013 | Genova and Amsterdam: 2012 | Hamburg: 2011.

Technologic interfaces for on-time exchange of information about rail operations are widely used in all the ports analysed, being the integration of the port's communication system with the national railway network one of the challenges to be achieved by some ports.

2. Mixed use of high-speed rail infrastructure for passengers and freight services

The aim of this section is to analyze whether there are lines designed for high-speed where freight services are currently being provided and to describe the main features of the freight services

There are several exploitation models, considering high-speed and conventional lines as well as high-speed and conventional services and possible combinations of such traffic on the network, which can lead to a mixed use of high-speed services and freight.

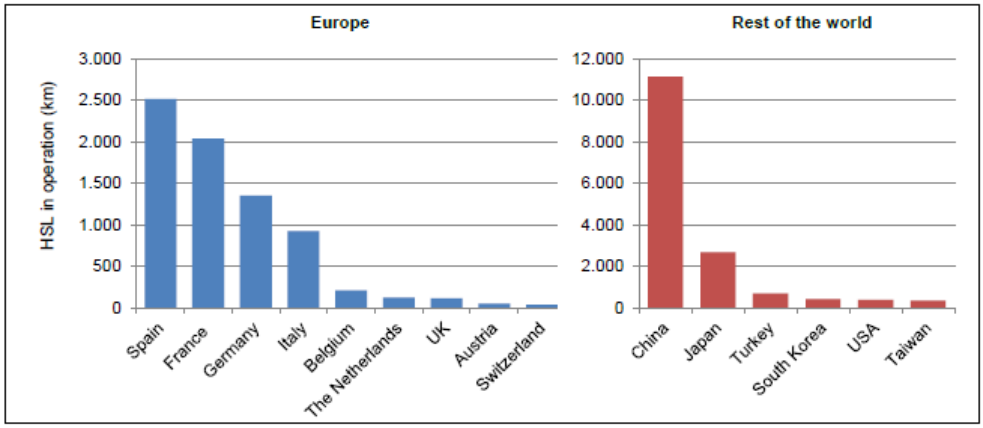


For the purpose of this study, the first and third options, those in which the mixed use of the infrastructure takes place in the HS line, has been analyzed.

The International Union of Railways (UIC) studied in the year 2001 the existing cases of high-speed lines exploitation with mixed traffic (López-Pita, 2001) and they are not aware of new sections opened since then with mixed exploitation of traffic (apart from the Barcelona-Figueres and TP-Ferro tunnel line).

European countries with experience in mixed operation of high-speed lines are Germany, France, Italy and Spain (with the abovementioned line). These four countries concentrate more than 90% of high-speed kilometers in Europe, a fact that explains why are precisely these 4 countries who faced concerns about broadening the scope of use of this infrastructure

High speed lines in operation in Europe and in the world (September 2014). Source: UIC (2014)



The study describes the experience of Germany, France and Italy, the three European countries, besides Spain, with a high-speed network envisaged to allow freight services.

Germany

The Network Statement 2015 for the German railway network shows that **it is possible to operate freight trains in the High-Speed Line Hanover-Würzburg and Manheim-Stuttgart**, provided that their gross weight is inferior to 1,600 t and that, independently of their speed, freight vehicles must be structurally designed to support the impact of other vehicles at 250 km/h.

Currently, mixed traffic operating on German HS lines is composed of two services for urgent freight transport (courier, express and parcel services), both being **operated at a maximum speed of 140 km/h.**

France

When the planning of new railway infrastructures in France was discussed, it was decided that **French high-speed lines would be designed to allow exclusively passengers' traffic.**

In spite of that, during the last 30 years La Poste (the French postal service) has carried freight in night trains. Goods transported were **parcels, junk mail and press** and, due to their low weight, the same trains used for passengers' services were adapted to La Poste requirement.

In June 2015, after many of service, **postal transport using the French high speed rail network is coming to an end**. The main reason which explains the change of the high speed for the combined freight is the **lack of critical mass of the high speed freight service**, as the customers demand for express mail has decreased by more than 50% since 2007. Therefore, **mixed traffic in France is not working any more due to economic feasibility reasons.**

Italy

The high speed network in Italy is theoretically practicable both by passengers and freight trains. Their technical characteristics have been designed to allow freight trains, even the heaviest and longest ones, to run on this network.

The decision of **designing high speed lines in order to permit freight trains' circulation was adopted due to financial reasons** during the economic analysis of the lines. These feasibility studies determined that the high speed network would not be profitable if it was not operated by considerable volumes of traffic

In practice, **freight trains have never run on Italian high-speed lines**. The reasons for this situation are rooted in the context of freight transport in Italy, where rail has minor relevance.

From the point of view of railway undertakings, and taking into account that freight rail traffic does not require speed but consistency and reliability, **the higher cost of the HSL charges is a clear disincentive for using the lines**. Finally, from an infrastructure manager perspective, channelling this traffic through the high-speed line would incur additional maintenance needs.

Conclusions regarding the mixed use of high-speed lines

The initiatives presented show that those countries which opted for building **HS lines with the technical characteristics to allow freight traffic**, did it so **mainly for economic reasons**, as freight trains' circulations in these lines during the night period would help to justify the great investment associated with a HSL without interfering with the passengers' traffic. France was the exception: being the high-speed network composed of new lines, separated from the conventional network, it was decided to build the high-speed network with parameters for passengers' services only (as the investment in lines for mixed traffic would significantly increase building costs) and thus reducing congestion in freight traffic through the released capacity in conventional lines .

With regard to the type of freight trains running on HSL, the following conclusions can be drawn:

- Freight services on high-speed lines are usually **limited to a very specific type of freight**: **urgent or high-priority goods (courier, express and parcel)**. Those are very light goods, which ensure less wear and tear to the tracks while making it possible to run at speeds considerably higher (140-160 km/h) than on conventional lines.

- Experiences with **heavier trains were not successful** due to several factors: on the one hand , the need of using **wagons with special characteristics** made the services too expensive, on the other hand, not urgent deliveries demand reliability instead of speed and the **higher charges of HSL** compared to the conventional ones difficult the profitability of the services. Besides, the **restriction of services to the night period** can add logistical difficulties

- Postal services on the French high-speed network have recently been supressed due to their **low overall profitability** resulting from a sharp decline in the demand for express mail.

The analysis of this experiences show that the existing HSL with technical characteristics allowing freight traffic have never been used for significant rail transport.

The freight services operated in the HSL in Germany and France are specialised in parcel, courier and press, run only during the night-time and are operated with high-speed trains; thus no massive freight transport, such as the expected in the Mediterranean Corridor, is operating on high-speed lines these days.

The co-existence of high-speed passengers and conventional freight traffics in the UIC line from Barcelona to Le Soler makes it the only line with mixed exploitation in the world.

CLYMA project consists of the implementation of the corridor approach to a section of the **Mediterranean corridor**, concretely to the Western part of the corridor and specifically to the Lyon-Madrid Axis.

The project comprises of studies and actions on the organization and optimal implementation of the **TEN-T network**, taking into account long term perspectives, environmental aspects and associated needs, as well as studies that promote environmental sustainability, resource efficiency and low-carbon transport within an integrated transport concept. This should stimulate the deployment of the **Green Corridor concept.** The project also intends to develop a **managerial structure** for the intermodal corridor.

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